Sharad Pawar Dental College and Hospital, Sawangi (Meghe), Wardha Department of Oral Medicine and Radiology

"PSYCHOSOCIAL AND SOCIOECONOMIC RISK FACTORS OF ORAL SQUAMOUS CELL CARCINOMA AND THEIR ASSOCIATION WITH DELAY IN DIAGNOSIS IN RURAL AREA."

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DECLARATION BY THE CANDIDATE

I, hereby declare that this thesis **"Psychosocial and Socioeconomic Risk Factors of Oral Squamous Cell Carcinoma and their Association with Delay in Diagnosis in Rural Area."** is a bonafide and genuine PhD research work carried out by me under the guidance of **Dr. Rahul R. Bhowate** Professor& Head, Department of Oral Medicine and Radiology.

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This is to certify that the work embodied in this thesis for the degree of Doctor of Philosophy (Medicine and Radiology) of Datta Meghe Institute of Medical Sciences (Deemed University), Nagpur, *entitled* **"Psychosocial and Socioeconomic Risk Factors of Oral Squamous Cell Carcinoma and their Association with Delay in Diagnosis in Rural Area,"** *was undertaken by* **Dr. Vidya K. Lohe** and *was* carried out in the Department of Oral Medicine and Radiology, Sharad Pawar Dental College and Hospital, Sawangi (Meghe), Wardha, under my guidance and direct supervision to my satisfaction.

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-Vidya K. Lohe

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INTRODUCTION

Cancer is one of the major causes of mortality and morbidity in the world. In developed countries cancer is the second most common cause of death. According to the World Health Report 2004, cancer accounted for 7.1 million deaths in 2003 and it is estimated that the overall number of new cases will rise by 50% in the next 20 years. [1]

Cancer is a generic term for all malignant neoplasms that can affect any part of the body. The term "oral cancer" is used in the restricted sense to describe squamous cell carcinoma and its variant, verrucous carcinoma. Oral cancer accounts for about 3-4% of all cancers. Of all oral cancers, 96% are carcinomas and 4% are sarcomas. The most common type of oral cancer is Oral Squamous Cell Carcinoma (OSCC), constituting about 90% of oral malignancies, and it may be defined as "An invasive epithelial neoplasm with varying degrees of squamous differentiation and a propensity to early and extensive lymph node metastases, occurring predominantly in tobacco and alcohol using adults in the 5th and 6th decades of life".[2] The remaining 10% are malignant intraoral salivary gland tumors, malignant melanomas, sarcomas of the jaws and soft tissues (including Kaposi sarcoma) and non-Hodgkin lymphomas. Incidence rates for oral cancer vary in males from 1 to 10 cases per 100,000 populations in many countries.[3]

Oral cancer arises from keratinocyte mutations. The cell of origin of OSCC is the oral keratinocyte. OSCC, as any cancer, is caused by DNA mutation, often spontaneous but increased by exposure to any of a range of mutagens – chemical, physical or microbial. The various changes in the DNA can progress from a normal keratinocyte to a pre-malignant or a potentially malignant keratinocyte that is characterized by an ability to proliferate in a less-controlled fashion than normal. The cells become autonomous and a true cancer results. [4]

The etiology of oral cancer is multi-factorial. Several risk factors are apparently associated with an increased incidence of oral cancer but tobacco and alcohol are two of the most important risk factors for development of oral cancer. Some of these risk factors are well established and generally acknowledged; others are relatively controversial. The patient factors, especially age, sex, and family history appear to be extremely significant determinants in the development of oral cancer. Many factors are related to lifestyle but environment and genetics may also play roles. More

emphasis has been directed towards the regular risk factors than the combined influence of socio-economic and psychological risk factors in dealing with oral cancer. Prevention, if possible, involves identification of population at risk on the basis of their habit, psychosocial and socio-economical status (SES) and recognition and management of established precancerous lesions.

Psychosocial and Socioeconomic risk factors of oral squamous cell carcinoma

Psychosocial factors are beliefs and social circumstances that influence the patient's cognitive interpretation of symptoms of disease.[5] Psychosocial risk factors are important since they can be sources of stress. Today, stress has become part and parcel of life. People encounter stress from multiple sources in their day to day life.

Increased levels of cortisol and adrenaline that occur when stressful stimuli are prolonged can result in deregulation of the immune system, leading to increased susceptibility of disease.

The psychological stress perspective emphasizes person's subjective evaluations of their ability to cope with demands presented to them by certain situations and experiences. [6]

The relationship between stress and illness is complex. The susceptibility to stress varies from person to person. An event that causes an illness in a person may not cause illness in other person. Events must interact with a wide variety of background factors to manifest as an illness. Among the factors that influenced the susceptibility to stress are genetic vulnerability, coping style, type of personality and social support.[7] When the body tolerates stress and uses it to overcome lethargy or enhance performance, the stress is positive, healthy and challenging. Hans Selye, one of the pioneers of the modern study of stress, termed this eustress. Stress is positive when it forces us to adapt and thus to increase the strength of our adaptation mechanisms, warns us that we are not coping well and that a lifestyle change is warranted if we are to maintain optimal health.[8] Several studies have shown that chronic stress exerts a general immunosuppressive effect that suppresses or withholds the body's ability to initiate a prompt, efficient immune reaction.[9]

There is a positive correlation between stress and tobacco consumption.[10] A variety of clinical and mucosal conditions are associated with the habit of tobacco chewing

and smoking, and many of these carry a potential risk for development of oral cancer. Occupational stress that intensifies an increase in consumption of tobacco is a very important factor in precipitating or aggravating factor in potentially malignant disorder. [11, 12]

The disproportionately higher prevalence of oral cancer in India as one of the fifth leading cancer in either sex are related to the use of tobacco in various forms, consumption of alcohol and low socioeconomic condition related to poor hygiene, poor diet or infections of viral origin. [13] The most widespread form of tobacco is chewing tobacco with or without betel-quid and this has been demonstrated as a major risk factor for cancer of oral cavity. In countries where such habits were prevalent and had cultural importance in traditional and religious ceremonies, oral cancer was one of the most common cancers. [14]

One of the enduring problems of public health is why some populations are healthier than others. The answers to such apparently simple questions, although complex to formulate, are crucial in understanding oral diseases and how they might be eliminated or controlled through the development of appropriate public policies and programmes. A meta-analysis of 41 case-control studies across the globe has demonstrated that low socioeconomic status is an independent risk factor for oral cancer. [15] Nevertheless, socioeconomic factors have a well-known impact on lifestyle. Smoking and alcohol consumption are coping mechanisms in individuals with low socioeconomic status.[16]

Smoking[17] and alcohol consumption [18] have been reported as coping mechanisms for the stress associated with poverty or low socioeconomic status. So, in effect, socioeconomic circumstances may play a deeper role in the etiology of the disease being not only potentially a cause itself, but according to Rose G[19] as a ‘‘cause of the cause.’’ It has been suggested that low socioeconomic status, by all measures, potentially infers some form of ‘stresses. These stresses may come from a range of sources e.g., insecurity of work, unemployment, fear of crime, debt, low social capital and community cohesion.[20] The biological basis for the pathway between the stresses associated with low socioeconomic status, inequalities and cancer development is not entirely clear but emerging hypotheses include the ‘‘biological ageing’’ effects resulting from poor socioeconomic circumstances, [21] perhaps being mediated by telomere shortening. [22] Nevertheless the increased oral cancer risk associated with low

SES is significant and persistent and ultimately the greatest burden of oral cancer falls upon people from the most deprived communities.

Delay in diagnosis of oral squamous cell carcinoma

Early detection is also called secondary prevention. The programs for cancer control are based on the premise that the earlier cancer is diagnosed, the better the outcomes in terms of increased survival and reduced mortality. Extended period of delay to diagnosis following the onset of symptoms is hypothesized to provide an important explanation for diagnosis at an advanced stage. It is a reasonable assumption that a cancer's stage at diagnosis is partly a function of the length of time it had been developing prior to diagnosis, as neoplastic tumors are known to increase in size over time. Furthermore, early diagnosis would reduce the morbidity and mortality from oral cancer. Increased clinical suspicion and the introduction of diagnostic aids may help achieve earlier diagnosis. Evidence also suggests that an oral examination of high risk individuals may be a cost-effective screening strategy. [23]

Oral cancer is easily detected by seeing a lesion in the oral cavity; however 60% of patients with oral cancer have advanced cancer and may have delay in seeking medical advice. [24]The silent nature of oral lesions and delay in diagnosis are thought to be responsible for this high incidence of advanced-stage oral cancer.[25, 26] According to Gomez I et al[27] the probability that patients with delayed diagnosis present at an advanced stage tumor at the time of diagnosis is approximately 30% higher than for non-delayed diagnosis patients. Those patients presenting with advanced-stage cancers have a less chance of survival too.

There are a number of reasons why people do not visit clinicians soon after noticing symptoms. One of which is the financial barrier, moreover patients may have inadequate or incorrect knowledge to appropriately interpret the relevance of their symptoms to malignancy or possibly fail to seek help due to the fear of cancer or lack of faith in medical treatment. This may be called as the "patient delay" or "diagnostic delay". [28]

An understanding of the reasons for late stage diagnosis of head and neck cancer could assist in the design of interventions aimed at reducing the frequency of these disastrous events. Besides, it can help health authorities to implement effective programs to prevent oral cancer. In order to modify patients health behavior, thus

improving their vital prognosis and quality of life as well as reducing social inequalities regarding health, it seems essential to take into account not only patients representations concerning health but also the social, emotional and contextual determinants of their decisions and behavior. [29]

The patients presenting with advanced-stage cancers have a little chance of survival, and depending on the site, they often undergo disfiguring and socially isolating treatment. An understanding of the reasons for late stage diagnosis of head and neck cancer could assist in the design of interventions aimed at reducing the frequency of these catastrophic events.

Diagnostic delay refers to the total period of time from onset of symptoms to diagnosis. The diagnostic delay is generally divided into two phases: the period from the onset of symptoms to seeking of care (patient delay) and the excess period elapsed between first contact with health care professional and specialist consult(s) for definitive diagnosis (provider delay).[30] Patient delay can be expected to vary by the symptoms produced, with some symptoms eliciting a more urgent response by the patient. [31] Porta et al. describes the set of influences that can affect the length of the period from onset of symptoms to diagnosis, which include ‘‘behavior of the patient and attending physician, tumor biology and host-tumor interactions, the functioning of the health care system and socio-cultural norms.’’ [32]

The outcome of an initial professional consultation will depend on the medical or dental practitioner’s interpretation of the signs and symptoms being presented in conjunction with the patient’s medical history. The decision to initiate a more urgent referral will also depend on the type of symptom, the practitioner’s educational background and clinical experience. [30] Furthermore, early diagnosis would lessen mortality from oral cancer and quality of life. Increased clinical suspicion and determinants of patients delay may help accomplish earlier diagnosis by minimizing the causes for delay.

The maximum burden of oral cancer falls upon people from the most underprivileged communities but its relation to socioeconomic status has not been studied extensively and is poorly understood. Delayed reporting is a common problem in patients with low socioeconomic group and may be responsible for advanced stage disease.

Research Gap analysis and need of the study

There are multiple factors associated with the etiology of oral cancer. Although the several risk factors are associated with an increased incidence of oral cancer but tobacco and alcohol are two of most important risk factors. More emphasis has been directed towards the regular risk factors. The combined influence of psychosocial and socioeconomic risk factors has not been explored extensively. There is uncertainty and limited recognition of relationship between socioeconomic disparities and oral cancer. There is a need to quantitatively and qualitatively assess this association. Diagnostic delays contribute to a poor prognosis in oral cancer. Extended period of delay in diagnosis is hypothesized to provide an important explanation for diagnosis at an advanced stage. There are a number of reasons why people do not visit clinicians soon after noticing symptoms. The psychosocial and socioeconomic risk factors may explain why people do not visit clinicians immediately after becoming aware of symptoms. But research in this area is meager; background factors associated with delay have not been fully characterized.

Therefore the present study titled "Psychosocial and socioeconomic risk factors of Oral squamous cell carcinoma and their association with delay in diagnosis of Oral squamous cell carcinoma in rural area" was conducted.

AIM AND OBJECTIVES

RESEARCH QUESTION

Is there is an association of psychosocial and socioeconomic risk factors of oral squamous cell carcinoma with delay in diagnosis of oral squamous cell carcinoma?

RESEARCH HYPOTHESIS

Psychosocial and socioeconomic status risk factors of oral squamous cell carcinoma may be associated with delay in diagnosis of oral squamous cell carcinoma.

NULL HYPOTHESIS

There may not be association of psychosocial and socioeconomic risk factors of oral squamous cell carcinoma with delay in diagnosis of oral squamous cell carcinoma.

ALTERNATE HYPOTHESIS

There may be an association of psychosocial and socioeconomic risk factors of oral squamous cell carcinoma with delay in diagnosis of oral squamous cell carcinoma.

AIM

The present study was aimed to evaluate psychosocial and socioeconomic risk factors of oral squamous cell carcinoma and their association with delay in diagnosis in rural area.

OBJECTIVES:

1. To evaluate psychosocial risk factor of oral squamous cell carcinoma in rural area.
2. To evaluate socioeconomic risk factor of oral squamous cell carcinoma in rural area.
3. To evaluate primary, secondary, professional and total diagnostic delay in oral squamous cell carcinoma patients in rural area.
4. To evaluate association of psychosocial and socioeconomic risk factors with primary, secondary, professional and total diagnostic delay in oral squamous cell carcinoma patients in rural area.

Anticipated Translatory component

- The psychosocial and socioeconomic status may be significant risk factors of Oral squamous cell carcinoma.
- In general, the low income, illiteracy, manual occupation of farming, laborers, is more commonly associated with OSCC.
- The psychosocial and socioeconomic status may be a cause of major delay in diagnosis of oral squamous cell carcinoma.
- Primary /Patients delay constitutes major delay in diagnosis of Oral cancer.
- Professional delay is also partly responsible for delay in diagnosis
- Identifying the causes of patient and professional delays with appropriate interventions can help in limiting them.

REVIEW OF LITERATURE

Oral cancer not only accounts for significant mortality, but it is also responsible for extensive disfigurement, loss of function, behavioral changes, and financial and sociologic hardship. Prevention, if possible, involves identification of population at risk and recognition and management of established precancerous lesions. Reducing diagnostic delay to achieve earlier detection is a basis to improve survival. The greatest burden of oral cancer falls upon people from the most deprived communities but its relation to socio-economic status has not been studied extensively and is poorly understood. Conway and colleagues investigated components of socioeconomic status and their impact on the risk of head and neck cancers in a case–control study.[33]

There are multiple factors associated with the etiology of oral cancer. But tobacco, betel nut and alcohol are the most important risk factors for development of oral cancer. Some of these risk factors are well established and generally acknowledged; others are relatively controversial. Patient factors, especially age, sex, and family history appear to be extremely significant determinants in the development of oral cancer. Many factors related to lifestyle but environment and genetics may play roles.

The prevalence of oral cancers is high in Asian countries, especially in South and Southeast Asia. Asian distinct cultural practices such as betel-quid chewing, and varying patterns of tobacco and alcohol use are important risk factors that predispose to cancer of the oral cavity.[34]

Tobacco use by the least educated is in large measure practiced in ignorance of the health consequences, with belief in medicinal properties of tobacco *e.g.,* for cleaning teeth, for relieving toothache, for preventing constipation and relieving gastric complaints like gas and stomach acidity and a desire for a low cost source of pleasure and satisfaction. Tobacco users, because of their nicotine addiction, prefer spending a disproportionate amount of their meager income on tobacco products, often curtailing essential expenditures for food, healthcare and education for the family.[35]

A meta-analysis of 41 case-control studies across the globe has demonstrated that low SES is an independent risk factor for oral cancer.[15] It is worth investigating into possible correlations between patient delay and socioeconomic status since this has been shown to be important in delay seeking medical attention for other illnesses, and to worsen health outcomes. For example, there could be a link between lower socioeconomic class and greater psychosocial stressors, which has been shown to be positively correlated with delay. Therefore the present study was undertaken. [5]

Psychosocial and Socioeconomic risk factors of oral squamous cell carcinoma

Psychosocial factors are beliefs and social circumstances that influence the patient's cognitive interpretation of symptoms of disease.[5] Psychosocial risk factors are important since they can be sources of stress. Nowadays, stress has become part and parcel of everybody's life. People encounter stress from multiple sources in their day to day life. Increased levels of cortisol and adrenaline that occur when stressful stimuli are prolonged can result in deregulation of the immune system, leading to increased susceptibility of disease.

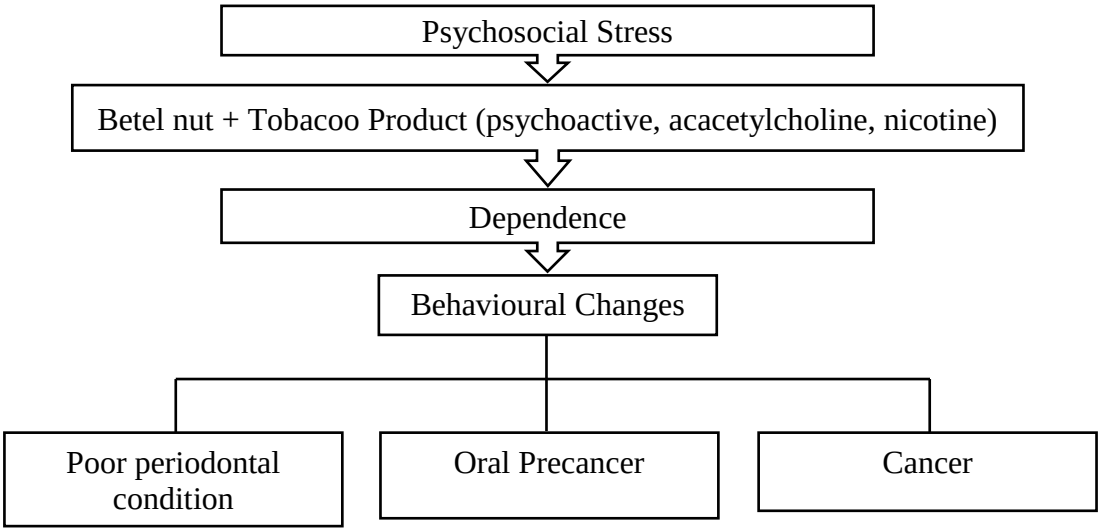


Fig. 1: Psychological stress oral cancer

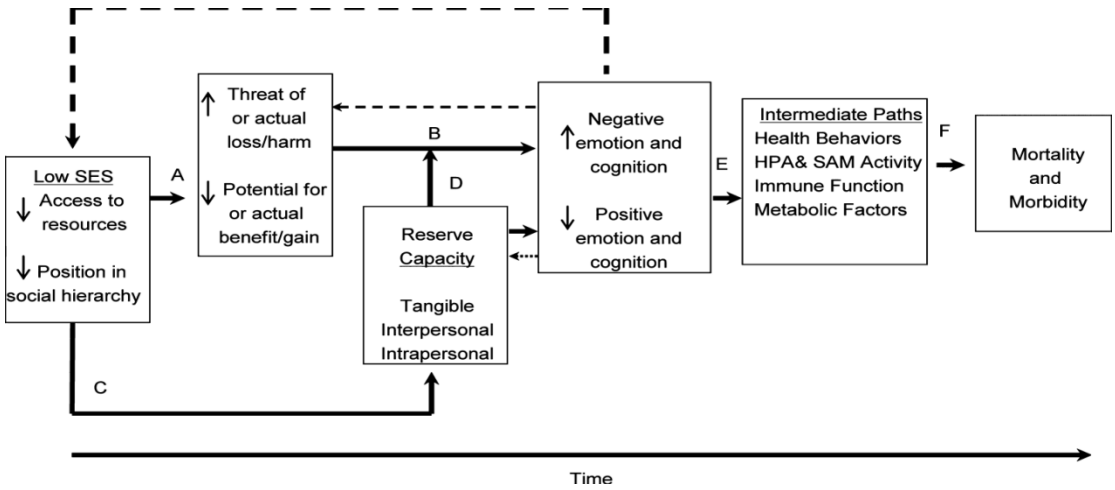


Figure 2. The reserve capacity model for the dynamic associations among environments of low socioeconomic status (SES), stressful experiences, psychosocial resources, emotion and cognition, and biological and behavioral pathways predicting morbidity and mortality over time.

[*Dashed lines* depict possible reciprocal influences. *Arrow A* depicts the direct influence of SES on exposure to stressful experiences. *Arrow B* indicates the direct impact of stressful experiences on

emotion and cognition. *Arrow E* shows the effects of stress on intermediate pathways hypothesized to affect health outcomes. *Arrow C* shows that socioeconomic environments condition and shape the bank of resources (*i.e.*, the reserve capacity) available to manage stress. *Arrow D* shows that the reserve capacity represents a potential moderator of the association between stress and cognitive–emotional factors. *Arrow E* indicates the direct impact of cognitive–emotional factors on intermediate pathways and *Arrow F* on intermediate pathways to illness and death. HPA: hypothalamic-pituitary-adrenocortical axis; SAM: sympathetic adrenal-medullary axis].[36]

The stressful life events, from the death of a loved one to the loss of a job, are linked to an increase in certain health problems, particularly heart disease, diabetes, and hypertension. Many people assume that stress leads to cancer as well. Evidence for this, however, is not clear. [36]

Faggiano F, Zanetti R, Costa G (1994)[37] investigated social differences in cancer incidence in Turin, Italy in 1985-87. It was a cancer incidence follow up study of the Turin population in relation to socioeconomic characteristics and was performed through record linkage between the 1981 census and the cancer registry. A case-control study nested in the cohort was analysed, where cases were subjects with a new diagnosis of cancer in 1985-87 and controls were a sample of the Turin population, frequency matched by sex and age group. Incidence odd ratios (ORs) were calculated for social classes (defined by education, housing tenure, and socioeconomic group) using a logistic regression model. The study population comprised subjects included in the 1981 Turin census (n approximately equal to 1,100,000) who were still alive, 20-69 years old, and were resident in Turin in the middle of study period. The analyses were based on 4215 male and 3451 female cases, and on 16,913 male and 13,838 female controls. They found that, compared with the highest educational level, the men in the lowest one showed an OR > 2 for respiratory cancers; OR = 1.48 for stomach cancer; and ORs < 0.7 for skin, colorectal, and prostate cancers. Women with a primary school education were protected against colorectal (OR = 0.71), skin (OR = 0.59), and breast cancer (OR = 0.66) compared with university degree women, but were at risk for cancer of the cervix (OR = 2.33) and stomach cancer (OR = 2.84). The association between educational level (primary school v university) and lung cancer risk is negative for men (OR = 2.47) and positive for women (OR = 0.62), while the association with housing tenure is negative for both sexes (OR = 1.44). According to them socioeconomic distribution of some risk factors (for example smoking, alcohol, and diet) in Italy can partially explain the differences in respiratory and digestive cancers. "Unbalanced" health promotion interventions, targeted at social

groups with the highest prevalence of risk factors, and national policies for increasing the level of education in the country may play an important role in reducing social differences in cancer risk.

Faggiano F, Partanen T, Kogevinas M, Boffetta P (1997)[38] accumulated data on the presence, magnitude and consistency of socioeconomic differentials in mortality and incidence of all malignant neoplasms and 24 individual types of neoplasms in 37 populations in 21 countries. More or less consistent excess risks in men in lower social strata were observed for all respiratory cancers (nose, larynx and lung) and cancers of the oral cavity and pharynx, oesophagus, stomach, and, with a number of exceptions, liver, as well as for all malignancies taken together. For women, low-class excesses were consistently encountered for cancers of the oesophagus, stomach, cervix uteri and, less consistently, liver. Men in higher social strata displayed excesses of colon and brain cancers and skin melanoma. In the two Latin American populations for which data were available, lung cancer was more frequent in higher social strata. Excesses in high female socioeconomic strata were seen in most populations for cancers of the colon, breast and ovary and for skin melanoma. Longitudinal data from England and Wales suggested widening over time of social class differences in men for all cancers combined and for cancers of the lung, larynx and stomach, and in women for all cancers combined and for cervical cancer.

Rahman M, Fukui T (2000)[39] studied bidi smoking and health stated that bidi, an age-old form of indigenous smoking is used widely by the people of lower socioeconomic status in India, Bangladesh, Nepal, Pakistan and other south Asian countries. It is made of about 0.2–0.5 g raw, dried and crushed tobacco flakes (naturally cured) rolled by hand in tendu leaf (Diospyrus mebunoxylon or Diospyrus ebenum) or white paper. Nicotine and tar content are higher in bidi than that of a cigarette.

Nancy E. Adler and Katherine Newman (2002)[40]: Socioeconomic status has traditionally been defined by education, income, and occupation. Each component provides different resources, displays different relationships to various health outcomes, and would be addressed by different policies. Education is perhaps the most basic SES component since it shapes future occupational opportunities and

earning potential. It also provides knowledge and life skills that allow better-educated persons to gain more ready access to information and resources to promote health. Income.In addition to providing means for purchasing health care, higher incomes can provide better nutrition, housing, schooling, and recreation. Occupation, occupational status is a more complex variable, and its measurement varies depending on one's theoretical perspective about the significance of various aspects of work life. One aspect is simply whether or not one is employed, since the employed have better health than the unemployed have.

Hashibe M et al (2003)[41] in their study "Socioeconomic status, lifestyle factors and oral premalignant lesions" stated that SES may affect a variety of lifestyle factors that alter the risk of oral cancer as well as oral premalignant lesions, including tobacco chewing, smoking and alcohol drinking. Subjects with low socioeconomic status may additionally have less fruit, vegetable and vitamin intake. They concluded that SES may be associated with oral premalignant lesions because of access to medical care, health related behaviors, living environment or psychosocial factors. Though the mechanism for the association is not clear, higher socioeconomic status index, education and income were associated with decreased risk of oral premalignant lesions in their study. Individuals with low income were more likely to chew tobacco, smoke cigarettes, drink alcohol, eat less fruits and vegetables, and have lower BMI. Similarly, the less educated had higher percentages of tobacco chewing, low fruit and vegetable intake and low BMI.

Rahman M, Sakamoto J, Fukui T (2003) [42], in their study, bidi smoking, oral cancer: a meta-analysis tried to project the relationship of bidi smoking with oral cancer and also that of cigarette smoking within the same population. They stated that, the results (bidi smoking significant whereas cigarette not) might reveal the following situations. First, overall toxicity, as measured by tar, nicotine, carbon monoxide, ammonia, hydrogen cyanide, other volatile phenols and carcinogenic hydrocarbons, benzaanthracine, benzapyrene and radioactive uranium, is higher in bidi smoke compared to cigarette. Bidi wrapper (tendu leaf) is less porous than cigarette paper and poor in combustibility, resulting in a higher intake of carbon monoxide, nicotine and tar. Second, bidi smokers are more habituated with chewing tobacco and betel quid than cigarette smokers. These two substances are also recognized as risk factors for oral

cancer. They might have accelerated the carcinogenic process. Third, because bidi smokers belong to lower socioeconomic strata of the society, inadequate oral hygiene might also play important role in this regard. These features collectively make bidi smokers more vulnerable to oral cancer than cigarette smokers. Odds ratio for both smokers (bidi, cigarette) could be explained by the following: they could be in a transition process to cigarette smoking from bidi smoking; thus they are away a bit from the toxicity of bidi either by a reduced number per day or by curtailed other high risk factors (tobacco and betel quid chewing, *etc*.). Bidi smokers account for 42% of the rural and 21% of the urban adult male population in India and 34% and 24%, respectively, in Bangladesh. Most of these people are the least privileged group of the society. Cessation of bidi smoking is therefore likely to prevent thousands of death from a variety of cancers as well as morbidity from various chronic conditions in this 'Have Not's group. Most of the bidi smokers are less educated and belong to economically disadvantaged group in the society. Moreover, they are not well reachable by mass media campaign. A campaign against all kinds of tobacco use through doctors, local health care workers, medicine shop-keepers, barefoot doctors and local community leaders could be more effective in the Indian subcontinent.

Hobdell MH, Oliveria ER, Bautista R, Myburgh NG, Lalloo R, et al. (2003)[43] investigated the relationship between socioeconomic status variables and oral health in an attempt to determine the association between social, economic and behavioral risk factors and the incidence of oral cancer among other oral health concerns. Their results described a marked gradient in oral diseases between the most highly and the least socio-economically developed countries and that there is an apparent association between oral cancer and the socioeconomic status variables. The results of their study provided evidence that "oral health policies which focus entirely on the genetic and biological determinants of health, leaving the social and societal determinants unaltered, are unlikely to be entirely successful at the level of population health."

Conway DI, Stockton DL,Warnakulasuriya KA, Ogden G, Macpherson LM. (2006)[44] studied the incidence of oral and oropharyngeal cancer in United Kingdom (1990–1999) for recent trends and regional variation. Their study was aimed to determine whether the incidence of oral cancer is continuing to rise in the United Kingdom and if this varies geographically? A descriptive epidemiological study of

oral cancer incidence in 12 United Kingdom cancer registries (1990-1999) was undertaken. Poisson regression models were employed to assess trends. There were 32,852 oral cancer cases registered (1990-1999). Statistically significant increases in incidence of 18% and 30% were seen in males and females respectively ($p<0.01$). The trend was observed in younger (<45 years) and older (45+ years) age groups ($p<0.01$) with 3.5% and 2.4% average annual increases respectively. These increases were consistent for the majority of regions in the older group. For the younger group the increases in incidence were more rapid and differed geographically. Incidence remains higher in men than women, in older compared with younger groups, and in northern regions.

Khandekar SP, Bagdey PS, Tiwari RR (2006)[45] conducted a hospital based Cross-sectional study on oral cancer and some epidemiological factors. Majority of the subjects included in the study belonged to 51-60 years age group. It was found that the 57 (71.3%) subjects consumed tobacco in the form of betel quid or khaini and 31 (63.3%) males were tobacco smokers in the form of cigarettes and bidis. Alveolus was the common site of oral cancer being present in 55% of the subjects. Histopathologically 22 cases were diagnosed as verrucous carcinoma, 27 cases as well differentiated squamous cell carcinoma, 16 cases as moderately differentiated squamous cell carcinoma and 15 cases as poorly differentiated squamous cell carcinoma, Most of the subjects belonged to lower middle and upper lower socio-economic scale according to modified Kuppuswamy's socio-economic scale. They concluded that, the low socioeconomic status may be a risk factor for poor oral hygiene thereby further increasing the risk of oral cancer in tobacco chewers.

Conway DI, Brewster DH, McKinney PA, Stark J, McMahon A, Macpherson LM (2007)[46] found that, there is uncertainty and limited recognition of the relationship between socioeconomic inequalities and oral cancer. They quantitatively assess the association between socioeconomic status and oral cancer incidence risk. A systematic review of case-control studies obtained published and unpublished estimates of the socioeconomic status risk related to oral cancer. Studies were included which reported odds ratios (ORs) and corresponding 95% CIs of oral cancer with respect to socioeconomic status, or if the estimates could be calculated or obtained. Meta-analyses were performed on subgroups: socioeconomic status

measure, age, sex, global region, and development level, time-period and lifestyle factor adjustments; while sensitivity analyses were conducted based on study methodological issues. Forty-one studies provided 15,344 cases and 33,852 controls which met our inclusion criteria. Compared with individuals who were in high SES strata, the pooled ORs for the risk of developing oral cancer were 1.85 (95%CI 1.60, 2.15; n = 37 studies) for those with low educational attainment; 1.84 (1.47, 2.31; n = 14) for those with low occupational social class; and 2.41 (1.59, 3.65; n = 5) for those with low income. Subgroup analyses showed that low socioeconomic status was significantly associated with increased oral cancer risk in high and lower income-countries, across the world, and remained when adjusting for potential behavioral confounders. Inequalities persist but are perhaps reducing over recent decades. Oral cancer risk associated with low socioeconomic status is significant and comparable to lifestyle risk factors. Their study provide evidence to steer health policy which focus on lifestyles factors toward an integrated approach incorporating measures designed to tackle the root causes of disadvantage.

Gupta PC Ray CS (2007)[35] attempted to illustrate the greater risk to adverse health outcomes among the less educated due to a greater prevalence of tobacco use among them. Numerous surveys worldwide and in India show a greater prevalence of tobacco use among the less educated and illiterate. They stated that, high tobacco use among the less educated and under privileged affects them in multiple ways: (*i*) Tobacco users in such households, because of their nicotine addiction, prefer spending a disproportionate amount of their meager income on tobacco products, often curtailing essential expenditures for food, healthcare and education for the family.(*ii*) Because of high tobacco use and other factors of disadvantage connected with low educational status, they suffer more from the diseases and other health impacts caused by tobacco. This higher morbidity results in high health care expenditures, which impoverish the family further. (*iii*) Premature death caused by tobacco use in this under- privileged section often takes away the major wage earner in the family, plunging it into even more hardship. Tobacco use is a terrible scourge particularly of the less educated, globally and in India. Tobacco use, education and health in a human population are inter-related in ways that make sufferings and deaths caused by tobacco use even more tragic than normally realized. Tobacco use works against social and economic development and should be appropriately addressed

through health education and tobacco cessation services particularly in the under privileged, illiterate population.

Conway DI, Petticrew M, Marlborough H, Berthiller J, Hashibe M, et al. (2008)[15] designed a systematic review to address the questions related to the socioeconomic inequalities and oral cancer risk. They set three measures to define socioeconomic status: low income, low occupational social class and low educational attainment. They concluded that low socioeconomic status was significantly associated with increased oral cancer risk in high- and lower-income countries, across the world, and remained when adjusting for potential behavioral confounders. They stated that, individually, each of the socioeconomic status measures showed slightly different magnitudes of oral cancer risks and that although some studies had used educational attainment as a measure, the most significant risk of oral cancer was associated with low income. Only four out of the 37 studies included in the study provided data on the association of education with oral cancer risk and they all reported that high educational levels were associated with an increased risk for oral cancer.

Warnakulasuriya S (2009)[47] reviewed the Global epidemiology of oral and oropharyngeal cancer and presented data on incidence, mortality, survival and trends in cancers of the lip, oral cavity and oropharynx using available recent data sources around the world. Oral and pharyngeal cancer, grouped together, is the sixth most common cancer in the world. The review focuses primarily on several high-risk countries in an attempt to gain insight into the geographic variations in the incidence of this cancer in the globe and to relate the high incidence in some populations to their life style. With an estimated half a million cases around the globe and the rising trends reported in some populations, particularly in the young, urgent public health measures are needed to reduce the incidence and mortality of oral and oropharyngeal cancer.

Islami F, Kamangar F,Nasrollahzadeh D ,Aghcheli K, Sotoudeh M, Abedi-Ardekani B et al (2009)[48] investigated socio-economic status and oesophageal cancer: results from a population-based case–control study in a high-risk area. Data were obtained from a population-based case–control study conducted between 2003 and 2007 with 300 histologically proven OSCC cases and 571 matched neighborhood

controls. They used conditional logistic regression to compare cases and controls for individual socioeconomic status indicators, for a composite wealth score constructed using multiple correspondence analyses, and for factors obtained from factors analysis. They found that various dimensions of socioeconomic status, such as education, wealth and being married were all inversely related to OSCC. The strongest inverse association was found with education. Compared with no education, the adjusted odds ratios (95% confidence intervals) for primary education and high school or beyond were 0.52 (0.27–0.98) and 0.20 (0.06–0.65), respectively. They concluded that, the strong association of socioeconomic status with OSCC after adjustment for known risk factors implies the presence of yet unidentified risk factors that are correlated with socioeconomic status measures; identification of these factors could be the target of future studies.

Conway DI, McMahon AD, Smith K, Black R, Robertson G, Devine J, McKinney PA.(2010)[33] coated that, the complex associations between socioeconomic circumstances and risk for head and neck cancer are under-explored. They investigated components of social class and their relative influence on the risk of head and neck cancers by studying 103 patients (age range 24–80 years) who had been diagnosed with cancer of the head and neck between April 2002 and December 2004, and 91 controls that were randomly selected from general practitioners' lists. Information about occupation, education, smoking, and alcohol consumption was collected at personal interview. Socioeconomic circumstances were measured at an individual level (education, occupational social class, unemployment), and by area-based measures of deprivation. Odds ratios (OR) and 95% confidence intervals (CI) were computed using unconditional logistic regression and multivariate analyses. People living in the most deprived areas (OR = 4.66, 95%CI 1.79–12.18); and those who were unemployed (OR = 2.27, 95% CI 1.21–4.26) had a significantly higher risk of cancer than those with high levels of educational attainment (OR = 0.17, 95% CI 0.05–0.58). Significance was lost for all measures of social class when adjustments were made for smoking and consumption of alcohol. Smoking was the only significant risk factor (OR = 15.53, 95% CI 5.36–44.99) in the multivariate analysis. A high risk of head and neck cancer was consistently associated with poor socioeconomic circumstances, and there were strong links for specific components however smoking dominated the overall profile of risk.

Imad Al-Dakkak 2010[49] summarized a case–control study on oral cancer about what are the socioeconomic risk factors for head and neck cancers? They also commented that, the association between head and neck cancers and socioeconomic factors remains under-researched and poorly understood. The study showed that individuals living in the most deprived areas as well as those with a lifetime experience of unemployment had a statistically significant elevated risk of head and neck cancer, whereas high levels of education were associated with a low risk of the disease. The effect of education may be attributed to its influence on risky behaviors and lifestyle choices. When socioeconomic factors were adjusted for smoking and consumption of alcohol, statistical significance was lost. Although smoking and alcohol consumption dampened these associations, a trend of increasing risk for head and neck cancers with severe deprivation, low education and unemployment was observed. When behavioral risk factors and socioeconomic variables were entered into a multivariate model, smoking was the only independent variable found to be significantly associated with head and neck cancers. Cancer patients in the experimental group were mainly heavy smokers; therefore, it is not surprising to detect a strong association between these cancers and smoking.

Madani AH, Dikshit M, Bhaduri D, Jahromi AS, Aghamolaei T (2010)[50] Conducted a case control study on relationship between selected socio-demographic factors, cancer of oral cavity. The cases were 350 with squamous-cell carcinoma of oral cavity diagnosed between 2005 and 2006 in Morbai, Narandia, Budharani Cancer Institute, Pune, India. Similar number of controls match for age and sex selected from the background population. Cases and controls were interviewed for tobacco related habits and general characteristics; age, gender, education and possible socio-demographic factors. Chi-square test in uni-variate analysis and estimate for risk showed that education, occupation and monthly household income were significantly different between cases and controls (*P*, 0.001). Irrespective to gender, relative risk, here odds ratio, (OR) of low level of education (OR = 5.3, CI 3.7–7.6), working in field as a farmer (OR = 2.5, CI 1.7–3.7), and monthly household income less than 5000 Indian Rupees currency (OR = 1.7, CI 1.2–2.3) were significant risk factors for oral cancer. While, there was no significant relationship between religious and or marital status either in males or females.

Agarwal AK, Sethi A, Sareen S, Dhingra D, (2011)[51] assessed the role of socioeconomic factors and health-seeking behavior in treatment delay in oral and oropharyngeal cancer. They studied 153 patients with oral and oropharyngeal squamous cell carcinoma who were managed in the department of otolaryngology and head and neck surgery between January 2006 and December 2007. There were 127 male patients (83%) and 26 females (17%) with ages ranging from 22 years to 70 years. Fifty-nine patients (39%) presented to us with early stage disease (i.e. stage I and II), whereas, 94 patients (61%) presented with late stage disease (i.e. stage III and IV). Of the 59 patients presenting with early stage disease, 20 were illiterate and 39 literate with 28 patients (47%) belonging to low socio-economic status and 32 patients (54%) having an access to primary health centre. Of the 94 patients presenting with late stage disease, 53 were illiterate and 41 literate with 58 patients (62%) belonging to low socio-economic status and 38 patients (40%) having an access to primary health centre. They concluded that, literacy, socio-economic status, access to primary health centre and health-seeking behavior has a significant association with the stage of presentation of patients with oral and oropharyngeal cancer.

Gupta PC, Ray CS, Sinha DN, Singh PK. (2011)[52] in their article 'Smokeless tobacco: A major public health problem in the South East Asia region (SEAR): A review. They stated that, smokeless tobacco use is on the upswing in some parts of the world, including parts of SEAR. It is therefore important to monitor this problem and understand the possible consequences on public health. Material for this review was obtained from documents and data of the World Health Organization, co-authors, colleagues, and searches on key words in Pub Med and on Google. Smokeless tobacco use in SEAR, as betel quid with tobacco, declined with increased marketing of cigarettes from the early twentieth century. Smokeless tobacco use began to increase in the 1970s in South Asia, with the marketing of new products made from areca nut and tobacco and convenient packaging. As a consequence, oral precancerous conditions and cancer incidence in young adults have increased significantly. Thailand's successful policies in reducing betel quid use through school health education from the 1920s and in preventing imports of smokeless tobacco products from 1992 are worth emulating by many SEAR countries. India, the largest manufacturing country of smokeless tobacco in the Region, is considering ways to regulate its production. Best practices require the simultaneous control of smokeless

and smoking forms of tobacco. Governments in SEAR would do well to adopt strong measures now to control this problem.

Imad Al-Dakkak and Khadra M (2011)[53] conducted a multicentre case–control study about Socio-economic status and upper aero digestive tract cancer. Cases were defined as those diagnosed with primary squamous cell tumors of the upper aero digestive tract between 2002 and 2005. Diagnoses included malignant cancers of the oral cavity, oropharynx, hypo-pharynx, larynx or esophagus. Incident cases were ascertained through weekly monitoring of head and neck cancer clinics in hospital departments and confirmed by pathology department records. Controls were frequency-matched to cases by sex and age (five-year groups). In the UK centers, population controls were randomly selected from the same community medical practice list as the corresponding cases. Specifically, for each case, a total of 10 controls were selected, matched by age and sex. Potential controls were approached in a random order one at a time until one agreed to participate. In all other centres, hospital controls were used. Only controls with a recently diagnosed disease were accepted, and admission diagnoses related to alcohol, tobacco or diet were excluded. Eligible diagnoses included endocrine and metabolic; genito-urinary; skin, subcutaneous tissue and musculoskeletal; gastro-intestinal; circulatory; ear, eye and mastoid; nervous system diseases; trauma and plastic surgery. The proportion of controls within a specific diagnostic group could not exceed 33% of the total in any particular centre. Personal interviews collected information on demographics, lifetime occupation, history, smoking, alcohol consumption and diet. Socioeconomic status was measured by education, occupational social class and unemployment. Odds ratios (ORs) and 95% confidence intervals (CIs) were computed using unconditional logistic regression. The study showed that when controlling for age, sex and centre, significantly increased risks for upper aero digestive tract cancer were observed for those with low versus high educational attainment OR = 1.98 (95% CI 1.67, 2.36). Similarly, for occupational socioeconomic indicators – comparing the lowest versus highest International Socio-Economic Index (ISEI) quartile for the longest occupation gave OR = 1.60 (1.28, 2.00); and for unemployment OR = 1.64 (1.24, 2.17). Statistical significance remained for low education when adjusting for smoking, alcohol and diet behaviors OR = 1.29 (1.06, 1.57) in the multivariate analysis. Inequalities were observed only among men but not among women and were greater

among those in the British Isles and Eastern European countries than in Southern and Central/Northern European countries. Associations were broadly consistent for sub site and source of controls (hospital and community). They found that, socioeconomic inequalities for upper aero digestive tract cancers are only observed among men and are not totally explained by smoking, alcohol drinking and diet.

Khan ZU. (2012)[54] reviewed the current prevalence and risk factors for oral carcinoma across the Indian subcontinent. They coated that, oral cancer is increasing in Indian subcontinent mainly due to lack of hygiene, tobacco use, chewing tobacco leaves, smoking and many other factors. Cancer is the second most common cause of mortality and morbidity today after cardiovascular problems. Oral cancer is the eleventh most common cancer in the world and two third deaths due to oral cancer occurs in developing world, out of which one third occurs in Indian Subcontinent. Human papilloma virus is a known risk factor oral cancer specially type 16 and 18. This is causing not only huge impact on the health of the community but also the economy of the Indian subcontinent countries. They summarized few recommendations by which oral cancer can be tackled in Indian subcontinent. They recommended different approaches from primary prevention to secondary and tertiary prevention methods. These include better hygiene, health education, and proper screening methods to detect those at risk, earlier treatment and smoking cessation clinics, proper legislation at government level and global approach as well.

Coelho KR (2012)[55] reviewed Challenges of the Oral Cancer Burden in India. According to them oral cancer ranks in the top three of all cancers in India, which accounts for over thirty per cent of all cancers reported in the country and oral cancer control is quickly becoming a global health priority. They stated that, oral cancer is of significant public health importance to India. Firstly, it is diagnosed at later stages which result in low treatment outcomes and considerable costs to the patients whom typically cannot afford this type of treatment. Secondly, rural areas in middle- and low-income countries also have inadequate access to trained providers and limited health services. As a result, delay has also been largely associated with advanced stages of oral cancer. Earlier detection of oral cancer offers the best chance for long term survival and has the potential to improve treatment outcomes and make healthcare affordable. Thirdly, oral cancer affects those from the lower socioeconomic groups, that is, people

from the lower socioeconomic strata of society due to a higher exposure to risk factors such as the use of tobacco. Lastly, even though clinical diagnosis occurs via examination of the oral cavity and tongue which is accessible by current diagnostic tools, the majority of cases present to a healthcare facility at later stages of cancer subtypes, thereby reducing chances of survival due to delays in diagnosis.

Saman DM (2012)[56] updated a review of the epidemiology of oral and pharyngeal carcinoma (OPC) in the United States. The literature on oral and pharyngeal cancer disparities among racial groups also appears to be growing. Though much of the literature on OPC risk factors is dominated by tobacco studies, there have been several studies that have established the protective effects of a healthful diet. Certain protective factors against developing OPC include the consumption of coffee, vegetables, fruit, and dietary foliate intake. Other protective factors may include socioeconomic-based variables. The literature points to a differential distribution of OPC among minorities and other sub-populations. There seems to be a disproportional burden of OPC among certain sub-populations within and outside of the United States. For example, studies in the United States have shown disparities in OPC between Appalachian states and non-Appalachian states, low socioeconomic and higher socioeconomic status populations, black and white Americans, and males and females. Disparities also exist in places outside of the United States, such as Taiwan. Globally, significant differences in the incidence of OPC have been observed by country, with men in northern France and southern India having the highest OPC incidence rates when compared to 47 other countries.

