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Epidemiological Study of Health Parameters in Smokeless Tobacco Consumers

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Abstract: ***Objective: The study is a representation of a cohort population from a socio-economically low background indulging in the consumption of smokeless tobacco in Southern Mumbai, India. The study was undertaken to compile the data from a self-designed Questionnaire and to identify and study the inter-relationship between parameters like triggers to consumption, oral habits and tobacco consumption frequency as contributing factors to Oral and Dental Problems and mental health in Smokeless Tobacco Consuming cohort. Methods: The project was conducted in the Southern part of Mumbai city, India. The cohort consisted of 45 tobacco consuming respondents, 3 non consumers and 2 respondents who quit the habit for more than a year. All respondents belonged to a socio-economically lower background of a working class consisting of cab drivers and local vendors. Results: The study revealed that 80% of the population faced severe dental problems due to the consumption of tobacco. Out of which, 20% said that the consumption was triggered by frustration, 31.1% by stress and 17.7% due to lack of concentration and anxiety. Conclusion: The study revealed that Stress, Frustration/Anxiety and Lack of concentration are the most common triggers that leads to consuming smokeless tobacco. It also reveals that consuming more number of Smokeless Tobacco products is directly correlated to the poor oral hygiene causing oral problems in the population. In our study, an interrelationship was observed between triggers to consumption, oral hygiene and consumption frequency.***

Keywords: Oral health, Dental problems, Smokeless Tobacco, Saliva, Survey, Questionnaire

1. Introduction

The Europeans introduced tobacco into South Asia in the 1600s, for pipe smoking and probably also as snuff. The chewing of betel quid (a mixture of the leaf of the *Piper beetle* vine, aqueous calcium hydroxide paste [slaked lime], pieces of areca nut [*supari*], and frequently some spices) was a popular habit that had already been integrated into social and cultural life in this region for over a millennium. Believed to have originated in prehistoric times, this practice extends east wards as far as the South Pacific islands. After its introduction, tobacco soon became a new ingredient in betel quid (*pan*), which has become the most commonly used form of smokeless tobacco, although its use varies in different parts of the world. An estimate of the number of betel quid users globally is 600 million[1].

Smokeless tobacco users in India and Pakistan together have been estimated to number 100 million[2]. Habitual betel quid chewing is commonly practiced by men and women in Bangladesh, India, Pakistan and Sri Lanka, while tobacco smoking is much more common among men in these countries compared to women, except for certain small geographic areas. Countries in South Asia are major producers of tobacco and the region is a net exporter. Tobacco leaf production has been increasing steadily for many decades and has doubled since the 1960s[3]. The increasing demand for tobacco in Bangladesh is being met by imports, especially from India[4]. About 35–40% of tobacco consumption in India is in smokeless forms, mostly of the species *Nicotiana rustica,* while most smoking tobacco is *N. tabacum*[5-7].

In some parts of India, such as the states of Bihar and Maharashtra, smokeless tobacco use is more common than smoking. Apart from regional preferences due to differing socio-cultural norms, the preference for smokeless tobacco is inversely related to education and income[8]. In countries of South Asia, particularly India, traditional values do not favor smoking by the young or by women, but there is no such taboo against using smokeless tobacco. Thus, most women who use tobacco use it in smokeless forms. Tobacco use, in whatever form, generally begins during adolescence. Awareness of the hazards of smokeless tobacco use is very low in rural populations. On the other hand, many believe tobacco, smoked or smokeless, has medicinal value for curing or palliating common discomforts such as toothache, headache, and stomach ache. This leads to advice for initiating tobacco use from adults to other non-users, even children in India. It has been estimated that roughly one third of women and two-thirds of men use tobacco in one form or another[9]. In prevalence surveys in eight rural areas of India, smokeless tobacco use was 3–53%among men and 3–49% among women also, in these areas 2–26% of men and 0–4% of women practiced both smoking and smokeless tobacco habits[10-13].

It has also been reported that betel quid chewing is strongly associated with cancer of oral cavity, especially when tobacco is added to quid. Areca derived N-nitrosamines and nicotiana-specific N-nitrosamines derived from tobacco contribute to the high risk of oral cancer in betel quid chewers[14]. According to one survey conducted, Chronic systemic exposure to nicotine could contribute to accelerated coronary artery disease, acute cardiac ischemic events, and hypertension. Systemic absorption of sodium and mutagenic chemicals from smokeless tobacco could aggravate hypertension or cardiac failure, or contribute to cancer, respectively[15].

Fiona M. Collins [16] mentions that tobacco use continues to have a personal impact on individuals as well as having a public health impact. Tobacco use results in systemic conditions that include cardiovascular disease, lung disease,

and numerous types of cancer, and is the single largest cause of death in the United States. With respect to oral health, it is associated with an increased risk of oral cancer and other mucosal lesions, periodontal disease, impaired healing, and caries. In addition, exposure to environmental smoke (second-hand smoke) is associated with oral and systemic diseases that include caries, cardiovascular and lung disease, and periodontal disease. Educating and advising patients on tobacco cessation, and referring them or implementing a program, helps patients stop using tobacco and improve their health[16]. Hence, the aim of our study was to create awareness about Oral health amongst the working class people in the population.

