



## Epidemiological Analysis of Buccal Cancer Patients in Terms of Addictions and Socio-Economic Status and the Outcomes Associated with it

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### Abstract

**Aim:** An epidemiological analysis of buccal cancer patients; with respect to their addiction habits and income, and its correlation with the overall outcome in these patients.

**Materials and Methods:** A total of 472 patients of buccal carcinoma diagnosed in the year 2015 were analysed retrospectively in our institute. These patients were then evaluated for alcohol and tobacco consumption and a detailed history of the nature of consumption (quantity and duration) was taken. Other factors studied were the socio-economic status of these patients. The patients were divided into 3 groups based on their annual total family income, These patients were then closely followed up to ascertain the stage of their disease, the treatment taken, their compliance to treatment as well as the outcome at two years.

**Discussion:** The study showed a greater incidence of tobacco usage in the male population, thus leading to a greater incidence of buccal carcinoma in the male population. Thus, ensues the possibility that 85% of buccal cancer patients arriving at our institute were males. Family income appears to play a role in the addiction patterns seen in the study. Close to 63% of patients belonging to the higher income strata had history of tobacco and/or alcohol consumption. This increased to almost 80% in the middle income group and to 88% in the low income group. Lower income groups also arrived at later stages of presentation to the institute as compared to the higher income groups.

**Conclusion:** Our study confirms the association of Tobacco consumption in the etio-pathogenesis of buccal cancer with close to 80% of males and 60% of females in our patient base consuming it. The increased usage of tobacco products in the lower socio-economic strata highlights the need for better education in this population against its usage. Better screening facilities and better referral centres are the need of the hour.

**Keywords:** Buccal Squamous Cell Carcinoma (OSCC); Buccal Cancer; Global Adult Tobacco Survey (GATS)

### Introduction

Buccal squamous cell carcinoma (OSCC) is the most common type of tumour in the oral cavity [1]. The majority of the tumours are locally advanced (approximately 48% of patients are stage 3 or 4) and have relatively poor prognosis with 5 years survivals < 50

- 60% [2-4]. Oral malignancies are endemic in many parts of India and the sub-continent and can be considered a major health issue. Tobacco usage has been associated in the etio-pathogenesis of oral, especially buccal, cancers. Data from the Global Adult Tobacco Survey (GATS), which conducted representative household surveys in

14 low- and middle-income countries (Bangladesh, Brazil, China, Egypt, India, Mexico, Philippines, Poland, Russia, Thailand, Turkey, Ukraine, Uruguay and Vietnam), suggest 41% of men and 5% of women across these countries currently use tobacco products [5]. An OECD (Organization for Economic Cooperation and Development) study proclaimed that 30% of the adult Indian population (18yrs and above) consumed alcohol with 11% of them being heavy consumers [6-8].

The International Agency for Research on Cancer (IARC) has classified both cigarette smoke and smokeless tobacco as Group 1 carcinogens. IARC has also identified 72 measurable carcinogens in cigarettes and tobacco associated products [9]. The N-nitrosamines, benzene, 1,3-butadiene, aromatic amines, and cadmium present in cigarettes and tobacco associated products often rank highly in their carcinogenicity<sup>(9)</sup>. Smokeless products available in India such as khaini, misri and the tobacco quid are often far higher in nitrosamines thus having a more potent carcinogenic capability. Alcohol has a known carcinogenic action in cancers of the liver and bladder, but its role in causing buccal and upper aero-digestive tract cancers is less well defined. Alcohol is postulated to act by a synergistic action on the buccal mucosal wall by means of cellular dehydration increasing the permeability of other carcinogens; such as those in tobacco products, into the cell [10].

Carcinogen exposure leads to the formation of carcinogen-DNA adducts, which then cause mutations that, if not repaired or removed by apoptosis, will eventually give rise to cancer. G:A and G:T mutations, mutations in the *KRAS* oncogene and in the *P53* tumour suppressor gene are strongly associated with tobacco-caused cancers [11,12].

### Aim of the Study

This study aims to investigate the epidemiological profile of the patients arriving in our institute with a special emphasis on addiction (tobacco and alcohol) and income; and their outcomes at the end of two years.

An epidemiological analysis of buccal cancer patients, with respect to their addiction habits and income; and its correlation with the overall outcome in these patients.