Pawar HJ, Dhumale GB, Singh KK et al (2012) [57]studied the relationship between socio-demographic factors and oral cancer in rural area of Maharashtra state, India: Case Control Study. In all 132 cases with oral cancer diagnosed during January to December 2011 at department of Radiotherapy and Oncology, Rural medical College and Hospital, Loni, Maharashtra, India. Similar number of controls match for age and sex selected from the background population. Cases and controls were interviewed for tobacco related habits and general characteristics; age, gender, education and possible socio- demographic factors. They found that, Chi-square test in uni-variate analysis and estimate for risk showed that education, occupation and monthly household income were significantly different between cases and controls (p, 0.001).

irrespective to gender, relative risk, here odds ratio, (OR) of low level of education (OR = 5.2, CI 3.3–8.3), working in field/farm as a laborer (OR = 2.3, CI 1.4–3.4), and monthly household income less than 5000 Indian Rupees currency (OR = 2.9, CI 1.9–4.2) were significant risk factors for oral cancer. While, there was no significant relationship between religious and or marital status either in males or females.

Sree Vidya Krishna Rao, Mejia G, Roberts-Thomson K, Logan R(2013)[34] reviewed the epidemiology of Oral Cancer in Asia in the Past Decade- 2000-2012 and found that, There are dissimilarities in the incidence rates of OC across different countries in Asia. While there are some common factors like use of tobacco, alcohol and quid chewing there are some differences in the prevalence of habits, in addition to some still unknown or unexplained factors other than social and economic factors in these Asian countries. High incidence is particularly observed in Asian countries with a cultural practice of chewing quid. Recently available quid sachets like gutkha and panmasla are used by children, men and women alike and may increase OC incidence. Tobacco chewing along with smoking and alcohol are the main reasons for the increasing incidence rate of OC. Low SES and diet low in nutritional value lacking vegetables and fruits contribute towards the risk.

Ganesh R, John J, Saravanan S. (**2013)**[58] studied the socio demographic profile of oral cancer patients residing in Tamil Nadu in a hospital based study. The study population were subjects with oral cancer who reported for treatment. A pretested interviewer administered questionnaire was used to assess the socioeconomic status of oral cancer patients. Pareek's scale of classification was used for rural population and Kuppuswamy's classification was used in urban population to assess the socioeconomic status. A total of 266 oral cancer patients aged 21-60 years and above comprised the study population. Most of the study subjects belonged to the lower socio economic classes. About 48.5% of rural subjects had agriculture as a source of occupation and 28.6% of urban subjects were unskilled laborers. In both rural and urban subjects, majority, 94.9% and 71.9% had family income below Rs 5000. The percentage of illiterates was high in both rural and urban class (i.e.) 55.8% and 21.9% respectively. The difference in the prevalence of oral cancer among different levels of literacy and occupation was found to be significant statistically. They concluded that identifying occupation, income and education specific disparities in tobacco use can

provide a useful "signspot" indicating inequalities that need to be addressed by policy makers and broader community through allocation of resources.

Allam E et al (2013)[59] their review was to provide insights into the social and behavioural factors associated with the development of oral cancer. Socioeconomic status has been directly related to the incidence of oral cancer. They suggested that, the incidence of oral cancer is greatly impacted by behaviours that can be modified, the impact that these behaviours as well as other social determinants has on oral cancer and its outcome needs to be addressed by society. They concluded that oral cancer is mostly attributable to both an individual predisposition or the genetic characteristics and the lifestyle behaviours that are linked to increased risk such as smoking, betel quid or tobacco chewing, alcohol intake, and dietary micronutrient deficiencies. More importantly, the exposure to more than one of these factors has a synergistic effect in increasing the risk of oral cancer. These lifestyle factors and behaviours are considered the downstream determinants of oral cancer, while the upstream determinants are those which are common to all cancers such as the community level environmental factors, industrial pollution and contamination, access to the health care system, health insurance, and quality of health care, which are all dependent on the SES of the individual.

Pawar HJ, Dhumale GB, Singh KK (2014)[60] studied epidemiological determinants of oral cancer in a rural area of Maharashtra state, India, with the background that retrospective studies on oral cancer patient profiles related to socioeconomic status and risk habits could provide etiologic clues for prevention in specific geographic areas. Their aim was **t**o study the socio-demographic distribution of oral cancer cases. A cross sectional retrospective study was conducted through case records of oral cancer patients who reported during 2007-2011 to department of Radiotherapy and Oncology, Rural Medical College and Pravara Rural Hospital, Loni, Maharashtra state, India. Data on socio-demography, histopathology, and sites of cancer and risk habit profiles of the oral cancer patients were recorded in a predesigned proforma by one calibrated examiner with internal validity checks. They found that, 464 oral cancer patients constituted 24% of total cancer patients. Mean age of the patients was 51 years, ranging from 13-90, with a male: female ratio of 2:1. 6.25% were young (< 30 years), 67.24% were in 30 to 60 years and 26.51% were more than 60 years. The

most common cancers among the youngest age group are those of tongue and buccal mucosa (41.26%). 348 (75%) oral cancer patients had risk habits, 55% were habituated for >10years and 25% were habit free. Majority 59% were chewers of betel quid alone (17%) / betel quid with tobacco (42%); smokers were (31%) and alcohol users were (14%) of patients. Chewers of gutkha, khaini were more in <30 years of age and betel quid in >30 years**.** They concluded that the prevalence of oral cancer was higher among elderly males predominantly with risk habits of betel quid / tobacco chewing and smoking for more than 10 years.

Rajesh N, Sreelakshmi K and Ramesh K (2014)[61] studied Profile of oral cancer patients attending tertiary care hospital, Bellary, Karnataka, India in a tertiary care hospital, Bellary, Karnataka. The study was carried out from 1st March 2012 to March 2013. Study variables included demographic factors, socioeconomic factors, enquiries regarding modifiable risk factors such as tobacco usage, alcohol consumption. Data entry and statistical analysis was done using Microsoft excel. Data presented in form of percentages and proportions. Out of the total 120 cases, majority of the subjects were above 40 years age and both males and females were equally affected. Characters of oral cancer patients revealed that, 35.8% were illiterate, 23.3% were not working, 81.6% of patients were using smokeless tobacco, 42.5% were using betel nut, 35.8% were smokers and 16.6% were alcoholics. Oral cancer was observed equally among both males and females. Productive age group was more affected and illiteracy, occupation of labour, low income is more commonly associated.

Bryere et al.: (2014) [62] Studied socioeconomic environment and cancer incidence: a French population-based study in Normandy. The struggle against social inequalities is a priority for many international organizations. The objective of the study was to quantify the cancer burden related to social deprivation by identifying the cancer sites linked to socioeconomic status and measuring the proportion of cases associated with social deprivation. The study population comprised 68 967 cases of cancer diagnosed between 1997 and 2009 in Normandy and collected by the local registries. The social environment was assessed at an aggregated level using the European Deprivation Index (EDI). The association between incidence and socioeconomic status was assessed by a Bayesian Poisson model and the excess of cases was calculated with the Population Attributable Fraction (PAF). For lung, lips-mouth-pharynx and unknown

primary sites, a higher incidence in deprived was observed for both sexes. The same trend was observed in males for bladder, liver, esophagus, larynx, central nervous system and gall-bladder and in females for cervix uteri. The largest part of the incidence associated with deprivation was found for cancer of gall-bladder (30.1%), lips-mouth-pharynx (26.0%), larynx (23.2%) and esophagus (19.6%) in males and for unknown primary sites (18.0%) and lips-mouth-pharynx (12.7%) in females. For prostate cancer and melanoma in males, the sites where incidence increased with affluence, the part associated with affluence was respectively 9.6% and 14.0%. They concluded that beyond identifying cancer sites the most associated with social deprivation, this kind of study points to health care policies that could be undertaken to reduce social inequalities.

Prasad LK (2014)[63] reviewed the burden of oral cancer in an Indian scenario and found that, physical, psychological, social and economic state of an individual, stance a massive constrain in reaching out the affected strata. Increasing number of oral cancer patients belongs to weaker socioeconomic section, lack awareness, have misconceptions. The additional fact of inadequate access to trained providers and limited health services lead to delayed detection of oral cancer.

Krishna A, Singh RK, Singh S, Verma P, Pal US, Tiwari S (2015)[64] studied associations of oral squamous cell carcinoma (OSCC) with respect to gender, age group, socioeconomic status and risk habits; This was an unmatched case-control study during period January 2012 to December 2013. Total of 471 confirmed OSCC patients and 556 control subjects were enrolled. Data on socio-demography, risk habits with duration and medical history were recorded. There were significant associations between OSCC with middle age (41-50years; unadjusted OR=1.63, 95%CI=1.05-2.52, p=0.02) (51-60 years; unadjusted OR=1.79, 95%CI=1.15-2.79, p=0.009) and male subjects (unadjusted OR=2.49, 95%CI=1.89-3.27, p=0.0001). Cases with both habits of tobacco chewing and smoking were at a higher risk for OSCC than tobacco chewing alone (unadjusted OR=0.52, 95%CI=0.38-0.72, p=0.0001), duration of risk habits also emerged as a responsible factor for the development of carcinoma. The majority of patients were presented in well-differentiated carcinomas (39.9%). Prevalence of advance stages (TNM stage III, IV) was 23.4% and 18.3% respectively. They concluded that, in most Asian countries,

especially India, there is an important need to initiate the national level public awareness programs to control and prevent oral cancer by screening for early diagnosis and support a tobacco free environment.

Pawar HJ Singh KK, Dhumale GB (2015)[65] in their epidemiological study, the prevalence and assessment of various risk factors among oral cancer cases carried out in a rural area of Maharashtra state, India found that, a lower degree of educational status was widespread. The majority of cases had agriculture and laborer as their occupation. This has resulted in their lower monthly income level. The study thus, suggests that the risk of oral cancer is inversely proportional to increasing level of education and economical status risk factors. It is further confirmed by multivariate analysis, which shows that education, particularly low educational status, agricultural or laborer occupation, unemployment and low monthly household income were the significant independent Women with oral cancer were more affected by socio-demographic factors, particularly, education, occupation and income. They have observed that social and demographic characteristics are associated to oral cancer. It may be due to effect of socio-demographic characteristics like mouth hygiene in general and in particular association of education and occupation with tobacco use, a known risk factor among men. They interpreted that, cancer in general is multi-factorial in origin and several environmental interactions are possible. Age, gender, illiteracy or low educational level, occupation; working in agricultural sector, low monthly household income and married status of men result in smoking, chewing, drinking and dietary habits which can be considered as significant contributing factors modifying the multistage process of carcinogenesis.

Chadha P et al (2016)[66] conducted study on demographic and clinico-pathological profile of head and neck squamous cell carcinomas, study included all resected head and neck squamous cell carcinomas cases which presented between December 2012 and May 2015.Clinicopathological parameters such as age, gender, place of residence (rural/urban), site, initial presentation, habits (tobacco/alcohol consumption), histological grade/degree of differentiation, TNM staging at the time of presentation, along with loco-regional recurrence/relapse were analysed for the Indian population. They found that most common age group at presentation is 61-70 years (32.2%), with a strong male predilection (4:1 ratio).The majority of the patients (71.1 %) hailed

from a rural background. Alveolus and tongue/base of tongue were the most commonly involved sites (n=26; 28.9% each).Most of the patients practiced the habit of tobacco consumption in the form of smokeless tobacco chewing (81.1%). Majority of the head and neck squamous cell carcinomas were well differentiated and stage T2N0M0 at presentation. Loco regional recurrence/relapse was seen in only 30% of the cases. Most of the cases present late as the symptoms are ignored which often leads to a delayed treatment. Mass education campaigns about the risk factors in head and neck squamous cell carcinomas, awareness about the importance of early diagnosis and treatment along with the varied presentation of this disease are warranted in order to control its spread. The epidemiological data of patients with head and neck squamous cell carcinomas s in India has been outlined in this study. Hence, a multidisciplinary approach involving various health professionals along with regular dental check-ups and oral hygiene programs targeting the population are required.

Psychosocial and socioeconomic risk factors of Oral squamous cell carcinoma are associated with delay in diagnosis of Oral squamous cell carcinoma

Regardless of the risk factors contributing to oral cancer development, the most important factor that alters patient survival is the stage by which the cancer is detected. The silent nature of oral lesions and delay in diagnosis are believed to be responsible for the high incidence of advanced-stage oral cancer.[26] It would be beneficial to know the factors which hinder the patients from early detection and receiving prompt treatment. Diagnostic delay refers to the total period of time from onset of symptoms to diagnosis. Diagnostic delay is generally divided into two phases: the period from the onset of symptoms to seeking of care (patient delay) and the excess period elapsed between first contact with health care professional and specialist consult(s) for definitive diagnosis. [32] Patient delays can be expected to vary by the symptoms produced; with some symptoms eliciting a more urgent response by the patient.[32] There is no agreement about a time-point beyond which a cancer diagnosis should be considered delayed. Many authors have used the mean or the median of the time distribution to categorize diagnostic delay. The median is more frequently used because it is not affected by extreme values and the distributions usually have very wide ranges. Other authors choose an arbitrary time-point (more

than 30 d) to discriminate between delayed and non-delayed cases. This time-period would allow the patient to identify the symptoms, seek consultation, maintain a follow-up of symptoms of 7–10 d, attend a second consultation, undergo biopsy, and, finally, is sufficient for the pathologist to report the results back to the dentist/physician.

Figure 3 Types of diagnostic delay in oral cancer [27]

Olesen F, Hansen RP, Vedsted P et al[67] describe the types of delay in a flow chart as follows:

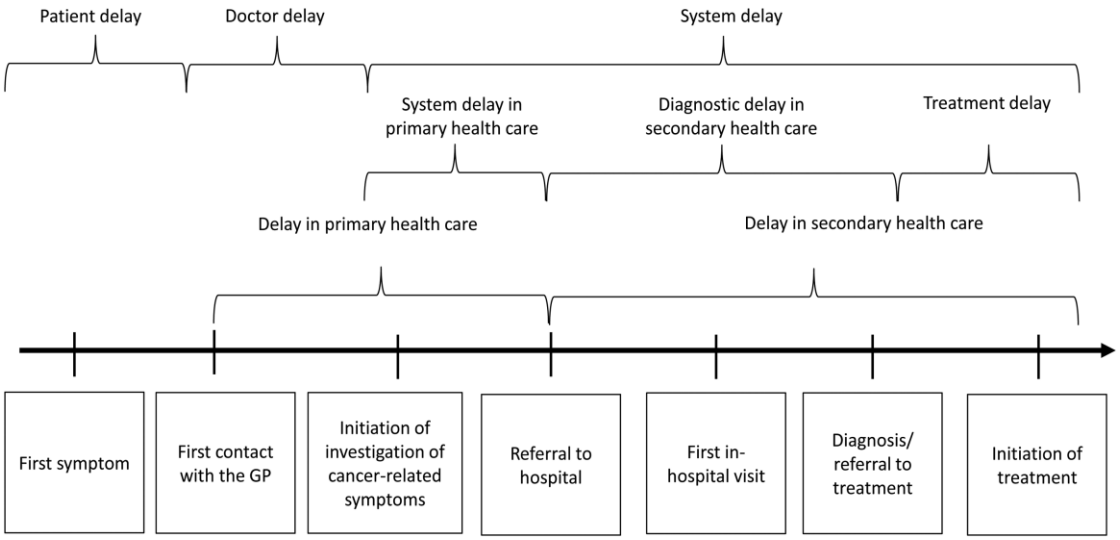


Figure 4. Different types of delay between the onset of the first symptoms and the beginning of anticancer treatment. [67]

Diagnostic delay refers to the total period of time from onset of symptoms to diagnosis. Delay can be of 3 types: (i) primary delay, (ii) secondary delay, and (iii) tertiary delay. Primary delay may be regarded as a form of health risk-taking behavior. Therefore it is expected that defining the demographic and psychosocial determinants of this behavior in oral cancer patients would help in deducing the components of an intervention plan.

Kumar S, Agarwal SP, Gupta CK (1993)[68] In their study titled "Investigation of factors causing delay in the treatment of oral mucosal cancer" reported that 22% of patients delayed reporting to hospital for more than 6 months after seeing their family doctor. Paucity of dental practitioners in India, inability of the family doctor to recognize the gravity of the lesion, a pessimistic outlook towards treatment and recourse to alternative medical treatment were some of the factors responsible for secondary delay. Fear of disfigurement, belief that destiny was inexorable and pessimistic attitude were minor factors (4%). Secondary delay can be greatly reduced by a reassuring and convincing primary health care physician.

Andersen BL, Cacioppo JT (1995)[31] in their study "Delay in seeking a '- cancer diagnosis: delay stages and psycho-physiological comparison processes" stated that delay can be classified in the following stages: Appraisal - time between when a person first detects an unexplained symptom and the moment they infer illness; lllness – time between when a person first infers illness to when they decide to seek medical help; Behavioral- time *b*etween when a person decides to seek medical help to when they act on scheduling an appointment; Scheduling- time between when a person schedules an appointment to the first contact with a health care professional; Treatment – time between when a person first seeks medical attention to when they begin treatment.

Kowalski LP, Franco EL, Torloni H, Fava AS, de Andrade Sobrinho J, Ramos G, Oliveira BV, Curado MP (1994) [69] studied the lateness of diagnosis of oral and oropharyngeal carcinoma: factors related to the tumor, the patient and health professionals. In their study, the risk of presenting with advanced stage verses early stage disease was evaluated in a prospective study of 336 consecutive patients with oral and oropharyngeal carcinomas referred to three head and neck surgery services in Sao Paulo, Curitiba and Goiania during the period from February 1986 to December 1988. Income and educational levels were not associated with stage distribution. The risk of having advanced disease was dependent upon male gender. Another important determinant of advanced stage was tumor location on the less visible surfaces of the oral cavity and oropharynx. Although there was a clear increase in delay of referral among cases who were seen by more than one health professional, duration of symptoms and patient and professional delays were not associated with the risk of

advanced disease in uni-factorial analysis. The following factors were independently associated with the risk of advanced disease for lip carcinoma: a painful ulcer, alcoholism and delay caused by a non-specialist medical doctor. The risk factors associated to advanced oral carcinoma were: type of lesion, odynophagia/dysphasia, delay caused by a dentist and delay caused by a non-specialist medical doctor. Two of the most important immediate consequences of advanced stage were a conspicuous increase in treatment costs and a longer hospital stay.

Allison P, Franco E, Black M, Feine J(1998)[70] studied the role of professional diagnostic delays in the prognosis of upper aero digestive tract carcinoma. They found that, despite the belief that cancer mortality can be reduced if lesions are detected, diagnosed and treated at an early stage, only one study, among a number concerning cancers of the upper aero digestive tract, has found any relationship between such delays and prognosis for this population of cancer patients. The aim of this study was, therefore, to investigate the relationship between patient and professional diagnostic delays and patient prognosis in a group of aero digestive tract cancer patients. Patients diagnosed with squamous cell carcinoma of oral cavity sites (ICD-9 141, 143-5) oro-, naso- and hypopharynx (ICD-9 146-8) and larynx (ICD-9 161) was included in the study. Stepwise multiple logistic regressions were used to calculate the odds ratio (OR) of late versus early stage disease for selected study variables. The sample comprised 188 subjects. Multivariate analysis found that having a pharyngeal cancer (OR 9.26; 95% CI 4.02-21.32; P: 0.0001) a professional delay > 1 month (OR 2.28; 95% CI 1.13-4.64; P: 0.022) and age > or = 65 years (OR: 0.45; 95% CI: 0.22-0.91; P: 0.024) were predictive of late stage disease. A dose-response relationship between professional delay and OR for late stage disease for the whole sample (P for trend 0.03) and among those with oral cancer (P for trend 0.0001) was found. The results of this study suggest that, among patients with an aero digestive tract cancer, professional delays > 1 month are contributing to an increased risk for being diagnosed with late stage disease.

Warnakulasuriya K Harris CK Scarrott DM (1999)[71] determined public awareness and knowledge of oral cancer in population of Great Britain. The respondents were selected according to a systematic probability sample designed to be representative of all adults in Great Britain (GB). The overall design was similar to previous omnibus surveys carried out by National Opinion Poll (NOP). The survey was carried out in

ten regions of GB in September 1995 and was commissioned by the Health Education Authority (HEA). A random sample of 1,894 members of the public over the age of 16 years were asked in face-to-face interviews their knowledge relating to cancer, with particular reference to oral cancer, its causes and those at high risk and general attitudes to cancer. Oral cancer was one of the least heard of cancers by the public with only 56% of the participants being aware, whereas 96% had heard of skin cancer, 97% lung cancer and 86% cervical cancer. There was a 76% awareness of the link between smoking and oral cancer but only 19% were aware of its association with alcohol misuse. Whereas 94% agreed that early detection can improve the treatment outcome, a disheartening 43% believed that whether a person developed a cancer or not was a matter of chance and therefore was unavoidable. This survey highlights a general lack of awareness among the public about mouth cancer and a lack of knowledge about its causation especially the excess risk associated with alcohol.

Kumar S Heller RF Pandey U et.al (2001)[72] the main research hypotheses of their study were: Psychosocial factors are important in determining primary delay in the presentation of oral cancer patients to a medical practitioner and delay in presentation is associated with an advanced stage of oral cancer. They analyzed the psychosocial factors related to delay in presentation of oral cancer patients through the Triandis' model of health-seeking behavior and also examined the relationship between delay and the stage of cancer. Seventy-nine oral cancer patients were interviewed after evolving a valid and reliable questionnaire, and determining the sample size. Univariate and multivariate logistic regression analysis was applied between demographic variables, psychosocial factors, primary delay (defined as delay between the first symptom and the seeking of medical advice), secondary delay (interval between the first consultation and presentation at the medical college), tertiary delay (delay in definitive treatment even after being seen at a tertiary care centre) and stage of the disease. Multiple logistic regression was also carried out. Primary delay ranged from less than a week in 5 (6.3%) patients to more than 1 year in 8 (10%) patients. A linear relationship was found between primary and secondary delay (F-statistic p <0.0152). A majority of patients (70.9%) had advanced oral cancer. The stage of cancer at presentation to the hospital was significantly related to primary but not to secondary delay. Multivariate analysis revealed that five variables, 'ill fated to have cancer', 'cancer a curse', 'non-availability of transport', 'trivial ulcers in mouth are self-

limiting' and 'prolonged treatment renders family stressful' were significant independent predictors of primary delay. The identified independent predictors of primary delay should be used to develop the main theme of an educational intervention programme for patients with oral cancer.

Pitiphat W, Diehl SR, Laskaris G, Cartsos V,Douglass CW, Zavras AI. (2002)[73] in their clinical research report suggest that early detection and treatment improve the prognosis for oral cancer. Delays from the onset of symptoms to clinical diagnosis are common. Their aim was to identify factors associated with this delay. Between 1995 and 1998, for that they interviewed 105 consecutive patients with histologically confirmed oral cancer in Greece. If 21 or more days elapsed from the time the patient noticed major symptoms to a definitive diagnosis, they called it a delay (52% of cases). They used logistic and linear regression to estimate odds ratios of delayed diagnosis and to identify correlates of length of delay, respectively. Former smokers had a 4.3 times greater risk of delayed diagnosis compared with current smokers (95% confidence interval: 1.1-17.1). The length of delay was greater among single patients, nonsmokers, or those with stage IV tumors. Clinicians should be advised that delay in the diagnosis of oral cancer occurs frequently, even in individuals who do not smoke heavily.

Porta M, Fernandez E, Alguacil J. (2003).[74] describes the set of influences that can affect the length of the period from onset of symptoms to diagnosis. "Diagnostic delay," the duration of symptoms or the symptom to diagnosis interval (SDI), are highly complex variables that reflect the behavior of the patient and the attending physician, tumor biology and host-tumor interactions, the functioning of the health care system, and socio-cultural norms. In addition to tumor stage, other variables mediate the relationship between duration of symptoms and survival; clinical and epidemiologic procedures to measure them must be improved. Largely at odds with clinical and common wisdom, decades of research have shown that often SDI is not associated with tumor stage and/or with survival from cancer. It would be relevant to increase evidence in support of the notion that, for each type of tumor, there is a positive relationship between the length of the pre symptomatic and the symptomatic phases. They concluded that, ‘behavior of the patient and attending physician, tumor biology and host-tumor interactions, the functioning of the health care system and socio-cultural norms.’’

Holmes JD, **Dierks EJ, Homer LD, Potter BE (2003)[75]** studied "is detection of oral and oropharyngeal squamous cancer by a dental health care provider associated with a lower stage at diagnosis?" They stated that, stage at diagnosis is the most important prognostic indictor for oral and oropharyngeal squamous cell cancers (SCCs). Unfortunately, approximately 50% of these cancers are identified late (stage III or IV). Data were gathered on 51 patients with newly diagnosed oral or oropharyngeal SCC through patient interview and chart audit. In addition to demographic data, specific inquiry was made regarding the circumstances surrounding the identification of the lesion. The main outcome measure was tumor stage grouping based on detection source. They found that, health care providers detecting oral and oropharyngeal SCCs during non-symptom-driven (screening) examinations were dentists, hygienists, oral and maxillofacial surgeons, and, in 1 case, a dentist. All lesions detected by physicians occurred during a symptom-driven examination. Lesions detected during a non-symptom-driven examination were of a statistically significant lower average clinical and pathologic stage (1.7 and 1.6, respectively) than lesions detected during a symptom-directed examination (2.6 and 2.5, respectively). Additionally, a dental office is the most likely source of detection of a lesion during a screening examination (Fisher exact test, P =.0006). Overall, patients referred from a dental office were of significantly lower stage than those referred from a medical office. Finally, patients who initially saw a regional specialist (dentist, oral and maxillofacial surgeon, or otolaryngologist) with symptoms related to their lesion were more likely to have appropriate treatment initiated than those who initially sought care from their primary care provider. Overall, detection of oral and oropharyngeal SCCs during a non-symptom-driven examination is associated with a lower stage at diagnosis, and this is most likely to occur in a dental office. A regional specialist was more likely than a primary care provider to detect an oral or oropharyngeal SCC and initiate the appropriate treatment during the first visit for symptoms related to the lesion.

Llewellyn CD. Johnson NW, Warnakulasuriya S (2004)[28] studied factors associated with delay in presentation amongst younger patients with oral cancer did find education to be important, and stated that low educational status was most consistent factor associated with delay in seeking treatment by the patients with oral cancer. They interpreted that there are a number of reasons why people do not visit

clinicians soon after noticing symptoms. One is the financial barrier. Moreover; patients may have insufficient or incorrect knowledge to appropriately interpret the relevance of their symptoms to malignancy or possibly fail to seek help due to the fear of cancer or lack of faith in medical treatment. This may be called as the "patient delay" or "diagnostic delay". Professional delay was assessed based on the identification of lesion and referral of the patient. In their study 29% of the primary care clinicians prescribed the patients creams and tablets for their symptoms and 25% told the patients that the symptoms will go away automatically which suggests that more than 50% of the doctors could not identify the cancerous lesions and gave false guidance to the patients. This also is a cause for the delay and is considered as the 'professional delay' , there are other studies which emphasize on this aspect and even say that in such cases patients may generally be disciplined to seek early medical care. In India there are many professionals of alternative medicine who lack the knowledge of malignancy and its symptoms. In this study, the mean time from referral to the specialist was 19.32 days, which is appropriate. The longer delay was 240 days that too because the patient was using an alternative medicinal therapy for the treatment of oral cancer. This specific delay illustrates the need for patients to realize the potential seriousness of the problem and the wisdom of arranging early appointments with the specialist, and take proper guidance regarding the case. There was also significant delay observed from meeting the specialist to getting the treatment of oral cancer with a mean delay of this interval being 29.73 days in this study. This interval also includes the patient undergoing necessary tests and other investigations. The longest range of this delay was 300 days in the present study. In these cases the delay was caused due to various reasons of which the main reasons were the socio-economic factors and awaiting funds from various government schemes for the treatment. There were also few cases that had anxiety about surgery and hence caused the delay. Surprisingly, there were some patients who decided not to get treated as there were no symptoms of pain.

Smith LK, Pope C , Botha JL (2005)[76] they said that, the reduction of delay in cancer diagnosis has been targeted as a way to improve survival. They undertook a qualitative synthesis of international research evidence to provide insight into patients' experiences of recognizing symptoms of cancer and seeking help. They searched international publications (1985-2004) for delay in cancer diagnosis to identify the relevant qualitative research, and used meta-ethnography to identify the common

themes across the studies. Their synthesis interpreted individual studies by identification of second-order constructs (interpretations offered by the original researchers) and third-order constructs (development of new interpretations beyond those offered in individual studies). They identified 32 papers reporting help-seeking experiences for at least 20 different types of cancer. The analysis showed strong similarities in patients with different cancer types. Key concepts were recognition and interpretation of symptoms, and fear of consultation. Fear manifested as a fear of embarrassment (the feeling that symptoms were trivial or that symptoms affected a sensitive body area), or a fear of cancer (pain, suffering, and death), or both. Such analyses allowed exploration of third-order constructs. The patient's gender and the sanctioning of help-seeking were important factors in prompt consultation. Strategies to understand and reduce patients' delay in cancer presentation can help symptom recognition but need to address patients' anxieties. The effect of the patient's sex in help-seeking also needs to be recognized, as does the important role of friends, family, and health-care professionals in the sanctioning of consultation. This meta-ethnography provides an international overview through the systematic synthesis of a diverse group of small-scale qualitative studies.

McLeod N M H (2005)[77] conducted the study "to detect delays in referral and diagnosis persist in Oral cancer patients." Oral cancer accounts for around 1% of all new cancers diagnosed in the United Kingdom every year. Mortality rates remain relatively high and prognosis is worst in cases of more advanced disease at time of diagnosis. Early identification of malignant lesions and speedy referral to a specialist for treatment are therefore important. The reasons and extent of the delays at the different stages between a patient first noticing an oral lesion and attending a health care professional and then being referred for specialist care have previously been studied and consistently found to be longer than desired and suggest the use of professional delay for the whole time from the patient's first consultation to their commencing definitive treatment. This is carried out by making up of referral delay (time from consultation to referral being made), appointment delay (time to appointment at specialist centre) and treatment delay (time from diagnosis to definitive treatment commencing). There is no consensus on what should be considered excessive delay at each stage. The Department of Health guidelines only mention the length of time after a symptom or sign is noticed that referral should be made and therefore referral time will be affected by patient delay.

The time taken by patients with oral cancer to seek advice from health professionals remains the longest delay in them obtaining specialist advice and treatment. Authors finding suggest that the publicity generated by the National Oral Cancer Awareness Week in1995 and subsequent years, and other publications and events since then, have not had the desired effect in terms of improving patient awareness of the importance of seeking advice on oral lesions, as the mean patient delay has increased. They commented that, General dental practitioners play a crucial role in screening patients for oral cancer and education in this area should form a regular part of continuing professional development. Substantial number of patients also presents via their family doctors and education on oral cancer should also be available for this group at both undergraduate and postgraduate level. The treatment of oral cancer is becoming more centralised and Oral and Maxillofacial surgeons and other specialists working in district general hospitals, who are the first point of referral for most patients with oral lesions and will generally make the initial diagnosis, need to ensure that not only are patients given first appointments as early as possible but also that biopsy and arrangements for following up results is arranged to minimise delays. Referral pathways for definitive care need to be clearly defined, again to reduce any further delays before definitive treatment can be started

Scott SE, Grunfeld EA, McGurk M (2006)[78] performed a systematic review on 'patient's delay in oral cancer suggested that, detecting oral cancer at an early stage is the most effective means of improving survival and reducing morbidity from this disease, yet a significant proportion of patients delay seeking help after the self-discovery of symptoms of oral cancer. The literature on factors associated with patient delay was searched systematically to access relevant data published between 1975 and 2005. Eight studies met the inclusion criteria for the review. In these studies, most clinical/tumor factors, socio-demographic variables, and patient health-related behaviors were not related to the duration of patient delay. Healthcare factors and psychosocial factors may play a role but the research in this area is sparse, a theoretical and of poor quality. Patient delay is a problem in oral cancer and yet at present the reasons for such delays are poorly understood and under-researched. Systematic, high-quality and theory-driven research in this area is urgently required.

Rhodus N L(2007)[79] reviewed on **e**arly detection and prevention of oral cancer. They stated that the aetiology of oral cancer is apparently multi-factorial and involves many alterations in host immunity, metabolism, angiogenesis, and exposure to chronic inflammation in a genetically susceptible individual that accumulate over time. The carcinogenic changes may be influenced by oncogenes, carcinogens, and mutations caused by chemicals, viruses, irradiation, drugs (tobacco and alcohol), hormones, nutrients, or physical irritants. The tongue is the most common site for oral cancer in both American men and women. Oral cavity cancer accounts for about 17,000 of the 30,000 cases of oropharyngeal cancer diagnosed each year and is more common than leukaemia, Hodgkin's lymphoma, brain, stomach, or ovarian cancer; the5-year survival rate has remained at approximately 50% over the past 30 years. This is a major reason why detection of oral cancer as early as possible and/or prevention of the premalignant lesion from progressing to carcinoma are so important. Unfortunately, very little progress has been made during the past 40 years in regard to early diagnosis.

Morelatto RA, Herrera MC, Fernandez EN, Corball AG, Lopez de Blanc SA (2007)[80] the aim of the present study was to investigate diagnostic delay in oral cancer (OC) in two diagnosis centers in Cordoba, Argentina. Special attention was paid to the role of the patient and the professional in the diagnostic delay. Seventy clinical records of patients with newly diagnosed oral squamous cell carcinoma were included. They found that both patients and professionals were responsible for the delay in diagnosis. This delay was longer for tumors in early stages. Multiple logistic regression analysis indicated that the professional delay was the most associated variable to the stage of tumor. They concluded that, continuing education in OC and precancerous lesions are important to reduce the professional delay. The findings of this study also indicate that58% of the patients are partially responsible for delay in the diagnosis of OC. Intensive public promotion and educational campaigns against OC are also needed to increase patient awareness.

Donnell A et al (2008)[5] in their review article on "delay in diagnosis of oral cancer" stated that, despite the obvious accessibility of the oral cavity for dental examination to detect early signs of oral cancer, significant delays seem to occur in the diagnosis of oral squamous cell carcinomas. Such delays are universal and affect a significant

number of patients throughout the world. Their review describes statistics related to diagnostic delays, and focuses on identifying their root causes. Several parameters of delay are considered, organized in two main categories, as related to i) the patient, or ii) the health care professional. It is evident that 'stage at diagnosis' is a very important parameter, and should be a subject of intense research. If left untreated Cancer will progress and eventually spread; therefore, in theory diagnostic delay can lead to regional or distant metastasis and to adverse health outcomes. It is currently unclear what proportion of patients develops an aggressive form of oral cancer as compared with a latent lesion that might require many weeks to advance from one stage to the next. Understanding tumor biology and tumor aggressiveness becomes imperative for the proper clinical management of the patient. Aggressive tumors manifest abruptly, with signs of advanced disease such as regional lymphadenopathy, or enlargement, or distant metastasis. When tumors are aggressive, the length of time between when a person first detects a symptom and the moment they see a health care professional to request care seems short; the window of opportunity to act early is very narrow or absent. Understanding the sources, extent, and root causes of diagnostic delays is crucial for system-wide interventions aimed to expedite the clinical management of patients with oral cancer and to improve prognosis and quality of life. Factors contributing to patient delay are diverse. When reviewing the' literature, it is useful to group these factors into categories as Scott et al. did in their 2006 systematic review of patient delay in oral cancer. These broad categories are: I) clinical/tumor factors, 2) patient socio-demographics, 3) health related behaviors, 4) healthcare factors and 5) psychosocial factors.

Gomez I, Seoane J, Varela-Centelles P, Diz P, Takkouche B (2009)[27] diagnostic delay in oropharyngeal cancer may be associated with poor prognosis. As controversy exists on this topic because of contradictory results, the aim of this study was to perform a systematic review of the relationship between total diagnostic delay and advanced disease stages. A systematic search of MEDLINE, EMBASE, and ISI proceedings was performed to identify observational studies that provided relative risks (RRs) and 95% confidence intervals (CIs) for patients with confirmed pathological diagnosis. The outcome of interest was disease stage (TNM classification), while the exposure of interest was the total diagnostic delay. The study-specific adjusted logs RRs for cohort studies were weighted by the inverse of

their variance to compute a pooled RR and its 95% CI. The fixed-effects pooled RR of advanced stages of oropharyngeal cancer when diagnostic delay is present was 1.32 (95% CI: 1.07–1.62). This association was stronger when the analysis was restricted to oral cancer (pooled RR: 1.47; 95% CI: 1.09–1.99) and when delay was longer than 1 month (pooled RR: 1.69; 95% CI: 1.26–2.77). The probability for patients with delayed diagnosis to present an advanced-stage tumor at diagnosis was significantly higher than that of patients with no delay in diagnosis. However, new prospective studies with strict methodology are needed to shed more light on this association.

Goy J, Hall SF, Stewart DF, Grome PA (2009)[30] examined the evidence for an association between patient and/or provider-related diagnostic delay and late stage at diagnosis. The author identified all English language published studies worldwide and present a summary of the direction and magnitudes of the associations observed. He considered the role of study population characteristics and symptom variation across the head and neck cancer sites on the delay-stage association. The 27 eligible studies reviewed varied considerably in the cancer types grouped by analysis, types of delay, and measurement of delay. The relationship between diagnostic delay and stage at diagnosis varied in direction and magnitude, with no consistent positive association in any of the head and neck cancer sites. Possible explanations for the lack of an observed relationship between patient delay and stage include: inaccurate measurement of delay, lack of sensitivity of disease stage to delay-related disease progression, and variation in tumor aggressiveness, which could lead to variation in symptom progression rates.

Gomez I, Warnakulasuriya S, Varela-Centelles P, Lopez-Jornet P, Suarez-Cunqueiro M Diz P, Seoane J. (2010)[81] in their review article, **i**s early diagnosis of oral cancer a feasible objective? Who is to blame for diagnostic delay? They stated that, psychosocial factors may play a role, but research in this area is meager, theoretical and of poor quality. More recent investigations into psychological factors involved in delay by patients indicate the importance of competing priorities, symptom misattribution perceived inability to access care and attempts to self-medicate prior to consulting a health care professional. Thus, application of psychosocial theoretical models to the investigations in the field of diagnostic delay should be attempted, as the perception of the signs of cancer by the individual may be

misunderstood and lead the patient to erroneous behavioral responses that may adversely affect his ⁄ her demands or access to care It seems necessary to support investigations aimed at understanding the role of patient delay in oral cancer in different geographical locations to harvest information that facilitates the design of public health interventions for early diagnosis of oral cancer amongst the identified risk groups. Stated that, worldwide, oral cancer has one of the lowest survival rates and poor prognosis remains unaffected despite recent therapeutic advances. Reducing diagnostic delay to achieve earlier detection is a cornerstone to improve survival. Thus, intervention strategies to minimize diagnostic delays resulting from patient factors and to identify groups at risk in different geographical areas seem to be necessary. The identification of a scheduling delay' in oral cancer justifies the introduction of additional educational interventions aimed at the whole health care team at dental and medical practices. The access to and the kind of healthcare system in a particular country are also relevant in this context, particularly the referral system. The design of a simple, clear, fail-safe, fast-track referral scheme for those suspected with cancer may diminish greatly the length of the delay. Moreover, there is a need for future investigations, which are methodologically adequate, that consider cultural and geographical aspects and use patient survival as the final outcome, that are able to recognize the agents ⁄ factors responsible for diagnostic delay by patients as well as healthcare providers and those attributable to the healthcare systems. Nowadays, diagnostic delay is most often categorized as (i) patient delay – the period between the patient first noticing a sign or symptom and their first consultation with a health care professional concerning that sign or symptom; and (ii) provider ⁄ professional delay – the period from the patient's first consultation with a health care professional and the definitive pathological diagnosis . The overall diagnostic delay would include the period elapsed since the first symptom or sign until the definitive diagnosis.

Syed Mohammad Asad Zaidi, Nauman Fazal Manzoor, Shabbir Akhtar (2010)[82] in their review the challenge of head and neck squamous cell carcinoma control in Pakistan mentioned that a vast majority of patients present with advanced stage disease. The silent nature of oral lesions, misinterpretation of symptoms and lack of awareness about risk factors and symptoms related to head neck face OSCC contribute to the high prevalence of patient related delay. Provider related delay stems

from the lack of trained oncologists and associated treatment facilities. In addition, many patients especially from rural setups seek help from spiritual healers first in order to get a quick remedy. Others even after presentation are fearful of biopsies and are hesitant to accept the diagnosis. These factors need to be taken into consideration before any large-scale control programme can be initiated.

Luiz Carlos Oliveira dos Santos, Olívio de Medeiros Batista , Maria Cristina Teixeira Cangussu (2010)[83] stated that, **o**ral cancer in Brazil still presents high levels of incidence and mortality bearing different traits throughout the national territory. In most of the cases the diagnosis is late; however there is a great possibility for cure when treated early on .they assessed factors associated with the late diagnosis of oral cancer in the state of Alagoas. This was a prospective cross-sectional study was carried out in 74 patients, all of them diagnosed with oral squamous cell carcinoma in a hospital of Alagoas, between July of 2007 and September of 2008. A semi-structured interview was given, obtaining socio-demographic data, the type of professional help sought, symptom onset, referrals and tumor clinical stage at the moment of diagnosis. According to the results obtained in this study, the patients usually sought professional medical help, rather than dental help when a lesion in the mouth appeared, being always referred to a specialist by the dentist, in advanced stages of the disease. This study suggests the need for continued education programs for the population and professionals aiming at the early identification of symptoms of the illness; however needing further studies.

Agrawal AK, Sethi A, Sareen D, Dhingra S (2011)[51] assessed the role of socioeconomic factors and health-seeking behavior in treatment delay in oral and oropharyngeal cancer in Indian population. The prospective study was carried out in a tertiary care centre in 153 patients with oral and oropharyngeal squamous cell carcinoma that were managed in the department of otolaryngology and head and neck surgery between January 2006 and December 2007. There were 127 male patients (83%) and 26 females (17%) with ages ranging from 22 years to 70 years. Fifty-nine patients (39%) presented to us with early stage disease (i.e. stage I and II), whereas, 94 patients (61%) presented with late stage disease (i.e. stage III and IV). Of the 59 patients presenting with early stage disease, 20 were illiterate and 39 literate with 28 patients (47%) belonging to low socio-economic status and 32 patients (54%) having

an access to primary health Centre. Of the 94 patients presenting with late stage disease, 53 were illiterate and 41 literate with 58 patients (62%) belonging to low socio-economic status and 38 patients (40%) having an access to primary health Centre. Literacy, socio-economic status, access to primary health Centre and health-seeking behavior of Indian population has a significant association with the stage of presentation of patients with oral and oropharyngeal cancer.

AkbulutN et al(2011)[83] conducted at Ankara University Faculty of Dentistry a case series on delayed diagnosis of oral squamous cell carcinoma in three patients with OSCCs located in posterior region, along with the clinical and radiological findings. All of patients' diagnoses in this report were delayed. The patients in the study were referred to an oncology hospital because of their metastases. Posterior localized tumors demonstrate a worse prognosis, since these often remain unnoticed in screening examinations, and once symptoms arise from regional lymph node metastases, the tumours are at an advanced stage at the time of initial diagnosis. An early diagnosis is not necessarily easy, because patients and health care professionals underrate the initial lesions, which are generally asymptomatic. This reality suggests that physicians have gaps in their knowledge of pathology, that patients delay seeking medical care and that access to and the quality of medical care are deficient, all of which reflect the absence of preventive public health programs and an effective health care system. In patients with head and neck cancer OSCC, delays in diagnosis of more than one month may contribute to an increased chance of the diagnosis of later-stage disease. OSCC and its treatment directly affect patients 'health-related quality of life. The most basic functions of speech, chewing and swallowing are frequently altered, while symptoms such as pain and psychosocial issues like appearance and emotional functioning can also be problematic. If these tumours are at an advanced stage, aggressive therapy, including surgery, radio therapy and, if needed, chemotherapy may be used to treat patients with the worst prognoses. In terms of quality of life, survival probability and treatment of the patient, early diagnosis of OSCC is very important. They stated that, early diagnosis is of vital importance for the prognosis of the patients with oral squamous cell carcinomas. For this reason, dentists play a crucial role in the early detection and prevention of oral cancers. Dentists should have enough knowledge about clinical and radiological forms of anatomic structures to diagnose cancer in the oral region. One of the most important duties of a dentist is

good follow-up of patients, especially in the diagnosis period. Dentists should request a biopsy, and in the presence of metastasis, the patient should be directed to the appropriate related department.

Waal I V et al(2011)[84] carried out review on early diagnosis in primary oral cancer, particularly with regards to the number of cell divisions that as required before cancer reaches a measurable size. They ventilated that, oral cancer particularly OSCC is largely a preventable diseases, the emphasis should also perhaps even more so be on cessation of tobacco and alcohol habits. The delay in diagnosis of oral cancer is caused by both by patients delay and doctor's delay. The total delay including scheduling delay, work up delay and treatment planning delay with average of all delay was 6 months. The total delay is more or less evenly distributed between patients and doctors delay and is partly due to unawareness of the oral cancer among the public and professionals and partly to barriers in the health care system that may prevents patients from seeking dental and medical care. They found that, dentist and physician and also oral hygienist and nurses may play role in such screening programs. Such earlier diagnosis will result in less treatment morbidity and probable in many patients in true longer survival.

Dwivedi AK, Dwivedi SA, Deo S, Shukla R, Pandey A, Dwivedi DK (2012)[86] conducted an epidemiological study on delay in treatment initiation of cancer patients and found that, early diagnosis and timely initiation of treatment of cancer patients may improve survival and quality of life. Various measures of delay can be made during diagnosis and treatment initiation. Most of the studies were based on single type of cancer with different definitions and measurements of delay in diagnosis and treatment. Thus, it has been difficult to synthesize results and generalize to other types of cancer. The study proposes to measure total duration between onsets of symptom to start of treatment into three components, namely primary, secondary and tertiary delays. Primary delay is defined as onset of symptoms to contacting the first medical person, secondary delay is from first medical contact to confirmed diagnosis, and tertiary delay is from confirmed diagnosis to treatment initiation.