2. Materials and Methods

Study Design: This study was a community based cross-sectional study.

Questionnaire: The subjects completed a short self-administered questionnaire specially designed for this study with assistance from the researchers before the collection of a swab from their oral cavity. The questionnaire included a range of questions covering the topics of awareness about chewing tobacco and its implications, personal like and dislikes, knowledge of health effects of tobacco & its constituents, disorders caused due to chewing smokeless tobacco, dangers of different tobacco products, quitting-consuming it and different chewing cessation products. Apart from this, questions based on the respondent's sociodemographics, lifestyle patterns, family history and regarding chewing attitude were considered so as to make sure accurate data collection and analysis of each factor was possible. They were also evaluated on the basis of their knowledge about cancer; smokeless tobacco being one of the major cause of cancer. Questions about their dental/oral health, oral health practices were also included in the questionnaire.

Survey and Data Collection: A convenient sampling method was used to recruit smokeless tobacco consumers from a mixed group consisting of taxi drivers, dabbawalas, local vendors and support staff at K.C. College. A total of 50 such people, male ranging between 20-60 years of age and above, participated in the study. Out of the 50 respondents, 45 were tobacco consumers and 5 were non-consumers. Out of the 5 non consumers, 2 were the ones who had quit tobacco in the recent past.

3. Results

1) Consumption trigger

The first step in this study was to find out and evaluate the triggers that led the respondents to consume tobacco (Fig 1). Out of 45 respondents, 31.1% said that 'stress' was the major factor triggering the consumption, 20% said that it was 'frustration'. 17.7% said that it was anxiety.4.44% said it was due to boredom 6.66% said it was out of loneliness. 2% said that it was 'sadness' and the remaining 17.7% said that it was to increase 'concentration'. Out of the cohort, a majority of 40% belonged to the age group between 18-30, 64.4% belonged to the age group of 31.49 and the remaining 11.11% belonged to the senior group between 50-60 years. From Fig 1, we can say that frustration, stress and ability to concentrate are the major triggers that lead to consuming tobacco in the cohort.

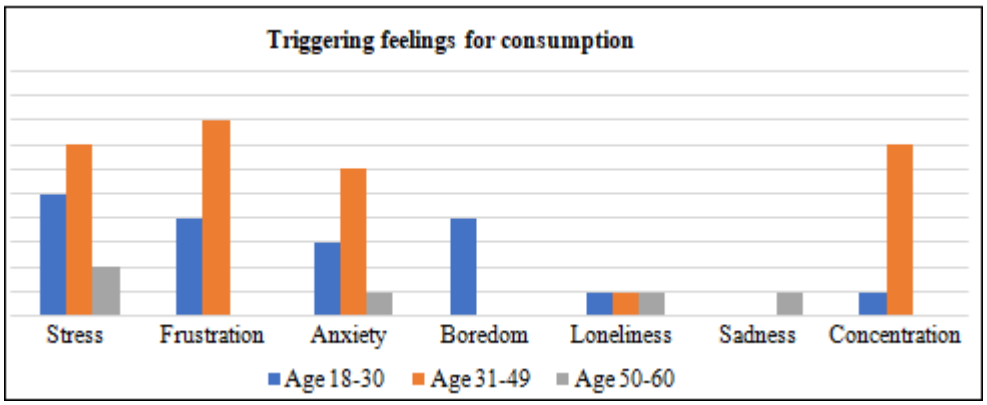

Figure 1: Distribution of triggering feelings for consumption in different age groups

2) Daily Consumption frequency

Consumption Status	1 time	2-4 times	More than 5 times
Number	0	22	23
%	0	48.88%	51.11%

3) Effect of Tobacco Consumption on Oral Health

The next parameter evaluated was the effect of consuming tobacco over the oral hygiene in the respondents (Fig 2 and Fig 3). Nine parameters were evaluated: Bad breath, Stained Teeth, Tooth fall, tooth decay, Ulcers, Red/White patch, Difficulty opening mouth, Numbness and swallowing difficulty. 50 respondents were evaluated (including the controls). 80% of the population faced the problems of stained teeth. 46.66% of the population complained about tooth fall. 8.88% of the population faced problems related to bad breath and 11.11% of the population complained about tooth decay.

Oral Problems	Bad Breath	Stained Teeth	Tooth Fall	Tooth decay
Number	**4**	**36**	**12**	**5**
Percentage	**8.88%**	**80%**	**46.66%**	**11.11%**

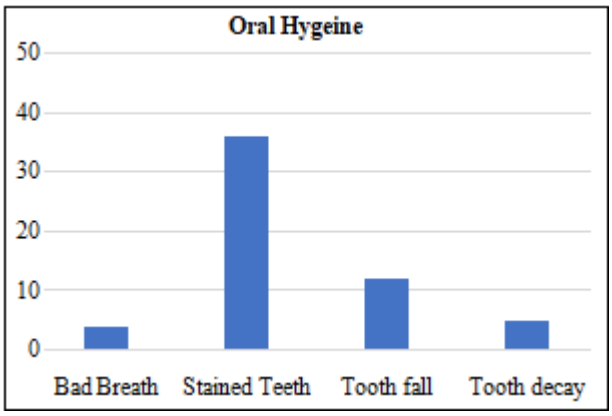

Figure 2: Effect of tobacco consumption on oral hygiene

17.77% complained about having oral ulcers, 11.11% complained about experiencing red/white patches in the mouth and feeling numb. 2.22% complained about finding it difficult to swallow food and 4.44% complained about facing difficulty while opening mouth.