### Materials and Methods

A total of 472 patients of buccal carcinoma diagnosed in the year 2015 were analysed retrospectively in our institute. These patients were then evaluated for alcohol and tobacco consumption

and a detailed history of the nature of consumption (quantity and duration) was taken. Those consuming alcohol (more than 60 ml/day) or tobacco (amount not quantified) for more than 2 years on a regular basis were considered consumers; while those who did not meet these criteria were considered non-consumers. Other factors studied were the socio-economic status of these patients. The patients were divided into 3 groups based on their annual total family income, group A constituted patients with an annual income less than Rs 150,000; group B were those with an annual income between Rs 150,000 and 500,000; group C were those with an income greater than Rs 500,000. These patients were then closely followed up to ascertain the stage of their disease, the treatment taken, their compliance to treatment as well as the outcome at two years.

No active intervention was performed on the patient by the investigating officer and a proper consent was obtained from the patient. Decisions regarding treatment of the patient were taken by the institutional tumour board, which was blinded to the study. An ethical clearance was obtained from the institute.

## Results

### Sex-wise distribution

Our study group comprised 403 males and 69 females, of which 66.5% males and 58% females did use tobacco and tobacco products, additionally 15.63% males and 4.5% females concurrently consumed tobacco and alcohol simultaneously. Only 17.87% males and 37.5% females had no history of any addiction (Figure 1). Income wise addiction patterns:- a total breakup of our patient base showed 192 patients having an annual income less than Rs 150000/- (group A), 193 patients had an income between Rs 150000 - Rs 500000/- (group B) and 87 patients had an income greater than Rs 500000/- per annum. Addictions to tobacco were uniform across the cohort regardless of patient income, however alcohol addiction was more common amongst the lower income groups (A and B) (Figure 2).

### Stage at presentation

Patients in the lower income groups (A and B) were seen to present in the more advanced stages as compared to the higher income groups (Figure 3).

Outcome in terms of 2 year survival and follow-up: patients from the higher income group (C) had lesser mortality and better rates of follow up in the 2 year period (Figure 4).

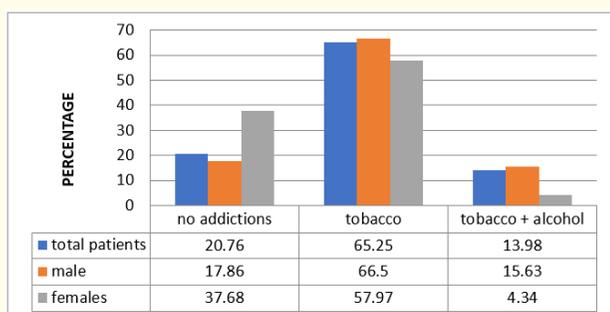


Figure 1: Sex-wise patient distribution.

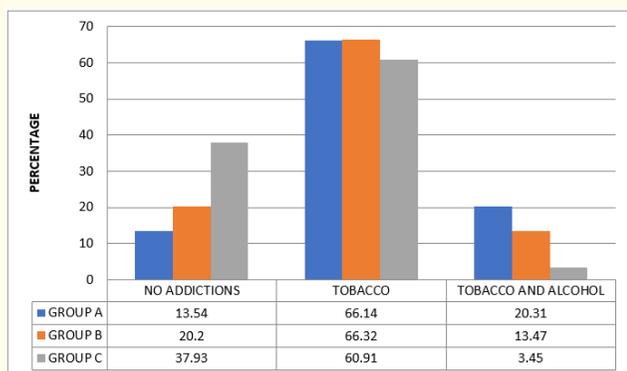


Figure 2: Addictions based on income.

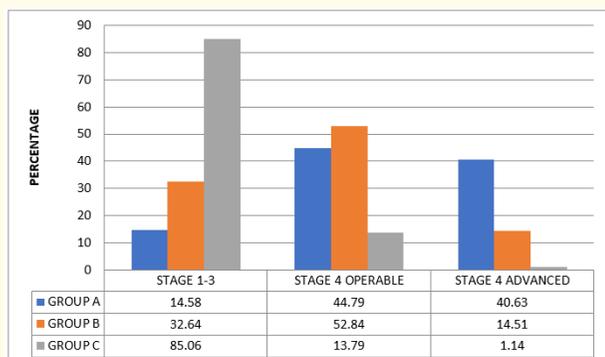


Figure 3: Stage at presentation.