Shenoi R, Devrukhkar V, Chaudhuri, Sharma BK, Sapre SB, Chikhale A.(2012)[87], studied the demographic and clinical profile of oral squamous cell

carcinoma patients. In their study, OSCC cases were retrospectively analyzed from January 2008 to September 2010 for age, gender, occupation, duration of the symptoms, habits, site of primary tumor, and TNM staging, and the findings were formulated to chart the trends in central India population. In their observations and result male to female ratio was 4.18:1. Mean age was 49.73 years. The most common site of presentation of tumor was in mandibular alveolus region. Tobacco chewing was the major cause for the development of OSCC. Maximum number of patients 201 (68.14%) were presented within 6 months of onset of symptoms. Majority of patients were presented in Stage III (82.37%). Correlation between the two variables, i.e., site to habits, staging to site involved, staging to duration of the disease, staging to habits, and staging to age of the patient, were found to be statistically non significant They concluded that, most of the cases report at advanced stages of the disease which often leads to delay in the management coupled with the fact that health care centers are burdened with long waiting lists. Strategies to overcome the present situation must be undertaken by oral health programs for the early diagnosis and prevention and management and follow up of oral cancer.

Seoane-Romero JM, Vazquez-Mahía I, Seoane J et.al (2012)[88] identified factors related to advanced-stage diagnosis of oral cancer to disclose high-risk groups and facilitate early detection strategies. A cohort study on 88 consecutive patients treated from January 1998 to December 2003. Inclusion criteria: pathological diagnosis of OSCC (primary tumor) at any oral site and suffering from a tumor at any TNM stage. Variables considered: age, gender, smoking history, alcohol usage, tumor site, macroscopic pattern of the lesion, co-existing precancerous lesion, degree of differentiation, diagnostic delay and TNM stage. A total of 88 patients (mean age 60±11.3; 65.9% males) entered the study. Most patients (54.5%) suffered no delayed diagnosis and 45.5% of the carcinomas were diagnosed at early stages (I-II). The most frequent clinical lesions were ulcers (70.5%). Most cases were well- and moderately-differentiated (91%). Univariate analyses revealed strong associations between advanced stages and moderate-poor differentiation (OR=4.2; 95%CI=1.6-10.9) or tumor site (floor of the mouth (OR=3.6; 95%CI=1.2-11.1); gingivae (OR=8.8; 95%CI=2.0-38.2); and retromolar trigone (OR=8.8; 95%CI=1.5-49.1)). Regression analysis recognized the site of the tumor and the degree of differentiation as significantly associated to high risk of late-stage diagnosis. Screening programmes

designed to detect asymptomatic oral cancers should be prioritized. Educational interventions on the population and on the professionals should include a sound knowledge of the disease presentation, specifically on sites like floor of the mouth, gingivae and retromolar trigone.

Jafari A et al (2013)[89] conducted retrospective -descriptive study in two hundred and fifty six files related to the oral and pharyngeal cancer to inspect the referral conditions and the reasons for the delay in curing the patients referred to the educational hospitals specialized in the field of cancers in Tehran. They recorded data related to the time difference between the first time of attending to lesion and diagnosing the cancer as patient's delay and until the definitive treatment as professional's delay. The majority of the cancers were oral squamous cell carcinoma. The mean of the time between the patients' first noticing the problem and the time visiting a primary care clinician was 270 days (range, 0-2520 days). The mean of the time from when the patient visited a primary- care clinician to the starting time of definitive treatment was 90 days (range, 0- 270 days) and concluded that SCC was the most common occurring cancer. Delays related to the patients were more than those related to the professionals. And at last, accuracy in recording the files and training the patients were recognized to be the most imperative factors to continue the treatment successfully.

Joshi P, Nair S, Chaturvedi P, Nair D, Agarwal J P, D'Cruz A K. (2014)[90] shared their experience regarding delay in seeking specialized care for oral cancers: Experience from a tertiary cancer center. They shared that, advanced oral cancers are a challenge for treatment, as they require complex procedures for excision and reconstruction. Despite being occurring at a visible site and can be detected easily, many patients present in advanced stages with large tumors. Timely intervention is important in improving survival and quality of life in these patients. The aim of their study was to find out the causes of delay in seeking specialist care in advanced oral cancer patients. A prospective questionnaire based study was done on 201 consecutive advanced oral squamous cancer patients who underwent surgery at our hospital. All patients had either cancer of gingivo-buccal complex (GBC) or tongue and had tumors of size more than 4 cm (T3/T4) and were treatment naove at presentation. They found that, even though most patients observed abnormal lesions in their mouth,

majority delayed the decision to visit a physician early. A significant percentage of patients (50%) also reported a delayed diagnosis by the primary care physician before being referred to a tertiary care center for definitive treatment. The average total duration from symptoms to treatment was 7 months. They concluded that, main reasons of this delay in receiving treatment were due to patients themselves (primary delay) or due to time taken by the primary physician to diagnose the condition (secondary delay). Oral self-examination can be helpful in detecting oral cancers early.

Krishnatreya M, Kataki AC, Sharma JD , Nandy P , Rahman T, Kumar M, Gogoi G, Hoque N(2014)[91] studied educational levels and delays in start of treatment for head and neck cancers in North-East India according to them there are various patient and professional factors responsible for the delay in start of treatment (SOT) for head and neck cancers (HNC). Their retrospective study was conducted on data for HNC patients registered at the hospital cancer registry in North-East India. All cases diagnosed during the period of January 2010 to December 2012 were considered for the present analysis. Educational levels of all patients were clustered into 3 groups; illiterates (unable to read or write), qualified (school or high school level education), and highly qualified (college and above). The analysis showed that, 1066 (34.6%) patients were illiterates, 1,869 (60.6%) patients were literates and 145 (4.7%) of all patients with HNC were highly qualified. The stage at diagnosis were stage I, seen in 62 (34.6%), stage II in 393 (12.8%), stage III in 1,371 (44.5%) and stage IV in 1,254 (40.7%). The median time (MT) to the SOT from date of attending cancer hospital (DOACH) was, in illiterate group MT was 18 days, whereas in the qualified group of patients it was 15 days and in the highly qualified group was 10 days. Analysis of variance showed there was a significant difference on the mean time for the delay in SOT from DOACH for different educational levels ($F=9.923$, $p=0.000$). They concluded that, educational level is a patient related factor in the delays for the SOT in HNCs in our population.

Joshi P, Dutta S, Chaturvedi P, Nair S (2014)[92] studied head and neck cancers in developing countries. According to them head and neck cancers are the most common cancers in developing countries, especially in Southeast Asia. Head and neck cancers are more common in males compared to females. This is mainly attributed to tobacco, areca

nut, alcohol, etc. Oral cancers are most common amongst all head and neck squamous cell cancers (HNSCC). HNSCC in the developing world differ from those in the Western world in terms of age, site of disease, etiology, and molecular biology. Poverty, illiteracy, advanced stage at presentation, lack of access to health care, and poor treatment infrastructure pose a major challenge in management of these cancers. The annual GDP (gross domestic product) spent on health care is very low in developing countries compared to the developed countries. Cancer treatment leads to a significant financial burden on the cancer patients and their families. Several health programs have been implemented to curb this rising burden of disease. The main aims of these health programs were to increase awareness among people regarding tobacco and to improve access to health care facilities, early diagnosis, treatment, and palliative care.

Stefanuto P, Doucet JC, Robertson C (2014)[93] reviewed 'delays in treatment of oral cancer: a review of the current literature'. This review aims to update the reader as to the current issues surrounding the delay in treatment of oral cancer. They searched Medline/PubMed and the Cochrane database. English-language publications were included. Paired reviewers selected articles for inclusion and extracted data. The strength of the evidence was graded as high, moderate, or low. Eighteen studies met their inclusion criteria. The majority of the studies were retrospective case-control studies (55%). They concluded that, patient delay continues to be the greatest contributor to overall delay in treatment of head and neck cancers, with an average delay of 3.5 to 5.4 months. In addition, the average professional delay is approximately 14 to 21 weeks. Cumulatively, the amount of delay may be causative for the late stage at which head and neck cancers are diagnosed and subsequently treated.

Rana S et al (2014)[94] conducted study on detection of metastases in oral squamous cell carcinoma to give an insight into the diagnostic workup available for the evaluation of metastasis in patients with OSSC and reinforces the need for further research to develop more accurate methods. This makes it imperative to diagnose metastasis at an early stage to facilitate appropriate therapeutic management to reduce the morbidity and mortality associated with this disease. Several modalities have been developed and wide use for recognition of metastasis with their inherent advantages and disadvantages including CT, MRI, PET, ultrasound, PET/CT have been used for detection of metastasis of OSCC and useful in treatment decisions and must be able to

detect metastatic nodes in patients with early stage tumors. This technique must sufficiently sensitive to detect microscope disease and specific enough so that frequent false negative results do not lead to universal prescription of elective neck treatment resulting in unnecessary patient morbidity.

Rahman SS et al (2014)[95] conducted the study to evaluate the clinical profile of patients with oral squamous cell carcinoma attending a tertiary care hospital. They evaluated for gender, age, education, occupation, personal habits, site of lesion and histological grading. Two hundred and sixteen confirmed cases of oral squarnous cell carcinoma were included in this study. It was conducted over a period of two years from July 2009 to June2011 in the department of Dental Surgery of Khulna Medical College Hospital and found that male female ratio was 1.5: 1. Mean age was 50.46 years. Correlation between two variables i.e. level of education and histomorphological pattern of the lesion were found to be statistically non significant (P>0.05). The commonest age of presentation was in the fifth decade of life. Most of the cases reported at advance stages of the disease which often leads to delay in the management. Majority of patients (70.73%) presented with well differentiated squamous cell carcinoma. Tobacco chewing was the major cause for the development of oral carcinoma. Majority of the cases were reported at the advanced stage that depicts the negligence of the health care among the population. Widely spread educational campaigns against determinant factors of oral cancer are urgent in order to reduce oral cancer incidence rates.

Guneri P, Epstein JB (2014)[96]. In their review "Late stage diagnosis of oral cancer: Components and possible solution" tried to explore both the nature of oral cancer and the adjuncts available for detection, and presents the current issues in diagnostic delays of oral cancer detection. They noted that the precursor lesions either may have innocuous appearance or may be asymptomatic or minimally symptomatic, but if the abnormality is not appreciated, no next steps in diagnosis can be made. Detection of abnormality is clearly critical in patient and provider evaluation: the key challenge is differentiating PMD and OSCC from variations of normal and from benign and inflammatory lesions. Unfortunately, even though current adjuncts provide some additional information, they are challenged to identify/differentiate PMDs and OSCC from inflammatory analogues. Definitive diagnosis depends on diagnostic procedures

such as detection of tissue change, decision to biopsy, biopsy site selection, quality of the tissue submitted, laboratory procedure and pathologist's skill and interpretation. Consequently, each step in patient presentation and professional decision making may be responsible for delay, and the often asymptomatic or nonspecific findings also increase the risk in delay. All educational methods to improve the knowledge of the clinicians and to raise public awareness with respect to OSCC should be employed. Additionally, system barriers shall be meticulously analyzed and appropriate solutions shall be discussed within related officials in order to find ways to decrease the delays in OSCC diagnosis and to be able to detect these lesions in earlier stages. Dental professionals should seek every opportunity to enhance their knowledge and clinical practice skills by attending to postgraduate courses, using adjunct methods to improve the detection and diagnostic accuracy, and to consult with the experts with appropriate training and clinical skills.

Panzarella V, Pizzo G, Calvino F et.al (2014)[97] This retrospective study investigated, in two cohorts of subjects living in Southern Italy and awaiting treatment for oral squamous cell carcinoma (OSCC), the variables related to diagnostic delay ascribable to the patient, with particular reference to the cognitive and psychological ones. A total of 156 patients with OSCC (mean age: 62 years, M/F: 2.39 : 1) were recruited at the Universities of Palermoand Naples. Risk factors related to patient delay included: socio-demographic, health-related, cognitive and psychological variables. The analysis was conducted by considering two different delay ranges: dichotomous (f1 month vs. .1 month) and polytomous (1 month, 1–3 months, .3 months) delay. Data were investigated by Univariate and multivariate analyses and a P value0.05 was considered statistically significant. For both delay measurements, the most relevant variables were: 'Personal experience of cancer "unawareness" and 'Knowledge of cancer' were found to be statistically significant both for dichotomous and for polytomous categorization of delay, respectively. The findings of the study indicated that, in the investigated cohorts, the knowledge about cancer issues is strongly linked to the patient delay. Educational interventions on the Mediterranean population are necessary in order to increase the patient awareness and to emphasize his/her key role in early diagnosis of OSCC.

Christophe V, Leroy T, Seillier M, et al. (2014)[98] investigated the factors explaining delayed consultation for head and neck cancers in the North of France. The author evaluated 400 patients with a not yet treated head and neck cancer diagnosed in one of six health centers in the North of France region. The main evaluation criterion was 'patient delay'. Sociocognitive, emotional, medical, sociodemographic, socioeconomic, educational, professional and geographic factors were assessed by means of a case report form, a questionnaire completed by the clinical research associate together with the patient, a questionnaire completed by the patient and a recorded semi directive interview of the patient by a psychologist (for 80 patients only). The collected data was analyzed to underline the differences between patients who consulted a doctor earlier versus those who consulted later. Such operations resulted to reduce diagnosis timelines in patients presenting with symptoms suggestive of head and neck cancers, with a view to (1) reducing the abnormally high death rates and changes in quality of life induced by delayed treatment and (2) fighting social inequality in terms of healthcare, a central component of the French Cancer Plan.

Chintala A, Muttagi S, Agarwal C (2014)[99] determined various causes for delayed diagnosis and relationship of this delay with socio-economic factors. The study was conducted on 100 stage III/IV oral cancer patients treated between January 1, 2011–August 31, 2012. The study details were collected using a self-designed validated interviewer administered questionnaire. More than 50% of the primary care clinicians could not identify the cancerous lesions and gave false guidance to the patients. This is a cause for the delay and is considered as the 'secondary delay' and the maximum range of this delay is 240 days. The range for diagnostic and treatment delay was 300 days, and these come under 'professional delay'. A statistical significant association (p<0.05) was found when the Socio-economic status was compared with total time delay from first symptom to treatment. It is necessary to recommend development of preventive programs that focus on raising public awareness of the signs and symptoms of oral cancer that are essential for promoting earlier diagnosis and treatment in India. It is also the responsibility of the health care professionals to ensure that cancerous lesions are detected at the earliest and treated promptly. All together this will lead to earlier presentations faster diagnosis and better treatment outcomes for oral cancer.

Akram M, Siddiqui SA, Karimi AM. (2014)[100] analyzed the impact of various socio-demographic and psychosocial factors on the delayed reporting to Healthcare Professional (HCP) in oral and oropharyngeal cancer patients. This cross sectional observational study was conducted using a structured questionnaire. Questionnaire included questions to assess socio-demographic and psychosocial factors associated with delay. Delay was defined as time intervals of more than 3 month from first symptom recognition to first medical consultation to a HCP. Association of delay with these factors was analyzed using logistic regression analysis. Final analysis was done on 259 patients. Delay in reporting to HCP was present in 156 (60%) patients. Among socio-demographic factors delayed reporting was highly significant with older age group, low socioeconomic status, and rural residence and with insufficient knowledge of Head and Neck cancer. Sex and marital status were statistically insignificant factor for delay. Among psychosocial factors attribution of symptoms as minor, absence of fear and use of alternate therapy was significant factors responsible for delay. Disclosure to other and motivation were statistically insignificant in our study. The results of this study provide guidance towards interventions to reduce patient delay. Interventions should target the rural, older age group and lower socioeconomic population for educating them and to change their psychosocial behavior for oral and oropharyngeal cancer.

Sundresh J (2015)[101] conducted the study on secondary neck nodes from squamous cell carcinoma of 67 patients from Tamil Nadu with histologically proven squamous cell carcinoma with varying degrees of differentiation were included. Nine areas of the head and neck inclusive of five primary sites in the oral cavity and three in the oropharynx and the maxillary antrum were examined in the patients presenting with squamous cell carcinoma of the head and neck. It was found that 20% of the patients were in the age group of 31 to 40 years, 55% were in the age group of 41-50 years, 16.6% were in the age groups of 51 to 60 years and 8.3% were in the age group of 61 to 70 years. In patients with lesions smaller than 2 cm, 44.44% subjects had cervical node metastases; whereas in patients with lesion size between 2.1 to 4 cm, 75% had cervical node metastases. However, in subjects with lesion size above 4 cm, 100 % of the patients had cervical node metastases. Patients with large primaries of greater than 4 cm and those with higher histological grade ranging from moderate to poorly differentiated metastases showed a greater prevalence of nodal regional metastases

compared to the rest. With decreasing degree of differentiation, an increased prevalence of nodal metastases was observed and concluded that the highest prevalence of head and neck squamous cell carcinoma was observed in the fourth and fifth decades of life and base of the tongue, tonsils and soft palate and buccal mucosa were found to be the frequent sites of occurrence that progressed to metastases. Study also showed that, with increase in the size of tumor and a decrease in the degree of differentiation, the prevalence of cervical node metastases increased. A considerable proportion of study participants had advanced stage of the disease which shows that there is a negligence of oral hygiene and health care among the population. In order to prevent the increasing incidence of squamous cell carcinoma of the head and neck, there is an urgent need for educational campaigning against tobacco, betel leaves and nut and alcohol consumption. Also, the high risk populations should be screened early and the importance of diagnosing the disease early for the survival of the patient should be emphasized. Early diagnosis could also improve the quality of life and reduce cost of treatment in patients with squamous cell carcinoma of the head and neck. Though the study findings require validation through large scale studies, this study, in conclusion projects an early age of occurrence of squamous cell carcinoma in population and increase in cervical nodal metastases with increasing tumor size and decrease in degree of differentiation.

Das Neves J.C et al (2015)[102] conducted a quantitative cross-sectional study in 2007 to determine associations between the late diagnosis of oral cancer and demographic/clinical factors. Oral tumors were recorded based on the TNM staging system, with T1 and T2 considered early diagnosis and T3 and T4 considered late diagnosis. They found that patient age ranged from 30 to 105 years (mean: 64.7). Just over half of the patients (54.9%) resided in urban areas and approximately 1/4 (25.7%) had an agricultural occupation. The majority had smoking habits (89.9%) and consumed alcohol (62.5%). The most frequent tumor site was the tongue (42.4%), followed by the hard palate (19.2%) and lip (12.2%). The majority (70.1%) were in advanced stages (III and IV). A greater percentage of smokers were in advanced stages than non-smokers. The percentage of cases in the early stages was lowest when the tumor was located in the tongue (14.1%) and highest when located in the buccal mucosa (80.0%) and concluded that the main causes of the late diagnosis of oral cancer are insufficient training on the part of physicians and dentists in the field of

pathology, delays on the part of patients in seeking medical assistance and deficient access to quality medical care, reflecting the absence of preventive public health programs and an effective healthcare system. Greater attention to oral cancer should be given in the public healthcare system in Brazil, especially in the realm of primary care and prevention and the adequate training of healthcare professionals for the early diagnosis of potentially malignant tumours of the oral cavity. The public healthcare network should be capable of promptly treating such patients, thereby reducing the number of cases of advanced stages of the disease and allowing greater survival with an improved quality of life.

Lakshmaiah KC (2015)[103] carried out the prospective observational study "Locally advanced oral cavity squamous cell carcinoma: Barriers related to effective treatment" in a tertiary oncology center to analyze the scenario of locally advanced oral cavity cancer patients who received induction chemotherapy. Social reasons such as nobody being available to accompany patients to receive treatment and inability to bear expense of transportation to and from the hospital also had an impact on treatment adherence. As there are only a few government funded cancer centers which are often overburdened with patients and have a long waiting list, a prolonged delay for surgery date following good response to induction chemotherapy increasing tumor size rendering it inoperable was also a significant factor contributing to poor outcome in our patients. Proper implementation of health scheme is also important as delay in approval of individual treatment plan (approval for surgery following chemotherapy/ approval for radiation following surgery or chemotherapy) can be annoying for patients and their relatives who later on prefer for alternative treatment such as homeopathy or ayurvedic treatment.

Tiwari V, Yogi V, Ghori HU, Singh OP, Peepre K, Yadav S, Mohare C. (2015)[104] their aim was to identify the factors causing delayed initial diagnosis and subsequent management in patients presenting to the Oncology department. In their study three hundred proven cancer patients were prospectively evaluated for the pattern of presentation to the outpatient Department of Radiation Oncology of a Government Medical College (MC) in Central India. The mean age of presentation was 51.05 years (range 7 months-77 years). The number of male patients was 168 while females were 132. The duration of symptoms ranged from 20 days to 3 years. The number of

patients with little/no education presented mainly in advanced stages as compared to their educated counterpart and this difference was statistically significant ($p<0.001$). The number of patients presenting directly to the department was 108, those diagnosed outside and referred was 84 while those diagnosed and received some form of oncologic treatment outside and referred thereafter was 108. The difference in the primary delay between patients presenting directly to the MC versus those diagnosed outside was significant ($p=0.0126$). The mean duration of starting definitive treatment after presentation to the outpatient was 4.68 days (range 0-22 days) and was very significantly ($p< 0.001$) less than the secondary delays caused to the other two subsets of patients. They concluded that, factors causing delayed presentation are both patient and system related. It is imperative to educate the common people regarding the early signs and symptoms of cancer. At the same time, the system needs to overhaul its efficiency to avoid secondary delays that adversely affect the treatment outcome. An up gradation of the existing oncology facilities in the public sector can achieve this target efficiently.

Baishya N, Das AK, Krishnatreya M, Das A, Das K, Kataki AC, Nandy P (2015)[105] in their pilot study on factors associated with presentation delay in patients affected with head and neck cancers commented that, patient delay can contribute to a poor outcome in the management of head and neck cancers. The main objective of patients with cancers of the head and neck attending a regional cancer center of North East India were consecutively interviewed at the time of patient registration from June 2014 to November 2014. The participation of patients was voluntary. The questionnaire included information on age, gender, residential status, educational qualification, monthly family income, any family history of cancer, and history of prior awareness on cancer from television (TV) program and awareness program. They observed that, out of 311 patients, with an age range of 14-88 years (mean 55.4 years), 81.7% were males and 18.3% females (M:F=4.4). The overall median delay was 90 days (range=7 days-365 days), in illiterate patients the median delay was 90 days and 60 days in literate patients ($P=0.002$), the median delay in patients who had watched cancer awareness program on TV was 60 days and in patients who were unaware about cancer information from TV program had a median delay of 90 days ($p=0.00021$) and delay of <10 weeks was seen in 139 (44.6%) patients, a delay of 10-20 weeks in 98 (31.5%) patients, and a delay of 20-30 weeks in 63 (20.2%) patients.

They concluded that, education and awareness had a significant impact in reduction of median patient delay in our HNC cases.

Bhat S P, Bhat V, Permi H, Shetty J K, Aroor R, Bhandary S K. (2016)[106] conducted retrospective study of 202 histopathologically confirmed cases of oral and oropharyngeal malignancies in Justice K.S. Hegde Charitable Hospital, Mangalore to determining the distribution of oral and oropharyngeal malignancies in terms of age, sex, personal habits, symptoms, site, histopathological type and differentiation during the three years period between January 2011 and December 2013. Majority of the patients were males. Buccal mucosa was the commonest site of lesions. Half of them had history of smoking, whereas the remaining had history of smokeless tobacco consumption. One-third of the patients had history of alcohol consumption. However, 10.8% of the patients had no addictions and this group was dominated by females. In the current study, maximum number of cases was moderately differentiated (49.7%), followed by well differentiated in 34.7%, poorly differentiated in 14.9%, and undifferentiated in 0.4%. However in India, smoking, alcohol consumption and tobacco chewing are the common etiological factors. Anatomically, the anterior portion of the oral cavity is commonly involved, possibly due to the longer duration of contact with the carcinogens in tobacco and alcohol. Squamous cell carcinoma is the most common histological type. Verrucous carcinomas have a good prognosis and should be reported as a distinct entity. Clinicians should be aware that minor salivary gland tumors, non-Hodgkin lymphomas, and melanoma can occur in oral cavity, more commonly on the palate. This study reflects that there is an urge to raise awareness and educate people regarding detrimental effects of alcohol and tobacco consumption, importance of dental hygiene, oral self-examination and the availability of preventive health care services.

Warnakulasuriya S et al (2016)[107] conducted the study on understanding gaps in the oral cancer continuum and developing strategies to improve outcomes. They stated that, every year half a million people are diagnosed with oral and oropharyngeal cancer worldwide. On average 50% of them die with or of the disease within the first 5 years of diagnosis. Diagnostic delay in the detection of oral and oropharyngeal cancers is common. The data presented by their group has significant implications for future oral cancer policy and planning cancer services. Clearly, late detections pose a major public

health challenge in most countries in the world. Some methodological issues when researching referral delays in primary care need to be considered. They urge the forum to reflect on the over arching question on how to improve death rates from oral cancer. Although it is not known whether patient delay is a result of a lack of knowledge with regard to oral cancer signs and symptoms, public education is still paramount in raising people's awareness of oral cancer from an early age. To achieve this goal, targeted education campaigns through media to alert the public about the warning signs of oral cancer are needed. To reduce scheduling delays, medical and dental school training about this disease must be improved. Opportunistic oral cavity examinations with follow-up of suspicious lesions must be promoted to reduce the burden of disease. In addition, stronger evidence on the impact of delay on disease control could be achieved through better measurement of delay duration. More detailed studies relating delay to disease outcomes are needed. Views of patients and care givers are of critical importance for understanding any gaps in primary healthcare delivery. Such evidence would underscore the need for programs to educate high-risk persons and primary care providers about the importance of prompt referral in the presence of symptoms, and may also provide a stronger argument than is currently available for opportunistic screening of high-risk persons for oral cancer whenever possible. The study of patients' visits to primary care facilities prior to a cancer diagnosis can identify determinants and populations at risk of a delayed diagnosis. Development of early detection guidelines will help to configure optimal diagnostic assessment programs. Evidence-based guidelines with standards of care that suit local settings are fundamental for improving the quality of care delivered when a person presents to a GP or a dentist with a suspicious sign or symptom that needs an urgent referral

Naseer R, Naz I, Mahmood MK (2016)[108] studied the f**requency of delayed diagnosis** of oral squamous cell carcinoma in Pakistan. Their objectives was to determine the frequency of delayed diagnosis of oral squamous cell carcinoma highlighting factors responsible for any delay and their possible relevance to demographic and diagnostic features. This cross sectional study of six months duration was conducted in the Oral and Maxillofacial Surgery Department of the Armed Forces Institute of Dentistry, Rawalpindi, Pakistan. A total of 246 patients, both male and female, having a biopsy proven definitive diagnosis of oral squamous cell carcinoma were included using a consecutive sampling technique. Delay in

diagnosis was assessed from the stated period of time from when the patient first noticed symptoms of disease until a definitive diagnosis was made. Delayed diagnosis was considered if this was more than 40 days. In their study **t**he ages of patients ranged from 27 to 60 years with a mean of 46.7 ± 10.2 years and a marked male predominance (3.7:1). Delayed diagnosis was observed in 91.5% of cases. However, statistically no significant differences were found with age, gender, marital, education status, household income and time of biopsy. Their primary finding of delayed diagnosis with no prior contact with any health care professional clearly reflects a need of taking urgent measures to avoid serious impacts on morbidity and mortality associated with oral squamous cell carcinoma.

Reducing the time between the onset of the first symptoms of cancer and the first consultation with a doctor (patient delay) is essential to improve the vital prognosis and quality of life of patients. Longer patient delay is linked to the already known sociodemographic, socioeconomic, socioeducational, sociocultural and socioprofessional factors. However, recent data suggest that some sociocognitive and emotional determinants may explain patient delay from a complementary point of view. The main objective of this study is to assess whether, in head and neck cancer, patient delay is linked to these sociocognitive and emotional factors, in addition to previously known factors.

MATERIALS AND METHODS

Type of study: Cross-sectional.

Venue of research: Department of Oral Medicine and Radiology, Sharad Pawar Dental College, Datta Meghe Institute of Medical Sciences, (Deemed University) Sawangi (Meghe), Wardha.

Sample size: 120 subjects who were willing to voluntarily participate in the study.

Sampling Strategy: Patients visiting the Outpatient Department (OPD) of Oral Medicine and Radiology were screened. Histopathologically diagnosed cases of OSCC were included in the study. The study subjects were explained about the objectives and purpose of the study and written informed consent was taken from all those patients who accepted to participate in the study.

Inclusion criteria:

120 subjects with histopathologically confirmed diagnosis of oral squamous cell carcinoma (OSCC) coming from rural areas to the outpatient Department of Oral Medicine and Radiology, Sharad Pawar Dental College, Sawangi (Meghe), Wardha,

Exclusion criteria:

1. Malignancies other than oral squamous cell carcinoma
2. Patients from urban area
3. Medically compromised patients

Duration of Study: 4 years; February 2013 to January 2017

Sample size calculation

SAMPLE SIZE:- No. of samples were selected using,

- SS=$\frac{Z^2\times(P)\times(1-P)}{C^2}$, where,
- Z=Zvalue=1.96

  P=Percentage of picking a choice expressed in decimals=0.5

  C= Confidence interval (95%) i.e.0.5
- New SS=$\frac{SS}{1+\frac{SS-1}{Population}}$, where population is patients attended OPD of particular case in last 1 year.

SS= Z^2 x(P) x(1-p) / C^2

SS= $(1.96)^2$ x (0.5) X (1-0.5) / $(0.05)^2$

SS= 8.84 x 0.5 x 0.5 / 0.0025

SS= 0.96 / 0.0025 = 384

New SS = SS/ 1+ (SS-1/ POP)

New SS = 384/ 1+ (384-1/POP)

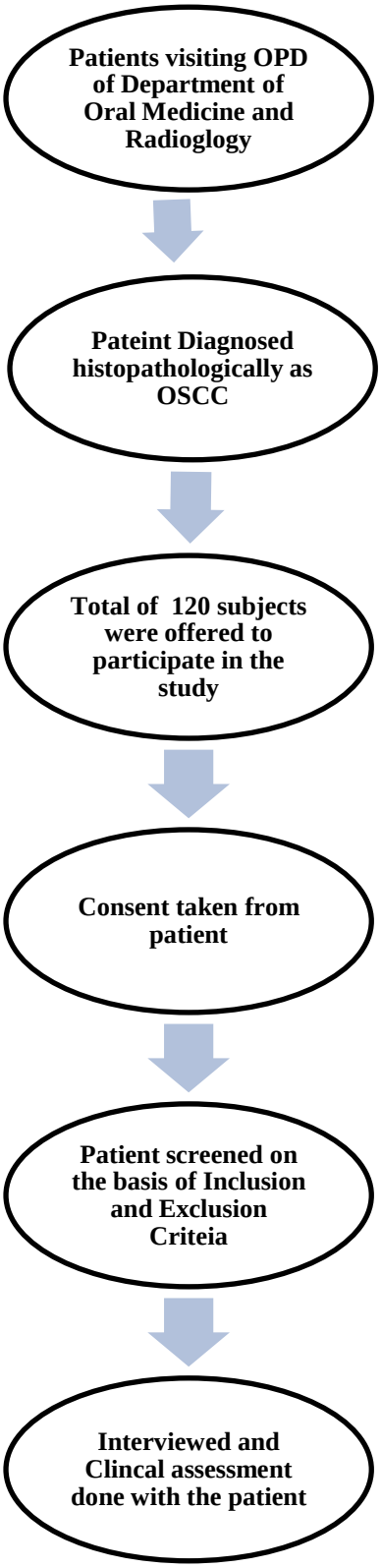
= 384/ 1+(383/POP)

= 384/ (POP+383/POP)

= 384/3.2

= 120

Flow chart showing the recruitment of patients in the study



STUDY PROTOCOL:

- Confirmation of diagnosis of OSCC by histopathology report
- Briefing of study subjects about the study.
- An informed consent was taken
- Clinical history and Examination
- Evaluation of psychosocial and socioeconomic status
- Evaluation of primary, secondary, professional/ referral and total delay.

METHODOLOGY

After obtaining the prior approval from the Institutional ethics committee (Annexure I) of Datta Meghe Institute of Medical Sciences Sawangi (Meghe) Wardha the present study was carried out in the Department of Oral Medicine and Radiology, Sharad Pawar Dental College and Hospital, Sawangi (Meghe) Wardha.

The study subjects residing at rural area and those who came to OPD of Oral Medicine and Radiology, Sharad Pawar Dental College and Hospital Sawangi (Meghe) Wardha.

For this cross-sectional study, total 120 subjects of histopathologically confirmed diagnosis of oral squamous cell carcinoma coming from rural area were included. All the subjects were provided and explained a written informed consent in their vernacular language. Subjects signed the consent form before they were included in the study.

After taking a written informed consent (Annexure II) from the patient, they were briefed about the study and a thorough case history was taken according to the proforma and prior consent attached in the study including demographic data like age, gender, education, occupation and income adverse habit, history about other risk factors etc. A complete clinical examination of the oral cavity was carried out under aseptic examination procedure using a sterile mouth mirror and probe under artificial light.

Data Collections Tools:

1. Structured case history proforma and thorough clinical examination (Annexure III)
2. Structured, pre-designed, pre-tested psychological stress presumptive stressful life event scale given by Gurumit Singh et al[109] instrument containing 51 closed ended questions (items) for knowing their psychological stress. (Annexure IV).

3. Structured, pre-designed, pre-tested Aggarwal OP et al (2005)[110] instrument containing 22 closed ended questions (items) for knowing their SES. (Annexure V).
4. Evaluation of Delay I Diagnosis: pre-designed, pre-tested evaluation form (Annexure VI)

Oral Examinations:

Oral Examination was done for each patient.

Materials:

A. For Examination of the patients:

1. Physiological dental chair with illumination.
2. Mouth mask
3. Sterile gloves
4. Plain mouth mirror
5. Straight Probe
6. Explorer
7. Kidney tray
8. Cotton, Gauze
9. Cheek Retractor

A complete examination of head and neck region was performed to assess the precise location and extent of the primary tumor and to identify regional metastatic disease.

On inspection, various findings were taken in to consideration:

1. Appearance: Ulcerative/Proliferative / Ulceroproliferative / Infiltrating /Exophytic
2. Location / Site of involvement
3. Size in cms
4. Color of the lesion

On palpation, various findings were taken in to consideration:

5. Local temperature
6. Consistency
7. Fixity of the lesion
8. Tenderness of the lesion
9. Status of the teeth in the vicinity

TNM clinical staging was done and details like antero-posterior width of tumour, size and no. of lymph nodes (bilaterally / ipsi-laterally) involved was examined.

All the relevant data regarding the patient including age, sex, duration of habit, type and form of tobacco consumption, frequency of habit, clinical location and type of lesion, TNM Staging, psychosocial stress score, socioeconomic status, primary, secondary, professional and total delay, Height, Weight and Body Mass Index was entered in Master Chart.

Evaluation of psychosocial and socioeconomic status

For psychological stress the patients were interviewed and subjected to presumptive stressful life event scale given by Gurumit Singh Kaur [109]was used.

Method for estimation of psychological assessment of stress

For psychosocial stress, structured, pre-designed, pre-tested psychological stress presumptive stressful life event scale instrument containing 51 closed ended questions (items) for knowing their psychological stress **(Annexure IV)** was used. The measuring instrument of psychological stress to assess the stress was applied to all patients. Presumptive Stressful Life Events Scale (PSLES) by Gurmeet Singh, Dalbir Kaur, Harsharan Kaur, which allowed to know the degree of stress, was subjected to all 120 subjects. PSLES is a modified scale of Holme's and Raphe's Social Readjustment Rating Scale (SRRS), mainly for the Indian population. The instrument consists of 51 oriented items to search the changes or recent experiences in past 12 months. The questionnaire was applied to all patients in his/her native language.

Every item or event of the scale has their mean score of highest 95 to the lowest 20. Total score was calculated by adding all individual item scores that the person had experienced. Scoring criteria as per the original author recommendation was applied in the study.

Instrument (Scale) for Measuring the Socioeconomic Status

Structured, pre-designed and pre-tested, Aggarwal OP et al (2005)[110] instrument, containing 22 closed ended questions (items) for knowing the SES of all 120 patients of the study **(Annexure V)**.

The proforma has largely included family parameters and very few are based on head of the family. The proforma has been developed for all sections of the society.

Definition of a family:

It includes nuclear or joint family with a married couple with unmarried children or without children. Head of the family will be either husband/wife. Dependent father/mother/brother/sister does not become head of the family unless he/she is earning and one kitchen with pooled income is managed by him/her.

SCORING SYSTEM

Sr. No	Social Status	Score
1	Upper High	>76
2	High	61-75
3	Upper Middle	46-60
4	Lower Middle	31-45
5	Poor	16-30
6	Very Poor or Below Poverty Line <15	<15

Evaluation of delay in diagnosis

Pre-designed, pre-tested evaluation form (Annexure VI)

All the patients were enquired about the length of time, from the time at which the patient first became aware of the symptoms to his or her visit to a primary care clinician. A complete clinical examination of all the 120 OSCC patients was carried out, and the cases were clinically categorized according to clinical TNM (tumor, node, and metastasis) staging into stage I, II, III and IV.

For exploring period of delay in diagnosis: a self designed, structured, pretested and validated questionnaire incorporated in case history proforma (Annexure VI)

Diagnostic delay was measured as follows:

- Primary delay: The length of time between a patient's first awareness of symptoms of oral cancer and their first consultation with a primary care clinician.
- Secondary delay: The length of time between a patient was seen by the primary care clinician to the time when the patient was seen by the specialist.
- Referral/ Professional delay: The time period between initial evaluations by a primary care provider to referral to a specialist, is termed referral delay.
- Total delay: The overall diagnostic delay in oral cancer includes the period elapsed between the first symptom or sign and the definitive diagnosis.

STATISTICAL ANALYSIS:

The tabulations of the results were done for the Oral squamous cell carcinoma patients. All the variables from the study were statistically analyzed for the mean values, standard deviation, standard error, range, and "P" value. Evaluation of results and statistical analysis was carried out using "Chi" Square test. In all the above tests, "P" value < 0.05 was taken to be statistically significant; "P" value > 0.05 was taken to be statistically not significant, and "P" value < 0.01 was taken to be statistically highly significant.

The data was analyzed using SPSS 22.0 version.

The confidence interval of the difference in the present study was 95%.

Data Entry and Statistical Analysis

Data collected was entered in computer software EPI Info version 6.00 and analyzed using the same software.

Data Analysis was done in following parts:

I: Description of Study Participants: Descriptive Statistics

II: Association between different variables:

Appropriate statistical test was applied to determine the association between variables. P value of less than 0.05 (< 0.05) was considered to be significant.

Statistical Formulae:

Descriptive Analysis: Descriptive statistical analysis (i.e. mean and standard deviation) was obtained by calculating the mean and standard deviation.

Descriptive analysis was done for each variable. The following calculation was used for descriptive Statistics:

Percentage = n x100/ total (N)

Mean = $\bar{X} = \frac{\sum X}{n}$

Where

X= sum of total readings

n= number of samples

Standard Deviation (σ):

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}$$

Where,

Xi- individual values

n- Number of samples

Confidence Interval:

$$\overline{X} \pm 1.96\,\sigma/\sqrt{n}$$

The Chi Square test (χ^2) value:

$$\chi^2 = \sum_{i=1}^{n}\frac{(O_i - E_i)^2}{E_i}$$

Where O = Observed value

E = Expected Value = R X C / N,

Where R = Row Total

C = Column total

N = Grand Total

Z test Value for two sample means:

Z = Difference between Means of two sample mean / SE ($x_1 - x_2$).

Where $SE(x_1 - x_2) = [(SE_1^2 + SE_2^2)]^{½}$

$= [SD_1^2/n_1 + SD_2^2/n_2]^{½}$

R test for Pearson coefficient correlation test was calculated.

One way ANOVA for F value and p value was also calculated wherever deemed necessary.

PLATE I

FIG 1: Armamentarium used for Clinical examination

FIG 2: Intraoral malignancy involving alveolar mucosa, gingivo-buccal sulcus and buccal mucosa

OBSERVATIONS AND RESULTS

The present study was undertaken to evaluate "**Psychosocial and Socioeconomic Risk Factors of Oral Squamous Cell Carcinoma and their Association with Delay in Diagnosis in Rural Area".**

For the present study, total 120 histopathologically confirmed OSCC patients were included. After taking, prior consent thorough case history according to the proforma attached in this study was taken and the clinical examination of the oral cavity was carried out. Each and every subject in the study was evaluated for psychosocial and socioeconomic status using the structured proforma.

Table 1 and Graph No. 1: Sex wise distribution of total 120 OSCC patients: showed that, there were 94 (78.33%) males and 26 (21.66%) females out of **120 OSCC patients** which showed male predominance with 3.61:1 ratio.

Table No. 2 and Graph 2: Age wise distribution of OSCC patients: showed that, all the subjects studied were between the age group of 27 to 85 years with mean age 51.3±12.6 years. Out of 120 OSCC subjects, none was between 11 to 20 years, 09(7.5%) subjects were between 21 to 30 years, 24(20%) were between 31 to 40 years of age, 33(27.5%) were between 41 to 50 years of age, 28(23.33%) were between 51 to 60 years of age, 23(19.16%) were between 61 to 70 years, 02(1.66%) were between 71 to 80 years. and 01(0.83%) were between 71 to 80 years. The mean age was 51.3 ± 12.6 years (Mean ± SD).

Table No. 3 and Graph No.3: Habit wise distribution in OSCC patients:

Habit wise distribution in OSCC and control subjects revealed that, among the 120 OSCC patients, 57(47.50%) had habit of tobacco quid (tobacco + lime), 25 (20.83%) betel nut quid (betel nut + tobacco+lime),15 (12.50%) bidi,14 (11.66%) were having both betel nut quid and tobacco quid, 13 (10.83%) betel leaf quid with tobacco and 12 (10.00%) betel nut. Along with one of the above habits 42(35.00%) were having alcohol 53(44.16%) were using snuff/gul/gudakhu for teeth cleaning. (Table 5, Graph 5)

Table No.4 and Graph No. 4: Site wise distribution in 120 OSCC subjects:

Site wise distribution in 120 OSCC subjects, revealed that out of 120 subjects of OSCC, 76 (63.33%) were involving gingivo-buccal sulcus and/ labial sulcus,

alveolus, buccal/labial mucosa, 18 (15.00%) were involving commissural area, labial and/buccal mucosa, 15 (12.50%) were involving tongue, 05 (4.16%) were involving alveolus lingual sulcus, floor of mouth and /tongue, 03 (2.50%) were involving palate, alveolus, and / gingivo-buccal sulcus, and 03 (2.50%) were involving maxillary antrum, alveolus and/palate. It was found that involvement of alveolus, buccal/labial mucosa, and/gingivo-buccal sulcus and/ labial sulcus was the most frequently encountered site which can be attributed to tobacco quid and betel nut quid and betel leaf quid keeping habit.

Psychosocial and Socioeconomic Risk Factors of Oral Squamous Cell Carcinoma

Table No. 5: Frequency of particular psychosocial stress score in OSCC patients

Revealed that, the financial loss *or* problems was encountered by all the 120 (100%) patients; followed by marriage of daughter or dependant in 23(19.16%); family conflict in 21(17.50%); death, of close family member in 12(10.00%); excessive alcohol or drug use by family member in 10(08.33%); property or crops damaged in 8(06.66%); death of spouse in 6(05.00%); illness of family member in 6(05.00%); lack of son in 6(05.00%); son or daughter leaving home in 4(03.33%); Suspension or dismissal from job in 03(02.50%); major purchase or construction of house in 03(02.50%); marital separation/divorce in 2(01.66%) cases; marital conflict in 2(01.66%); self or family member unemployed in 2(01.66%); lack of child in 1(0.83%); large loan in 1(0.83%); appearing for an examination or interview in 1(0.83%); trouble with neighbor in 1(0.83%) cases. The mean stress score of OSCC patients was 105.76±36.94.

Table No. 6 and Graph No. 5: Monthly per capita income from all sources of OSCC patients

Monthly per capita income from all sources (total monthly income /no. of family members) revealed that, out of 120 OSCC patients, none were having monthly per capita income greater than Rs.50,000/-, 07 (5.83%) were having Rs. 20000-49999, 13 (10.83%) were having Rs. 10000-19999/-, 32 (26.66%) were having Rs. 5000-9999/-, 62 (51.66%) were having Rs 2500-4999/-, 06 (5.00%) were having Rs.1000-2499/- and none were having less than Rs.1000/- monthly per capita income from all sources.

Table No 7: Educational status of OSCC patients

Educational status revealed that, out of 120 OSCC patients, 01 (0.83%) was post graduate, 05(4.16%)) were graduates, 37(30.83%) were 10th class pass but less than graduate, 40(33.33%) were primary pass but less than 10^{th}, 10(8.33%) were primary but attended school for at least one year, and 27(22.50%) were illiterate.

Table No. 8: Occupation wise distribution of 120 OSCC patients

Occupational status of OSCC subjects revealed that, 01(0.83%) patient had state government service, 16(13.33%) had service in private sector or independent business employing 2-20 persons, 36(30.00%) had service at shops/ transport/ **own cultivation of land**, 40(33.33%) self employed with income greater than Rs.5000/- (farm worker /laborer) and 27(22.50%) self employed with income less than Rs.5000/- (farm worker /laborer, house wife).

Table No 9 and Graph No. 6: Distribution of OSCC patients according to socioeconomic status.

Distribution of OSCC subjects according to socioeconomic status showed there was no patient from very high, high and very poor categories, 15(12.50%) were from upper middle SES, 38(31.66%) were from lower middle SES, 67(55.83%) poor SES. The mean SES score was in 120 in OSCC was 33.37±8.93.

The data obtained was compared within the various socioeconomic status of OSCC group and subjected to chi square test, x^2 value was 140.60; p-value was 0.0001 suggesting statistically significant difference within the SES of OSCC subjects.

Table 10 and Graph No. 7: Correlation of mean psychosocial stress score with mean SES score

Revealed that, in OSCC patients, the mean psychosocial stress score was 105.76±36.94 and the mean SES score was 33.4±8.93. The data obtained was subjected to Pearson correlation test and the r value was 0.15 and p was 0.084 suggesting positive correlation between psychosocial stress and SES of OSCC group.

Table No. 11 and Graph Nos. 8a, 8b, 8c: Correlation of mean psychosocial stress score with mean UM, LM and Poor SES scores

Revealed that, the mean psychosocial stress score in UM SES was 108.1±30.59 and the mean socioeconomic status score in UM SES of OSCC group was 48.9±3.68.

The data obtained was subjected to Pearson correlation test and the r value was 0.09and p was 0.72, suggesting positive correlation between psychosocial stress and UM SES of OSCC group.

The mean psychosocial stress score in LM SES was 113.63±29.79 and the mean socioeconomic status score in LM SES of OSCC group was 39.3±29.8. The data obtained was subjected to Pearson correlation test and the r value was 0.05 and p was 0.72, suggesting positive correlation between psychosocial stress and LM SES of OSCC group.

