INTRODUCTION

Oral cavity is prone for a number of changes with advancing age and also as a result of the environmental and life style related factors. Lesions of the oral mucosa may occur as a result of trauma, infections, systemic diseases and due to excessive consumption of alcohol or smokeless tobacco. The rates of prevalence and incidence of oral mucosal lesions is available from various countries, but the information obtained may not always be applicable to the Indian population because of the existence of cultural, ethnic and demographic differences. Despite the efforts made by various groups, the data related to prevalence of oral mucosal lesions is very little in Indian literature.

Chewing and smoking of tobacco along with consumption of alcohol are some of the common social habits in India. The Portuguese introduced tobacco in India about 400 years ago and since then it has become a part of our social and cultural surrounding. India is next to China in the second place as far as manufacturing and consumption of tobacco is concerned. The prevalence of use of tobacco use among Indian adults is 35%. Initially in India beedi smoking was very popular but now smokeless tobacco is used in preparation of paan and gutkha. Dry tobacco-areca nut preparations such as paan masala, gutkha and mawa are very popular amongst individuals and have a very high addictive potential. According to a survey, it has been estimated that there are 250 million users who are ten or more than 10 years of age.

Smoking, drinking and tobacco chewing are associated with oral lesions such as leukoplakia, oral submucous fibrosis and oral lichen planus which have a tendency for malignant transformation. Tobacco consumption is one of the most important risk factors for oral cancer. Nearly 50% males and 25% females are affected by cancers related to tobacco. Oral squamous cell carcinoma may develop de novo or may arise from various premalignant
lesions. A timely intervention at appropriate levels may help in prevention and control of lesions associated with tobacco. If the major risk factors are kept in mind in respect to oral mucosal lesions and its associated effects, a range of preventive measures can be implemented at primary, secondary or tertiary levels.

A large number of cases present initially with precursor lesions that are classified as precancerous lesions and precancerous conditions.

A precancerous lesion may be defined as a morphologically altered tissue in which oral cancer is more likely to develop than normal tissue, for example, Leukoplakia, Erythroplakia etc. A precancerous condition on the other hand is defined as a generalized state which is associated with an increased risk of cancer. In a World Health Organization (WHO) Workshop, held in the year 2005, a decision was made to use the term "potentially malignant disorders (PMD)" for all precursor lesions which implies that all disorders described under this term may not actually convert into cancer.  

The following lesions have been identified as Potentially Malignant Disorders by the World Health Organisation in association with Oral Cancer.  

- Leukoplakia  
- Oral lichen planus  
- Erythroplakia  
- Oral submucous fibrosis (SMF)  
- Discoid lupus erythematosus  
- Palatal lesion of reverse cigar smoking

Oral cancer is a major health issue in India, where it ranked amongst other countries as far as the prevalence of various types of cancers are concerned. Age related rates of oral cancer in India is very high, that is, 20 per 100,000 population and thus accounts for almost 30% of all
cancers in the country. The variation in the patterns of incidence of the disease is due to the combined effect of social and cultural diversity of the population. The importance Oral cancer is because of its significant role in public health especially in the Indian subcontinent. Simply because, it is diagnosed at a very late stage which results in low treatment outcomes and is considerably costly for patients who typically cannot afford this type of treatment. Secondly they also have inadequate access to trained health workers and thus limited health services, a delay has thus been largely associated with advanced stages of oral cancer. Early detection of oral cancer offers a better chance for survival and will have the potential to improve treatment outcomes and make healthcare affordable. Thirdly, oral cancer affects individuals coming from lower socioeconomic groups as prevalence of use of tobacco is much higher in this group. Although an early clinical diagnosis can be made through visual inspection of the oral cavity yet a majority of cases presented to the healthcare worker are at a very late stage of cancer subtypes, thereby reducing chances of survival. Various public health service providers, academic medical centres and hospitals in India have recognised oral cancer as a serious form of disease.