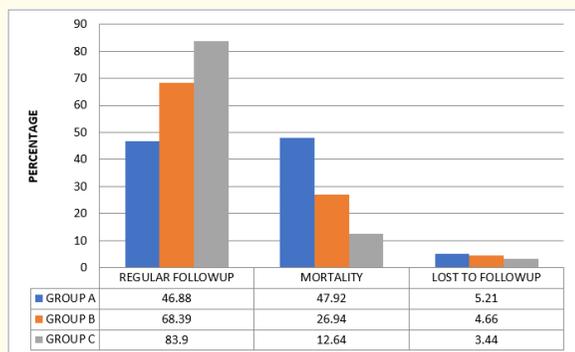


Figure 4: Mortality and follow-up at 2 years.

## Discussion

The study showed a greater incidence of tobacco usage in the male population, thus leading to a greater incidence of buccal carcinoma in the male population. Thus, ensues the possibility that 85% of buccal cancer patients arriving at our institute were males. Tobacco usage is a proven carcinogenic agent with alcohol also having a proven synergistic action. Usage of the tobacco quid in the gingivo-buccal space has shown to have an increased propensity to result in cancer of the buccal mucosa. Usage of smokeless tobacco products is common practise especially in the rural Indian setup.

Family income appears to play a role in the addiction patterns seen in the study. Close to 63% of patients belonging to the higher income strata (Group C) had history of tobacco and/or alcohol consumption. This increased to almost 80% in the middle income group (Group B) and to 88% in the low income group (group A). Alcohol consumption is also higher in Group A (20%) as compared to group B (13%) and group C (3%). This could possibly be due to greater levels of education and health awareness amongst the higher income groups as compared to the lower income groups. This also thus calls for a need of better implementation of the tobacco and alcohol cessation and education campaigns with better identification of the populations at risk.

Lower income groups also arrived at later stages of presentation to the institute as compared to the higher income groups. 85% of group C patients arrived in our setup at an early stage (Stage 1 - 3). This percentage reduced to 32% in group B patients and down to an abysmal 15% in Group A patients. Multiple factors are responsible for this, most important being the high levels of poverty in the majority of the populations. Lack of finances result in a majority of patients avoiding healthcare, till symptoms are unbearable. Another reason is lack of access to proper primary healthcare and proper referral to the correct higher centre. Many of the lower income patients reside in remote villages where the access to healthcare is not easy. This coupled with the inability to correctly diagnose the disease at the primary health centre and the inability to undertake prompt referral to the correct higher centre for treatment leads to many patients advancing in the stage of their disease by the time they reach tertiary healthcare. Another major issue is lack of education amongst the lower income strata, these patients generally are unaware as to the seriousness of their ailment as well as many take incorrect treatment from un-qualified personnel or quacks resulting in disease progression and further discomfort to the patient.

The arrival of patients in advanced stages in the lower income groups and its effect is thus seen in the survival graph at 2 years. Only 46% of patients of Group A have been seen to follow up regularly at the end of a two year period. The mortality in this group is also high with 48% succumbing to their disease within 2 years. Increasing family income shows better survival rates with 68% of

Group B and 84% of Group C patients in regular follow-up at the end of 2 years. Mortality rates are also lower as the income increases with 27% of group B and 13% of group C patients succumbing to their disease within a two year period.

The above study thus shows that morbidity and mortality in buccal cancer patients can be largely prevented by better screening of patients, better education of patients, and the implementation of stronger and stricter anti-tobacco and alcohol consumption laws with education of the harmful effects of the same. Better facilities need to be setup at the rural level with better access to primary health care and proper referral to the correct tertiary healthcare centre.

## Conclusion

Our study confirms the association of Tobacco consumption in the etio-pathogenesis of buccal cancer with close to 80% of males and 60% of females in our patient base consuming it. The increased usage of tobacco products in the lower socio-economic strata highlights the need for better education in this population against its usage. Better screening facilities and better referral centres are also the need of the hour. Tackling not just the disease but also the socio-economic factors associated with it is very important as it can reduce the disease burden as well as improve the morbidity and mortality associated with it. As seen with the improved outcomes in the higher socio-economic strata, improved outcomes may also be possible in the groups of patients if the correct interventions are taken.

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