The mean psychosocial stress score in Poor SES was 100.8±41.26 and the mean socioeconomic status score in Poor SES of OSCC group was 26.6±3.78.

The data obtained was subjected to Pearson correlation test and the r value was 0.12 and p was 0.31 suggesting positive correlation between psychosocial stress and Poor SES of OSCC group.

Table No. 12 and Graph No. 9: Age of starting habit in OSCC patients.

Age of starting habit in OSCC subjects revealed that, 69 (57.50%) subjects started habit between 11-20 years. Fifty (41.66%) subjects between 21-30 years and only 1(00.83%) subject of OSCC started habit between 31-40 years. The lowest age starting habit was 15 years and highest age starting habit was 32 years with the mean age of starting habit was 21.10±3.02

Table No. 13 and Graph No. 10: Association of 120 OSCC subjects according to age of starting habit and according to SES (UM, LM, POOR).

The age of starting habit in OSCC subjects revealed that, 69(57.50%) subjects of OSCC started habit between 11-20 years. Out of these 69 OSCC patients, 02(2.89%) were from upper middle SES, 18(26.08%) were from lower middle SES and 49(71.01%) were from poor SES suggesting that, people with poor SES start adverse habit at lower age. Fifty (41.66%) subjects of OSCC started habit between 21-30 years. Out of these 50 OSCC patients, 12(24.00%) were from upper middle SES, 20(40.00%) were from lower middle SES and 18(36.00%) were from poor SES. One (00.83%) subject of OSCC started habit between 31-40 years which was in upper middle SES.

When the age of starting habit within 120 OSCC subjects according to SES, was subjected to one way ANOVA test, F value was 25.51 and p value was p=0.0001, suggesting statistically significant difference in age of staring habit in OSCC and control subjects according to SES.

Table No. 14 and Graph No. 12: Frequency of habit among OSCC Subjects.

Frequency of habit among **OSCC** subjects revealed that, out of 120 OSCC subjects, 62(51.66%) patients had frequency of habit 1-5 times per day, 53(44.16%) had 6-10 times per day, 04(03.33%) had from 11-15 times per day, 01(00.83%) had 21-25 times per day. The mean frequency of habit in OSCC was 5.85±2.015.

Table No. 15: Distribution of 120 OSCC subjects according to duration of adverse habit

Revealed that, out of 120 OSCC subjects, 02(01.66%) patients had duration of habit upto 5 years, 05(04.16%) had from 6-10 years, 07(05.83%) had from 11-15 years, 20(16.66%) had from 16-20 years, 22(18.33%) from 21-25 years, 10(08.33%) had from 26-30 years, 11(09.16%) had from 31-35 years, 14(11.66%) had from 36- 40 years, 20(16.66%) had from 41-45 years, 06(05.00%) had from 46-50 years, 01(00.83%), 02(01.66%) had from 51-55 years. The mean duration of habit in OSCC was 29.50±12.32.

Table No.16: Distribution of mean age of starting habit, mean duration and mean daily frequency of habit in OSCC subjects.

The mean age of starting habit was 21.10±3.02. The mean duration of habit was 29.50±12.32. The mean frequency of habit was 5.85±2.

Table No. 17: Statistical correlations of mean age of starting habit, mean duration and mean daily frequency in OSCC subjects.

There was negative correlation between mean age of starting habit and mean duration of habit starting habit and mean duration of habit (r was -0.108, p value was 0.242).

There was positive correlation between mean age of habit and mean daily frequency of habit (r value was 0.83 and p=0.083)

There was positive correlation between mean daily frequency of habit and mean duration of habit (r value was 0.121and p=0.189).

Table No.18 and Graph No.16: Correlation between mean age of staring earning and mean age of starting habit in OSCC patients

Illuminated that, the mean age of starting earning was 18.30±2.33and the mean age of starting habit was 21.10±3.02. The data obtained was subjected to Pearson correlation test, r-value was 0.646, and the p value was, p=0.0001showing positive correlation between mean age of staring earning and mean age of starting habit in OSCC patients.

Table No. 19 and Graph No. 17a, 17b, 17c.: Correlation of mean age of starting habit and mean age of starting earning according to SES (UM, LM AND POOR) in OSCC subjects.

Showed that, in UM SES of **OSCC,** the mean age of starting habit was 24.60±3.86 and the mean age of starting earning was 21.06±3.01. The data obtained was subjected to Pearson correlation test, r-value was 0.462, and the p value was, p=0.083 showing positive correlation between mean age of starting habit and mean age of staring earning in UM SES of OSCC patients.

In LM SES of **OSCC,** the mean age of starting habit was 22.23±3.14 and the mean age of starting earning was 18.97±2.29. The data obtained was subjected to Pearson correlation test, r-value was 0.507, and the p value was, p=0.001 showing significant positive correlation between mean age of starting habit and mean age of staring earning in LM SES of OSCC patients.

In Poor SES of OSCC, the mean age of starting habit was 19.68±1.50 and the mean age of starting earning was 17.31±1.40. The data obtained was subjected to Pearson correlation test, r-value was 0.468, and the p value was, p=0.001,S showing significant positive correlation between mean age of starting habit and mean age of staring earning in Poor SES of OSCC patients.

Table No. 20 and Graph No. 18: Reasons for starting adverse habit in OSCC subjects

Various reasons for starting adverse habit in OSCC and control subjects revealed that, 40(33.33%) started habit to accompany their friends or co-workers, 30 (25.00%) as a part of traditions, 16 (13.33%) to time pass/ unoccupied, 15 (12.50%) to extend their hunger, 15 (12.56%) for motion related problems, 04 (3.33%) to increase the capacity of working.

Table No. 21: Distribution of 120 OSCC subjects associated with oral precancer (OPC) Distribution of 120 OSCC subjects associated with oral precancer (OPC) revealed that out of 120 OSCC patients, 32 (26.66%) were also associated with OPC. Out of 32 OPC patients, 23 (19.16%) patients also had oral submucous fibrosis (OSMF), 8 (6.66%) had leukoplakia and 01 (0.83%) had OSMF and leukoplakia both. Out of 23 OSMF patients 17 (73.91%) were males and only 06 (26.08%) were females which shows high male predominance. Out of the 8 (6.66%) leukoplakia patients, 7 (87.5%) were males and only 01 (12.5%) were females and 01 (0.83%) patient had both OSMF and leukoplakia which again show highest male predominance in this group.

Table No. 22 and Graph No. 19: Distribution of 32 OPC subjects according to SES

Showed that out of 32 (26.66%), 23 (19.16%) patients also had oral submucous fibrosis (OSMF). Out of 23 OSMF patients, 05(15.62%) were from UM SES, 07(21.87%) were from LM SES and 11(34.37%) were from Poor SES.

Out of 32 OPC patients, 8 (6.66%) had leukoplakia. Out of the 8 (6.66%) leukoplakia patients, none were from UM SES, 01(3.12%) were from LM SES and 06(18.17%) were from Poor SES.

Out of 32 OPC patients, 01 (0.83%) had OSMF and leukoplakia both and this 01(3.12%) was from UM SES.

The data obtained was subjected to chi square test x^2 value was 1826, p=0.0011showing non significant difference.

Table No. 23: Distribution of 32 OPC subjects according to whether consultation sought for OPC.

Out of 23 (71.87%) patients of OSMF, 02(08.69%) were not aware of OPC or it was an incidental finding, 09(39.13%) were aware of OPC but did not consult, 04(17.29%) were aware of OPC, took treatment, but got no complete relief therefore continued the habit, 08(34.78%) were aware of OPC, took treatment but did not continue the treatment because could not quit habit.

Out of 8 (25.00%) leukoplakia patients, 05 (62.8%) were not aware of OPC or it was an incidental finding, 03(37.5%) were aware of OPC but did not take treatment,

01(12.5%) were aware of OPC, took treatment but did not continue the treatment because could not quit habit.

Out of 32 OPC patients 01 patient had both OSMF and leukoplakia he was aware of OPC, took treatment but did not continue treatment because could not quit habit.

Table No. 24 and Graph No. 20: Oral hygiene habits in OSCC

The oral hygiene practice wise distribution showed that, out of 120 subjects, 53(44.16%) were using snuff/gul/gudakhu for cleaning teeth, 52(43.33%) were using local dant manjan, 06(05.00%) were using ash/coal powder/tooth powder and only 09 (7.50%) were using tooth paste and brush for cleaning teeth.

Table 25 and Graph No. 21: Distribution of 120 OSCC subjects according to severity of body mass index (BMI).

Distribution of body mass index in 120 OSCC subjects showed that, 93(77.5%) patients were severe and moderately underweight (UP TO 16.99 kg/m^2), 16(13.33%) patients were mild underweight (17.00 TO 18.49 kg/m^2), 11(09.16%) were normal (18.50 to 24.99 kg/m^2).

Mean BMI of OSCC subjects was 15.25 with standard deviation of 2.27 and 95% confidence interval being 14.84-15.67.

Table 26: Distribution of 120 OSCC subjects according to severity of body mass index (BMI) and SES (UM, LM, POOR)

Association between socioeconomic status and body mass index in 120 OSCC subjects revealed that, out of 15(12.50%) patients of upper middle SES, 12(80.00%) patients were severe and moderately underweight, 03(20.00%) were mild underweight.

Out of 38(31.6%) patients of lower middle SES, 25(65.78%) patients were severe and moderately underweight, 06(15.70%) were mild underweight and BMI of 07(18.42%) patients was normal.

Out of 67(55.83%) patients of poor SES, 56(83.58%) patients were severe and moderately underweight, 08(11.94%) were mild underweight and BMI of 03(04.47%) patients was normal.

The data obtained was subjected to chi square test x^2 value was 28.68 and the p value was 0.0001 suggesting statistically significant difference between body mass index of OSCC and UM, LM and Poor SES.

Table 27: Type of diet in OSCC subjects

Revealed that, 97 (80.83%) of OSCC and 90(75.00%) of control subjects used to take mixed diet; 23(19.16%) subjects of OSCC and 30(25.00%) used to take vegetarian diet.

Table No. 28 and Graph No. 22: Category wise distribution of OSCC subjects

In OSCC group, the category wise distribution showed that, out of 120 subjects, 14(11.66%) were from open category, 49(40.83%) were from OBC, 21(17.50%) from SC, 21(17.50%) from ST and 15(12.50%) were from NT category.

Table 29: Association of category, SES and education in OSCC subjects

Out of 14 (11.66%) patients of **open** category, 3(21.42%) were from upper middle, out of these 3 patients, 02(66.66%) patients were primary pass but less than 10^{th} pass, 01(33.33%) was 10th pass but less than graduation.

Out of 14 (11.66%) patients of open category, 5(35.71%) were from lower middle SES, out of these 5 patients, 01 (20.00%) was illiterate, 01(20.00%) primary pass but less than 10^{th} pass, 03 (60.00%) 10th pass but less than graduation.

Out of 14 (11.66%) patients of open category, 6 (42.85%) were from poor SES, out of these 6 patients, 01(16.66%) was illiterate, 01(16.66%) was less than primary, 03

(50.00%) were primary pass but less than 10^{th} pass, 01(16.66%) was10th pass but less than graduation. The data obtained was subjected to chi square test and x^2 value was 103.4,p=0.0001 suggesting statistically significant correlation between educational status of open category subjects and their SES.

Out of 49 (40.83%) patients of OBC category, 9(18.36%) were from upper middle SES, out of these 9 patients, 03(33.33%) patients were primary pass but less than 10^{th} pass, 02 (22.22%) were 10th pass but less than graduation, 03 (33.33%) were graduate and 01(11.11%) was with professional qualification.

Out of 49 (40.83%) patients of OBC category, 19 (38.77%) were from lower middle SES, out of these 19 patients, 01(5.26%) was illiterate, 09(47.36%) were primary pass

but less than 10th pass, 08(42.10%) were10th pass but less than graduation, 01(5.26%) was post graduate.

Out of 49 (40.83%) patients of OBC category, 21 (42.85%) were from poor SES, out of these 21 patients, 06 (28.51%) were illiterate, 13(61.90%) were primary pass but less than 10th pass, 02 (9.52%) were10th pass but less than graduation.

The data obtained was subjected to chi square test, x^2 value was155.7, p=0.0001, suggesting statistically significant difference between educational status of OBC category subjects and their SES.

Out of 21(17.50%) patients of SC category, 1(4.76%) was from upper middle, out of these 1 patient, 01(100%) patient was primary pass but less than 10th pass.

Out of 21(17.50%) patients of SC category, 7(33.33%) were from lower middle SES, out of these 7 patients, 05(71.42%) were primary pass but less than 10th pass, 02(28.57%) were10th pass but less than graduation.

Out of 21(17.50%) patients of SC category, 13(61.90%) were from poor SES, out of these 13 patients, 03(23.07%) were illiterate, 01(7.69%) was less than primary, 05

(38.46%) were primary pass but less than 10th pass, 03(23.07%) was10th pass but less than graduation, 01(7.69%) were graduate. The data obtained was subjected to chi square test, x^2 value was 132.7, p=0.0001, suggesting statistically significant correlation between educational status of SC category subjects and their SES.

Out of 21(17.50%) patients of ST category, 2(9.52%) were from upper middle, out of these 2 patients, 01(50.00%) patient was primary pass but less than 10th pass, 01(50.00%) was 10th pass but less than graduate.

Out of 21(17.50%) patients of ST category, 2 (9.52%) were from lower middle SES, out of these 2 patients, 02(100%) were10th pass but less than graduation.

Out of 21(17.50%) patients of ST category, 17(80.95%) were from poor SES, out of these 17 patients, 10(58.82%) were illiterate, 06(35.29%) were primary pass but less than 10th pass, 02(9.52%) were10th pass but less than graduation.

The data obtained was subjected to chi square test, x^2 value was 241.8, p=0.0001, suggesting statistically significant correlation between educational status of ST category subjects and their SES.

Out of 15(12.50%) patients of NT category, none was from upper middle.

Out of 15(12.50%) patients of NT category, 4 (26.66%) were from lower middle SES, out of these 4 patients, 01(25.00%) was illiterate, 03 (75.00%) were10th pass but less than graduation.

Out of 15(12.50%) patients of NT category, 11(73.33%) patients were from poor SES, out of these 11 patients, 08(72.72%) were illiterate, 02(18.18%) were primary pass but less than 10^{th} pass, 01(9.09%) was10th pass but less than graduation.

The data obtained was subjected to chi square test, x^2 value was 67.45, p=0.0001, suggesting statistically significant correlation between educational status of NT category subjects and their SES.

Psychosocial and Socioeconomic Risk Factors of Oral Squamous Cell Carcinoma and its Association with Delay in Diagnosis

Table No.30 and Graph No. 23: Distribution of 120 OSCC patients according to presenting complaints.

Distribution of 120 OSCC patients according to presenting symptoms (Table 46 and Graph)revealed that, 59(49.16%) consulted for pain, 16 (13.33%) for pain and mobility of tooth or exfoliation of teeth in the vicinity, 15 (12.50%) for extra oral swelling with or without pain, 11 (09.16%) for bleeding from the lesion, 08 (6.66%) for non healing ulcer, 07 (05.83%) for increase in the size of lesion and 04(03.33%) for reduced mouth opening.

Table No. 31 and Graph No. 24: Distribution of 120 OSCC patients according to TNM staging.

Distribution of 120 OSCC subjects according to TNM staging revealed that out of 120 OSCC patients, none were from stage I, 4(03.33%) cases were from stage II, 31(25.83%) were from stage III and 85(70.83%) were from stage IV.

Table No. 32 and Graph No. 25: Distribution of 120 OSCC subjects according to histopathological grading.

Distribution of OSCC subjects according to histopathological grading revealed that out of 120 OSCC patients, 46 (38.33%) were having well differentiated squamous cell carcinoma, 60 (50.00%) were from moderately differentiated and 14 (11.66%) were poorly differentiated squamous cell carcinoma.

Table 33 and Graph No. 26: Association between psychosocial stress score and TNM staging in OSCC subjects

Association between TNM staging and psychosocial stress in 120 OSCC patients revealed that, Out of 4(03.33%) cases from TNM stage II, all 04(100%) cases were having stress score between 149 -101.

Out of 31(25.83%) cases of TNM stage III, 01(3.22%) cases was having stress score more than 200; 05(16.12%) cases were having stress score between 199 -150, 19(61.29%) having stress score between 149 -101and 06(19.35%) cases were having stress score less than 100.

Out of 85(70.83%) cases from TNM stage IV, 01(1.17%) cases was having stress score more than 200, 05(9.41%) cases were having stress score between 199 -150, 19(58.82%) having stress score between 149 -101and 26(30.58%) cases were having stress score less than 100.

The data obtained was subjected to chi square test and the x^2 value was 62.73 $p<0.05$ and p value was 0.00010 and $p<0.05$ suggestive of statistically significant correlation between TNM staging and psychosocial stress.

Table No. 34 and Graph No. 27: Association between TNM staging according to SES (UM, LM, Poor) in 120 OSCC patients.

Association between TNM staging according to SES (UM, LM, POOR) in 120 OSCC patients revealed that: Out of 4(03.33%) cases from TNM stage II, 03(75.00%) cases were from upper middle SES, 01(25.00%) was from lower middle SES.

Out of 31(25.83%) cases of TNM stage III, 08(25.80%) cases were from upper middle SES, 11(35.48%) cases were from lower middle SES and 12(38.70%) cases were from poor SES.

Out of 85(70.83%) cases from TNM stage IV, 04 (4.70%) cases were from upper middle SES, 26 (30.58%) cases were from lower middle SES and 55 (64.70%) cases were from poor SES. When the data obtained was subjected to chi square test, x^2 value was 136.40 and p value 0.0001, which showed statistically significant correlation between TNM staging and socioeconomic status of OSCC patients.

Table no 35: Distribution of 120 OSCC subjects according to duration of mean primary, secondary, referral and total diagnostic delay.

Out of 120 OSCC patients, mean primary delay was 5.8±2.5 months; mean secondary delay was 1.05±0.65 months, mean professional delay was 0.53 ±0.62 months, mean

total delay was 7.384±2.98 months suggesting that total delay followed by primary delay was the longest delay.

Table No. 36 and Graph No. 28. Distribution of 120 OSCC subjects according to duration of primary diagnostic delay.

Distribution of duration of primary diagnostic delay in 120 OSCC subjects revealed that, out of 120 OSCC cases, 14 (11.66%) reported upto 3 months, 72 (60.00%) between 3-6 months, 20 (16.66%) reported between 6-9 months, 14 (11.66%) reported between 9-12 months. Further, out of 94(78.33%) males and 26 (21.66%), all 14 (14.89%) males reported upto 3 months,; 48(51.06%) males reported between 3-6 months and 14(53.84%) females reported between 3-6 months; 9(9.57%) males reported between 6-9 months and 11(42.30%) females reported between 6-9 months and 13(13.82%) males reported between 9-12 months and 01(3.8%) females reported between 9-12 months.

The data obtained from males and females was subjected to chi square test x^2 value was 17.38 and p value was 0.0038, showing statistically significant association of 120 OSCC patients with primary delay.

Table No. 37: Distribution of 120 OSCC patients according to reasons for presenting late.

Distribution of120 OSCC patients according to reasons for **presenting late** to the professional revealed that, 61(50.83%) painless nature ; 43(35.83%) had fear about what doctor might tell; 33(27.50%) had financial problems; 26 (21.66%) reported that there was no body to accompany; 23 (19.16%) were unaware of the serious nature of the disease. 18 (15.00%) tried home remedy, 14 (11.66%) tried analgesics for pain, 07 (5.83%) had more important work than consulting, 05 (04.16%) tried alternative medicine, 04 (3.33%) had some stressors like illness of family members, 02(01.66%) tried quacks (baba/vaidu).

Table No. 38 and Graph No. 29: Distribution of 120 OSCC subjects according to duration of secondary diagnostic delay.

Distribution of duration of secondary diagnostic delay in 120 OSCC subjects revealed that, out of 120 OSCC cases, 02 (1.66%) cases showed no delay and all 2 were males, 101 (84.16%) (77males and 24females) reported upto 1 month, 11 (9.16%) (9males and 2females) between 1-2 months, 05 (4.16%) (5 males) reported between 2-3

months, 01 (0.83%) (1male) reported between 3-4 months. The data obtained was subjected to chi square test x^2 value was 2.55 and p value was 0.063.

Table No. 39 and Graph No. 30: Distribution of 120 OSCC subjects according to duration of referral/professional delay.

Distribution of duration of **referral/ professional** delay in 120 OSCC subjects revealed that, out of 120 OSCC cases, in 49 (40.83%) (37 males, 12 females) cases there was no delay, 30 (25.00%) (26 males, 4females) the delay was upto 0.5 month, in 35(29.16%) (27 males, 8 females) cases the delay was between 0.5-1 month, in 2 (1.66%) (2 females) cases the delay was between 1-2 months and in 4 (3.33%) (4 males) cases the delay was between 2-3 months. The data obtained was subjected to subjected to chi square test x^2 value was 9.82 and p value was 0.043 showing statistically significant difference between referral delay and males and females of 120 OSCC patients.

Table No. 40 and Graph No. 31: Various specialists responsible for professional/ referral delay out of 71 (59.16%) OSCC subjects

Various specialists responsible for professional / referral delay out of 71 (59.16%) OSCC cases were, in 32 (46.37%) cases, primary health care, in 27 (38.02%) cases private practitioners, in 05(7.24%) cases, traditional healers in 03 (04.34%) cases dentists, in 03 (04.34%) cases, homeopathic doctors and in 01 (01.44%) case dermatologist was responsible.

Table No.41 and Graph No. 32: Distribution of 120 OSCC subjects according to duration of total delay

Distribution of duration of total diagnostic delay in 120 OSCC subjects revealed that, out of 120 OSCC cases, in 3 (2.50%) cases the total delay was upto 3 months, in 50 (41.66%) cases, the delay was between 3-6 months, in 43 (35.83%) cases the delay was between 6-9 months, in 13 (10.83%) cases, the total delay was between 9-12 months, and in 11(9.16%) cases the total delay was between more than 12 months. The data obtained was subjected to chi square test x^2 value was 3.14 and p value was 0.053 showing statistically non significant difference.

Table No. 42. Association of 120 OSCC subjects between psychosocial stress and duration of primary diagnostic delay

Association between psychosocial stress and duration of primary delay in 120 OSCC patients revealed that, out of 120 OSCC cases, 2(1.66%) cases were having

psychosocial stress score more than 200. Out of these 2(1.66%) cases, all 2(1.66%) showed primary delay between 3-6 months.

Out of 120 OSCC cases, in 13(10.83%) cases the psychosocial stress score was within 150-199. Out of these 13 (10.83%) cases, 10(8.33%) showed primary delay within 3-6 months; 3(2.5%) showed primary delay between 6-9 months.

Out of 120 OSCC cases, in 76(63.33%) cases the psychosocial stress score was within 101-149. Out of these 76(63.33%) cases, 10(8.33%) showed primary delay up to 3 months; 45(37.5%) showed primary delay between 3-6 months; 13 (10.83%) showed primary delay between 6-9 months. and 8 (6.66%) showed primary delay between 9-12 months.

Out of 120 OSCC cases, in 29(24.16%) cases the psychosocial stress score was less than101. Out of these 29(24.16%) cases, 4(3.33%) showed primary delay up to 3 months; 14(11.66%) showed primary delay between 3-6 months; 7(5.83%) showed primary delay between 6-9 months. and 4 (3.33%) showed primary delay between 9-12 months. The data obtained was subjected to chi square test x^2 value was 5.64 and p value was 0.77, which showed statistically non significant correlation between psychosocial stress score and duration of primary delay in OSCC patients.

Table No. 43: Association of 120 OSCC subjects between psychosocial stress and duration of total diagnostic delay

Association between psychosocial stress and duration of total delay in 120 OSCC patients revealed that, out of 120 OSCC cases, 2(1.66%) cases were having psychosocial stress score more than 200. Out of these 2(1.66%) cases, 01(0.83%) showed total delay between 3-6 months and 01(0.83%) showed primary delay between 6-9 months.

Out of 120 OSCC cases, in 13(10.83%) cases the psychosocial stress score was within 150-199. Out of these 13 (10.83%) cases, 07(5.83%) showed total delay within 3-6 months and 06(5.00%) showed total delay between 6-9 months.

Out of 120 OSCC cases, in 79(65.83%) cases the psychosocial stress score was within 101-149. Out of these 79(65.83%) cases, 02(1.66%) showed total delay up to 3 months; 34(28.33%) showed total delay between 3-6 months; 29(24.16%) showed total delay between 6-9 months; 08(6.66%) showed total delay between 9-12 months and 6(5.00%) showed total delay more than 12 months.

Out of 120 OSCC cases, in 26 (21.66%) cases the psychosocial stress score was less than101. Out of these 26 (21.66%) cases, 12(10.00) showed total delay between 3-6 months; 06(5.00%) showed total delay between 6-9 months; 05(4.66%) showed total delay between 9-12 months. and 03(2.5%) showed total delay more than 12 months.
When the data obtained was subjected to chi square test, x^2 value was 8.10 and p value 0.77, which showed statistically non significant correlation between psychosocial stress score and duration of total delay in OSCC patients.

Table No. 44 and Graph No. 33: Association of clinical staging with primary delay.

Association of clinical staging with **primary** delay revealed that, out of 120 OSCC cases, 4(3.33%) was from TNM stage II. Out of these 4 cases, 01(25.00%) reported upto 3 months, 03(75.00%) reported between 3-6 months.
Out of 120 OSCC cases, 31(25.83%) were from TNM stage III. Out of these 31 cases, 07(22.58%) reported upto 3 months, 17(54.83%) reported between 3-6 months, 04 (12.90%) reported between 6-9 months and 03(09.67%) reported between 9-12 months.
Out of 120 OSCC cases, 85(70.83%) were from TNM stage IV, Out of these 85 cases, 06(07.05%) reported upto 3 months, 52(61.17%) reported between 3-6 months, 16(18.82%) reported between 6-9 months and 11(12.94%) reported between 9-12 months. The data obtained was subjected to chi square test and x^2 value was 43.80, and p=0.0001 showing statistically significant difference between clinical staging and primary delay. It showed that greater the primary delay, late was the clinical stage of OSCC.

Table No. 45 and Graph No. 34: Association of clinical TNM staging with secondary delay.

An association of clinical staging with **secondary** delay revealed that, out of 120 OSCC cases, 4(3.33%) was from TNM stage II. Out of these 4 cases, all 04(100%) reported between 0-1 month.
Out of 120 OSCC cases, 31(25.83%) were from TNM stage III. Out of these 31 cases, 28(90.32%) patients reported between 0-1 months, 02(06.45%) reported between 1-2 months and 01(03.22%) reported between 3-4 months.
Out of 120 OSCC cases, 85(70.83%) were from TNM stage IV. Out of these 85 cases, 71(83.52%) patients reported between 0-1 months, 09(10.58%) reported between 1-2 months and 05(05.88%) reported between 2-3 months. The data obtained was

subjected to chi square test and x^2 value was 30.03, and p=0.0001 showing statistically significant difference between clinical staging and secondary delay.

Table No. 46 and Graph No. 35: Association of TNM clinical staging with professional/ referral delay.

Association of clinical staging with **professional/ referral** delay revealed that, out of 120 OSCC cases, 4(3.33%) was from TNM stage II. Out of these 4 cases, in 03 (75.00%) cases there was no delay and 01(25.00%) case reported between 0.5-1 month.

Out of 120 OSCC cases, 31(25.83%) was from TNM stage III. Out of these 31 cases, in 11(35.48%) cases there was no delay, 08(25.80%) cases reported between upto 0.5 month, and 12(38.70%) cases reported upto 0.5-1 month,

Out of 120 OSCC cases, 85(70.83%) was from TNM stage III. Out of these 85 cases, in 35(41.17%) cases there was no delay, 23(27.05%) cases reported between upto 0.5 month, 22(25.88%) cases reported upto 0.5-1 month, 02(02.35%) patients reported between 1-2 months and 03(3.52%) patients reported between 2-3 months.

The data obtained was subjected to chi square test and x^2 value was 61.09, and p=0.0001 showing statistically significant difference between clinical staging and professional or referral delay.

Table No. 47 and Graph No. 36: Association of TNM clinical staging with total delay

Association of clinical staging with **total** delay showed that, out of 120 OSCC subjects, 4(3.33%) cases were of stage II out of these 4 cases, in 01(25.00%) patient the total delay was upto 3 months, in 02(50.00%) cases, the delay was between 3-6 months, and in 01(25.00%) case the delay was between 6-9 months.

Out of 120 OSCC subjects, 31(25.83%) cases were of stage III out of these 31 cases, in 02(06.45%) patients the total delay was upto 3 months, in 18(58.06%) cases, the delay was between 3-6 months, in 06(19.35%) cases the delay was between 6-9 months, in 03(09.67%) cases, the total delay was between 9-12 months, and in 02(06.45%) cases the total delay was between more than 12 months.

Out of 120 OSCC subjects, 85(70.83%) cases were of stage IV out of these 85 cases, there was no total delay upto 3 months, in 30(35.29%) cases, the delay was between 3-6 months, in 36(42.35%) cases the delay was between 6-9 months, in 10(11.76%) cases, the total delay was between 9-12 months, and in 09(10.58%) cases the total delay was between more than 12 months.

The data obtained was subjected to chi square test and x^2 value was 70.44, and p=0.0001 showing statistically significant difference between clinical staging and total delay.

Table No. 48: Association of primary delay with TNM clinical staging and SES.

Association of primary delay with clinical staging and SES revealed that, out of 120 OSCC cases, 14(11.66%) patients reported upto 3 months, out of these 14 cases, 01(07.14%) was from TNM stage II and this 01(100%) was from upper middle SES.

Out of 14(11.66%) patients reporting upto 3 months, 07(50.00%) were from TNM stage III. Out of these 7 cases 05(71.42%) were from upper middle SES, 01(14.28%) was from lower middle SES and 01(14.28%) was from poor SES.

Out of 14(11.66%) patients reporting upto 3 months, 06(42.85%) were from TNM stage IV. Out of these 6 cases, none were from upper middle SES, 02(33.33%) were from lower middle SES and 04(66.66%) were from poor SES.

Association of primary delay with clinical staging and SES revealed that, out of 120 OSCC cases, 14(11.66%) patients reported upto 3 months, out of these 14 cases, 01(07.14%) was from TNM stage II and this 01(100%) was from upper middle SES.

Out of 14(11.66%) patients reporting upto 3 months, 07(50.00%) were from TNM stage III. Out of these 7 cases 05(71.42%) were from upper middle SES, 01(14.28%) was from lower middle SES and 01(14.28%) was from poor SES. The data obtained was subjected to chi square test and x^2 value was 219.8 and p value was 0.0001, suggesting statistically significant difference in association of duration of primary delay (upto 3 months) with clinical staging and SES.

Out of 120 OSCC cases, 72(60.00%) patients reported between 3-6 months. Out of these 72 cases, 03(04.16%) were from TNM stage II and out of these 3 cases, 01(33.33%) was from upper middle SES, 01(33.33%) was from lower middle SES and 01(33.33%) was from poor SES.

Out of 72(60.00%) patients reporting between 3-6 months, 17(23.61%) were from TNM stage III. Out of these 17 cases 03(17.64%) were from upper middle SES, 07(41.17%) were from lower middle SES and 07(41.17%) were from poor SES.

Out of 72(60.00%) patients reporting between 3-6 months, 52(72.22%) were from TNM stage IV. Out of these 52 cases, 01(01.92%) was from upper middle SES, 19(36.53%) were from lower middle SES and 32(61.53%) were from poor SES. The data obtained was subjected to chi square test and x^2 value was 37.92 and p value was

0.0001, suggesting statistically significant difference in association of duration of primary delay(3-6 months) with clinical staging and SES.

Out of 120 OSCC cases, 20(16.66%) patients reporting between 6-9 months, none were from TNM stage II. Out of 20(16.66%) patients reporting between 6-9 months, 04(20.00%) were from TNM stage III. Out of these 04 cases, none were from upper middle SES, 03(75.00%) were from lower middle SES and 01(25.00%) was from poor SES. Out of 20(16.66%) patients reporting between 6-9 months, 16(80.00%)were from TNM stage IV. Out of these 16 cases, 02(12.50%) were from upper middle SES, 01(06.25%) was from lower middle SES and 13(81.25%) were from poor SES. The data obtained was subjected to chi square test and x^2 value was 101.4 and p value was 0.0001, suggesting statistically significant difference in association of duration of **primary** delay (6-9 months) with clinical staging and SES.

Out of 120 OSCC cases, 14 (11.66%) patients reporting between 9-12 months, none were from TNM stage II.

Out of 14 (11.66%) patients reporting between 9-12 months, 03(21.42%) were from TNM stage III. Out of these 03 cases, 01(33.33%) was from upper middle SES, 01(33.33%) was from lower middle SES and 01(33.33%) was from poor SES.

Out of 14 (11.66%) patients reporting between 9-12 months, 11(78.57%) were from TNM stage IV. Out of these 11 cases, 01(09.09%) was from upper middle SES, 03(27.27%) were from lower middle SES and 07(63.63%) were from poor SES. The data obtained was subjected to chi square test and x^2 value was 24.22 and p value was 0.0001, suggesting statistically significant difference in association of duration of **primary** delay (9-12 months) with clinical staging and SES.

Table No. 49: Association of secondary delay with TNM clinical staging and SES.

Association of **secondary** delay with clinical staging and SES revealed that, out of 120 OSCC cases, in 103 (85.83%) cases there was no delay, out of these 103 cases, 04(03.88%) cases were from TNM stage II and out of these 04 cases, 02 (50.00%) were from upper middle SES, 01 (25.00%) from lower middle SES and 01 (25.00%) was from poor SES.

Out of 103 (85.83%) no secondary delay cases, 28(27.18%) were from TNM stage III. Out of these 28 cases, 09(32.14%) were from upper middle SES, 09(32.14%) were from lower middle SES and 10(35.71%) were from poor SES.

Out of 103 (85.83%) no secondary delay cases, 71(68.93%) were from TNM stage IV. Out of these 71 cases, 02(02.81%) were from upper middle SES, 21(29.57%) were from lower middle SES and 48(67.60%) were from poor SES. The data obtained was subjected to chi square test and x^2 value was 63.64 and p value was 0.0001, suggesting statistically significant difference in association of duration of no secondary delay with clinical staging and SES.

Out of 120 OSCC cases, 11(09.16%) patients reported between 1-2 months. Out of these 11 cases, none were from TNM stage II.

Out of 11(09.16%) patients reported between 1-2 months, 02(18.18%) were from TNM stage III. Out of these 02 cases none were from upper middle SES and all 02(100%) were from lower middle SES.

Out of 11(09.16%) patients reported between 1-2 months, 09(81.81%)were from TNM stage IV. Out of these 09 cases, 01(11.11%) was from upper middle SES, 02(22.22%) were from lower middle SES and 06(66.66%) were from poor SES. The data obtained was subjected to chi square test and x^2 value was 127.90 and p value was 0.0001, suggesting statistically significant difference in association of duration of **secondary** delay (1-2 months) with clinical staging and SES.

Out of 120 OSCC cases, 05(04.16%) patients reporting between 2-3 months, none were from TNM stage II and III.

Out of 05(04.16%) patients reporting between 2-3 months, all 05(100%) were from TNM stage IV. Out of these 05 cases, 01(20.00%) was from upper middle SES, 02(40.00%) were from lower middle SES and 02(40.00%) were from poor SES.

Out of 120 OSCC cases, 01(0.83%) patients reporting between 3-4 months, none were from TNM stage II and III.

Out of 01(0.83%) patients reporting between 3-4 months, 01(100%) was from TNM stage IV. Out of these 01 case, none was from upper middle SES, 01(100%) was from lower middle SES and none was from poor SES.

Table No. 50: Association of professional / referral delay with TNM clinical staging and SES.

Association of **professional / referral** delay with clinical staging and SES revealed that, out of 120 OSCC cases, in 49(40.83%) patients, there were no patients with **professional / referral** delay, out of these 49 cases, 03(06.12%) were from TNM stage II. Out of these 03 cases, 01(33.33%) was from upper middle SES, 01(33.33%) was from lower middle SES and this 01(33.33%) was from poor SES.

Out of 49(40.83%) patients with no **professional / referral** delay, 11(22.44%) were from TNM stage III. Out of these 11 cases 04(36.36%) were from upper middle SES, 05(45.45%) was from lower middle SES and 02(18.18%) were from poor SES.

Out of 49(40.83%) patients with no **professional / referral** delay, 35 (71.42%) were from TNM stage IV. Out of these 35 cases, 02(05.71%) were from upper middle SES, 12(34.28%) were from lower middle SES and 21(60.00%) were from poor SES. The data obtained was subjected to chi square test and x^2 value was 47.98 and p value was 0.0001, suggesting statistically significant difference in association of duration of **professional / referral** delay (no delay) with clinical staging and SES.

Out of 120 OSCC cases, 31(25.83%) patients reported upto 0.5 month. Out of these 31 cases, none were from TNM stage II, 08(25.80%) were from TNM stage III. Out of these 08 cases 03(37.50%) were from upper middle SES, 02(25.00%) were from lower middle SES and 03(37.50%) were from poor SES.

Out of 31(25.83%) patients reported upto 0.5 month, 23 (74.19%) were from TNM stage IV. Out of these 23 cases, none was from upper middle SES, 05(21.73%) were from lower middle SES and 18(78.26%) were from poor SES. The data obtained was subjected to chi square test and x^2 value was 51.98 and p value was 0.0001, suggesting statistically significant difference in association of duration of **professional / referral** delay (upto 0.5 month) with clinical staging and SES.

Out of 120 OSCC cases, 35(29.16%) patients reporting between 0.5-1 month, 01(02.85%) was from TNM stage II. This 01(100%) was from poor SES.

Out of 35(29.16%) patients reporting between 0.5-1 month, 12(34.28%) was from TNM stage III. Out of these 12 cases, 02(16.66%) were from upper middle SES, 05(41.66%) were from lower middle SES and 05(41.66%) was from poor SES.

Out of 35(29.16%) patients reporting between 0.5-1 month, 22(62.85%) were from TNM stage IV. Out of these 22 cases, 02(09.09%) were from upper middle SES, 07(31.81%) was from lower middle SES and 13(59.09%) were from poor SES. The data obtained was subjected to chi square test and x^2 value was 82.23 and p value was 0.0001, suggesting statistically significant difference in association of duration of professional / referral delay (upto 0.5 month) with clinical staging and SES.

Out of 120 OSCC cases, 02(1.66%) patients reporting between 1-2 months, none were from TNM stage II. Out of 02(1.66%) patients reporting between 1-2 months, none were from TNM stage III. Out of 02(1.66%) patients reporting between 1-2 months,

02(100%) were from TNM stage IV. Out of these 02 cases, none was from upper middle SES, none were from lower middle SES and 02(100%) were from poor SES.

Out of 120 OSCC cases, 03 (02.50) patients reporting between 2-3 months, none were from TNM stage II.

Out of 03 (02.50) patients reporting between 2-3months, none were from TNM stage III. Out of 03 (02.50) patients reporting between 2-3 months, 03(100%) were from TNM stage IV. Out of these 03 cases, none was from upper middle SES, 01(33.33%) were from lower middle SES and 02(66.66%) were from poor SES.

Table No. 51: Association of total delay with clinical staging and SES

Association of **total** delay with clinical staging and SES revealed that, out of 120 OSCC cases, 03(02.50%) patients reported upto 3 months, out of these 03 cases, 01(33.33%) was from TNM stage II and this 01(100%) was from upper middle SES.

Out of 03(02.50%) patients reporting upto 3 months, 02(66.66%) were from TNM stage III. Out of these 2 cases, 02(100%) were from upper middle SES, none was from lower middle SES and none was from poor SES.

Out of 03(02.50%) patients reporting upto 3 months, none were from TNM stage IV.

Out of 120 OSCC cases, 50(41.66%) patients reported between 3-6 months. Out of these 50 cases, 02(04.00%) were from TNM stage II and out of these 2 cases, 01(50.00%) was from upper middle SES, 01(50.00%) was from lower middle SES and none was from poor SES.

Out of 50(41.66%) patients reporting between 3-6 months, 18(36.00%) were from TNM stage III. Out of these 18 cases 06(33.33%) were from upper middle SES, 05(27.77%) were from lower middle SES and 07(38.88%) were from poor SES.

Out of 50(41.66%) patients reporting between 3-6 months, 30(60.00%) were from TNM stage IV. Out of these 30 cases, none was from upper middle SES, 15(50.00%) were from lower middle SES and 15(50.00%) were from poor SES. The data obtained was subjected to chi square test and x^2 value was 100.80 and p value was 0.0001, suggesting statistically significant difference in association of duration of **total** delay (3-6 month) with clinical staging and SES.

Out of 120 OSCC cases, 43(35.83%) patients reporting between 6-9 months, 01(02.32%) were from TNM stage II and this 01(100%) patient belonged to poor SES.

Out of 43(35.83%) patients reporting between 6-9 months, 06(13.95%) were from TNM stage III. Out of these 06 cases, none were from upper middle SES, 05(83.33%) were from lower middle SES and 01(16.66%) was from poor SES.

Out of 43(35.83%) patients reporting between 6-9 months, 36(83.72%) were from TNM stage IV. Out of these 36 cases, 03(08.33%) were from upper middle SES, 05(13.88%) was from lower middle SES and 28(77.77%) were from poor SES. The data obtained was subjected to chi square test and x^2 value was 195.0 and p value was 0.0001, suggesting statistically significant difference in association of duration of **total** delay (6-9 month) with clinical staging and SES.

Out of 120 OSCC cases, 13(10.83%) patients reporting between 9-12 months, out of these 13 cases none were from TNM stage II.

Out of 13(10.83%) patients reporting between 9-12 months, 03(21.42%) were from TNM stage III. Out of these 03 cases, 01(33.33%) was from upper middle SES, 01(33.33%) was from lower middle SES and 01(33.33%) was from poor SES.

Out of 13(10.83%) patients reporting between 9-12 months, 10(76.92%) were from TNM stage IV. Out of these 10 cases, 01(10.00%) was from upper middle SES, 01(10.00%) were from lower middle SES and 08(80.00%) were from poor SES. The data obtained was subjected to chi square test and x^2 value was 44.15 and p value was 0.0001, suggesting statistically significant difference in association of duration of **total** delay (9-12 month) with clinical staging and SES.

Out of 120 OSCC cases, 11(09.16%) patients reporting more than12 months, out of these 11 cases, none were from TNM stage II.

Out of 11(09.16%) patients reporting more than12 months, 02(18.18%) were from TNM stage III. Out of these 02 cases, none were from upper middle SES, 01(50.00%) was from lower middle SES and 01(50.00%) was from poor SES.

Out of 11(09.16%) patients reporting more than12 months, 09(81.81%) were from TNM stage IV. Out of these 09 cases, 01(11.11%) was from upper middle SES, 03(33.33%) were from lower middle SES and 05(55.55%) were from poor SES. The data obtained was subjected to chi square test and x^2 value was 14.82 and p value was 0.0001, suggesting statistically significant difference in association of duration of **total** delay (>12 months) with clinical staging and SES.

Table No. 1: Sex wise distribution of total 120 OSCC patients

S. NO	Sex	No. of patients	Percentage
1	Male	94	78.33
2	Female	26	21.66
Total No. Of subjects		120	100%

Table No. 2: Age wise distribution of OSCC patients

Age Group	No of OSCC patients
11-20 Years	00
21- 30 Years	09(7.5%)
31-40 Years	24(20%)
41-50 Years	33(27.5%)
51-60 Years	28(23.33%)
61-70 Years	23(19.16%)
71-80 Years	02(1.66%)
81-90 Years	01(0.83%)
Mean Age in Years	51.3±12.6

Table No. 3: Habit wise distribution in OSCC patients.

Sr. No	**Type of habit**	**No. of OSCC subjects (%)**
1	Tobacco quid	57(47.50%)
2	Betel nut quid	25 (20.83%)
3	Bidi	15 (12.50%)
4	Tobacco quid and betel nut quid	14 (11.66%)
5	Betel leaf quid with tobacco	13 (10.83%)
6	Betel nut	12 (10.00%)
7	Alcohol along with one of the above habits	42(35.00%)
8	Snuff/ gul/gudakhu	**53(44.16%)**

Table 4: Site wise distribution in 120 OSCC subjects.

Sr No.	Site of oral cancer	Total no. Of subjects (%)
1	Gingivo-buccal /labial sulcus, alveolus, buccal/labial mucosa	76 (63.33%)
2	Commisure, labial and/buccal mucosa	18 (15.00%)
3	Tongue	15 (12.50%)
4	Alveolus lingual sulcus, floor of mouth and /tongue	05 (4.16%)
5	Palate, alveolus, and / gingivo-buccal sulcus	03 (2.50%)
6	Maxillary antrum, alveolus and/palate	03 (2.50%)
Total		120 (100%)

Table No. 5: Frequency of particular psychosocial stress score in OSCC patients.

S No.	Life event	Stress score allotted	No of OSCC patients
1	Financial loss or problems	54	120(100%)
2	Marriage of daughter or dependant	49	23(19.16%)
3	Family conflict	47	21(17.50%)
4	Death, of close family member	66	12(10.00%)
5	Excessive alcohol or drug use by family member	58	10(08.33%)
6	Property or crops damaged	61	8(06.66%)
7	Death of spouse	95	6(05.00%)
8	Illness of family member	52	6(05.00%)
9	Lack of son	51	6(05.00%)
10	Son or daughter leaving home	55	4(03.33%)
11	Suspension or dismissal from job	76	03(02.50%)
12	Major purchase or construction of house	46	03(02.50%)
13	Marital separation/divorce	77	2(01.66%)
14	Marital conflict	64	2(01.66%)
15	Self or family member unemployed	51	2(01.66%)
16	Lack of child	67	1(0.83%)
17	Large loan	49	1(0.83%)
18	Appearing for an examination or interview	43	1(0.83%)
19	Trouble with neighbor	40	1(0.83%)
	Mean stress score of OSCC patients	105.76±36.94	

Table No. 6: Monthly per capita income from all sources of OSCC patients.

S. No	Monthly per capita income from all sources (total monthly income /no. Of family members)	No of OSCC patients
1	>50000	00
2	20000-49999	07 (5.83%)
3	10000-19999	13 (10.83%)
4	5000-9999	32 (26.00%)
5	2500-4999	62 (51.66%)
6	1000-2499	06 (5.00%)
7	<1000	00(0.00%)
8	TOTAL	120(100%)

Table No 7: Educational status of OSCC patients.