Early detection of Oral cancer is crucial to improve the patient’s survival rate. The clinical diagnosis of oral precancerous lesions should be supplemented with a histopathological examination for an effective differential diagnosis. Currently histopathological examination for diagnosing dysplasia presents the gold standard in precancerous lesion risk evaluation.

Buccal epithelial cells are the very first barrier found in the oral mucosa exposed to smokeless tobacco. Oral epithelial cells are therefore identified as an ideal target site for early genotoxic events induced by carcinogenic agents entering the body through inhalation or...

There is an exfoliation in epithelial cells everyday (Mustafa et al 2011). Exfoliated buccal cells are at their final stage of cell differentiation and rarely display mitotic features (Scheiffle 2007, Mustafa et al 2011). A Cytomorphometric examination of these cells is thus a quantitative method to assess the influence of tobacco chewing on the buccal mucosa (Epstein et al 2002, Shiv et al 2012).

Cancer can be readily diagnosed by means of cytodiagnosis. Many clinicians use exfoliative cytology as a method of diagnosis which was introduced by Papa nicolou in 1943. It is considered as an easy non-invasive procedure which can be carried out even on slight suspicion regarding the nature of the lesion.

Exfoliative cytology was first used for cervical cancer cells and it is now being used in oral medicine practice to detect early changes in the oral mucosa. Cyto-diagnosis is also being used in the diagnosis of viral and fungal diseases of the oral cavity. Exfoliative cytology is performed with cytobrushes to obtain good-quality smears because it includes cells from deeper layers of epithelium especially squamous intraepithelial lesions. Improvement of cytological techniques has led to the development of liquid-based preparations which have renewed interest in the use of this approach as an auxiliary tool for detection of oral lesions. According to Mehrotra et al. the sensitivity and specificity of conventional exfoliative cytology in suspected malignant lesions, ranged between 76.8%–100%, and 88.9%–100%, respectively. The cytological study of oral cavity cells was shown to be suitable for routine application in mass screening programs, for early detection of suspected lesions and for pre-and post-treatment monitoring of confirmed cases of malignancy.
Genomic damage is one of the most important causes of developmental and degenerative diseases. It is an established fact that genetic damage is produced by the following—genotoxins, various medical procedures, micronutrient deficiency, lifestyle factors and genetic factors such as inherited defects in DNA metabolism or repair.\(^{39}\)

It is therefore essential to have reliable, relevant and minimally invasive biomarkers to improve the implementation of bio monitoring diagnostics for treatment of diseases caused by or associated with genetic damage. The micronuclei assay is an excellent method to serve as a biomarker which detects chromosomal loss or malfunction of mitotic spindles.\(^{40}\)

In the late 18\(^{\text{th}}\) century and early 19\(^{\text{th}}\) century Howell and Jowell described Feulgen positive nuclear bodies in human reticulocytes known as Howell and Jowell bodies, representing chromosomes separated from the mitotic spindle. The Human Micronucleus Project came to fore in the year 1997. It is an international collaborative programme which aimed to standardize micronucleus assay in peripheral blood and lymphocytes and also to analyse the effects of protocol and scoring criteria on the values thus obtained. Micronucleus (MN) is an upcoming topic, especially in the field of oral cancer. MN originates from chromosomal fragments or from whole chromosomes, which lag behind at anaphase during nuclear division. In due course of time it can be established that MN in exfoliated oral epithelial cells represent a preferred target site for early genotoxic events caused by carcinogenic agents. Various studies have shown a correlation between frequency of MN and severity of genotoxic damage. A grading of oral cancer can be measured in terms of the number of micronuclei, especially for oral squamous cell carcinoma (OSCC). There is much controversy regarding the criteria that should be followed for identification and method of counting of MN. Recent studies have attempted to establish a correlation between frequency of MN in oral exfoliated cells and histopathological grading of OSCC.\(^{41}\)