Sr no	Education of either husband or wife who is more educated among them	No of OSCC patients
1.	Post graduation (non-technical incl. PhD)	01 (0.83%)
2.	Graduation	05(4.16%)
3.	10th class pass but <graduation	37(30.83%)
4.	Primary pass but <10th	40(33.33%)
5.	Primary but attended school for at least one year	10(8.33%)
6.	Illiterate	7(22.50%)
	Total	120(100%)

Table No. 8: Occupation of OSCC patients.

S. No	Occupation of husband, otherwise wife.	No of OSCC patients
1.	Service in central/state/public undertakings or owner of a company employing >20 persons or self employed professional viz Doctor, Eng. CA. etc.	01(0.83%)
2.	Service in private sector or independent business employing 2-20 persons.	16(13.33%)
3.	Service at shops, transport, **own cultivation of land**	36(30.00%)
4.	Self employed with income >5000 **(farm worker/ laborer)**	40(33.33%)
5.	Self employed with income <5000 (**farm worker/ laborer**,/house wife)	27(22.50%)
6.	None of the family member is employed	00
	Total	120(100%)

Table No 9: Distribution of OSCC patients according to socioeconomic status.

S.No	SES scores	Socioeconomic status	OSCC
1	>75	Upper high	00(00.00%)
2	61-75	High	00(00.00%)
3	46-60	Upper middle	15(12.50%)
4	31-45	Lower middle	38(31.66%)
5	16-30	Poor	67(55.83%)
6	<15	Very poor	00(00.00%)
Total			120(100%)
x^2 -value			x^2 -value=140.60; p-value=0.0001, S

Table 10: Correlation of mean psychosocial stress score with mean SES score.

	Mean psychosocial stress score	Mean SES	r-value	P-value
OSCC	105.76±36.94	33.4±8.93	0.15	0.084,NS

Table No. 11: Association of mean psychosocial stress score with mean UM, LM and Poor SES score.

	SES		
	UM	LM	Poor
Psychosocial stress score	108.1±30.59	113.63±29.79	100.8±41.26
SES score	48.9±3.68	39.3±2.92	26.6±3.78
r-value	0.09	0.05	0.12
p-value	0.72,NS	0.72,NS	0.31,NS

Table No. 12: Age of starting habit in OSCC patients.

Age of starting habit (in years)	**No of patients in OSCC subjects**
11 to 20	69(57.50%)
21 to 30	50(41.66%)
31 to 40	01(00.83%)
Total	120(100%)
Mean Age of Starting Habit	21.10±3.02

Table 13: Distribution of 120 OSCC subjects according to age of starting habit and according to SES (UM, LM, POOR).

Age of starting habit (in years)	Total No of patients in OSCC subjects	SES	Distribution according to SES	
11 to 20	69(57.50%)	UM	02(2.89%)	
		LM	18(26.08%)	
		POOR	49(71.01%)	
21 to 30	50(41.66%)	UM	12(24.00%)	
		LM	20(40.00%)	
		POOR	18(36.00%)	
31 to 40	01(00.83%)	UM	01(100%)	F=25.51 P=0.0001,S
		LM	00	
		POOR	00	
Total	120(100%)	UM	15(12.50%)	
		LM	38(31.66%)	
		POOR	67(55.83%)	
Mean Age of Starting Habit	18.30±2.33	UM	21.06±3.01	
		LM	18.97±2.29	
		POOR	17.31±1.40	

F= one way ANOVA

Table No. 14: Frequency of habit among OSCC Subjects.

Frequency per day	Number of OSCC patients
1-5 times	62(51.66%)
6-10 times	53(44.16%)
11- 15 times	04(03.33%)
16-20 times	01(00.83%)
Total	120(100%)
Mean frequency of use (In years)	5.85
Standard Deviation	2.015

Table No. 15: Distribution of 120 OSCC subjects according to duration of adverse habit.

Duration range (in years)	No. of OSCC subjects
Up to 5 years	02(01.66%)
6-10 years	05(04.16%)
11 to 15	07(05.83%)
16 to 20	20(16.66%)
21 to 25	22(18.33%)
26 to 30	10(08.33%)
31to35	11(09.16%)
36-40	14(11.66%)
41-45	20(16.66%)
46-50	06(05.00%)
51-55	01(00.83%)
56-60	02(01.66%)
Total	120(100%)
Mean duration of habit (in years)	29.50
Standard Deviation	12.32

Table No. 16: Association of mean age of starting habit, mean duration and mean daily frequency in OSCC subjects.

OSCC subjects	Mean age of starting habit (in years)	Mean duration of habit (in years)	Mean daily frequency of use
n=120	21.10±3.02	29.50±12.32	5.85±2.01

Table No.17: Statistical correlations of mean age of starting habit, mean duration and mean daily frequency in OSCC subjects.

Habit history	Statistical values	Mean age of starting habit (in years)	Mean duration of habit (in years)	Mean daily frequency of use
Mean age of starting habit (in years)	r-value	1	-0.108	0.083
	p-value		0.242,NS,p>0.05	0.370,NS,p>0.05
Mean duration of habit (in years)	r-value	-0.108	1	0.121
	p-value	0.242,NS,p>0.05		0.189,NS,p>0.05
Mean daily frequency of use	r-value	0.083	.121	1
	p-value	0.370,NS,p>0.05	0.189,NS,p>0.05	

Table No.18: Correlation between mean age of staring earning and mean age of starting habit in OSCC patients.

	Mean age of starting earning	Mean age of starting habit	r-value, p-value
OSCC	18.30±2.33	21.10±3.02	0.646,P=0.0001,S

Table No. 19: Correlation of mean age of starting habit and mean age of starting earning according to SES (UM, LM AND POOR) in OSCC subjects.

Groups	SES	Mean age of starting habit (in years)	SES	Mean age of starting earning (in years)	r-value	p- value
OSCC Subjects N=120	Upper middle SES	24.60±3.86	Upper middle SES	21.06±3.01	0.462	0.083,NS
	Lower middle SES	22.23±3.14	Lower middle SES	18.97±2.29	0.507	0.001,S
	Poor SES	19.68±1.50	Poor SES	17.31±1.40	0.468	0.001,S

Table No. 20: Reasons for starting adverse habit in OSCC subjects

Sr. No	Various reasons for starting adverse habit	No. Of OSCC subjects (%)
1	To accompany	40(33.33%)
2	Tradition	30 (25.00%)
3	To pass time /non occupied	16 (13.33%)
4	Extend hunger	15 (12.50%)
5	Bowel habit	15 (12.56%)
6	Increase capacity of working	04 (3.33%)

Table No. 21: Distribution of 120 OSCC subjects associated with oral precancer (OPC)

	Group	Total No. of subjects (%)	Sex	No. of subjects (%)	x^2 -value
OSCC n = 120	OSMF	23(19.16%)	M	17 (73.91%)	16.85 p=0.0002, S
			F	06 (26.08%)	
	Leukoplakia	8 (6.66%)	M	7 (87.5%)	
			F	01 (12.5%)	
	OSMF and Lukoplakia	01 (0.83%)	M	01 (12.5%)	

OPC: Oral precancer; OSMF: Oral Submucous fibrosis

Table No. 22. Distribution of 32 OPC subjects according to SES

Type of OPC	UM	LM	POOR
OSMF	05(15.62%)	07(21.87%)	11(34.37%)
Leukoplakia	00	01(3.12%)	06(18.17%)
OSMF & leukoplakia	00	01(3.12%)	00
TOTAL	05(15.62%)	09(28.12%)	17(53.12%)
x^2 -value	1826,p=0.0011,NS,p>0.05		

Table No.23: Distribution of 32 OPC subjects according to whether consultation sought for OPC.

Sr. No.	Consultation history	No. of OSMF subjects (%)	No. of Leukoplakia subjects (%)	OSMF and Leukoplakia	x^2 -value
1	Not aware of OPC/ incidental finding	02(08.69%)	05 (62.8%)	00(00.00%)	1127.3 P=0.0001,S
2	Aware of OPC but no consultation	09(39.13%)	03(37.5%)	00(00.00%)	51.82 P=0.0001,S
3	Aware of OPC ,took treatment , but got no complete relief hence continued habit	04(17.29%)	00(00.00%)	00(00.00%)	36.04 P=0.0001,S
4	Aware of OPC, took treatment but did not continue treatment because could not quit habit	08(34.78%)	01(12.5%)	01(100%)	163.7 P=0.0001,S
	Total OPC N=32	23 (71.87%)	8 (25.00%)	01 (03.12%)	118.8 P=0.0001,S

Table No. 24: Oral hygiene habits in OSCC

Sr. No	Oral hygiene habit	**No of OSCC subjects**
1	Snuff/ gul/gudakhu	53(44.16%)
2	Local dant manjan	52(43.33%)
3	Tooth paste and brush	09 (7.50%)
4	Ash/coal powder/tooth powder	06(05.00%)
Total		120(100%)

Table 25: Distribution of 120 OSCC subjects according to severity of body mass index (BMI).

BMI category (kg. / m^2)	**Category**	**Frequency in OSCC subjects**
UP TO 16.99	Severe and moderately underweight	93(77.5%)
17.00 TO 18.49	Mild underweight	16(13.33%)
18.50 TO 24.99	Normal	11(09.16%)
25.00 TO 29.99	Overweight	00
30 OR MORE	Obese	00
Total		120(100%)
95% confidence interval		14.84-15.67
Mean BMI		15.25
Standard deviation		2.27

Table 26: Distribution of 120 OSCC subjects according to severity of body mass index (BMI) and SES (UM, LM, POOR)

SES	**Severe to moderate underweight**	**Mild underweight**	**Normal**	**Total**	x^2 **Value**	**P Value**
Upper middle n=15(12.50%)	12(80.00%)	03(20.00%)	00	15(100%)	28.68	0.0001,S
Lower middle n=38(31.6%)	25(65.78%)	06(15.70%)	07(18.42%)	38(100%)		
Poor n=67(55.83%)	56(83.58%)	08(11.94%)	03(04.47%)	67**(100%)**		
TOTAL	93(77.50%)	17(14.16%)	10(08.33%)	120(100%)		

Table 27: Type of diet in OSCC subjects.

Sr. No.	Type of diet	No of OSCC subjects
1	Mixed	97 (80.83%)
2	Vegetarian	23(19.16%)
Total		120(100.00%)

Table No. 28: Category wise distribution of OSCC

S. No.	Category	OSCC
1	OPEN	14(11.66%)
2	OBC	49(40.83%)
3	SC	21(17.50%)
4	ST	21(17.50%)
5	NT	15(12.50%)
Total		120(100%)

Table No.29: Association of category, SES and education in OSCC subjects

S. No	Category	OSCC	SES	Education						
				Illiterate	**<Primary**	**Primary pass but <10th**	**10th pass but <graduation**	**Graduation**	**Post Graduation**	**Professional qualification**
1	Open	14 (11.66%)	UM n=3 (21.42%)	00	00	02(66.66%)	01(33.33%)	00	00	00
			LM n=5 (35.71%)	01 (20.00%)	00	01 (20.00%)	03 (60.00%)	00	00	00
			Poor n=6 (42.85%)	01 (16.66%)	01 (16.66%)	03 (50.00%)	01 (16.66%)	00	00	00
x^2 -value				103.4,p=0.0001,S						
2	OBC	49 (40.83%)	UM n=9 (18.36%)	00	00	03 (33.33%)	02 (22.22%)	03 (33.33%)	00	01 (11.11%)
			LM n=19 (38.77%)	01 (5.26%)	00	09 (47.36%)	08 (42.10%)	00	01 (5.26%)	00
			P n=21 (42.85%)	06 (28.51%)	00	13 (61.90%)	02 (9.52%)	00	00	00
x^2 -value				155.7,p=0.0001,S						
3	SC	21 (17.50%)	UM n=1 (4.76%)	00	00	01 (100%)	00	00	00	00
			LM n=7 (33.33%)	00	00	05 (71.42%)	02 (28.57%)	00	00	00
			P n=13 (61.90%)	03 (23.07%)	01 (7.69%)	05 (38.46%)	03 (23.07%)	01 (7.69%)	00	00
x^2 -value				132.7,p=0.0001,S						
4	ST	21 (17.50%)	UM n=2 (9.52%)	00	00	01 (50.00%)	01 (50.00%)	00	00	00
			LM n=2 (9.52%)	00	00	00	02 (100%)	00	00	00
			P n=17 (80.95%)	10 (58.82%)	00	06 (35.29%)	01 (5.88%)	00	00	00
x^2 -value				241.8,p=0.0001,S						
5	NT	15 (12.50%)	UM n=0	00	00	00	00	00	00	00
			LM n=4 (26.66%)	01 (25.00%)	00	00	03 (75.00%)	00	00	00
			P n=11 (73.33%)	08 (72.72%)	00	02 (18.18%)	01 (9.09%)	00	00	00
x^2 -value				67.45,p=0.0001,S						
Total				35 (25.83%)	02 (1.66%)	51 (42.5%)	30 (25.00%)	04 (33.33%)	01 (0.83%)	01 (0.83%)

Psychosocial and Socioeconomic Risk Factors of Oral Squamous Cell Carcinoma and its Association with Delay in Diagnosis

Table No.30: Distribution of 120 OSCC patients according to presenting complaints.

Sr. no.	Presenting symptoms.	No. of OSCC subjects (%)
1	Pain	59(49.16%)
2	Pain and mobility of tooth/exfoliation	16 (13.33%)
3	Extra oral swelling with or without pain	15 (12.50%)
4	Bleeding	11 (09.16%)
5	Non healing ulcer	08 (6.66%)
6	Increase in size of lesion	07 (05.83%)
7	Reduced mouth opening	04(03.33%)
Total		120 (100%)

Table No. 31: Distribution of 120 OSCC patients according to TNM staging

TNM Staging	Number of patients	Percentage
Stage I	00	00.00
Stage II	04	03.33
Stage III	31	25.83
Stage IV	85	70.83
Total	120	100

Table No. 32: Distribution of 120 OSCC subjects according to histopathological grading

S. No.	Histopathological degree of differentiation	Total No. of subjects (%)
1	Well differentiated	46 (38.33%)
2	Moderately differentiated	60 (50.00%)
3	Poorly differentiated	14 (11.66%)
Total		120 (100%)

Table 33: Association between psychosocial stress score TNM staging in OSCC subjects

S. No	Psychosocial stress score in OSCC subjects	TNM clinical staging			
		I	II	III	IV
1	>200	00	00	01(3.22%)	01(1.17%)
2	199-150	00	00	05(16.12%)	08(9.41%)
3	149-101	00	04(100%)	19(61.29%)	50(58.82%)
4	<101	00	00	06(19.35%)	26(30.58%)
Total	120	n=00	n=04(03.33%)	n=31(25.83%)	n=85(70.83%)
x^2-value		62.73,p-value=0.00010,S<p<0.05			

Table No.34: Association between TNM staging according to SES (UM, LM, Poor) in 120 OSCC patients

TNM Staging	Socioeconomic Status		
	UM	LM	Poor
Stage I n=00	00	00	00
Stage II n=4(3.33%)	03(75.00%)	01(25.00%)	00
Stage III n=31(25.83%)	08(25.80%)	11(35.48%)	12(38.70%)
Stage IV n=85(70.83%)	04 (4.70%)	26 (30.58%)	55 (64.70%)
TOTAL n= 120	15(12.50%)	38(31.66%)	67(55.83%)
x^2-value	136.40,p=0.0001,S		

Table no 35: Distribution of 120 OSCC subjects according to duration of mean primary, secondary, referral and total diagnostic delay

Total No Of Patients	Primary Delay	Secondary Delay	Professional/ Referral Delay	Total Delay
120 (100%)	5.8 ± 2.5 months	1.05 ± 0.65 months	0.53 ±0.62 months	7.384 ±2.98 months
Median	5months	1 months	0.5 months	6.5 months
Range	1-12 months	0-4 months	0-3 months	2-18 months

Table No. 36. Distribution of 120 OSCC subjects according to duration of primary diagnostic delay

Total no of patients	**Upto 3 months**	**3-6 months**	**6-9 months**	**9-12 months**
120 (100%)	14 (11.66%)	72 (60.00%)	20 (16.66%)	14 (11.66%)
M=94 F=26	M=14(14.89%) F=0	M=48(51.06%) F=14(53.84%)	M=9(9.57%) F=11(42.30%)	M=13(13.82%) F=01(3.8%)
x^2-value between male and female	17.38,p=0.0038,S			

Table No.37: Distribution of120 OSCC patients according to reasons for presenting late

Sr. no	**Reasons for presenting late**	**No. of OSCC subjects (%)**
1	Painless nature	61(50.83%)
2	Fear about what doctor might tell	43(35.83%)
3	Financial problem	33(27.50%)
4	No body to accompany	26 (21.66%)
5	Unaware of serious nature of lesion	23 (19.16%)
6	Tried home remedy	18 (15.00%)
7	Tried analgesics	14 (11.66%)
8	More important work than consulting	07 (5.83%)
9	Tried alternative medicine	05 (04.16%)
10	Illness of family members	04 (3.33%)
11	Tried quacks (baba/ vaidu)	02(01.66%)

Table No. 38: Distribution of 120 OSCC subjects according to duration of secondary diagnostic delay

Total No of patients	**No delay**	**Upto 1 months**	**1-2 months**	**2-3 months**	**3-4 months**
120 (100%)	02 (1.66%)	101 (84.16%)	11 (9.16%)	05 (4.16%)	01 (0.83%)
M=94 F=26	M=2 F=0	M=77 F=24	M=9 F=2	M=5 F=0	M=1 F=0
x^2-value	2.55,p=0.63,NS,p>0.05				

Table No.39: Distribution of 120 OSCC subjects according to duration of referral/professional delay

Total No of patients	**No delay**	**Upto 0.5 months (15days)**	**0.5-1 months**	**1-2 months**	**2-3 months**
120 (%)	49 (40.83%)	30 (25.00%)	35(29.16%)	2 (1.66%)	4 (3.33%)
M=94 F=26	M=37 (39.36%) F=12 (46.15%)	M=26 (27.65%) F=4 (15.38%)	M=27 (28.72%) F=8 (30.76%)	M=0 F=2 (7.69%)	M=4 (4.25%) F=0
x^2-value	9.82,p=0.043,S,p<0.05				

Table No. 40: Various specialists responsible for professional/ referral delay out of 71 (59.16%) OSCC subjects.

Sr. no	Professionals	No. of OSCC subjects (%)
1	Primary health care	32 (46.37%)
2	Private practitioner	27 (38.02%)
3	Traditional healers	05(7.24%)
4	Dentist	03 (04.34%)
5	Homeopathic	03 (04.34%)
6	Dermatologist	01 (01.44%)
	Total	71(100%)

Table No.41: Distribution of 120 OSCC subjects according to duration of total delay

Total No. of patients	**Upto 3 months**	**3-6 months**	**6-9 months**	**9-12 months**	**> 12 months**
120 (100%)	3 (2.50%)	50 (41.66%)	43 (35.83%)	13 (10.83%)	11(9.16%)
M=94 F=26	M=3 (3.19%) F=0	M=39 (41.48%) F=11 (42.30%)	M=31 (32.97%) F=12 (46.15%)	M=11 (11.70%) F=2 (7.69%)	M=10 (10.69%) F=1 (3.84%)
Age 27-45 years n=49	02 (4.08%)	30 (61.22%)	13 (26.53%	01 (2.04%)	03 (6.12%)
ϰ2-value	3.14,p=0.53,NS,p>0.05				

Table No. 42. Association of 120 OSCC subjects between psychosocial stress and duration of primary diagnostic delay

Psychosocial stress	Upto 3 months	3-6 months	6-9 months	9-12 months	Total
>200 n=4	00	2(1.66%)	00	00	02(1.66%)
199-150 N=26	00	10(8.33%)	03(2.5%)	00	13(10.83%)
149-101	10(8.33%)	45(37.5%)	13(10.83%)	08(6.66%)	76(63.33%)
<101 N=58	04(3.33%)	14(11.66%)	07(5.83%)	4(3.33%)	29(24.16%)
x^2 value	6.81,p=0.65,NS,p>0.05				

Table No. 43: Association of 120 OSCC subjects between psychosocial stress and duration of total diagnostic delay

Psychosocial stress	Upto 3 months	3-6 months	6-9 months	9-12 months	>12 Months	Total
>200	0	01(0.83%)	01(0.83%)	00	00	2(1.66%)
199-150	0	07(5.83%)	06(5.00%)	00	00	13(10.83%)
1499-101	02(1.66%)	34(28.33%)	29(24.16%)	08(6.66%)	6(5.00%)	79(65.83%)
<101	00	12(10.00)	06(5.00%)	05(4.66%)	03(2.5%)	26 (21.66%)
TOTAL=120	02(1.66%)	54(46.00%)	42(35.00%)	13(10.83%)	09(7.5%)	TOTAL= 120 (100%)
x^2 -value	8.10,p=0.77,NS,p>0.05					

Table No. 44: Association of clinical staging with primary delay

TNM Staging	Upto 3 months	3-6 months	6-9 months	9-12 months
Stage I n=0	0	00	00	00
Stage II n=4(3.33%)	01(25.00%)	03(75.00%)	00	00
Stage III n=31(25.83%)	07(22.58%)	17(54.83%)	04(12.90%)	03(09.67%)
Stage IV n=85(70.83%)	06(07.05%)	52(61.17%)	16(18.82%)	11(12.94%)
TOTAL n=120 (100%)	14(11.66%)	72(60.00%)	20(16.66%)	14(11.66%)
x^2 -value	43.80,p-value=0.0001,S			

Table No. 45: Association of clinical TNM staging with secondary delay

TNM staging	0-1 months	Upto 1-2 months	2-3 months	3-4 months
Stage I n=0	00	00	00	00
Stage II n=4(3.33%)	04(100%)	00	00	00
Stage III n=31(25.83%)	28(90.32%)	02(06.45%)	00	01(03.22%)
Stage IV n=85(70.83%)	71(83.52%)	09(10.58%)	05(05.88%)	00
TOTAL n=120 (100%)	103(85.83%)	11(09.16%)	05(04.16%)	01(0.83%)
x^2 -value	30.03,p=0.0001,S			

Table No. 46: Association of TNM clinical staging with professional/ referral delay

Clinical stage	**No delay**	**Upto 0.5 month**	**0.5-1 month**	**1-2 months**	**2-3 months**
Stage I n=0	00	00	00	00	00
Stage II n=4(3.33%)	03(75.00%)	00	01(25.00%)	00	00
Stage III n=31(25.83%)	11(35.48%)	08(25.80%)	12(38.70%)	00	00
Stage IV n=85(70.83%)	35(41.17%)	23(27.05%)	22(25.88%)	02(02.35%)	03(3.52%)
Total n=120 (100%)	49(40.83%)	31(25.83%)	35(29.16%)	02(1.66%)	03(2.5%)
x^2 -value	61.09,p=0.0001,S,p<0.05				

Table No.47: Association of TNM clinical staging with total delay

Clinical Staging	**Upto 3 months**	**3-6 months**	**6-9 months**	**9-12 months**	**>12 months**
Stage I n=0	00	00	00	00	00
Stage II n=4(3.33%)	01(25.00%)	02(50.00%)	01(25.00%)	00	00
Stage III n=31(25.83%)	02(06.45%)	18(58.06%)	06(19.35%)	03(09.67%)	02(06.45%)
Stage IV n=85(70.83%)	00	30(35.29%)	36(42.35%)	10(11.76%)	09(10.58%)
TOTAL n=120 (100%)	03(02.50%)	50(41.66%)	43(35.83%)	13(10.83%)	11(09.16%)
x^2 -value	70.44,p=0.0001,S,p<0.05				

Table No. 48: Association of primary delay with TNM clinical staging and SES

Primary delay	**Clinical staging**	**UM**	**LM**	**Poor**	x^2 **-Value**
Upto 3 months n=14(11.66%)	Stage I n=00	00	00	00	219.8 p=0.0001,S
	Stage II n=01(07.14%)	01(100%)	00	00	
	Stage III n=07(50.00%)	05(71.42%)	01(14.28%)	01(14.28%)	
	Stage IV n=06(42.85%)	00	02(33.33%)	04(66.66%)	
3-6 months n=72(60.00%)	Stage I n=00	00	00	00	37.92 p=0.0001,S
	Stage II n=03(04.16%)	01(33.33%)	01(33.33%)	01(33.33%)	
	Stage III n=17(23.61%)	03(17.64%)	07(41.17%)	07(41.17%)	
	IV n=52(72.22%)	01(01.92%)	19(36.53%)	32(61.53%)	
6-9 months n=20(16.66%)	Stage I n=00	00	00	00	101.4 p=0.0001,S
	Stage II n=00	00	00	00	
	Stage III n=04(20.00%)	00	03(75.00%)	01(25.00%)	
	Stage IV n=16(80.00%)	02(12.50%)	01(06.25%)	13(81.25%)	
9-12 months n=14 (11.66%)	Stage I n=00	00	00	00	24.22 p=0.0001,S
	Stage II n=00	00	00	00	
	Stage III n=03(21.42%)	01(33.33%)	01(33.33%)	01(33.33%)	
	Stage IV n=11(78.57%)	01(09.09%)	03(27.27%)	07(63.63%)	

Table No. 49: Association of secondary delay with TNM clinical staging and SES

Secondary delay	**Clinical staging**	**UM**	**LM**	**Poor**	x^2 **-value**
No delay n=103 (85.83%)	Stage I n=00	00	00	00	63.64 p=0.0001,S
	Stage II n=04(03.88%)	02 (50.00%)	01(25.00%)	01(25.00%)	
	Stage III n=28(27.18%)	09(32.14%)	09(32.14%)	10(35.71%)	
	Stage IV n=71(68.93%)	02(02.81%)	21(29.57%)	48(67.60%)	
1-2 months n=11(09.16%)	Stage I n=00	00	00	00	127.90 p=0.0001,S
	Stage II n=00	00	00	00	
	Stage III n=02(18.18%)	00	02(100%)	00	
	IV n=09(81.81%)	01(11.11%)	02(22.22%)	06(66.66%)	
2-3 months n=05(04.16%)	Stage I n=00	00	00	00	-
	Stage II n=00	00	00	00	
	Stage III n=00	00	00	00	
	Stage IV n=05(100%)	01(20.00%)	02(40.00%)	02(40.00%)	
3-4 months n=01(0.83%)	Stage I n=00	00	00	00	-
	Stage II n=00	00	00	00	
	Stage III n=00	00	00	00	
	Stage IV n=01(100%)	00	01(100%)	00	

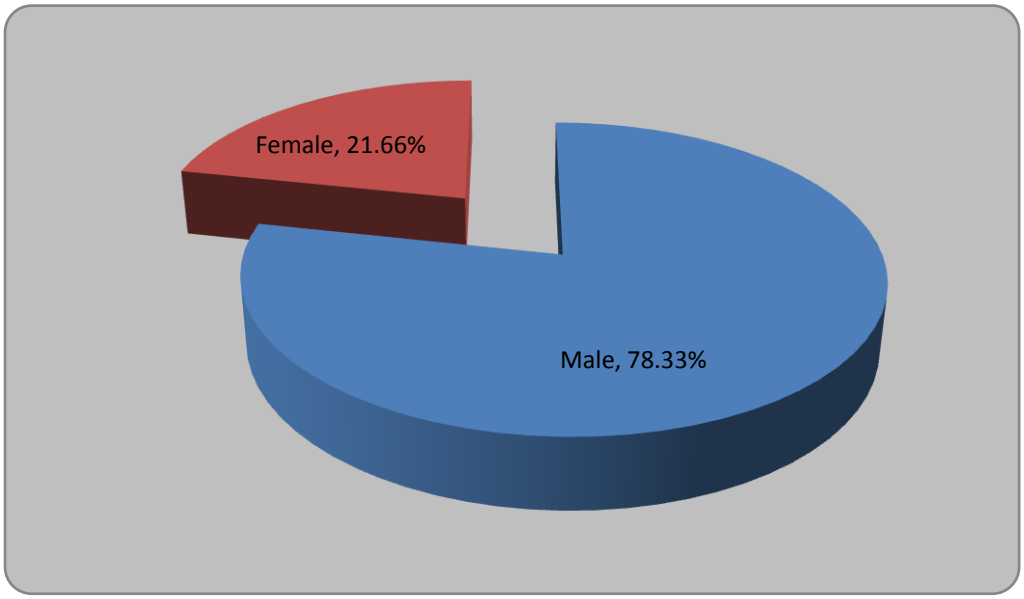
Table No. 50: Association of professional / referral delay with TNM clinical staging and SES

Total delay	**Clinical staging**	**UM**	**LM**	**Poor**	x^2 **-value**
No professional delay n=49(40.83%)	I=00	00	00	00	47.98 p=0.0001,S
	II n=03(06.12%)	01(33.33%)	01(33.33%)	01(33.33%)	
	III n=11(22.44%)	04(36.36%)	05(45.45%)	02(18.18%)	
	IV n=35 (71.42%)	02(05.71%)	12(34.28%)	21(60.00%)	
Upto 0.5 month n=31(25.83%)	I=00	00	00	00	51.98 p=0.0001,S
	II=00	00	00	00	
	III n=08(25.80%)	03(37.50%)	02(25.00%)	03(37.50%)	
	IV n=23 (74.19%)	00	05(21.73%)	18(78.26%)	
0.5-1 month n=35(29.16%)	I n=00	00	00	00	82.23 p=0.0001,S
	II n=01(02.85%)	00	00	01(100%)	
	III n=12(34.28%)	02(16.66%)	05(41.66%)	05(41.66%)	
	IV n=22(62.85%)	02(09.09%)	07(31.81%)	13(59.09%)	
1-2 months n=02(1.66%)	I=00	00	00	00	-
	II=00	00	00	00	
	III=00	00	00	00	
	IV=02(100%)	00	00	02(100%)	
2-3 months n=03 (02.50)	I=00	00	00	00	-
	II=00	00	00	00	
	III=00	00	00	00	
	IV=03(100%)	00	01(33.33%)	02(66.66%)	

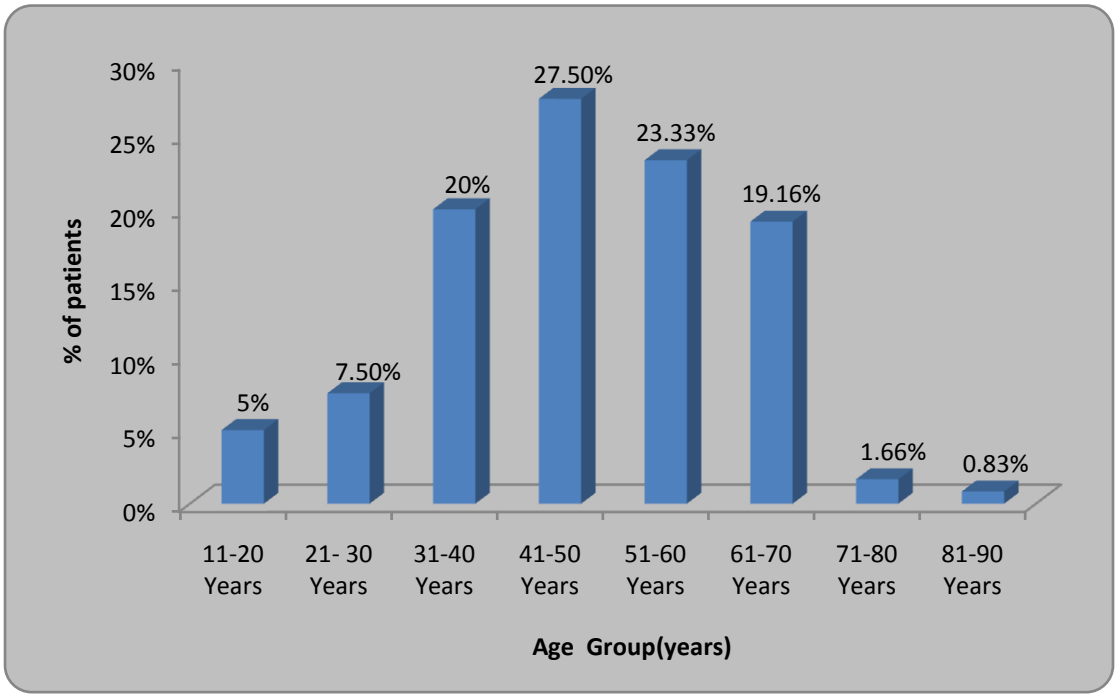
Table No. 51: Association of total delay with clinical staging and SES

Total delay	**Clinical staging**	**UM**	**LM**	**Poor**	x^2 **-value**
Upto 3 months n=03(02.50%)	I=00	00	00	00	-
	II=01(33.33%)	01(100%)	00	00	
	III=02(66.66%)	02(100%)	00	00	
	IV=00	00	00	00	
3-6 months n=50(41.66%)	I=00	00	00	00	100.80 p=0.0001,S
	II=02(04.00%)	01(50.00%)	01(50.00%)	00	
	III=18(36.00%)	06(33.33%)	05(27.77%)	07(38.88%)	
	IV=30(60.00%)	00	15(50.00%)	15(50.00%)	
6-9 months n=43(35.83%)	I=00	00	00	00	195.0 p=0.0001,S
	II=01(02.32%)	00	00	01(100%)	
	III=06(13.95%)	00	05(83.33%)	01(16.66%)	
	IV=36(83.72%)	03(08.33%)	05(13.88%)	28(77.77%)	
9-12 months n=13(10.83%)	I=00	00	00	00	44.15 p=0.0001,S
	II=00	00	00	00	
	III=03(23.07%)	01(33.33%)	01(33.33%)	01(33.33%)	
	IV=10(76.92%)	01(10.00%)	01(10.00%)	08(80.00%)	
>12 months n=11(09.16%)	I=00	00	00	00	14.82 p=0.0006,S
	II=00	00	00	00	
	III=02(18.18%)	00	01(50.00%)	01(50%)	
	IV=09(81.81%)	01(11.11%)	03(33.33%)	05(55.55%)	

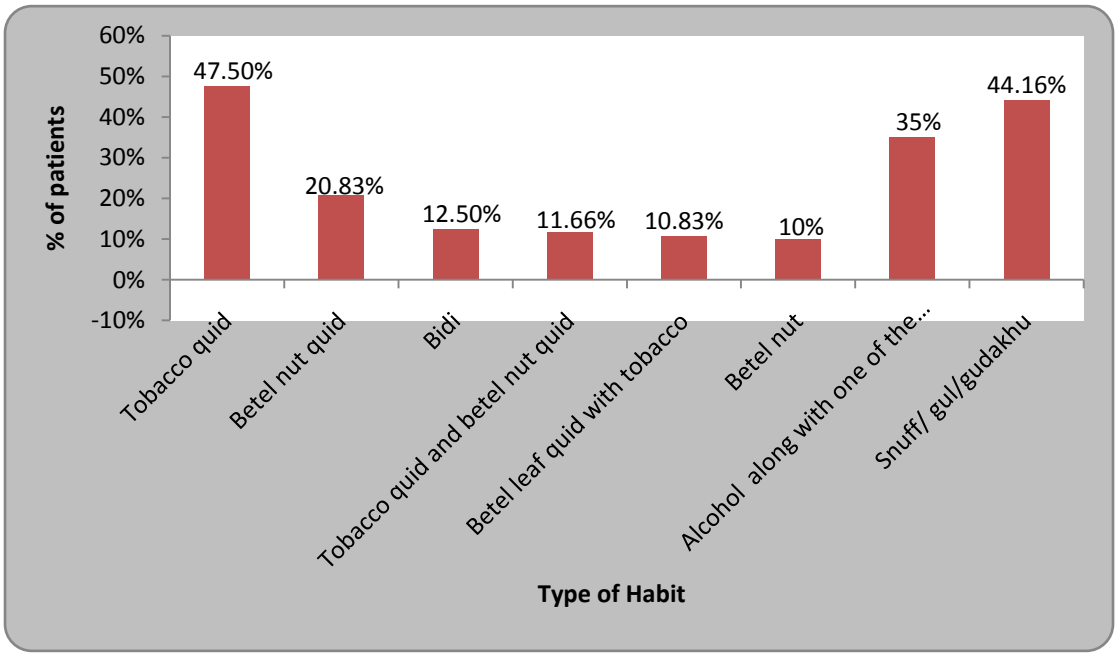
Graph No. 1: Sex wise distribution of total 120 OSCC patients



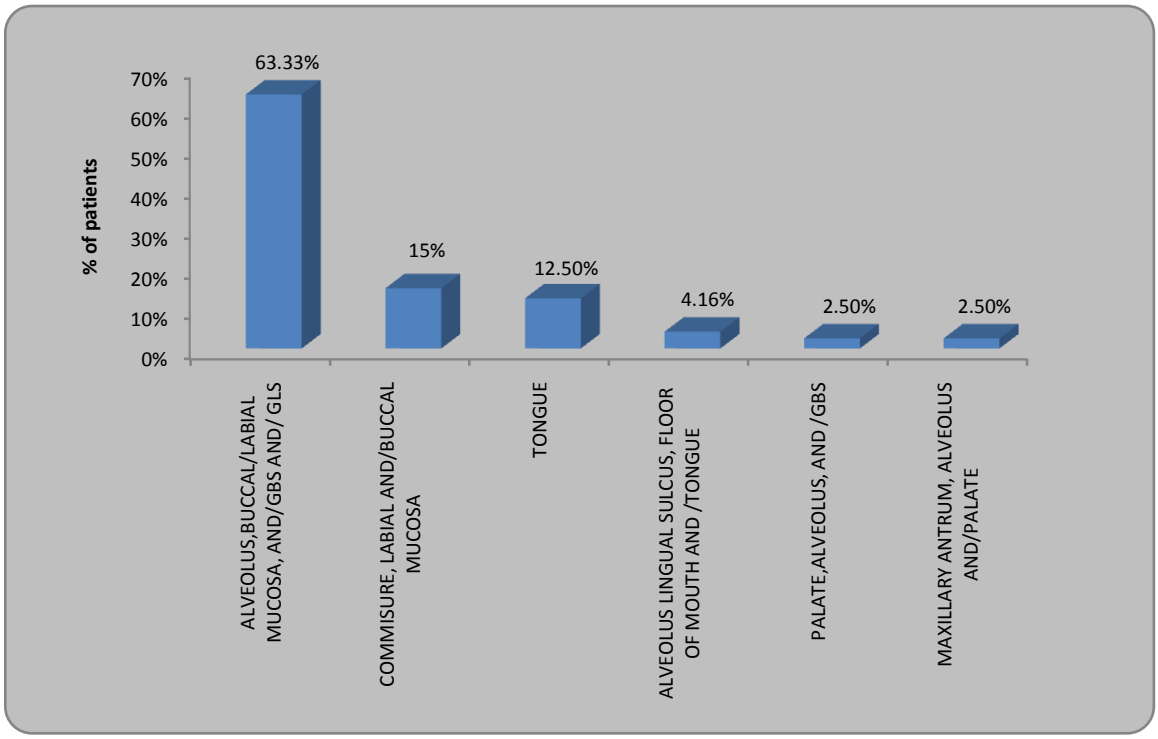
Graph No. 2: Age wise distribution of OSCC patients



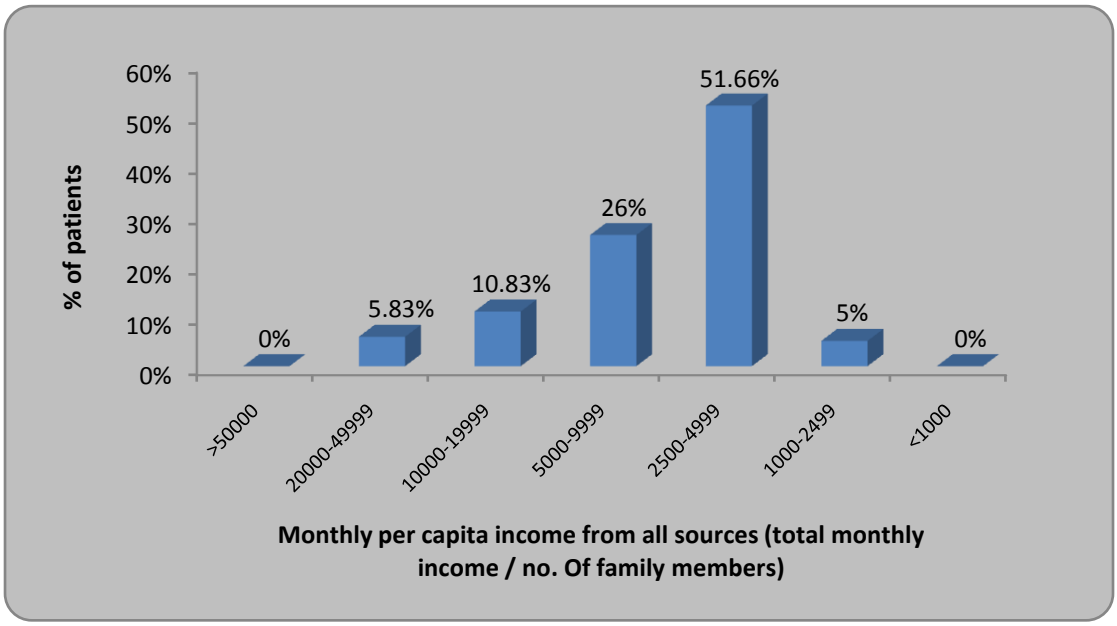
Graph No. 3: Habit wise distribution in OSCC patients



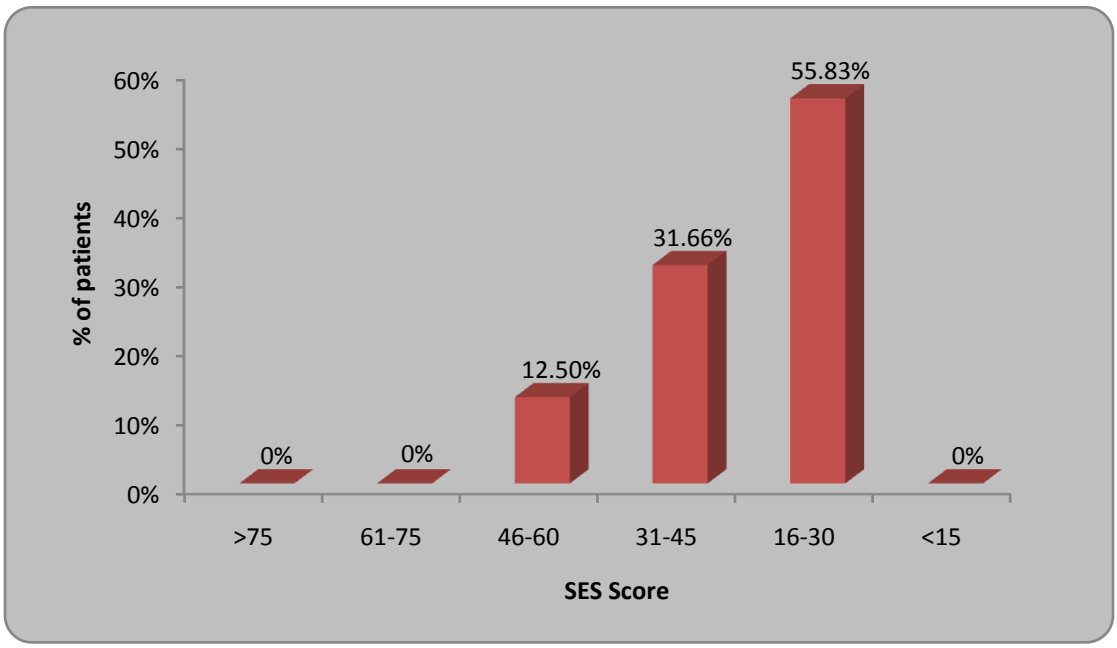
Graph No. 4: Site wise distribution in 120 OSCC subjects



Graph No. 5: Monthly per capita income from all sources of OSCC patients

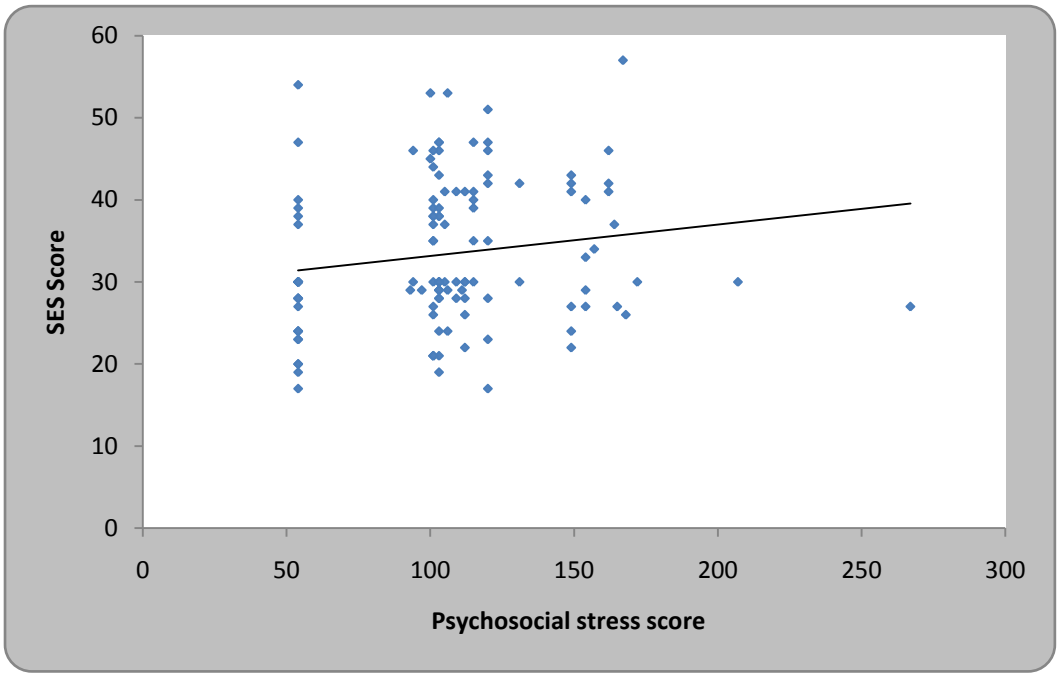


Graph No 6: Distribution of OSCC patients according to socioeconomic status scores

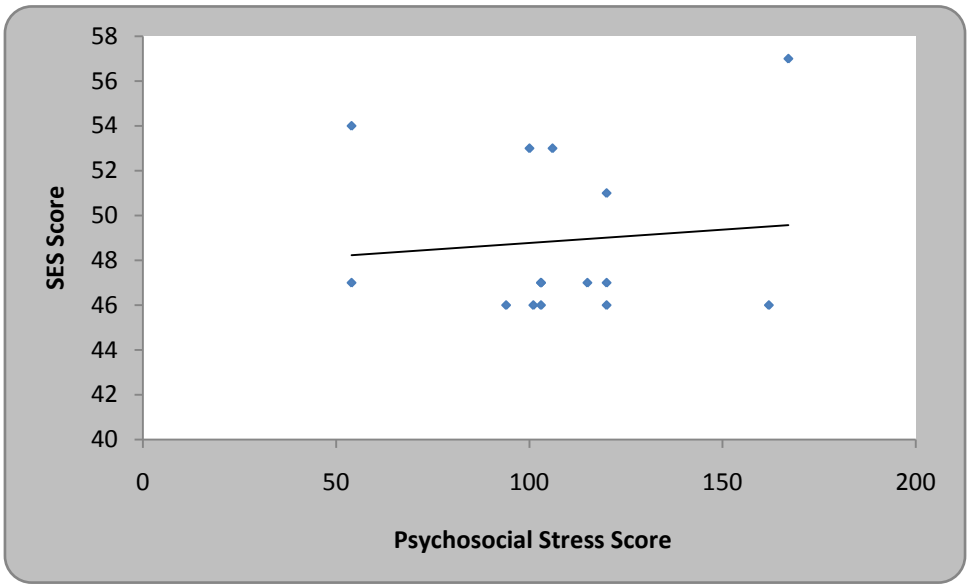


>75 Upper high; 61-75 High; 46-31 UM SES; 31-45 LM SES; 16-30 Poor SES; <15Very poor

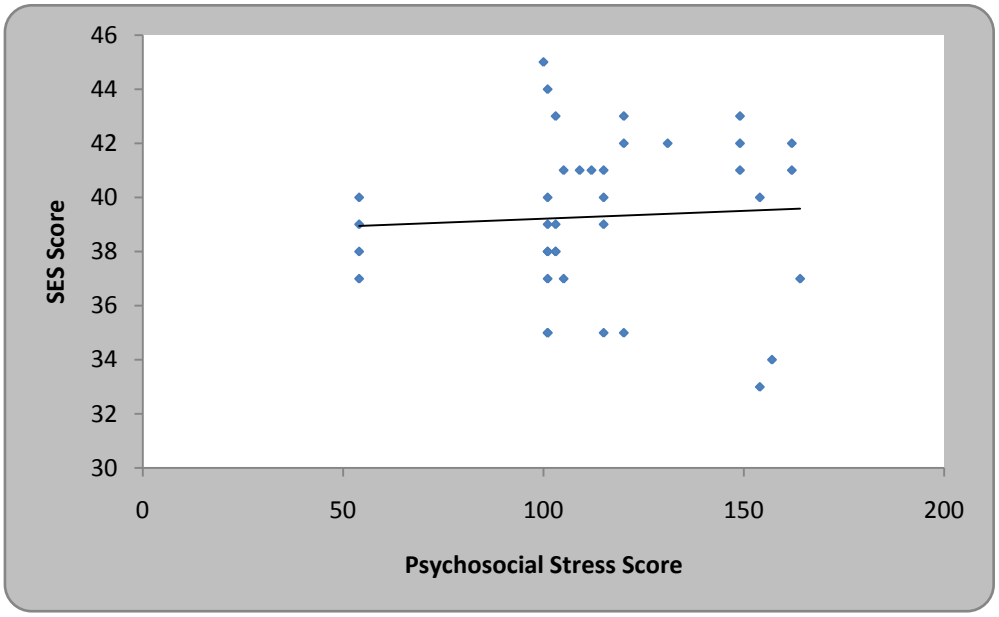
Graph No. 7: Correlation of mean psychosocial stress score with mean SES score



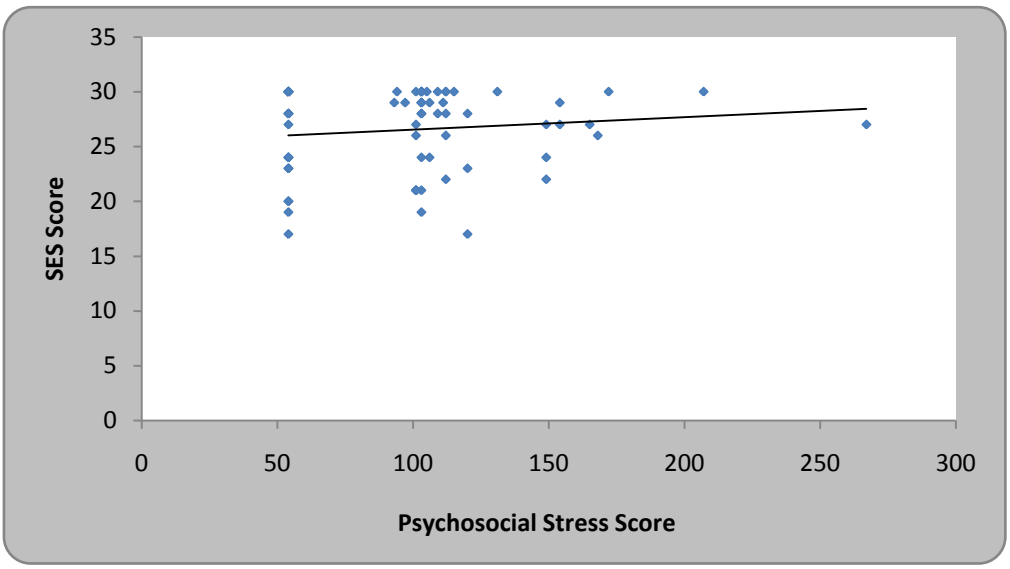
Graph No. 8a: Association of mean psychosocial stress score with mean UM SES



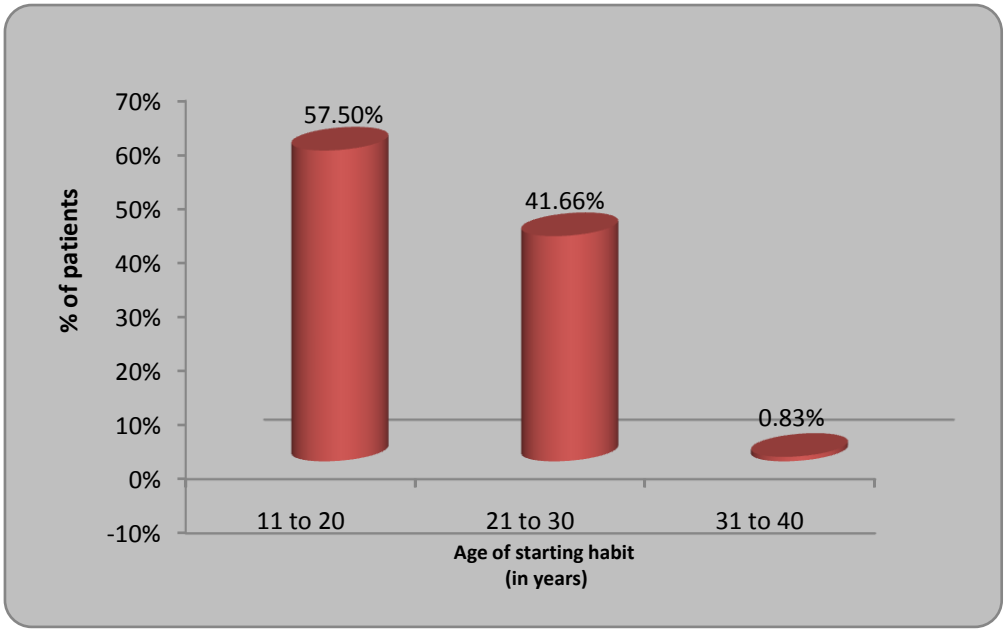
Graph No. 8b: Association of mean psychosocial stress score with mean LM SES



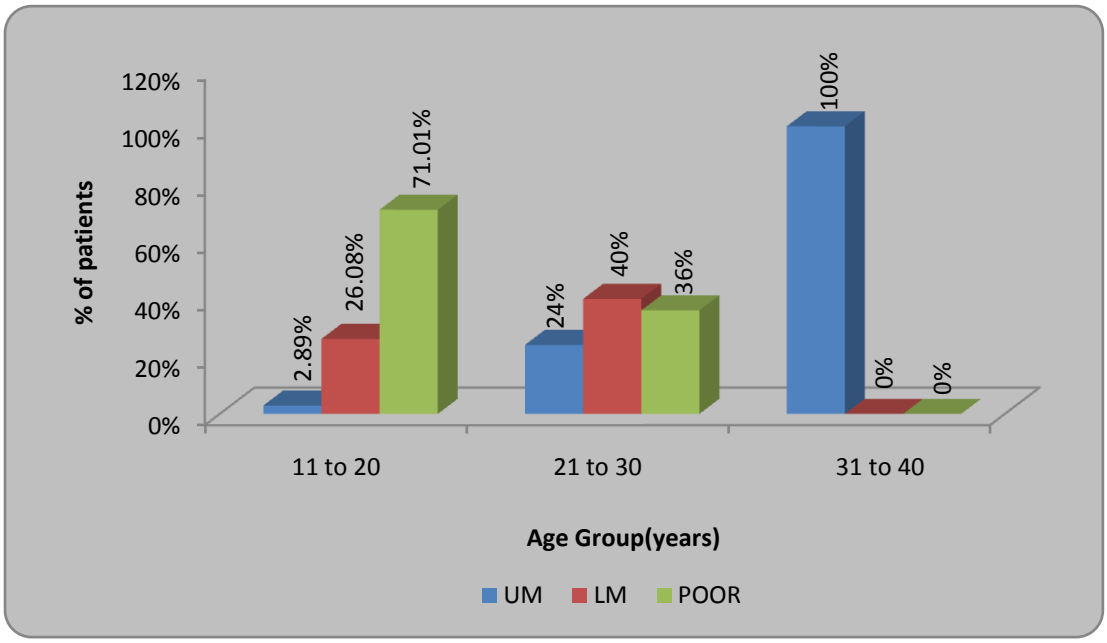
Graph No. 8c: Association of mean psychosocial stress score with mean Poor SES



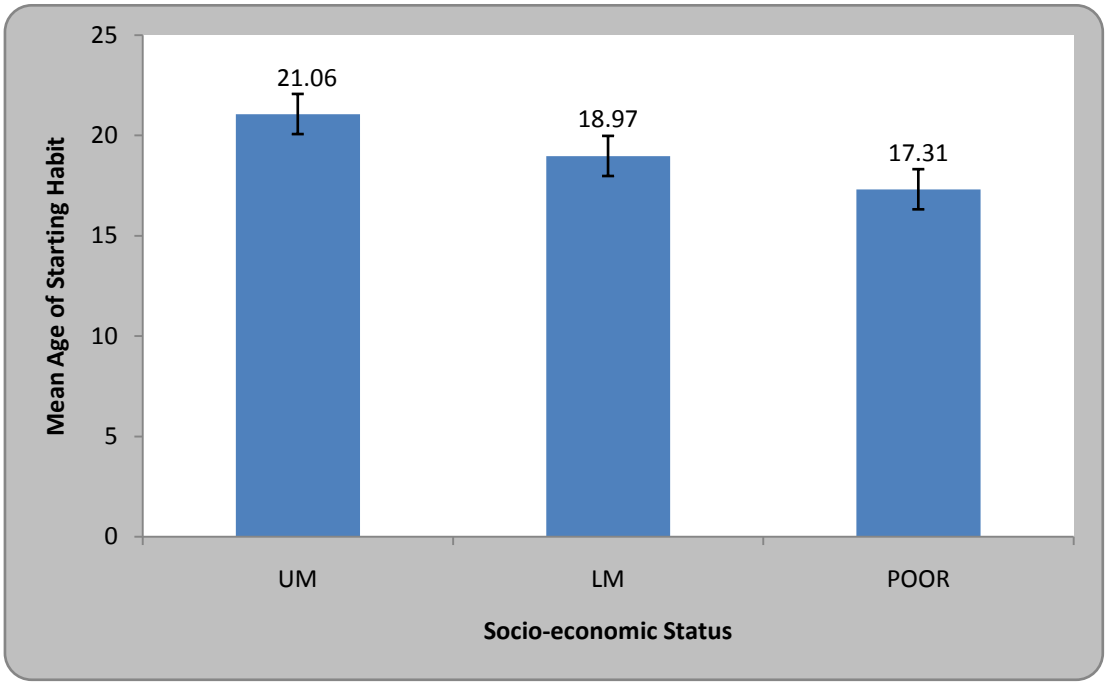
Graph No. 9: Age of starting habit in OSCC patients.



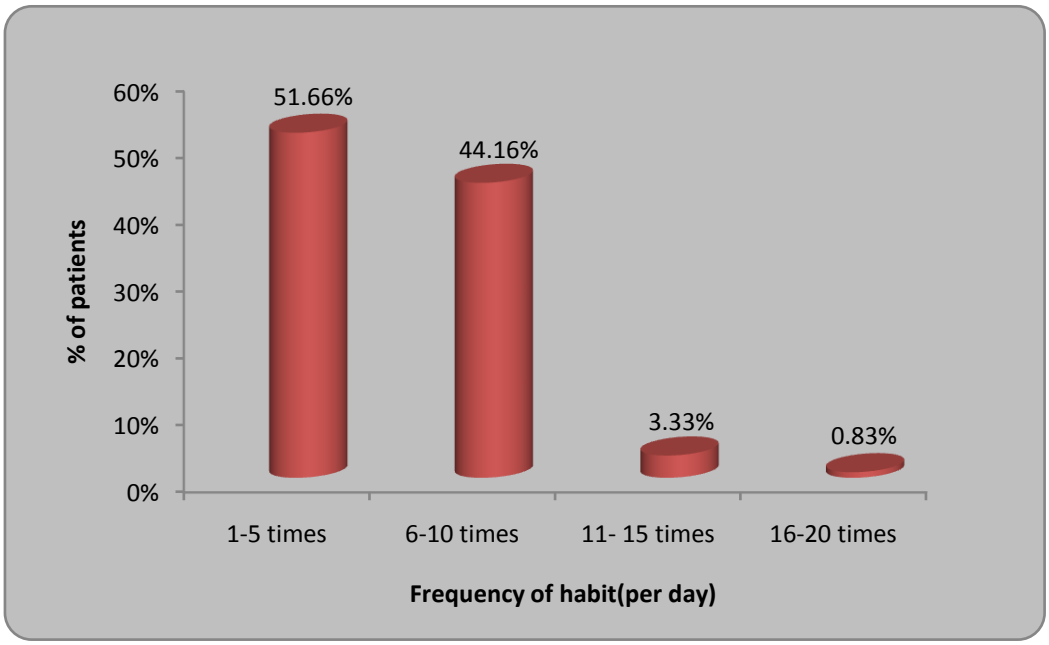
Graph No. 10: Association of 120 OSCC subjects between age of starting habit and SES (UM, LM, POOR).



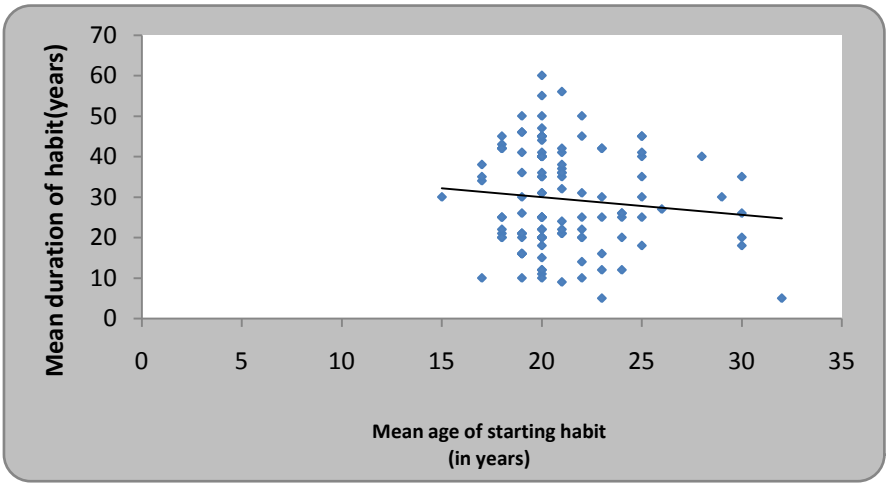
Graph No. 11: Distribution of 120 OSCC subjects according to mean age of starting habit and according to SES (UM, LM, POOR).



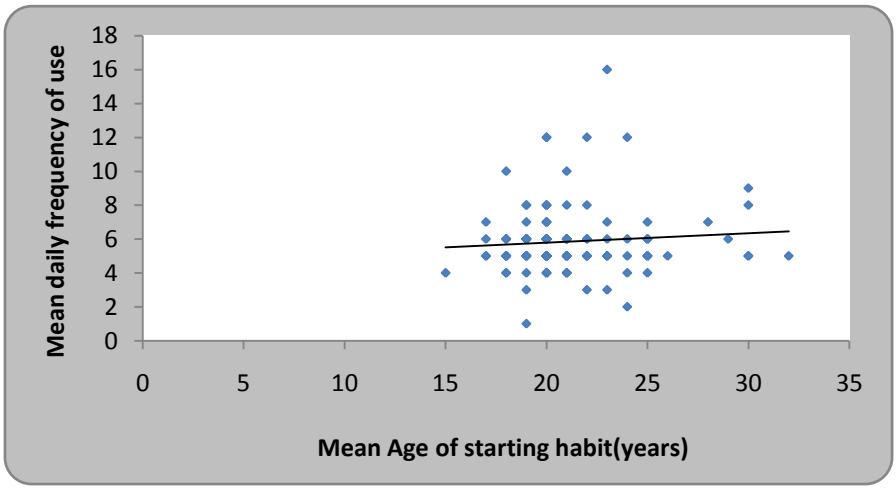
Graph No. 12: Frequency of habit among OSCC Subjects.



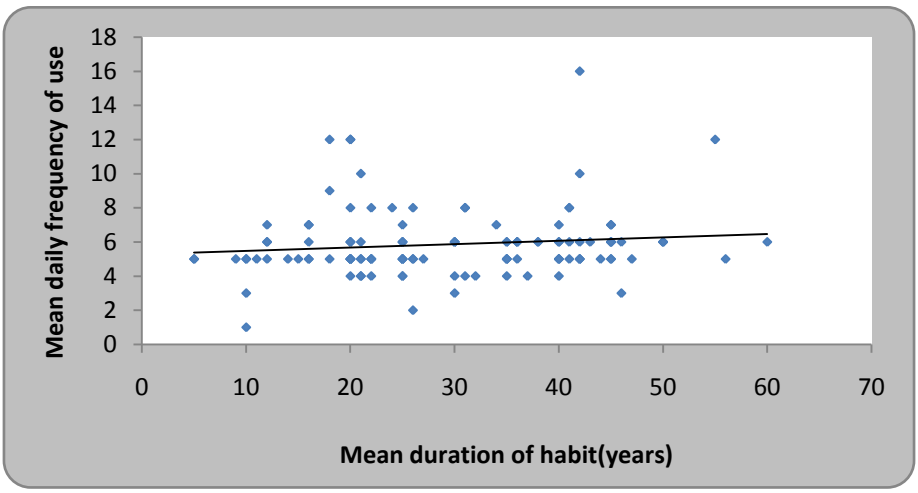
Graph No.13: Association of mean age of starting habit, mean duration



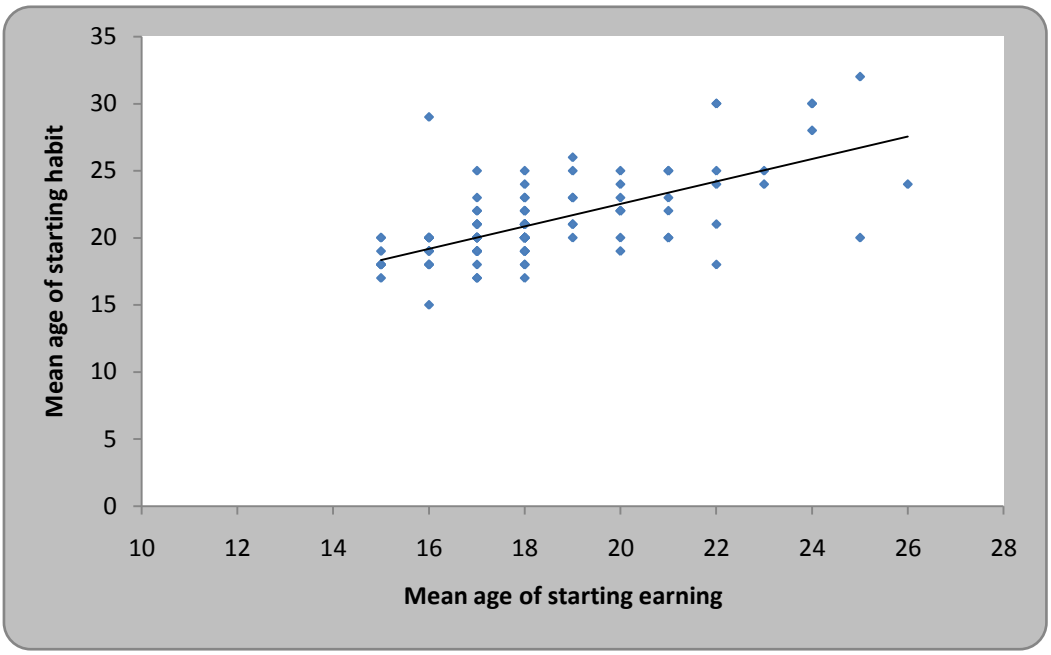
Graph No.14: Association of mean age of starting habit, and mean daily frequency



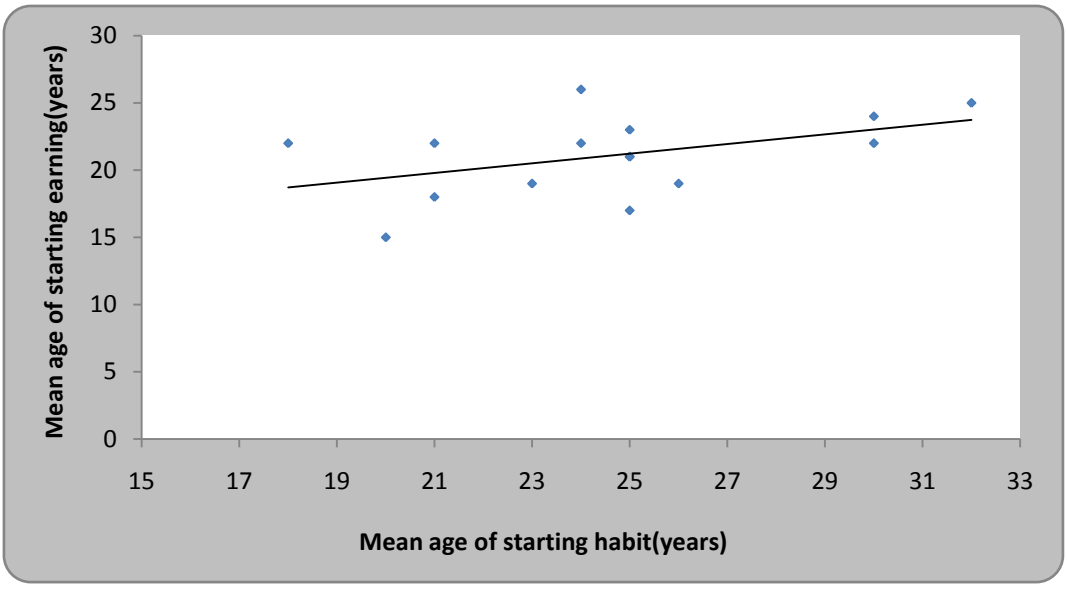
Graph No.15: Association of mean duration and mean daily frequency



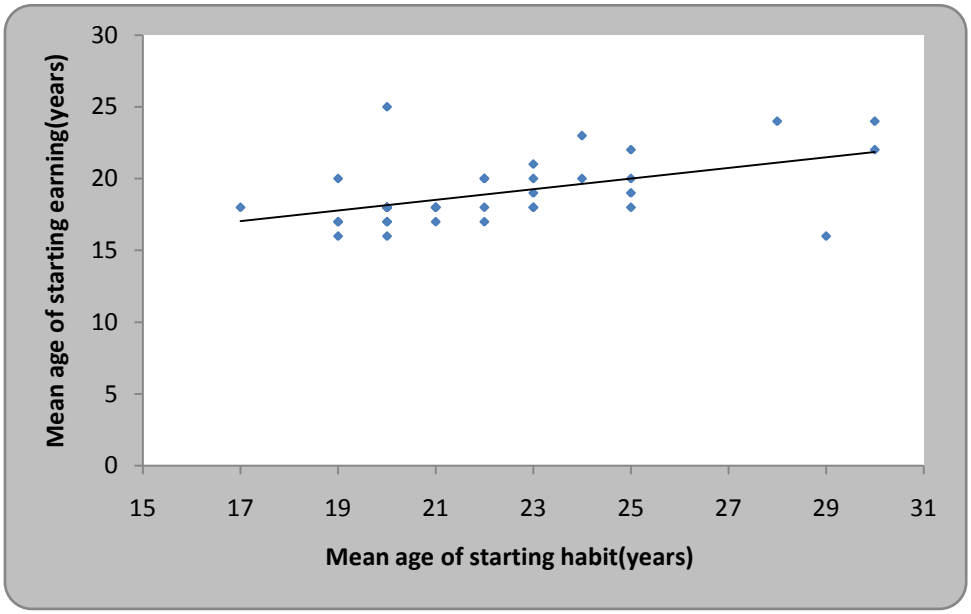
Graph No.16: Correlation between mean age of staring earning and mean age of starting habit in OSCC patients



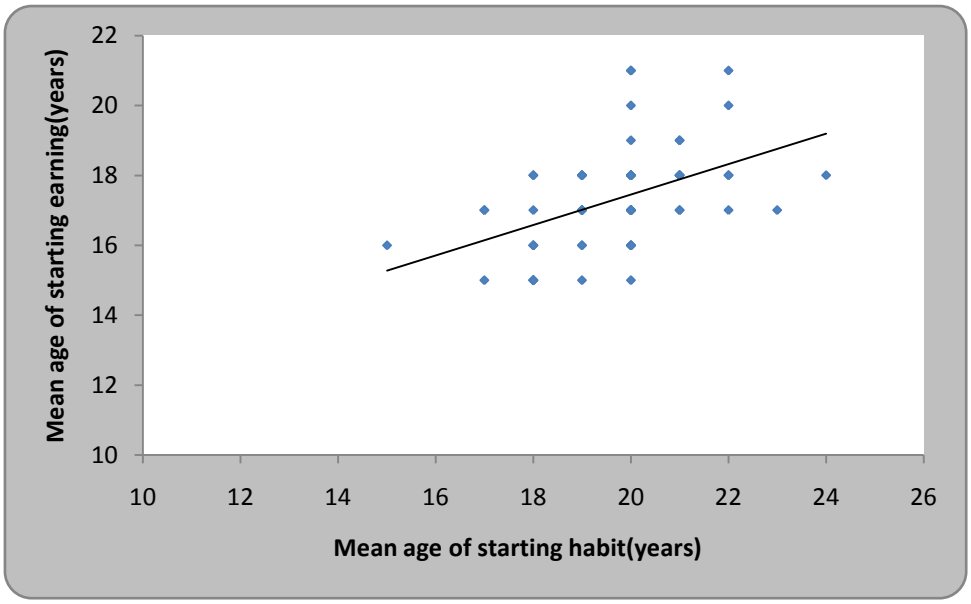
Graph No. 17a: Correlation of mean age of starting habit and mean age of starting earning in UM SES



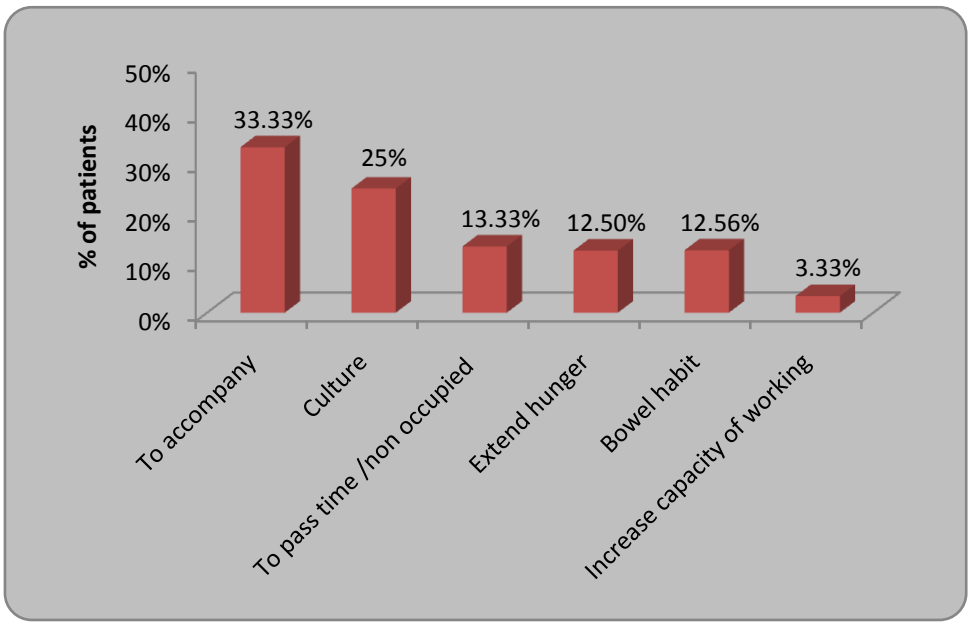
Graph No. 17b: Correlation of mean age of starting habit and mean age of starting earning according to LM SES



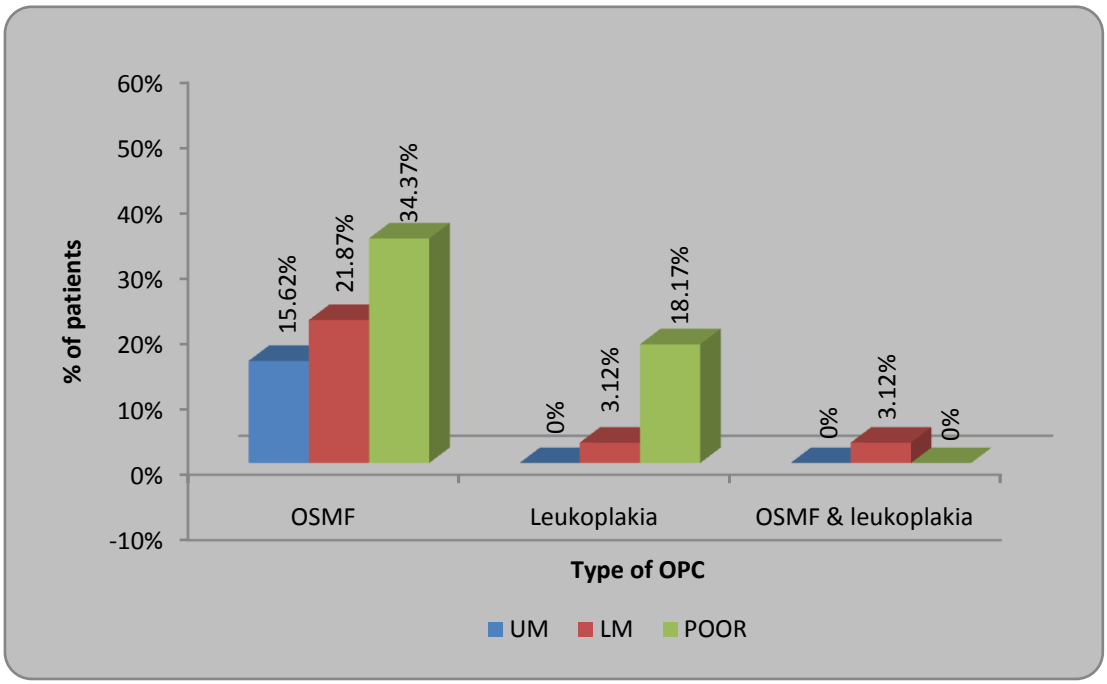
Graph No. 17c: Correlation of mean age of starting habit and mean age of starting earning according to Poor SES



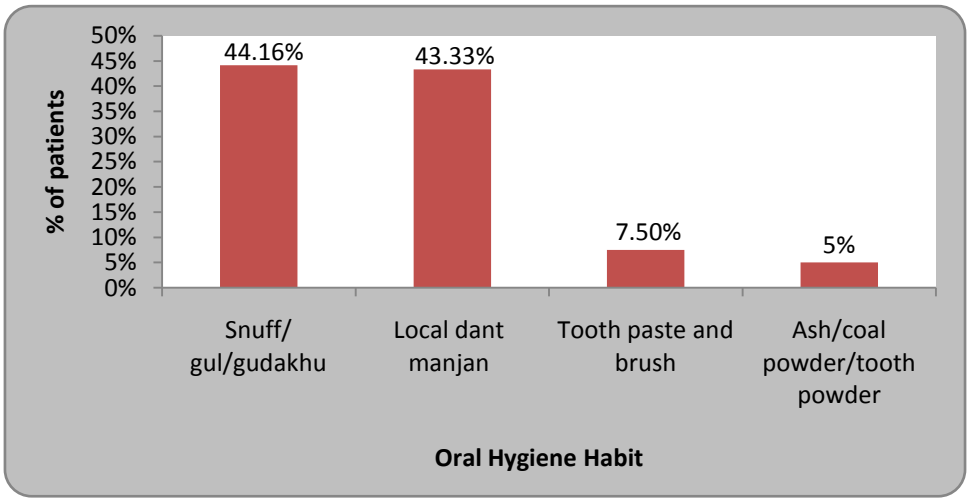
Graph No. 18: Reasons for starting adverse habit in OSCC subjects



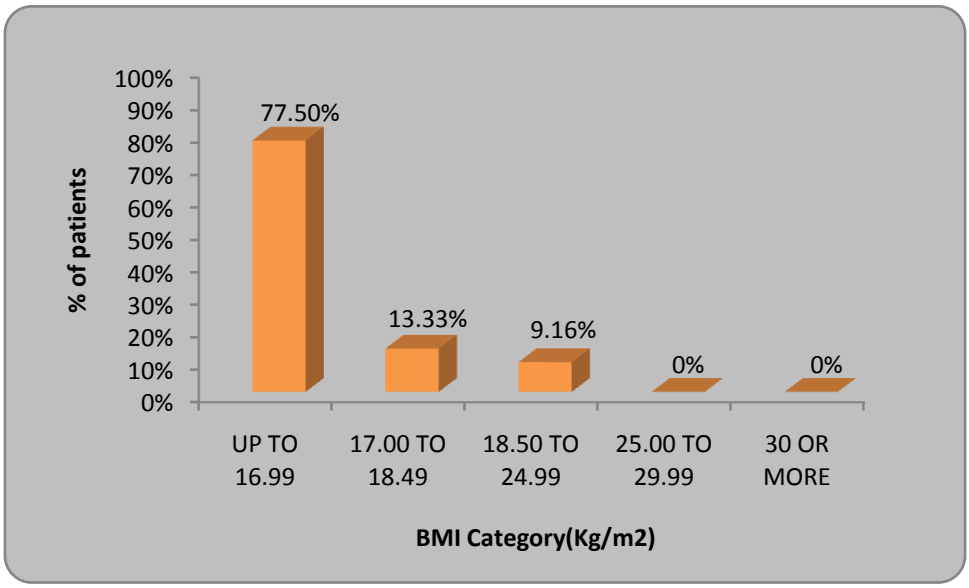
Graph No. 19. Distribution of 32 OPC subjects according to SES



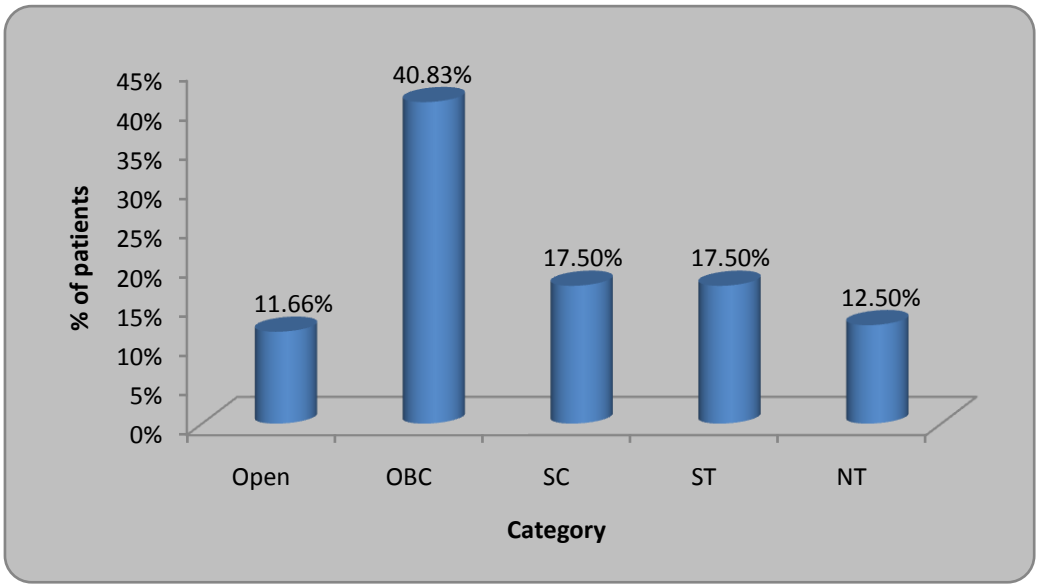
Graph No. 20: Oral hygiene habits in OSCC



Graph No. 21: Distribution of 120 OSCC subjects according to severity of body mass index (BMI)

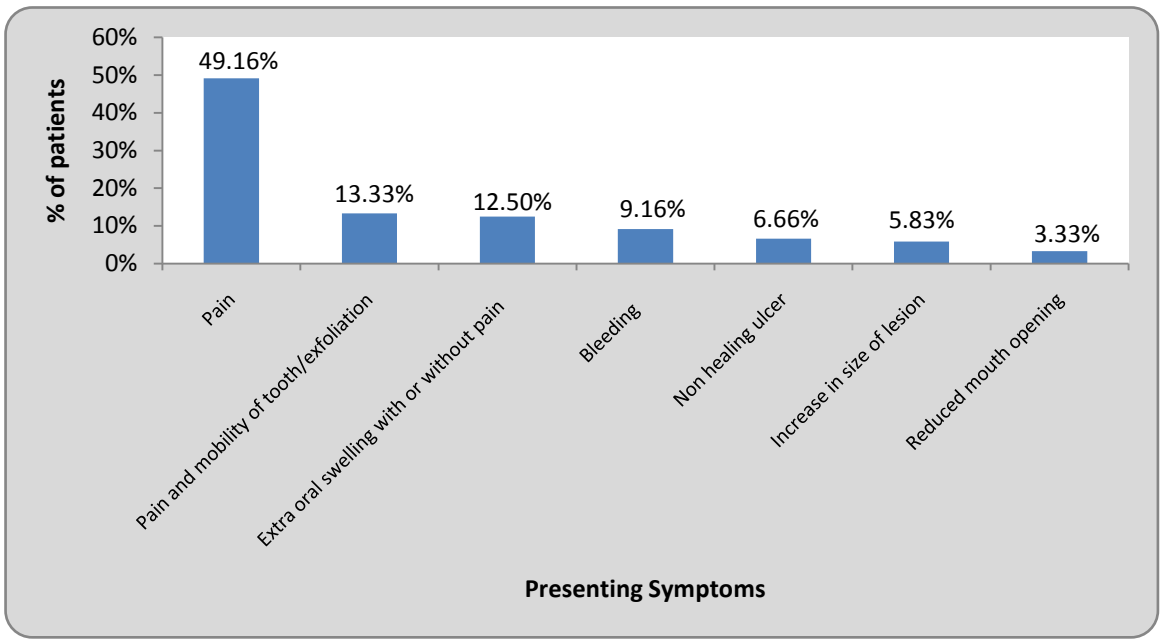


Graph No. 22: Category wise distribution of OSCC subjects

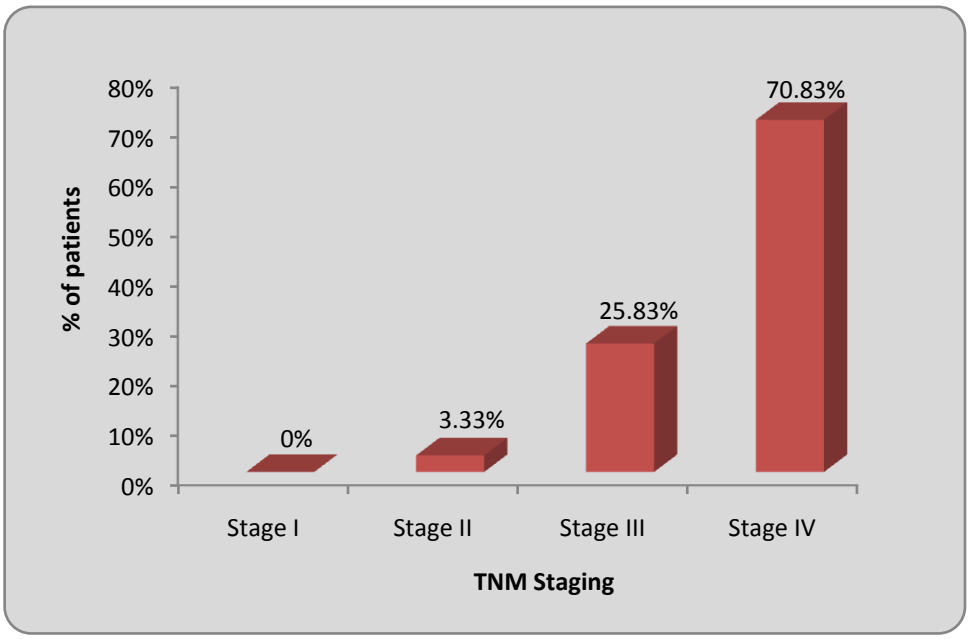


Psychosocial and Socioeconomic Risk Factors of Oral Squamous Cell Carcinoma and its Association with Delay in Diagnosis

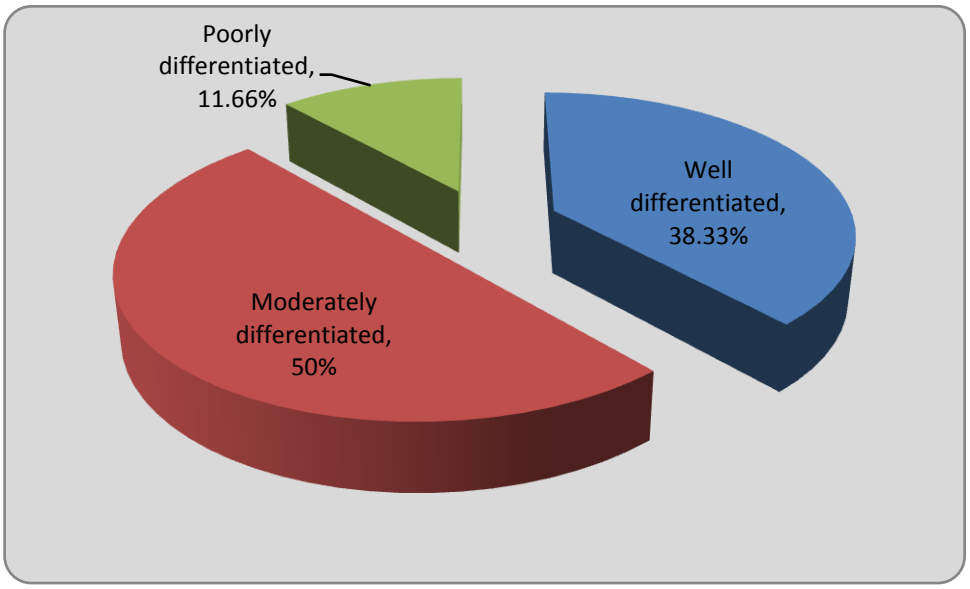
Graph No. 23: Distribution of 120 OSCC patients according to presenting complaints



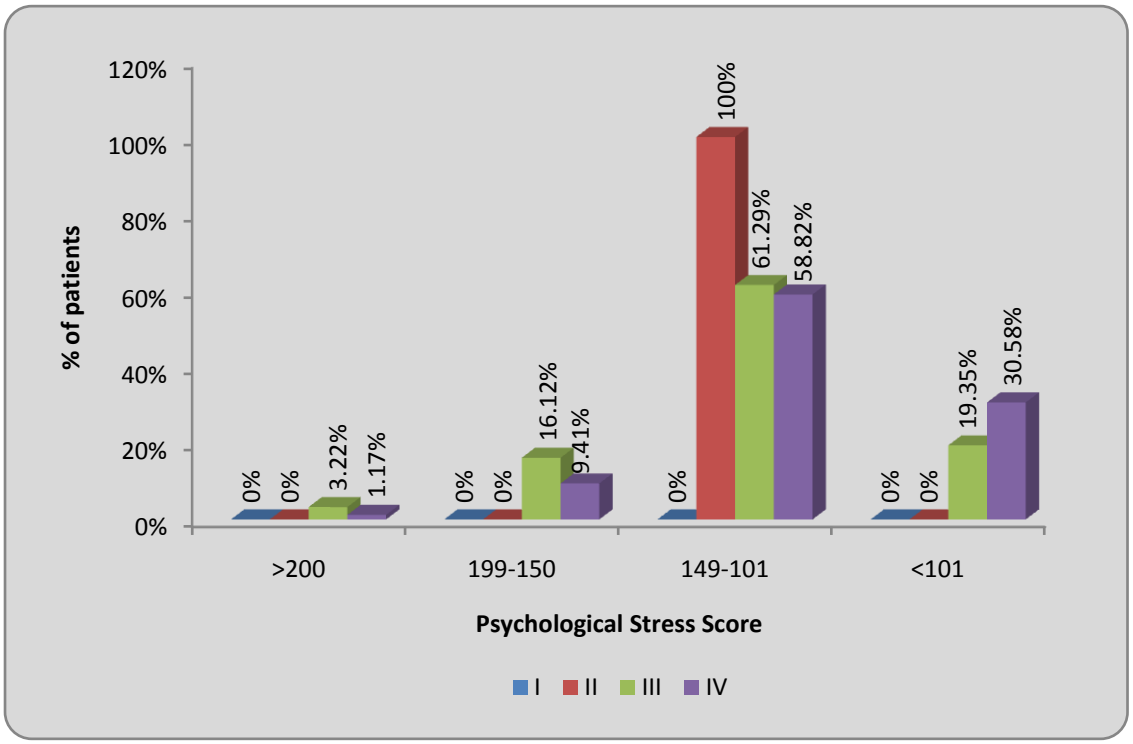
Graph No. 24: Distribution of 120 OSCC patients according to TNM staging



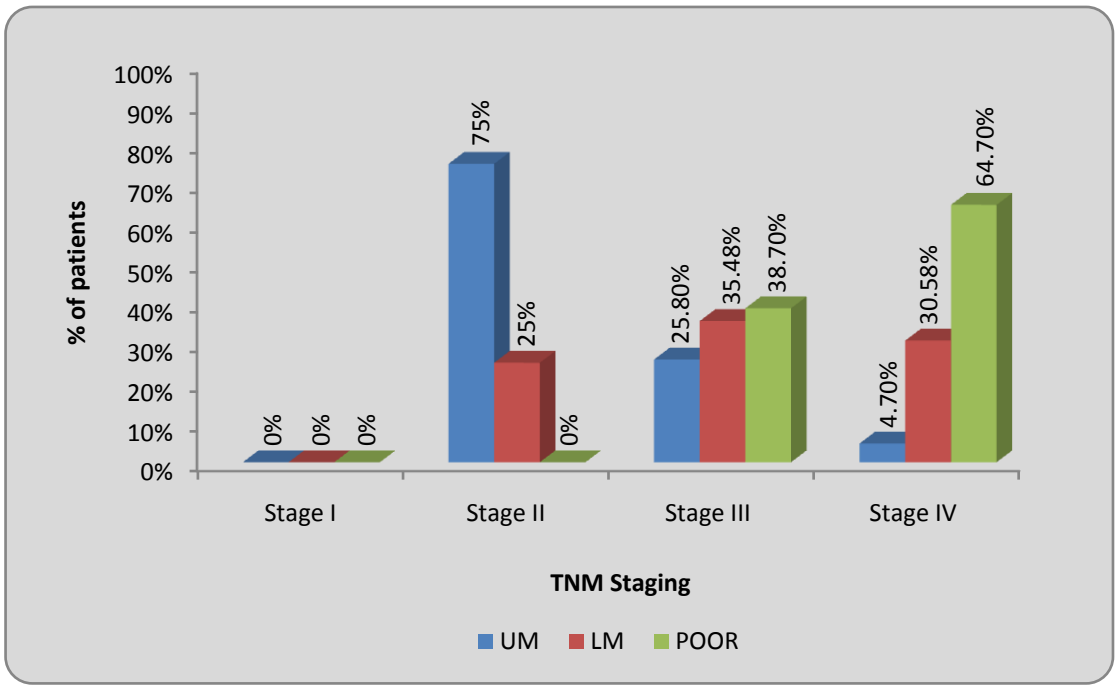
Graph No. 25: Distribution of 120 OSCC subjects according to histopathological grading



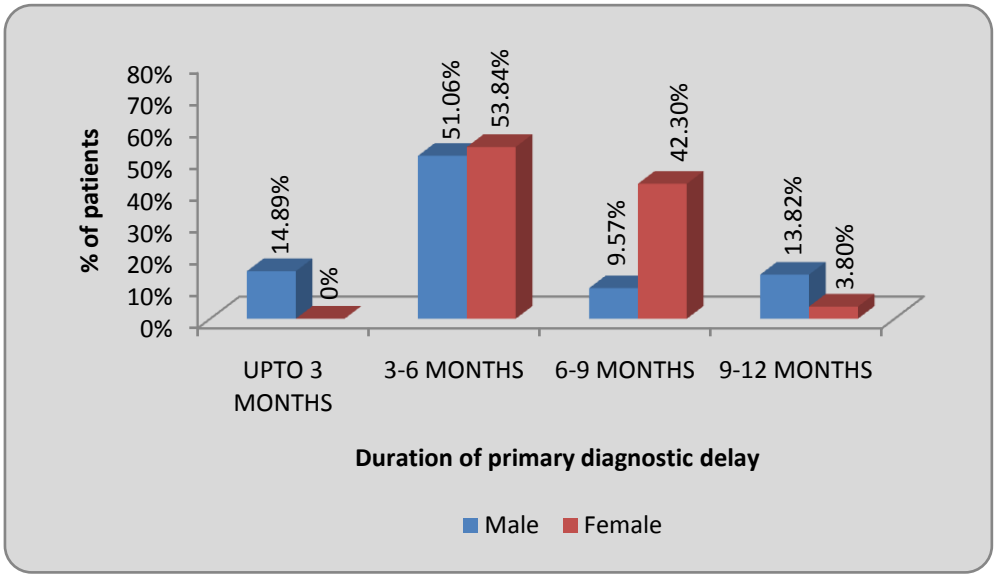
Graph No. 26: Association between TNM staging and psychosocial stress score



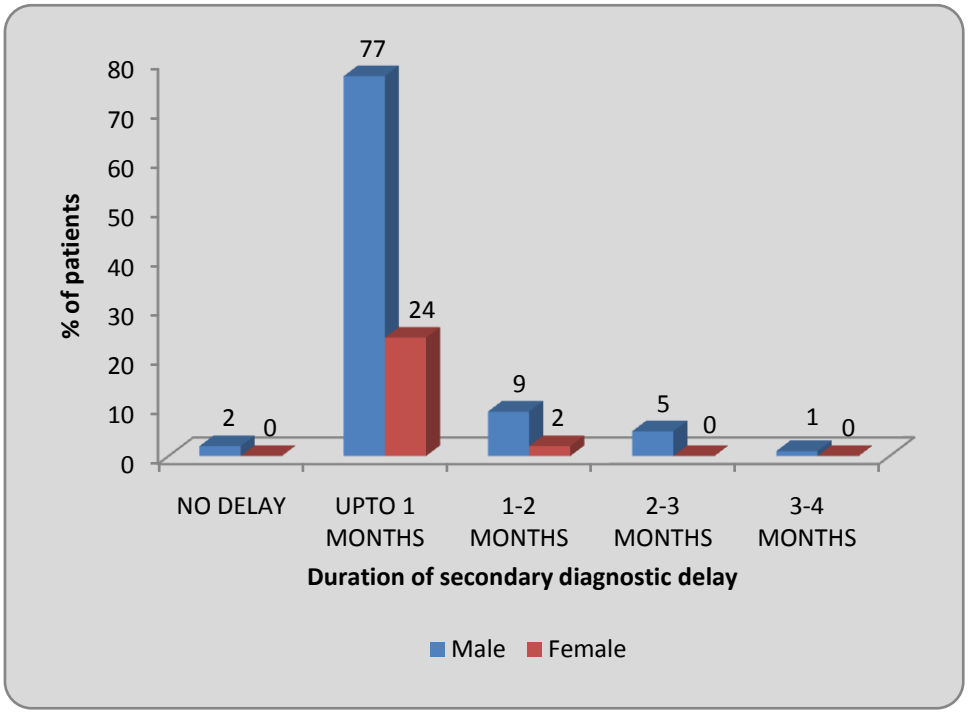
Graph No. 27: Association between TNM staging and SES



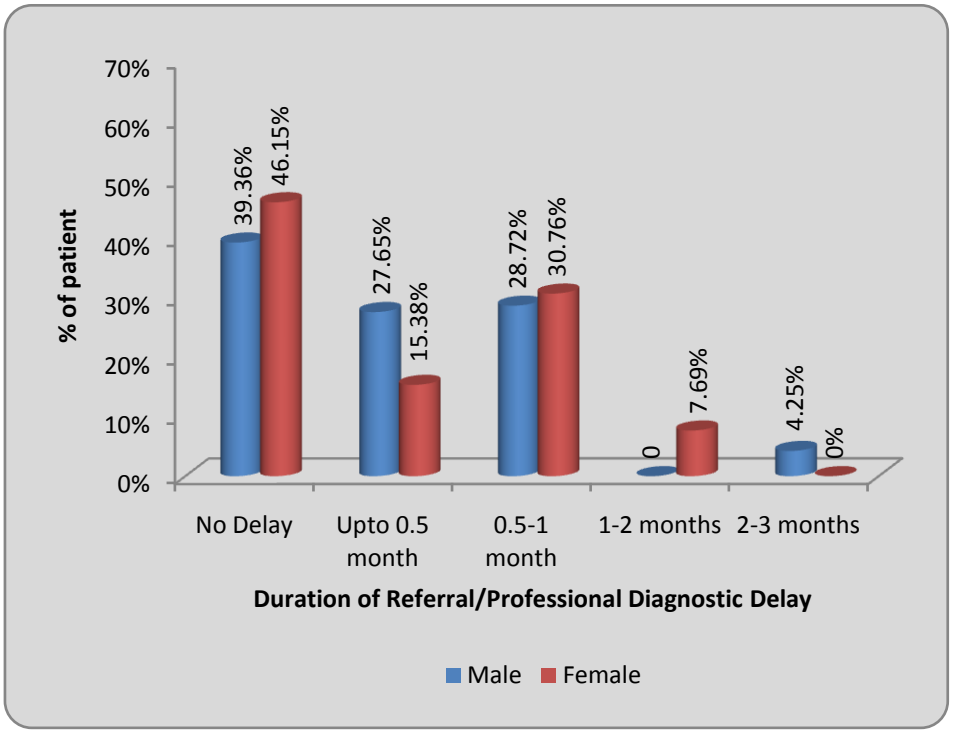
Graph No. 28: Distribution of 120 OSCC subjects according to duration of primary diagnostic delay



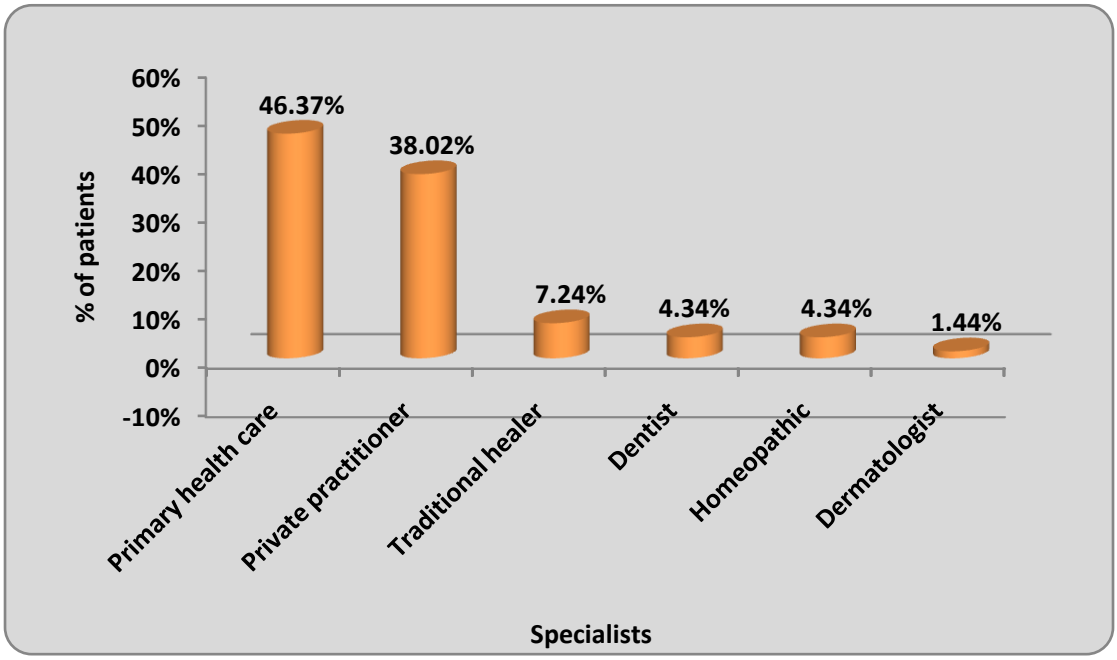
Graph No. 29: Distribution of 120 OSCC subjects according to duration of secondary diagnostic delay



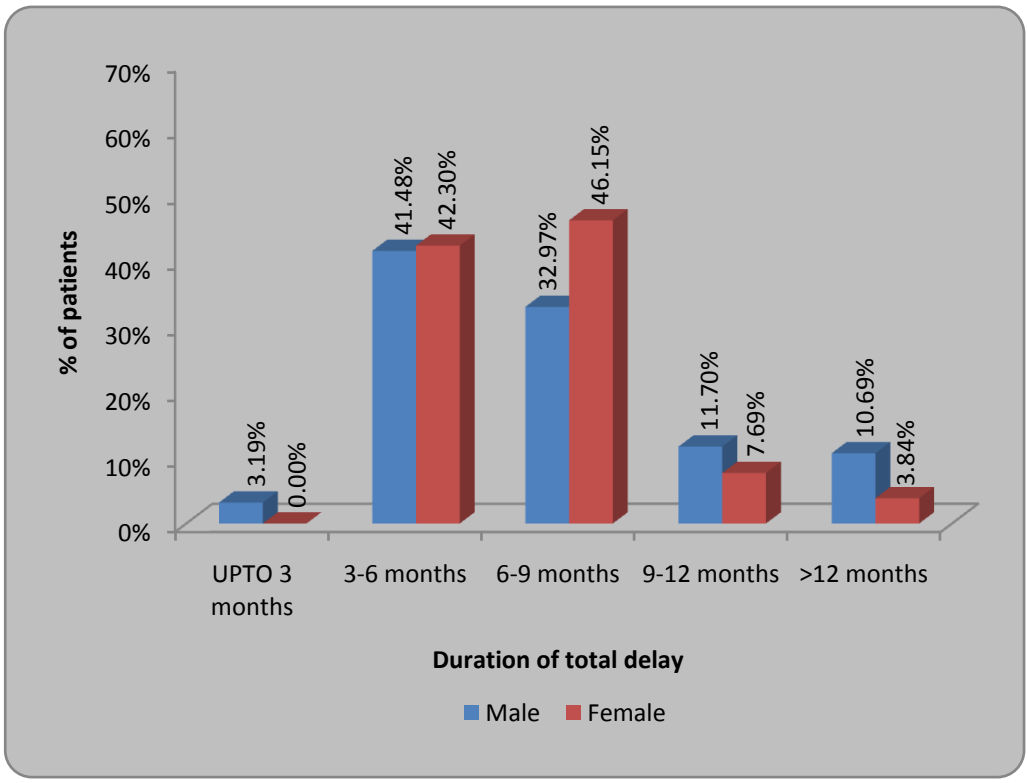
Graph No. 30: Distribution of 120 OSCC subjects according to duration of referral/professional diagnostic delay



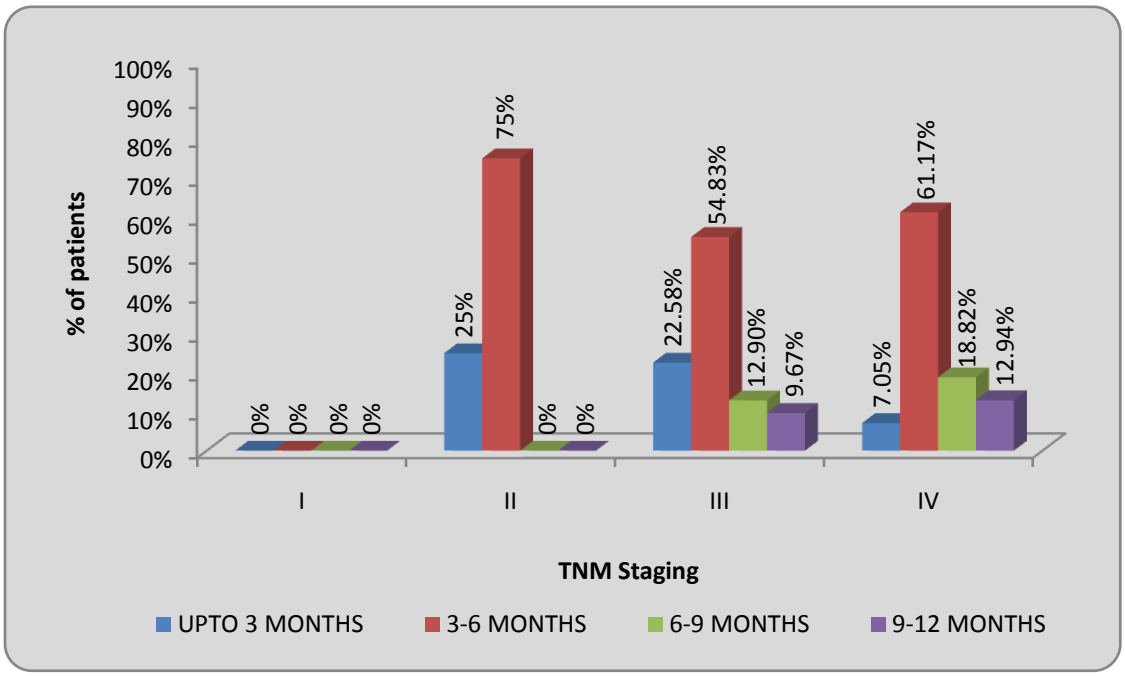
Graph No. 31: Various specialists responsible for professional/ referral delay out of 71 OSCC subjects.



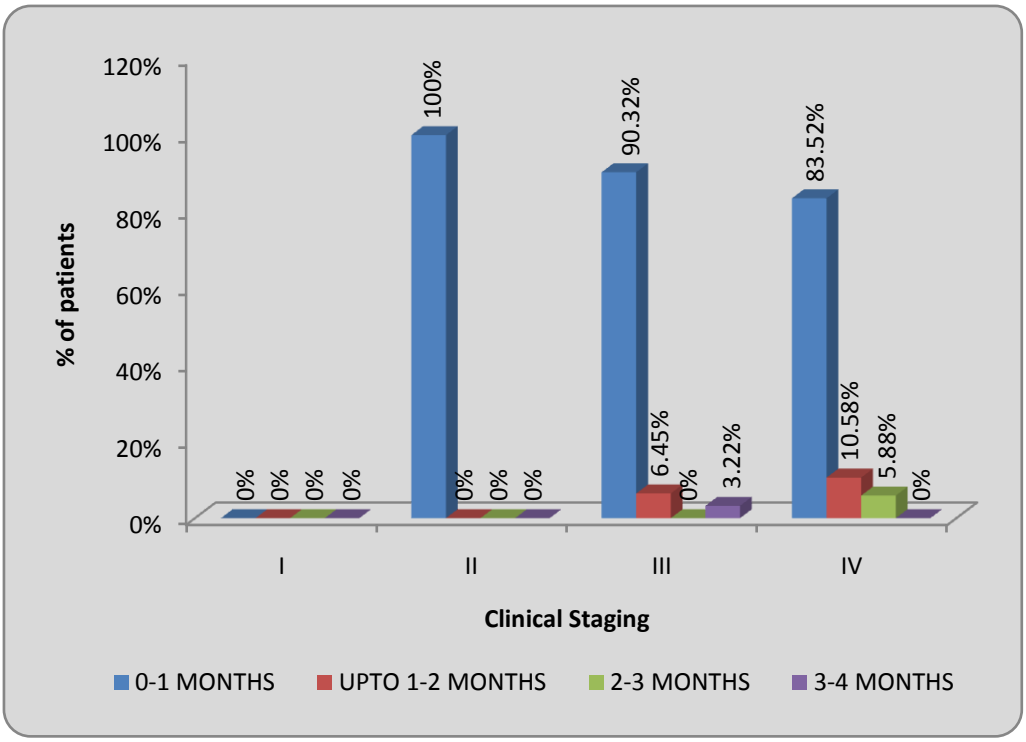
Graph No. 32: Distribution of 120 OSCC subjects according to duration of total delay



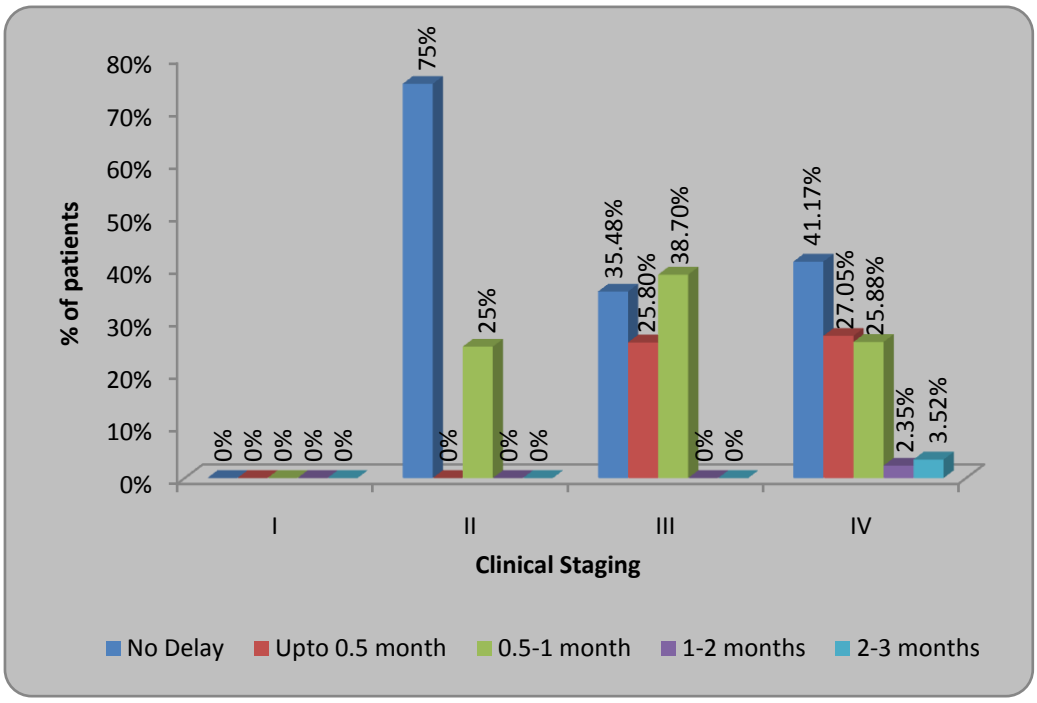
Graph No. 33: Association of TNM clinical staging with primary delay



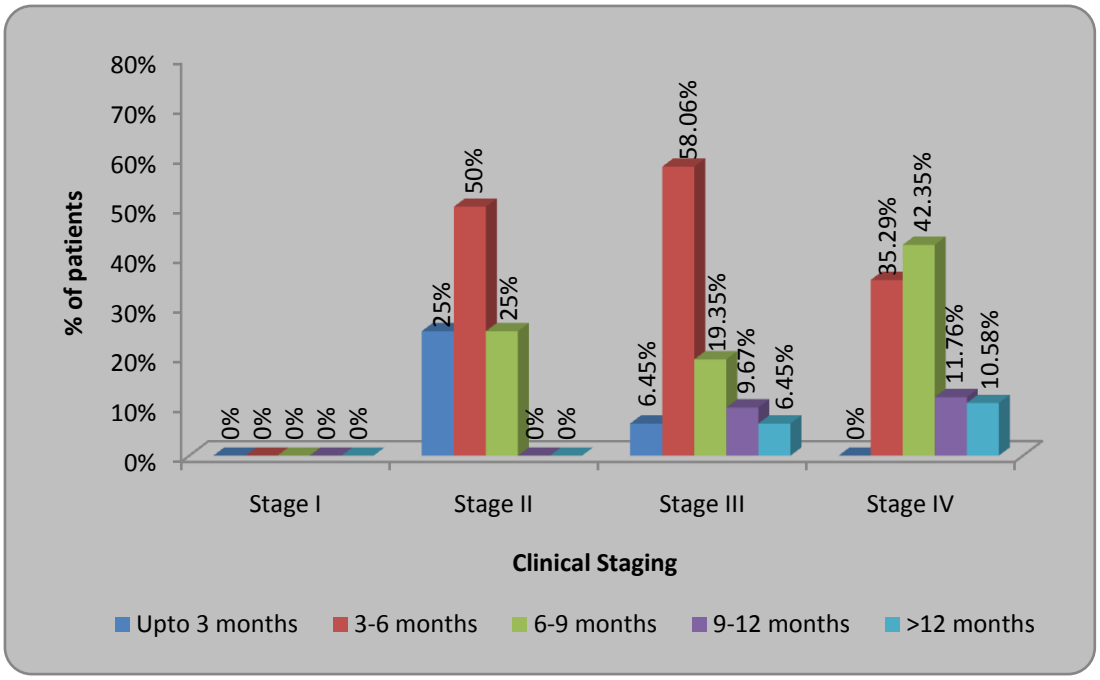
Graph No. 34: Association of TNM clinical staging with secondary delay



Graph No. 35: Association of TNM clinical staging with professional/ referral delay



Graph No. 36: Association of TNM clinical staging with total delay



DISCUSSION

The present study was undertaken to evaluate "Psychosocial and Socioeconomic Risk Factors of Oral Squamous Cell Carcinoma and their Association with Delay in Diagnosis in Rural Area". The primary objectives were:

1. To evaluate psychosocial risk factor of oral squamous cell carcinoma in rural area.
2. To evaluate socioeconomic risk factor of oral squamous cell carcinoma in rural area.
3. To evaluate primary, secondary, professional and total diagnostic delays in oral squamous cell carcinoma patients in rural area.
4. To evaluate association of psychosocial and socioeconomic risk factors with primary, secondary, professional and total diagnostic delays in oral squamous cell carcinoma patients in rural area.

For this present study, total 120 subjects with histopathologically confirmed diagnosis of oral squamous cell carcinoma were included.

Demographic details

Out of 120 OSCC patients, 94 (78.33%) were males and 26 (21.66%) were females with male: female ratio of 3.61:1 which shows male predominance. Some of the institutional studies from India reported that oral cancer occurred two to four times more commonly in men than women [111- 115].

Joshi P et al, (2014)[92] studied head and neck cancers in developing countries, according to them head and neck cancers are the most common cancers in developing countries, especially in Southeast Asia. Head and neck cancers are more common in males compared to females. This is mainly attributed to tobacco, areca nut, alcohol, habit mostly found in males as compared to females. Oral cancers are most common amongst all head and neck squamous cell cancers. Head and neck squamous cell cancers in the developing world differ from those in the Western world in terms of age, site of disease, etiology, and molecular biology. Moreover, poverty, illiteracy, advanced stage at presentation, lack of access to health care, and poor treatment infrastructure create a major challenge in management of these cancers.

In this study, the age in years at the time of data collection ranged from 27–85 years with the mean age being 51.3±12.6 years. This finding was similar with study of Agrawal AK et al (2011)[51]. In their study there were 127 male patients (83%) and 26 females (17%) with ages ranging from 22 years to 70 years. Conway DI et al (2010)[33] found in their study, the age range was between 24–80 years. In Indian studies conducted by Madani AH et al (2010) the age range was above 18 years [50], Agarwal AK et al (2011) the age range was between 22 to 70 years[51] Ganesh R et al (2013) the age range was 21-60 years [58],Pawar HJ et al (2014) the mean age range was 51years [60]

Habit wise distribution revealed that, all 120 subjects had adverse habit in one or the other forms. Amongst all habits, 90% patients of OSCC had tobacco habit in various forms. Tobacco use by the least educated is in practiced huge measure due to ignorance of the health consequences, with belief in medicinal properties of tobacco *e.g.,* for cleaning teeth, for relieving toothache, for preventing constipation and relieving gastric complaints and a desire for a low cost source of pleasure and satisfaction[13]. Tobacco users, because of their nicotine addiction, prefer spending a disproportionate amount of their meager income on tobacco products, often curtailing essential expenditures for food, healthcare and education for family [35].

Out of 120 OSCC subjects, 12 (10.00%) subjects had betel nut (Areca nut) chewing habit. Although tobacco is an established risk factor for OSCC, an increased risk for the development of oral malignancy in 'only areca nut users' is reported [116]. Betel nut is the basic ingredient of a variety of widely used chewed products. Thin slices of the nut, either natural or processed, may be mixed with a variety of substances including slaked lime (calcium hydroxide) and spices such as carda-mom, coconut, and saffron. Most significantly, they may be mixed with tobacco products or wrapped in the leaf of the piper betel plant. Hence the more common name betel nut [116].

Site wise distribution in 120 OSCC subjects, revealed that out of 120 subjects of OSCC, 76 (63.33%) were of gingivo-buccal sulcus and/ labial sulcus along with alveolus, buccal/labial mucosa. Eighteen (15.00%) were involving commisure, labial and/buccal mucosa; 15 (12.50%) were involving tongue; 05 (4.16%) were involving alveolus, lingual sulcus, floor of mouth and /tongue; 03 (2.50%) were involving palate, alveolus, and / gingivo-buccal sulcus; and 03 (2.50%) were involving maxillary antrum, alveolus and/palate. This can be attributed to the combined effect of patients quid keeping habits like 57 (47.50%) had habit of tobacco quid (tobacco +

lime), 25 (20.83%) betel nut quid (betel nut + tobacco+lime), 14 (11.66%) were having both betel nut quid and tobacco quid, 13 (10.83%) betel leaf quid with tobacco.

The tobacco/betel nut/ betel leaf quid is usually placed mainly in contact with gingivo buccal or gingivo labial sulcus in contact with buccal mucosa and eventually alveolus. This fact was responsible for 76 (63.33%) cases showing these sites of involvement. This finding is in similar with the study of Khandekar SP et al[45] in their hospital based study 'Oral Cancer and Some Epidemiological Factor' wherein alveolus was the common site of oral cancer being present in 55% of the subjects. A study conducted by Rengaswamy S et al[117] done in (2005) Kerala, found that in 59% of the oral cancer patients, the site of lesion was lower buccal mucosa and 8% cases were of gingival sulcus. It is comparable to another study conducted by Rao LP et al (2004)[118]**,** they found that 68% tumors were located on lower gingiva, 28% in the buccal mucosa and 4% on tongue extending to sublingual sulcus. The site of OSCC largely depends on the type and the way in which tobacco and betel nut products are consumed. In the West, the cancer of tongue and floor of mouth is common whereas in Indian subcontinent the cancers of gingival and buccal mucosa are common due to placement of tobacco quid in the oral cavity. The cancer of gingivobuccal complex is termed as 'Indian oral cancer' [54].

Psychosocial and socioeconomic risk factors of oral squamous cell carcinoma

After taking a written informed consent from the patient, they were briefed about the study and a thorough case history was taken including demographic details, adverse habits, history about other risk factors etc. To explore the association, in all 120 patients, a complete clinical examination was carried out. After that the patients were interviewed and subjected to:

Structured, pre-designed case history proforma along with consent form (Annexure II and III).

Structured, pre-designed, pre-tested presumptive stressful life event scale given by Gurumit Singh et al[109] was used. This is an instrument comprised of 51 closed ended questions (items) for knowing their psychological stress. (Annexure IV).

Structured, pre-designed, pre-tested, Aggarwal OP et al (2005)[110] instrument was used. This instrument contained 22 closed ended questions (items) for knowing their SES. (Annexure V).

Psychosocial risk factors are important since they can be sources of stress. These days, stress has become part and parcel of life. Individuals encounter stress from multiple sources in their day to day life. When stressful stimuli are prolonged, increased levels of cortisol and adrenaline can result in deregulation of the immune system, leading to increased susceptibility of disease. Psychosocial factors are beliefs and social circumstances that influence the patient's cognitive interpretation of symptoms of disease.

In this study, there were a number of psychosocial stressors like: the financial problems were encountered by all 120 (100%) patients; followed by marriage of daughter or dependant in 23 (19.16%) patients; family conflict in 21(17.50%) patients; death of close family member in 12 (10.00%) patients; excessive alcohol use by family member in 10 (08.33%) patients; property or crops damaged in 8 (06.66%) patients; death of spouse in 6 (05.00%) patients; illness of family member in 6 (05.00%) patients; lack of son in 6 (05.00%) patients etc. Particular score was assigned to each item and by adding the scores, final stress score was obtained.

In the present study, mean psychosocial stress score in all 120 OSCC subjects was found to be 105.76±36.94. There could be a link between lower socioeconomic status and greater psychosocial stressors[5]. Considerable evidence indicates that psychosocial factors may increase stress, which may then lead to mental distress. The relationship between stress and illness is complex. The susceptibility to stress varies from person to person. An event that causes an illness in a person may not cause illness in other person. Events must interact with a wide variety of background factors to manifest as an illness. Factors that influenced the susceptibility to stress are genetic vulnerability, coping style, type of personality and social support.[7, 119] SES along with the attitude, awareness, habits, and behavior ultimately determines the level of health and oral health in an individual.

Malu M et al (2015)[120] found a positive correlation between stress and tobacco consumption in their study of clinical prevalence of oral mucosal lesions among shift workers associated with tobacco smoking, chewing and mixed habits. A variety of clinical and mucosal conditions are associated with the habit of tobacco chewing and

smoking. Increase in consumption of tobacco is a precipitating or aggravating factor in development of potentially malignant disorders and ultimately predispose them to oral cancer[120]. In the present study 100% subjects were indulged in adverse habit in one or other forms. The psychosocial factors such as lack of social support or perception that health is not within the control of the individual may be intermediate factors in association of SES in potentially malignant disorders and oral cancer cases. Higher prevalence of oral cancer for lower SES was seen. The SES may affect lifestyle behaviours that alter the risk of oral cancer as well as potentially malignant disorders, (including tobacco/betel quid chewing, smoking, and alcohol drinking). [121]

According to Matthews KA et al 2010[36] the stressful life events from the death of a loved one, to loss of a job, are linked to an increase in certain health problems, particularly heart disease, diabetes and hypertension. Many people assume that stress leads to cancer as well. However, the evidence for this is not clear.

Greatest burden of oral cancer falls upon people from the underprivileged communities but its relation to socioeconomic status (SES) has not been studied extensively and is poorly understood.

In this study, socioeconomic status in all 120 patients was calculated. For that, all the 120 patients were interviewed and subjected to Aggarwal OP et al (2005) [110] instrument, containing 22 questions (items) for knowing their SES and accordingly categorization of SES was done.

Monthly per capita **income** from all sources of OSCC subjects revealed that, out of 120 OSCC patients, 32 (26.66%) were having income of Rs. 5000-9999/-, 62 (51.66%) were having income of Rs 2500-4999/-, and 06 (5.00%) were having income of Rs.1000-2499/-, showing that most of the patients were from low income group.

In addition to providing means for purchasing health care, higher incomes can provide better nutrition, housing, schooling, and recreation. [40] Ganesh R et al (2013)[58] found that in both rural and urban subjects, majority (94.9%) in rural and in urban (71.9%) had family income below Rs 5000/-. Conway DI et al. (2008)[15] found that, low SES was significantly associated with increased risk oral cancer in high and low income countries across the world and remained when adjusting for potential behavioral confounders. They stated that, individually each of the SES measures showed slightly

different magnitudes of risk of oral cancer and that although some studies had used educational attainment as a measure; the most significant risk of oral cancer was associated with low income.

The educational status of OSCC revealed that, out of 120 OSCC subjects 40(33.33%) patients were primary pass but less than 10^{th} class, 10 (8.33%) attended school for at least one year, and 27 (22.50%) were illiterate showing overall low educational level. These finding were in consistence with the study of Rajesh N et al (2014)[61] who studied profile of oral cancer patients attending tertiary care hospital, Bellary, Karnataka, India, in their study, out of the total 120 cases, 35.8% were illiterate. They found that, the productive age group was more affected and illiteracy, occupation of labor, low income is more commonly associated with it. Ganesh R, John J, Saravanan S. (2013)[58] found that, the percentage of illiterates was high in both rural and urban class (i.e.) 55.8% and 21.9% respectively. The difference in the prevalence of oral cancer among different levels of literacy and occupation was found to be significant statistically. Studies from India, Pakistan and Turkey show an association between education and oral cancer and illiteracy. [122, 123, 14, 124] Those who never attended school[125] and with low educational attainment [126] have greater risk. Education is perhaps the most basic SES component since it shapes future occupational opportunities and earning potential. It also provides knowledge and life skills that allow better-educated persons to gain more ready access to information and resources to promote health[40].

The **occupational s**tatus in this study revealed that, around 85% patients were farmers, farm workers and unskilled laborers. Ganesh R, John J, Saravanan S. (2013)[58] found that about 48.5% of rural subjects had agriculture as a source of occupation and 28.6% of urban subjects were unskilled laborers. The difference in the prevalence of oral cancer among different levels of literacy and occupation was found to be statistically significant.

People doing manual occupations such as agriculture, laboring, and working in industries, are at increased risk for developing oral cancer, [122, 124, 127] which is also seen among farmers in India.[50,57,14] Occupational status is a more complex variable, and its measurement varies depending on one's theoretical perspective about the significance of various aspects of work life[40]. Several studies stated that income, education and occupation are associated with risk of developing cancer.[15, 16, 33, 34, 45, 48,- 51, 65]

According to Nancy E. et al (2002)[40] the socioeconomic status has traditionally been defined by education, income, and occupation. Each component provides different resources, displays different relationships to various health outcomes, and would be addressed by different policies.

Distribution according **to socioeconomic status** among 120 OSCC subjects showed that, the mean socioeconomic status score in OSCC group was 33.37±8.93. Out of 120 OSCC patients, 15 (12.50%) were from upper middle SES, 38 (31.66%) were from lower middle SES, 67 (55.83%) were from poor SES. The data obtained was compared within the various socioeconomic status of OSCC group and subjected to chi square test, x^2 value was 140.60; p-value was 0.0001 suggesting statistically significant difference within various SES of OSCC subjects. This implies that along with other confounding factors, SES can also be considered as a potential risk factor in OSCC. Conway DI et al (2007)[46] stated that SES may play a deeper role in the etiology OSCC being not only potentially a cause itself, but according to Rose G[19] ''cause of the cause,'' since many proximal risk factors are more prevalent in the deprived. [46]

Socioeconomic status has been directly related to the incidence of oral cancer. The incidence of oral cancer is greatly impacted by behaviours that can be modified. The impact that these behaviours as well as other social determinants have on oral cancer and its outcome needs to be addressed by the society. [59] Oral cancer is mostly attributable to both an individual predisposition or the genetic characteristics and the lifestyle behaviours that are linked to increased risk such as smoking, betel quid or tobacco chewing, alcohol intake, and dietary micronutrient deficiencies.[55, 59]

The association of SES with OSCC was found in several studies.[12,15, 33, 34, 45- 50, 55, 58, 62, 63, 65] However**,** Imad Al-Dakkak et al (2011)[53] in their multicentre case–control study about Socio-economic status and upper aero-digestive tract cancer found that, socioeconomic inequalities for aero-digestive cancers are only observed among men and are not totally explained by smoking, alcohol drinking and diet. They stated that, this might be because of difference in life style behaviours. In the present study, the comparison between males and females was not fruitful because of unequal number of males and females.

Correlation of mean psychosocial stress score with mean SES score in OSCC subjects revealed that, the mean psychosocial stress score was 105.76±36.94 and the mean

SES score was 33.4±8.93. The data obtained was subjected to Pearson correlation test and the r value was 0.15 and p was 0.084, suggesting positive correlation between psychosocial stress and SES of OSCC patients.

In the present study, OSCC patients were exposed to variety of psychosocial stress. There could be a link between lower socioeconomic status and greater psychosocial stressors[5]. The stress combined with low SES may predispose an individual to tobacco consumption [120] and a desire for a low cost source of pleasure and satisfaction, [13] eventually predisposing them to oral precancer and OSCC. Tobacco users because of their nicotine addiction favor spending a disproportionate amount of their meager income on tobacco products, often curtailing essential expenditures for food, healthcare and education for family.[35]

There are few **general assumptions** that, people with low SES start working at comparatively lower age and most of them are engaged in adverse habit at younger age. In people with low SES, social stigma is less hence they are prone to adverse habits. Low SES may reflect exposure to harmful physical environments and agents which could increase the risk for oral cancer. [128] Low cost habits e.g. tobacco lime quid keeping, which is very much cheaper and easily shared. Bidi is local made and cheaper. [42] Betel leaf quid and betel nut chewing are customary in some communities. There is less facility of oral hygiene materials and awareness in people with low SES. Moreover, the people with low SES report precancerous lesions and conditions at later stages or at times it is an incidental finding. It is also stated that biologic ageing results from poor SES [12]; perhaps being mediated by telomere shortening [21, 22].

To explore the evidence of such above assumptions in the present study, these factors were also evaluated in this study.

Age, duration and frequency of habit

Age of starting habit revealed that, 69 (57.50%) OSCC patients started habit between 11-20 years. In 50 (41.66%) cases the age range of starting habit was between 21-30 years. Only 1(00.83%) patient started habit between 31-40 years. The lowest age of starting habit was 15 years and highest age of starting habit was 32 years with the mean age of starting habit was 21.10±3.02.

Association of age of starting habit and various levels of SES (UM, LM, Poor) was carried out and the data obtained was subjected to one way ANOVA test. F value was

25.51 and p value was p=0.0001, showing statistically significant difference in age of staring habit and various levels of SES (UM, LM, Poor), suggesting that age of starting habit was inversely proportional to SES.

Various reasons for starting adverse habit in OSCC and control subjects revealed that, 40 (33.33%) patients started habit to accompany their friends or co-workers, 30 (25.00%) started as a part of tradition, 16 (13.33%) to pass time/ unoccupied, 15 (12.50%) to extend their hunger, 15 (12.56%) for bowel habits and in 04 (3.33%) cases to increase the capacity of working. This study showed that, most of the patients started habit to accompany their co-workers suggesting that, these patients imitate the skill of working as well as get habituated to adverse habits to be a part of their peer group. Smoking bidi is an important risk factor contributing to a considerable number of oral cancer cases in India, Bangladesh, Nepal, Pakistan and Sri Lanka[39]. Bidi smoking is more widely practiced by people of lower socioeconomic strata. Since bidis are cheaper than cigarette, people of lower socioeconomic class and from rural areas use bidis more commonly. In such populations interaction with other risk factors could enhance the effect of bidi smoking. In the present study, 15 (12.50%) OSCC patients were bidi smokers and others used smokeless tobacco forms. It could be possible that more toxic products are emitted and inhaled by bidi smokers because of poor combustibility. [39] Bidi smokers have 3.1 times increased risk for oral cancer compared to non-smokers in South Asia.[42]

The mean age of starting habit was 21.10±3.02. The mean duration of habit was 29.50±12.32. The mean frequency of habit was 5.85±2. The mean age of starting habit, duration and frequency of habit was correlated within OSCC patients, and it was found that there was negative correlation between mean age of starting habit and mean duration of habit starting habit (r was -0.108, p value was 0.242) suggesting that, as the person grows older there is decline in the duration of habit.

There was positive correlation between mean age of starting habit and mean daily frequency of habit (r value was 0.83 and p=0.083) suggesting that, as the person grows older there is incline in the frequency of habit.

There was positive correlation between mean daily frequency of habit and mean duration of habit (r value was 0.121and p=0.189).

Age of starting to chew the quid before 20 years and chewing ≥10 quids per day increases the risk of oral cancer. A dose response relationship exists for number of quids chewed in a day and the risk persists even after quitting the habit[14]. In the present study the mean age of starting adverse habit in OSCC subjects was 18.30±2.33, mean duration of habit 29.50±12.32 and mean frequency of habit was 5.85±2.01.

Age of earning

Correlation between mean age of starting earning and mean age of starting habit in OSCC patients illuminated that, the mean age of starting earning was 18.30±2.33 and the mean age of starting habit was 21.10±3.02. The data obtained was subjected to Pearson correlation test, r-value was 0.646, and the p value was p=0.0001, showing positive correlation between mean age of starting earning and mean age of starting habit in OSCC patients.

Correlation of mean age of starting earning and mean age of starting habit according to SES (UM, LM, Poor SES) revealed that, in UM SES of OSCC there was positive correlation between mean age of starting habit and mean age of starting earning. In LM and Poor SES of OSCC subjects, there was significant positive correlation between mean age of starting habit and mean age of staring earning. This showed that as the SES decreases, mean age of starting earning and mean age of starting habit also decreases. This type of association was not explored in any of the previous studies.

SES and awareness of precancerous lesions and conditions

One classic feature of oral cancer is that, it is usually preceded by the occurrences of premalignant lesions and/or conditions. The people with low SES report precancerous lesions and conditions at late stage or it is an incidental finding. To explore this aspect, distribution of 120 OSCC subjects associated with oral precancer (OPC) were searched. It was found that, out of 120 OSCC patients, 32 (26.66%) patients also had OPC. Out of 32 OPC patients, 23 (19.16%) patients had oral submucous fibrosis (OSMF), 8 (6.66%) had leukoplakia and 01 (0.83%) had OSMF and leukoplakia both.

India is classified as a lower-middle-income group country by the World Bank.[129] Ninety percent of the oral cancer patients in rural areas belong to the lower or lower-middle socio-economic class, and 3.6% are below the poverty line.

In the present study, out of 120 OSCC cases, 32 (26.66%) had precancer. The precancerous lesions and conditions are the preventable aspects of the tobacco disease spectrum. It provides an opportunity for early detection and thus helps in prevention of malignant transformation.

Out of 32 OPC patients, 05 (15.62%) were from UM SES, 09 (28.12%) were from LM SES and 17(53.12%) were from Poor SES, showing that Poor SES patients ignored the precancer because of the painless nature of leukoplakia and slowly progressive pattern of oral precancer make the patients adaptive for the signs and symptoms.

Hashibe M et al (2003)[41] in their study "Socioeconomic status, lifestyle factors and oral premalignant lesions" stated that, SES may affect a variety of lifestyle factors that alter the risk of oral cancer as well as oral premalignant lesions, including tobacco chewing, smoking and alcohol drinking. Subjects with low socioeconomic status may additionally have less fruit, vegetable and vitamin intake. They interpreted that, SES may be associated with oral premalignant lesions because of access of patient to medical care, health related behaviors, living environment or psychosocial factors. Though the mechanism for the association is not clear, higher socioeconomic status index, education and income were associated with decreased risk of oral premalignant lesions in their study [41].

Oral hygiene practices

In OSCC group, the oral hygiene practice wise distribution showed that, out of 120 subjects, 53 (44.16%) were using snuff/gul/gudakhu for cleaning teeth. The clinician should be alert and aware to this insidious aspect of tobacco use. It was noted that, 52 (43.33%) patients were using local dant manjan, 06(05.00%) were using ash/coal powder/tooth powder and only 09 (7.50%) patients were using tooth paste and brush for cleaning teeth. In this study, 85.83% showed poor oral hygiene.

Poor oral hygiene has been advocated as a risk factor for oral cancer [14, 122]. In one study, more than 85% of oral cancer patients had poor oral hygiene [127]. The subjects in the upper class will have a better knowledge on the usefulness of oral hygiene aids and oral hygiene practices in the prevention of oral diseases which may be lacking among the lower classes. Besides, the lack of affordability to buy the oral hygiene aids may prompt the people in the lower classes to look out for cheaper alternatives in

the form of charcoal, mud etc. along with finger that is detrimental to the oral health. The direct relationship between SES and oral hygiene practices has been documented in the studies by Davidson et al [130]and Ronis et al.[131]

Khan ZU (2012)[54] reviewed the current prevalence and risk factors for oral carcinoma across the Indian subcontinent. He quoted that, oral cancer is increasing in Indian subcontinent mainly due to lack of hygiene, tobacco use, chewing tobacco leaves, smoking and many other factors. The lack of awareness on the ill effects of adverse habits among the subjects in the lower classes, scarce material resources, psychosocial stress due to an unfavorable social position and poor material conditions explains this difference in the prevalence of deleterious habits between different socioeconomic classes.

Body mass index

Distribution of body mass index in 120 OSCC subjects showed that, 93 (77.5%) patients were severe and moderately underweight (up to 16.99 kg/m^2), 16 (13.33%) patients were mild underweight (17.00 TO 18.49 kg/m^2), 11 (09.16%) were within normal range (18.50 to 24.99 kg/m^2). Mean BMI of OSCC subjects was 15.25 kg/m^2 with standard deviation of 2.27 and 95% confidence interval being 14.84-15.67.

In the present study, association between socioeconomic status and severity of body mass index in 120 OSCC subjects was carried out. The data obtained was subjected to chi square test which revealed that, x^2 value was 28.68 and the p value was 0.0001, suggesting statistically significant difference between body mass index of OSCC patiens and UM, LM and Poor SES. This can be attributed to the overall poor nutritional status in people with poor SES, at the same time underlying cancer process may play a role.

Hashibe M et al (2003) stated that, the individuals with low income were more likely to chew tobacco, smoke cigarettes, drink alcohol, eat less fruits and vegetables, and have lower BMI. Similarly, the less educated had higher percentages of tobacco chewing, low fruit and vegetable intake and low BMI.[41]

In the present study the diet wise distribution showed that, 97 (80.83%) were consuming non vegetarian diet and 23(19.16%) were consuming vegetarian diet. Wang Z et al (2010) stated that, risk of oral cancer for non-vegetarians is greater than

vegetarians by 85%. This could be attributed to reduced exposure to Polycyclic Aromatic Hydrocarbons among non-vegetarians compared with vegetarians and so contributes to the increase in risk for oral cancer. Polycyclic Aromatic Hydrocarbons present in the environment are carcinogens; they are present in high concentrations in meat products. However, the oral cancer risk attributable to dietary PAH exposure is still unclear. [132]

The caste category wise distribution showed that, out of 120 OSCC subjects, 14 (11.66%) were from open category, 49 (40.83%) were from OBC, 21 (17.50%) from SC, 21(17.50%) from ST and 15 (12.50%) were from NT category. The major percentages of patients were from OBC category. This can be attributed to the fact that, most of them were farmers, farm workers and also tobacco and betel quid users. When the association of category, SES and education in OSCC and control subjects was carried out, there was statistically significant association in Open, OBC, SC, ST and NT categories with SES and education. This type of correlation was not sought in any previous studies. However in the study of Pawar HJ (2012)[57] religion and marital status were studied which did not show any association with the development of oral cancer independently.

Psychosocial and Socioeconomic Risk Factors of Oral Squamous Cell Carcinoma and its Association with Delay in Diagnosis

OSCC is considered a public health problem. Advanced oral cancers are a challenge for treatment, as they require complex procedures for excision and reconstruction. There are a number of reasons why people do not visit clinicians soon after noticing symptoms and one of which is the financial barrier. Moreover patients may have inadequate or incorrect knowledge to appropriately interpret the relevance of their symptoms to malignancy or possibly fail to seek help due to the fear of cancer or post treatment complications. This may be called as the "patient delay" or "diagnostic delay"[28]. Hence, an effective strategy to improve outcome of OSCC and to reduce its morbidity seems to guide the patients towards an early diagnosis, by acting on those factors primarily involved in the initial stage of cognitive process.

The diagnostic delay refers to the total period of time from onset of symptoms to definitive diagnosis. The diagnostic delay is generally divided into two phases: the period from the onset of symptoms to seeking of care (patient delay) and the excess period elapsed between first contact with health care professional and specialist consultation(s) for definitive diagnosis (provider delay).[30] Patient delay is usually defined as intervals greater than 3 months and constitutes the largest proportion of the total delay period (30%).[26, 70]

Presenting symptoms

Distribution of 120 OSCC patients according to presenting symptoms revealed that, 59 (49.16%) patients consulted for pain, 16 (13.33%) for pain and mobility or exfoliation of teeth in the vicinity, 15 (12.50%) for extra oral swelling, 11 (09.16%) for bleeding from the lesion, 08 (6.66%) for non healing ulcer, 07 (05.83%) for increase in the size of lesion and 04 (03.33%) for reduced mouth opening. It seems that, the worsening and progression of the symptoms made the patients of this study to seek medical consultation. Therefore pain, mobility of tooth or exfoliation of teeth in the vicinity, bleeding etc. made the patient of this study to seek consultation but unfortunately these symptoms are the indicators of late stage of the disease.

TNM Clinical staging

Stage at diagnosis is the most important prognostic indicator for oral and oropharyngeal squamous cell cancers. Unfortunately, approximately 50% of these cancers are identified late (stage III or IV).[75] In the present study, 31 (25.83%) patients were from stage III and 85 (70.83%) were from stage IV. This showed that maximum patients reported in late stage i.e. TNM stage III and IV. Agrawal AK, et al (2011)[51] in their study found that, out of 153 oral and oropharyngeal cancer in Indian population, 50 (39%) patients presented with early stage disease (i.e. stage I and II), whereas, 94 patients (61%) presented with late stage disease (i.e. stage III and IV). Krishnatreya M et al (2014)[91] in their study 'the stage at diagnosis', found 62 (34.6%) patients in stage I, 393 (12.8%) in stage II, 1,371 (44.5%) in stage III and 1,254 (40.7%) in and stage IV. Das Neves JC et al (2015)[102] conducted a quantitative cross-sectional study to determine associations between the late stage of diagnosis of oral cancer and demographic/clinical factors. They found majority of patients (70.1%) were in advanced stages (III and IV).

Psychosocial stress and TNM staging

Association between **psychosocial stress and TNM staging i**n 120 OSCC patients when subjected to chi square test revealed that, the x^2 value was 62.73 and p value was 0.00010 and $p<0.05$, suggestive of statistically significant correlation between TNM staging and psychosocial stress score. The psychosocial stress score was computed by adding the scores obtained by an individual patient by subjecting them to a validated 51 closed ended questionnaire in which each psychosocial factor was allotted a specific score.[109] Akram M, et al (2014)[100] analyzed the impact of various sociodemographic and psychosocial factors on the delayed reporting to Healthcare professional in oral and oropharyngeal cancer patients. Among sociodemographic factors delayed reporting was highly significant with older age group, low socioeconomic status and rural residents and with insufficient knowledge of head and neck cancer.

The stressful life events, from the death of a loved one, to loss of job, are linked to an increase in certain health problems, particularly heart disease, diabetes, and hypertension. Many people assume that stress leads to cancer as well. Evidence for this, however, is not clear.[36] The psychosocial stressors in between the consultation

period like financial problem; peak time of crops; illness of family member; marriage of dependant and major purchase or construction of house etc. might be responsible for primary delay. Usually the tendency of the patients is that, whenever they realize any symptoms, they first reveal it to their family members or relatives or friends, self medicate, make changes in eating pattern etc. and major consultation period is wasted. Kumar S et.al (2001)[72] also found that, psychosocial factors are important in determining primary delay in the presentation of oral cancer patients to a medical practitioner and delay in presentation is associated with an advanced stage of oral cancer.

Andersen BL, Cacioppo JT (1995)[31] in their study, "Delay in seeking a cancer diagnosis: delay stages and psychophysiological comparison processes" stated that, delay can be classified in the following stages: Appraisal-time between when a person first detects an unexplained symptom and the moment they infer illness; Illness-time between when a person first infers illness to when they decide to seek medical help; Behavioral- time between when a person decides to seek medical help to when they act on scheduling an appointment; Scheduling-time between when a person schedules an appointment to the first contact with a health care professional; Treatment-time between when a person first seeks medical attention to when they begin treatment.

TNM staging and SES

Association between **TNM staging** according to SES (UM, LM, POOR) in 120 OSCC patients revealed that: Out of 31(25.83%) cases of TNM stage III, 08(25.80%) cases were from upper middle SES, 11(35.48%) cases were from lower middle SES and 12 (38.70%) cases were from poor SES. Out of 85(70.83%) cases from TNM stage IV, 04 (4.70%) cases were from upper middle SES, 26 (30.58%) cases were from lower middle SES and 55 (64.70%) cases were from poor SES. When the data obtained was subjected to chi square test, x^2 value was 136.40 and p value 0.0001, which showed statistically significant correlation between TNM staging and socioeconomic status of OSCC patients. This conveys that, financial problem; low education; no body to accompany especially women and elderly patients might be responsible for reporting in advanced stage. In the present study 37 (30.83%) patients with low educational level were in stage IV. The educational level i.e. the patient related factor is responsible for advanced stage disease.[91]

Agrawal AK, et al (2011)[51] assessed the role of socioeconomic factors and health-seeking behavior in treatment delay in oral and oropharyngeal cancer. They studied 153 patients with oral and oropharyngeal squamous cell carcinoma in the department of otolaryngology and head and neck surgery. Fifty-nine patients (39%) presented with stage I and II, whereas, 94 patients (61%) presented with stage III and IV. Out of the 94 patients presenting with late stage disease, 53 were illiterate and 41 literate with 58 patients (62%) belonging to low socio-economic status. The burden of oral cancer in an Indian scenario showed that, physical, psychological, socioeconomic state of an individual, stance an enormous constraint in reaching out the affected strata. Increasing number of oral cancer patients belongs to weaker socioeconomic section, lack awareness, have misconceptions and finally report late. The additional fact of inadequate access to trained providers and limited health services lead to delayed detection of oral cancer.[63]

Socioeconomic status was found to be associated with patient delay in the study of Kumar S (2001).[72] younger patients (under the age of 45 yr) were delayed in the referral process because cancer is usually not suspected at that age [28]. In addition, many patients especially from rural setups seek help from spiritual healers first in order to get a quick remedy.[81]

Histopathological gradings

i) Distribution of OSCC subjects according to histopathological grading revealed that out of 120 OSCC patients, 46 (38.33%) were having well differentiated squamous cell carcinoma, 60 (50.00%) were from moderately differentiated and 14 (11.66%) were poorly differentiated squamous cell carcinoma. Similar findings were noted in the study of Khandekar SP, Bagdey PS, Tiwari RR (2006).[45] In their study, histopathologically 22 cases were diagnosed as verrucous carcinoma, 27 cases as well differentiated squamous cell carcinoma, 16 cases as moderately differentiated squamous cell carcinoma and 15 cases as poorly differentiated squamous cell carcinoma. Bhat S P et al (2016)[106] in their study, revealed that, maximum number of cases were moderately differentiated (49.7%), followed by well differentiated in 34.7%, poorly differentiated in 14.9%, and undifferentiated in 0.4%.

Sundresh J (2015)[101] conducted the study on secondary neck nodes from squamous cell carcinoma of 67 patients from Tamil Nadu with histopathologically proven

squamous cell carcinoma with varying degrees of differentiation were included. The study showed that, with increase in the size of tumor and a decrease in the degree of differentiation, prevalence of cervical node metastases increased. They found that, a considerable proportion of study participants had advanced stage of the disease which shows that there is a negligence of oral hygiene and health care among the population.

Primary, secondary, professional and total Delay in Diagnosis

All the patients were enquired about the length of time, from the time at which the patient first became aware of the symptoms to his or her visit to a primary care clinician. A complete clinical examination of all the 120 OSCC patients was carried out, and the cases were clinically categorized according to clinical TNM (tumor, node, metastasis) staging into stage I, II, III and IV. Patients delay in presentation was measured as follows:

- Primary delay: The length of time between a patient's first awareness of symptoms of oral cancer and their first consultation with a primary care clinician.
- Secondary delay: The length of time between the patient was seen by the primary care clinician to the time when the patient was seen by the specialist.
- Referral/ Professional delay: The time period between initial evaluation by a primary care provider to referral to a specialist, is termed' referral delay.
- Total delay: The overall diagnostic delay in oral cancer includes the period elapsed between the first symptom or sign and the definitive diagnosis.

Distribution of duration of mean primary, secondary, professional/referral and total diagnostic delay

Out of 120 OSCC patients, mean primary delay was 5.8±2.5 months; mean secondary delay was 1.05±0.65 months, mean professional delay was 0.53 ±0.62 months, total delay was 7.384±2.98 months suggesting that total delay followed by primary delay was the longest delay.

Primary diagnostic delay

In this study, the length of time between a patient's first awareness of symptoms of oral cancer and their first consultation with a primary care clinician was considered as primary or patient's delay. In the present study, the mean primary delay was 5.8±2.5

months. Stefanuto P et al (2014)[93] reviewed 'delays in treatment of oral cancer and they found that, patient delay continues to be the greatest contributor to overall delay in treatment of head and neck cancers, with an average delay of 3.5 to 5.4 months.

i) Distribution of duration of **primary** diagnostic delay in 120 OSCC subjects revealed that, out of 120 OSCC cases, 14 (11.66%) reported upto 3 months, 72 (60.00%) between 3-6 months, 20 (16.66%) reported between 6-9 months, 14 (11.66%) reported between 9-12 months. This showed that, maximum patients reported between 3-6 months.

It is found that, about 30% of OSCC patients usually wait for more than 3 months before consulting medical/dental professional after self-discovery of signs and symptoms of oral cancer.[70, 78] The Patient delay can be expected to vary by the symptoms produced, with some symptoms eliciting a more urgent response by the patient.[31] The time taken by patients with oral cancer to seek advice from health professionals i.e. primary delay remains the longest delay in the present study and other studies [30, 51, 77,90, 95]

In the present study, the distribution of 120 OSCC patients according to reasons for **presenting late** to the professionals were discussed which revealed that, in 61(50.83%) patients, because of painless nature of lesion it was ignored; 43(35.83%) patients agreed that, because of fear of surgery and/ disfigurement they hesitated to visit a doctor. Thirty three (27.50%) patients had financial problems; 26 (21.66%) reported that there was no body to accompany; 23 (19.16%) were unaware of the serious nature of the disease. 18 (15.00%) tried home remedy, 14 (11.66%) tried analgesics for pain, 07 (5.83%) had more important work than consulting, 05 (04.16%) tried alternative medicine, 04 (3.33%) had some stressors like illness of family members, 02(01.66%) tried quacks (baba/vaidu). Therefore it can be said with confidence that various psychosocial and socioeconomic factors were playing role in patient delay. In the study of Jafari A et al 2013 [89] in whom the primary delay was 270 days. The relationship between diagnostic delay and stage at diagnosis found no consistent positive association in any of the head and neck cancer sites. The possible explanations for the lack of an observed relationship between patient delay and stage include: inaccurate measurement of delay, lack of sensitivity of disease stage to delay-related disease progression, and variation in tumor aggressiveness, which could lead to variation in symptom progression rates [5, 30].

When the data obtained from males and females with primary delay was subjected to chi square test, x^2 value was 17.38 and p value was 0.0038, showing statistically significant association of female OSCC patients with primary delay than males. Various reasons for females showing primary delay in this study were, there was no body to accompany the patient and is the most neglected person in low socioeconomic strata. Moreover in general, females think that males are more prone for oral cancer development than females. However in the study of Akram M, et al (2014)[100]sex and marital status were statistically insignificant factor for delay.

ii) Association of **clinical staging** with **primary** delay revealed that, out of 120 OSCC cases, 4 (3.33%) were from TNM stage II. Out of these 4 cases, 01(25.00%) reported upto 3 months, 03 (75.00%) reported between 3-6 months. Out of 120 OSCC cases, 31 (25.83%) were from TNM stage III. Out of these 31 cases, 07 (22.58%) reported upto 3 months, 17 (54.83%) reported between 3-6 months, 04 (12.90%) reported between 6-9 months and 03 (09.67%) reported between 9-12 months. Out of 120 OSCC cases, 85(70.83%) were from TNM stage IV. Out of these 85 cases, 06 (07.05%) reported upto 3 months, 52 (61.17%) reported between 3-6 months, 16 (18.82%) reported between 6-9 months and 11(12.94%) reported between 9-12 months. The data obtained was subjected to chi square test and x^2 value was 43.80, and p=0.0001, showing statistically significant difference between clinical staging and primary delay. It showed that greater the primary delay, late was the clinical stage of OSCC. This study and other studies [26, 28, 29, 73] suggested that, primary delay might be responsible for late stage of the disease.

The longer patient delay is linked to socio-cognitive and emotional determinants which may explain patient delay from a complementary point of view[29] in addition to the already known sociodemographic, socioeconomic, socio-educational, socio-cultural and socio-professional factors.

iv)Association of **primary** delay with clinical staging and SES: Association of primary delay upto 3 months (14 cases) with clinical staging and SES revealed statistically significant difference in association of duration of primary delay (upto 3 months) with clinical staging and SES. Out of 120 OSCC cases, 72 (60.00%) patients reported between 3-6 months showed statistically significant difference in association of duration of primary delay (3-6 months) with clinical staging and SES. Out of 120 OSCC cases, 20(16.66%) patients reported between 6-9 months, suggesting

statistically significant difference in association of duration of primary delay (6-9 months) with clinical staging and SES.

These findings indicate that overall, there was a statistically significant association of **primary** delay with clinical staging and SES. In the above discussion there was statistically significant association between TNM staging and socioeconomic status of OSCC patients, as well as TNM clinical staging with primary delay. This finding was in accordance with the findings of Agarawal AK et al[51], Prasad LK[63], Kumar S et al[72] and Syed Mohammad et al,[81] Panzarella V et.al [97], Christophe V et al [98]. Akram M et al (2014)[100] who, analyzed the impact of various sociodemographic and psychosocial factors on the delayed reporting to healthcare professional in oral and oropharyngeal cancer patients. Primary delay was defined as time intervals of more than 3 month from first symptom recognition to first medical consultation to a healthcare professional. Delay in reporting to health care professionals was present in 156 (60%) patients.[100]

Secondary diagnostic delay

Secondary delay: The length of time between the patient was seen by the primary care clinician to the time when the patient was seen by the specialist. In the present study, the mean secondary delay was 1.05±0.65 months.

i) Distribution of duration of **secondary** diagnostic delay in 120 OSCC subjects revealed that, out of 120 OSCC cases, 02 (1.66%) cases showed no delay and all 2 were males, 101 (84.16%) (77 males and 24 females) reported upto 1 month, 11 (9.16%) patients (9males and 2females) reported between 1-2 months, 05 (4.16%) (5males) reported between 2-3 months, 01 (0.83%) (1male) reported between 3-4 months. The data obtained from males and females was subjected to chi square test, x^2 value was 2.55 and p value was 0.063, showing statistically no difference between males and females as far as secondary delay was concern. The above findings suggest that, after primary consultation only in 1.66% there was no secondary delay whereas 84.16% patients reported upto 1 month and 11 (9.16%) showed 1-2 months secondary delay. Kumar S, et al (1993)[68] In their study titled "Investigation of factors causing delay in the treatment of oral mucosal cancer" reported that, 22% of patients delayed reporting to hospital for more than 6 months after seeing their family doctor. According to them paucity of dental practitioners, inability of the family doctor to

recognize the gravity of the lesion, a pessimistic outlook towards treatment and choice of alternative medical treatment, fear of disfigurement, and belief that destiny was inexorable, were some of the factors responsible for secondary delay. Secondary delay can be greatly reduced by a reassuring and convincing primary health care physician [68].

ii) An association of clinical staging with **secondary** delay revealed that, out of 120 OSCC cases, 4 (3.33%) were from TNM stage II. Out of these 4 cases, all 04(100%) reported between 0-1 month. Out of 31 (25.83%) of TNM stage III cases, 28 (90.32%) patients reported between 0-1 months, 02 (06.45%) reported between 1-2 months and 01 (03.22%) reported between 3-4 months. Out of 85 (70.83%) of TNM stage IV cases, 71 (83.52%) patients reported between 0-1 months, 09 (10.58%) reported between 1-2 months and 05(05.88%) reported between 2-3 months. The data obtained was subjected to chi square test, and x^2 value was 30.03, and p=0.0001, showing statistically significant difference between clinical staging and secondary delay.

This secondary delay can be explained as: In between the primary and secondary delay there can be financial problems for patient, no body to accompany; more important psychosocial stressors like peak time for crop, any family functions like marriage of son or daughter, paucity of higher diagnostic center nearby and transport. Some patients, because of fear of surgery prefer alternative therapy or try vaidu/ baba or may opt for spiritual alternative in between the primary and secondary delay and almost in 90% cases, patients are responsible for secondary delay.

Professional/ referral delay

Professional / Referral delay: The time period between initial evaluations by a primary care provider to referral to a specialist, is termed referral delay. In the present study, mean professional delay was 0.53 ±0.62 months

i) Distribution of duration of professional / referral delay: delay in 120 OSCC subjects revealed that, out of 120 OSCC cases, in 49 (40.83%) (37 males, 12 females) cases there was no professional delay, in 30 (25.00%) cases (26 males, 4females) the delay was upto 0.5 month, in 35(29.16%) (27 males, 8 females) cases the delay was between 0.5-1 month, in 2 (1.66%) (2 females) cases the delay was between 1-2 months and in 4 (3.33%) (4 males) cases the delay was between 2-3 months. The data

obtained from males and females was subjected to chi square test, x^2 value was 9.82 and p value was 0.043, showing statistically significant difference between referral delay and in males and females of 120 OSCC patients. This might be because the professionals failed to suspect malignancy in females because of low tobacco consumption rate in females. It is a fact that females tend to withstand stress more successfully than males and do not get easily addicted to adverse habits.

Joshi P et al (2014)[90] shared their experience regarding delay in seeking specialized care for oral cancers. Despite being occurring at a visible site and can be detected easily, many patients present in advanced stages with large tumors. A significant percentage of patients (50%) also reported a delayed diagnosis by the primary care physician before being referred to a tertiary care center for definitive treatment. The average total duration from symptoms to treatment was 7 months. They found that, a main reason of this delay was due to patients themselves or due to time taken by the primary physician to diagnose the condition. Allison P, et al(1998)[70] studied the role of professional diagnostic delays in the prognosis of upper aerodigestive tract carcinoma. The results of their study suggest that, among patients with an aerodigestive tract, professional delays were greater than 1 month were contributing to an increased risk for being diagnosed with late stage disease whereas, in the present study, mean professional delay was 0.53 ±0.62 months. This difference can be attributed to the difference in the site of cancer and the fact that the present study was carried out recently showing some increase in awareness by health care professionals. Tiwari V et al. (2015)[104] explored that, the number of patients presenting directly to the radiation oncology department was 108, those diagnosed outside and referred was 84 while those diagnosed and received some form of oncologic treatment outside and referred thereafter was 108. The difference in the primary delay between patients presenting directly to the radiation oncology department versus those diagnosed outside was significant (p=0.0126). They concluded that, factors causing delayed presentation are both patient and system related. It is imperative to educate the common people regarding the early signs and symptoms of cancer. At the same time, the system needs to overhaul its efficiency to avoid secondary delays that adversely affect the treatment outcome.

ii)Association of clinical staging with **professional/ referral** delay when subjected to chi square test, revealed that, x^2 value was 61.09, and p=0.0001, showing statistically significant difference between clinical staging and professional or referral delay.

iii) Various specialists responsible for professional / referral delay showed that, out of 120 OSCC cases in 71 (59.16%) cases there was professional delay. Out of these 71 (59.16%) OSCC cases, in 32 (46.37%) cases, primary health care professionals, in 27 (38.02%) cases, private practitioners, in 05(7.24%) cases, traditional healers, in 03 (04.34%) cases dentists, in 03 (04.34%) cases, Homeopathic doctors and in 01 (01.44%) case Dermatologist were responsible for professional delay.

In this rural set up, primarily the patients reported first to nearby primary health center or private medical practitioner where there are medical officers to whom the patients consult first, rather than a dentist. They fail to identify the cases in early stages and prescribed symptomatic treatment instead of referring them to a specialist. This finding was in accordance with Luiz Carlos Oliveira dos Santos, Olívio de Medeiros Batista , Maria Cristina Teixeira Cangussu (2010)[82] and Akbulut N et al(2011)[83]. In this study, in 3 cases dentist performed extractions for the complaint of mobile teeth without exploring the cause of mobility extensively as on an average, the periodontal condition of these patients was also poor. Waal I V et al (2011)[84] recommended that, dentist and physician and also oral hygienist and nurses may play role in such screening programs.

iv) Association of **professional / referral** delay with clinical staging and SES revealed that, when the data obtained was subjected to chi square test, p value was 0.0001, suggesting statistically significant difference in association of duration of **professional / referral** delay with clinical staging and SES. This association can be attributed to the fact that, in the present study, the majority of the patients 67 (55.83%) were from poor socioeconomic strata and 32 (46.37%) professionals responsible for referral delay were primary health care professionals and 25 (36.23%) were private medical practitioners. Chintala A et al (2014)[99] determined various causes for delayed diagnosis and relationship of this delay with socioeconomic factors. The study was conducted on 100 stage III/IV oral cancer patients treated between January 1, 2011–August 31, 2012. The study details were collected using a self-designed validated interviewer administered questionnaire. More than 50% of the primary care clinicians could not identify the cancerous lesions and gave false

guidance to the patients. This was a cause for the delay with the maximum range of this delay was 240 days in their study. They further stated that, it is also the responsibility of the health care professionals to ensure that cancerous lesions are detected at the earliest and referred /treated promptly. All together this will lead to earlier presentations, faster diagnosis and better treatment outcomes for oral cancer. There are several other studies which showed similar association.[28, 75, 77, 82, 99]

Total delay

Total delay: The overall diagnostic delay in oral cancer includes the period elapsed between the first symptom or sign and the definitive diagnosis.

In this study, the mean total delay was 7.384±2.98 months. The total delay was counted as under:

Total delay = Primary delay + Secondary delay +Professional delay

i) Distribution of duration of total diagnostic delay in 120 OSCC subjects revealed that, out of 120 OSCC cases, in 3 (2.50%) cases the total delay was upto 3 months, in 50 (41.66%) cases, the delay was between 3-6 months, in 43 (35.83%) cases the delay was between 6-9 months, in 13 (10.83%) cases, the total delay was between 9-12 months, and in 11(9.16%) cases the total delay was between more than 12 months. In the study of Naseer R et al (2016)[108] delayed diagnosis was considered if it was more than 40 days. In their study delayed diagnosis was observed in 91.5% of cases.

ii) Association of clinical staging with **total** delay showed statistically significant difference between clinical staging and duration of total delay in OSCC patients. This might be because, in the entire three primary, secondary and referral delays there was statistically significant association of clinical staging with **total** delay.

iii) Association of **total** delay with clinical staging and SES revealed that, when the data obtained was subjected to chi square test, p value was 0.0001, suggesting statistically significant difference in association of duration of **total** delay with clinical staging and SES.

In the study of Islami F et al,[48] the total delay was more or less evenly distributed between patients and doctors delay and is partly due to unawareness of the oral cancer among the public and professionals and partly to barriers in the health care system that may prevents patients from seeking dental and medical care.[48] Inability of the

family doctor to recognize the gravity of the lesion, inadequate oral examination, fear of surgery and disfigurement and selection of alternative medical treatment were some of the factors responsible for delay. [5, 68] Multivariate analysis revealed that five variables, 'ill fated to have cancer', 'cancer a curse', 'non-availability of transport', 'trivial ulcers in mouth are self-limiting' and 'prolonged treatment renders family stressful' were significant independent predictors of primary delay.[72]

Chintala A et al (2014)[99] determined various causes for delayed diagnosis and relationship of this delay with socio-economic factors. A statistical significant association ($p<0.05$) was found when the Socioeconomic status was compared with total time delay from first symptom to treatment. They ventilated that, it is necessary to recommend development of preventive programs that focus on raising public awareness of the signs and symptoms of oral cancer that are essential for promoting earlier diagnosis and treatment in India.

Homes et al [75] found that, health care providers detecting oral and oropharyngeal squamous cell carcinoma during screening examinations were dentists, hygienists, and oral and maxillofacial surgeons. All lesions detected by physicians occurred during a symptom-driven examination. Lesions detected during a non-symptom-driven examination were of a statistically significant lower average clinical and pathologic stage (1.7 and 1.6, respectively) than lesions detected during a symptom-directed examination (2.6 and 2.5, respectively). Additionally, a dental office is the most likely source of detection of a lesion during a screening examination. Overall, patients referred from a dental office were of significantly lower stage than those referred from a medical office. Finally, patients who initially saw a regional specialist (dentist, oral and maxillofacial surgeon, or otolaryngologist) with symptoms related to their lesion were more likely to have an appropriate treatment initiated than those who initially sought care from their primary care provider. Overall, detection of oral and oropharyngeal squamous cell carcinomas during a non-symptom-driven examination was associated with a lower stage at diagnosis, and this is most likely to occur in a dental office. A regional specialist was more likely than a primary care provider to detect an oral or oropharyngeal squamous cell carcinoma and initiate the appropriate treatment during the first visit for symptoms related to the lesion.

iv) In this study , the distribution of 120 OSCC patients according to **reasons** for presenting late revealed that, in 61(50.83%) cases, painless nature ; 43(35.83%) had

fear; 33(27.50%) had financial problems; 26 (21.66%) reported that there was no body to accompany; 23 (19.16%) were unaware of the serious nature of the disease. 18 (15.00%) tried home remedy, 14 (11.66%) tried analgesics for pain, 07 (5.83%) had more important work than consulting, 05 (04.16%) tried alternative medicine, 04 (3.33%) had some stressors like illness of family members, 02(01.66%) tried quacks (baba/vaidu).

The above one or more reasons were appreciated almost in 60-70% studies related to delay by [27, 67, 75, 102-105] The longer patient delay is linked to the already known socio-demographic, socioeconomic, socio-educational, socio-cultural and socio-professional factors. However, recent data suggest that, some socio-cognitive and emotional determinants may explain patient delay from a complementary point of view.[28] Smith and colleagues believed that, the most common causes of patient delay are fear, lack of symptom recognition.[76]

Overall it can be suggested that, early and appropriate consultation by patients followed by careful and detailed examination of oral cavity along with suitable referral collectively can reduce total delay in OSCC patients.

Reducing the time between the onset of the first symptoms of cancer and the first consultation with a doctor is essential to improve the vital prognosis and quality of life of patients.

SUMMARY AND CONCLUSION

The present study was undertaken to evaluate "Psychosocial and Socioeconomic Risk Factors of Oral Squamous Cell Carcinoma and their Association with Delay in Diagnosis in Rural Area". The primary objectives were:

1. To evaluate psychosocial risk factor of oral squamous cell carcinoma in rural area.
2. To evaluate socioeconomic risk factor of oral squamous cell carcinoma in rural area.
3. To evaluate primary, secondary, professional and total delay in oral squamous cell carcinoma patients in rural area.
4. To evaluate association of psychosocial and socioeconomic risk factors with primary, secondary, professional and total delay in oral squamous cell carcinoma patients in rural area.

For this present study, total 120 subjects with histopathologically confirmed diagnosis of oral squamous cell carcinoma were included.

Demographic details

In this study, out of 120 OSCC patients, 94 (78.33%) were males and 26 (21.66%) were females with male: female ratio of 3.61:1 which shows male predominance. This is mainly attributed to tobacco, areca nut, alcohol, habit mostly found in males as compared to females.

The age in years at the time of data collection ranged from 27–85 years with the mean age being 51.3±12.6 years.

Habit wise distribution revealed that, all 120 subjects had adverse habit in one or the other forms. Among all habits, 90% patients of OSCC had tobacco habit in various forms. Site wise distribution in 120 OSCC subjects, revealed that out of 120 subjects of OSCC, 76 (63.33%) were gingivo-buccal sulcus and/ labial sulcus along with alveolus buccal/labial mucosa. This can be attributed to the combined effect of patients quid keeping habits like 57(47.50%) had habit of tobacco quid (tobacco + lime), 25 (20.83%) betel nut quid (betel nut + tobacco+lime), 14 (11.66%) were having both betel nut quid and tobacco quid, 13 (10.83%) betel leaf quid with tobacco.

Psychosocial and socioeconomic risk factors of oral squamous cell carcinoma

After taking a written informed consent from the patient, they were briefed about the study and a thorough case history was taken including demographic details, adverse habit, history about other risk factors etc. To explore the association, in all 120 patients including cases, a complete clinical examination was carried out. After that the patients were interviewed and subjected to:

Structured, pre-designed case history proforma along with consent form (**Annexure II and III)**.

Structured, pre-designed, pre-tested psychological stress presumptive stressful life event scale given by Gurumit Singh et al[109] instrument containing 51 closed ended questions (items) for knowing their psychological stress. (Annexure IV).

Structured, pre-designed, pre-tested Aggarwal OP et al (2005)[110] instrument containing 22 closed ended questions (items) for knowing their SES. (Annexure V).

In this study, the mean psychosocial stress score in all 120 OSCC subjects was found to be 105.76±36.94. There were a number of psychosocial stressors like: the financial problem encountered by all the 120 (100%) patients; followed by marriage of daughter or dependant in 23(19.16%); family conflict in 21(17.50%); death, of close family member in 12(10.00%); excessive alcohol use by family member in 10(08.33%); property or crops damaged in 8(06.66%); death of spouse in 6(05.00%); illness of family member in 6(05.00%); lack of son in 6(05.00%) etc suggesting a link between lower socioeconomic status and greater psychosocial stressors.

Greatest burden of oral cancer falls upon people from the most deprived communities but its relation to socioeconomic status (SES) has not been studied extensively and is poorly understood.

In this study, socioeconomic status in all 120 patients including cases was calculated. Monthly per capita **income** from all sources of OSCC subjects revealed that, most of the patients were from low income group.

The educational status of OSCC revealed, overall low educational level. The **occupational s**tatus in this study revealed that, around 85% patients were farmers and unskilled laborers. Education is perhaps the most basic SES component since it shapes future occupational opportunities and earning potential. People doing manual

occupations such as agriculture, laboring, and working in industries, is at increased risk for developing OSCC.

The socioeconomic status has traditionally been defined by education, income, and occupation. Each component provides different resources, displays different relationships to various health outcomes.

The mean socioeconomic status score in OSCC group was 33.37±8.93. Out of 120 OSCC patients, 15(12.50%) were from upper middle SES, 38(31.66%) were from lower middle SES, 67(55.83%) poor SES. The data obtained was compared within the various socioeconomic status of OSCC group showed statistically significant difference within the SES of OSCC subjects. This implies that along with other confounding factors SES can also be considered as a potential risk factor in OSCC.

Correlation of mean psychosocial stress score with mean SES score in OSCC subjects: revealed that, the mean psychosocial stress score was 105.76±36.94 and the mean SES score was 33.4±8.93. Pearson correlation test suggested positive correlation between psychosocial stress and SES of OSCC group.

In the present study, OSCC patients were exposed to varieties of psychosocial stress. The stress combined with low SES may predispose an individual to tobacco betel nut and alcohol consumption and eventually predisposing them to oral precancer and OSCC.

There are few **general assumptions** that, people with low SES start working at comparatively lower age; most of them are engaged in adverse habit at younger age. Social stigma is less hence more habit prone. Low SES may reflect exposure to harmful physical environments and agents which could increase the risk for oral cancer. There is less facility of oral hygiene materials and awareness in people with low SES. Moreover, the people with low SES report precancerous lesions and conditions at late stage or at times it is an incidental finding.

To explore the evidence of such above assumptions in the present study, these objects were also evaluated in this study.

<u>Age, duration and frequency of habit</u>

The lowest age starting habit was 15 years and highest age starting habit was 32 years with the mean age of starting habit was 21.10±3.02.

Distribution in120 OSCC patients according to age of starting habit and according to various levels of SES (UM, LM, Poor) showed that, when the age of starting habit within 120 OSCC subjects according to SES (UM, LM and Poor SES), was subjected to one way ANOVA test, there was statistically significant difference in age of staring habit within OSCC group suggesting that age of starting habit was inversely proportional to SES.

Various reasons for starting adverse habit in OSCC showed that, most of the patients started habit to accompany their co-workers suggesting that, these patients imitate the skill of working as well as habit to be a part of their peer group.

In the present study the mean age of starting adverse habit in OSCC subjects was 18.30±2.33, mean duration of habit 29.50±12.32 and mean frequency of habit was 5.85±2.01.

Age of earning

Correlation between mean age of staring earning and mean age of starting habit in OSCC patients illuminated that, the mean age of starting earning was 18.30±2.33 and the mean age of starting habit was 21.10±3.02 which showed positive correlation between mean age of staring earning and mean age of starting habit in OSCC patients.

Correlation of mean age of starting earning and mean age of starting habit according to SES (UM, LM, Poor SES) revealed significant positive correlation between mean age of starting habit and mean age of staring earning in LM and poor SES of OSCC patients. This showed that as the SES decreases, mean age of starting earning and mean age of starting habit also decreases. This type of association was not explored in any of the previous studies.

SES and awareness of precancerous lesions and conditions

One classic feature of oral cancer is that it is usually preceded by the occurrences of premalignant lesions and/or conditions. In this study, it was found that, out of 120 OSCC patients, 32 (26.66%) were also associated with OPC. Out of 32 OPC patients, 23 (19.16%) patients also had oral submucous fibrosis (OSMF), 8 (6.66%) had leukoplakia and 01 (0.83%) had OSMF and leukoplakia both.

Out of 32 OPC patients 05(15.62%) were from UM SES, 09(28.12%) were from LM SES and 17(53.12%) were from Poor SES, showing that Poor SES patients ignored the precancer because of the painless nature of leukoplakia and slowly progressive pattern of oral precancer which makes patients adaptive for the signs and symptoms.

Oral hygiene practice

Out of 120 subjects, 53(44.16%) were using snuff/gul/gudakhu for cleaning teeth. Moreover, 52(43.33%) were using local dant manjan, 06(05.00%) were using ash/coal powder/tooth powder and only 09 (7.50%) were using tooth paste and brush for cleaning teeth. In this study, 85.83% showed poor oral hygiene.

The caste category wise distribution showed that, out of 120 OSCC subjects, 14(11.66%) were from open category, 49(40.83%) were from OBC, 21(17.50%) from SC, 21(17.50%) from ST and 15(12.50%) were from NT category. The major percentage of OBC category was found, this can be attributed to the fact that, most of them were farmers and tobacco and betel quid users. When the association of category, SES and education in OSCC and control subjects was carried out, there was statistically significant association in Open, OBC, SC, ST and NT categories with SES and education. This type of correlation was not sought in any previous studies.

Psychosocial and Socioeconomic Risk Factors of Oral Squamous Cell Carcinoma and its Association with Delay in Diagnosis

All the patients were enquired about the length of time, from the time at which the patient first became aware of the symptoms to his or her visit to a primary care clinician by following a structured evaluation form. A complete clinical examination of all the 120 OSCC patients was carried out, and the cases were clinically categorized according to clinical TNM (tumor, node, metastasis) staging into stage I, II, III and IV**.**

1. Presenting symptoms

In the present study, 59(49.16%) consulted for pain, 16 (13.33%) for pain and mobility of tooth or exfoliation of teeth, 15 (12.50%) for extra oral swelling with or without pain, 11 (09.16%) for bleeding from the lesion etc. These signs and symptoms made the patient of this study to seek consultation but unfortunately these symptoms are the indicators **of late stage** of the disease.

2. Clinical TNM staging

Stage at diagnosis is the most important prognostic indictor for oral squamous cell cancers. In the present study none of the patients were from stage I, 4(03.33%) cases were from stage II, 31(25.83%) were from stage III and 85(70.83%) were from stage IV. This showed that maximum patients reported in late stage

3. Psychosocial stress and TNM staging

Association between **psychosocial stress and TNM staging was** suggested statistically significant correlation between TNM staging and psychosocial stress score. This suggests that, to some extent, the psychosocial stressors in between the consultation period like death or illness of close family member, peak time for crops, marriage of son / daughter etc are responsible for delay.

4. TNM staging and SES

Association between **TNM staging according to SES** (UM, LM, POOR) revealed statistically significant correlation between TNM staging and socioeconomic status of OSCC patients.

All together, there seems to be a link between lower socioeconomic status and greater psychosocial stressors.

5.Primary delay

In this study, the length of time between a patient's first awareness of symptoms of OSCC and their first consultation with a primary care clinician was considered as primary or patient's delay. In the present study, the mean primary delay was 5.8±2.5 months.

i)Distribution of duration of **primary** diagnostic delay showed to be highest i.e. 72 (60.00%) patients reported between 3-6 months, 20 (16.66%) reported between 6-9 months, 14 (11.66%) reported between 9-12 months.

ii)Association of **clinical staging** with **primary** delay revealed statistically significant difference between clinical staging and primary delay. It showed that greater the primary delay, late was the clinical stage of OSCC and suggested that primary delay constitutes major delay.

iii) Various psychosocial stressors between the period of consultation like financial problems, peak time of crop, marriage of dependant, illness of close family members

contributed to major delay in addition to the painless nature and fear of surgery. If major stressors operate in the same period patients usually will not pay much attention.

iv) Association of **primary** delay with clinical staging and SES showed statistically significant difference in association of duration of primary delay (6-9 months) with clinical staging and SES. Altogether, there seems to be a link between low socioeconomic status and advance stage of the disease.

6. Secondary delay: The length of time between the patient was seen by the primary care clinician to the time when the patient was seen by the specialist. In the present study, the mean secondary delay was 1.05±0.65 months.

i)Distribution of duration of **secondary** diagnostic delay in 120 OSCC subjects revealed that, after primary consultation only in 1.66% there was no secondary delay whereas 84.16% patients reported upto 1 month and 11 (9.16%) showed 1-2 months secondary delay.

ii) An association of clinical staging with **secondary** delay revealed statistically significant difference between clinical staging and secondary delay. This secondary delay can also be attributed primarily to patient factors as well as lack of primary care person's convincing ability.

7. Professional / Referral delay: The time period between initial evaluation by a primary care provider to referral to a specialist, is termed' referral delay. In the present study, mean professional delay was 0.53 ±0.62 months

i) Association of clinical staging with **professional/ referral** delay showed statistically significant difference between clinical staging and professional or referral delay. Various specialists responsible for professional / referral delay showed that, out of 120 OSCC cases in 71 (59.16%) cases there was professional delay. Out of these 71 (59.16%) OSCC cases, in 32 (46.37%) cases, primary health care professionals, in 27 (38.02%) cases, private practitioners, The rural set up and poor SES, primarily the patients reported first to nearby primary health center or private medical practitioner where there are basically medical officers to whom the patients consult first, who failed to identify the cases in early stages and prescribed symptomatic treatment instead of referring them to a specialist which eventually made them to report in advanced stage.

8. Total delay: The overall diagnostic delay in oral cancer includes the period elapsed between the first symptom or sign and the definitive diagnosis.

In this study, the mean total delay was 7.384±2.98 months. The total delay was counted as under:

Total delay = Primary delay + Secondary delay +Professional delay

Association of clinical staging with **total** delay showed statistically significant difference between clinical staging and duration of total delay and socioeconomic status. This might be because; total delay is the result of the entire three primary, secondary and referral delays. Ultimately, the factors responsible for total delay can be combination of clinical tumor factors like size, site, stage and lymph node metastasis; psychosocial factors and sociodemographic factors including health related behaviour and health care factors.

Conclusions

Oral squamous cell carcinoma is a preventable malignancy as its strongly established risk factors are tobacco, alcohol and betel nut. The psychosocial and socioeconomic perspective is often ignored may lead to delay in diagnosis of OSCC. Influence of psychosocial and socioeconomic risk factors has been explored extensively in patients with OSCC in this study. Significant association of psychosocial and socioeconomic risk factors with oral squamous cell carcinoma in rural area was found.

Efforts to **reduce** exposure to risk factors alone are unlikely to succeed unless they are supported by measures to **improve** socioeconomic status.

In this study, 32(26.66%) OSCC patients also had oral precancer. The precancerous lesions and conditions are the preventable aspect of the tobacco disease spectrum. It provides an opportunity for early detection and thus helps in prevention of malignant transformation.

In the present study 53(44.16%) patients were using snuff/gul/gudakhu for cleaning teeth. The clinician should be alert and aware to this insidious aspect of tobacco use. Overall, in this rural set up, primarily the patients report first to nearby primary health center or a private medical practitioner. Often there is a failure on part of the primary health care professional and private medical practitioner to identify the cases in early stages.In this context the training of all health professionals in primary screening and non-symptom-driven examination is vital.

Utilizing alternative medicinal therapy like Homeopathy and traditional healers, spiritual approach, mantrik, baba etc. by the patients before visiting a healthcare professional can be a significant independent predictor of patient delay. Awareness policies regarding limited utility of such healers should be a part of public propaganda.

Feasible Translatory component

- The psychosocial and socioeconomic factors of oral squamous cell carcinoma and their association with delay in diagnosis are less explored which are significant in our study.
- The combined effects of psychosocial and socioeconomic factors of oral squamous cell carcinoma lead to delay in diagnosis; treatment and decrease in post operative quality of life.
- Custom made health policies should be formed for rural set up while determining the diagnosis and treatment protocols.
- Appropriate interventions to tackle the psychosocial and socioeconomic factors are mandatory and can be achieved by 'training the trainers' (PHC workers and private practitioners) in initiation of the disease and reducing the delay.
- Diagnostic difficulty is posed by an ulcerative lesions and small sized or early stage OSCC. Dentists receive more training than other medical specialists in the recognition of intra oral lesions and they have the ideal equipments and instruments for detecting oral cancer. They should maintain constant vigilance; insist on understanding the symptoms of oral cancer along with oral self examination on regular basis by the patients.
- As maximum patients of this study has no fixed source of income by employer, there is a need to employ health insurance policy to farmers ,farm workers and other unskilled workers.

LIMITATION AND SCOPE

Accurate identification of the timing of the onset of symptoms was a limitation. The accuracy with which people remember when events took place was a question (memory bias).

An intensified approach for the prevention of the psychosocial and socioeconomic risk factors and diversity in health seeking behavior is the need of the day.

Views of patients and care givers are of critical importance for understanding any gaps in primary healthcare delivery. The study of patients' visits to primary care facilities prior to a cancer diagnosis can identify determinants and populations at risk of a delayed diagnosis.

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