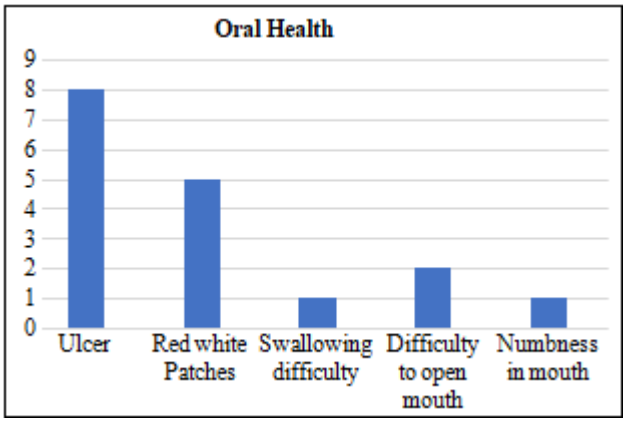

Figure 3: Effect of tobacco consumption on oral health

Oral Problems	Ulcer	Red/ White Patches	Swallowing difficulty	Difficulty to open mouth	Numbness in mouth
Number	8	5	1	2	1
Percentage	17.77%	11.11%	2.22%	4.44%	11.11%

Table 1: Correlation between triggering feelings, Consumption frequency and Oral Problems

Triggering feelings	Consumption frequency	Oral Problems
Stress	8	7
Frustration	7	6
Anxiety	4	4
Boredom	1	1
Loneliness	2	2
Sadness	1	2
Concentration	7	6

4. Discussions

The study is a representation of a large population indulging in the consumption of smokeless tobacco. 6% of respondents in the cohort were unaware of the harmful effects of consuming tobacco while the rest did not pay attention to harmful effects of the product, although they were aware. The cohort represents the daily wage earners who are taxi drivers, *dabbawalas*, cleaners, and support staff of an institute.

Thirty percent of the respondents consumed raw form of tobacco while 14% and 23% of the respondents consumed it with *pan* (betel leaf) and *pan masala* respectively. *Pan Masala* consists of tobacco and other flavouring substances. Around 8% of the respondents consumed smokeless tobacco in other forms like *khaini*, *gutkha and mawa*. 20 respondents were indulging in consuming more than just one type of product. The various types of smokeless tobacco products may lead to several changes in the oral cavity of the consumers depending upon the composition of the product which is significantly different in each type.

Along with smokeless tobacco consumption, 32% of the respondents were indulging in smoking cigarettes which is another form of tobacco that maybe contributing to the nicotine levels in their body. Another observation which came to our notice was that 66% of the respondents consuming the smokeless tobacco on a daily basis faced a psychological guilt in them during or after the consumption but since they were addicted to it they were unable to quit the habit and hence we found out the triggering feelings that lead to consumption of the product.

A total of 50 male respondents were evaluated in order to examine and correlate the various parameters relation to tobacco consumption. The age range of respondents was between 18 to 60 years. Out of the 45 tobacco consuming subjects, all of them reported that their consumption of tobacco is related to one of the behavioral triggers which is a grave concern. Out of all the triggers, the subjects reported frustration, stress and ability to concentrate as the main triggers.

The respondents who consumed more than 4 smokeless tobacco products are also the ones who complained about more number of oral problems. This was also attributed to the triggers of stress, frustration and ability to concentrate since the respondents who reported higher number of oral problems were the ones who consumed more number of tobacco products.

The taxi drivers who participated in the study represented a class of people who had a stressful life. They spend long waiting hours for the customer, fuel refill, traffic and also have irregular meal habits. This aids in them getting addicted to the consumption of the smokeless tobacco product, which is available even in remote areas, as small packets to be consumed. The ease of availability, the advertising of these products as mouth fresheners helps in the addiction. They reported that consumption of these products over a period of time made it impossible for them to drive with concentration.

Previous study on consumption of smokeless tobacco reports that the literature associating smokeless tobacco (ST) use with either increasing or decreasing dental caries incidence is even association between chewing tobacco use and dental caries is that the high levels of fermentable sugar in ST products can stimulate growth of cariogenic bacteria[18,19]. Users of chewing tobacco have been warned against

swallowing it as glucose in chewing tobacco could adversely affect blood glucose level of diabetics[20]. The way the chewing tobacco is used creates an environment conducive to dental caries; a wad of tobacco is kept in the oral cavity for 30 minutes on average and the chewing tobacco is used over an extended period each day[19,21]. This assumption is supported by *in vitro* evidence of stimulated growth of *Streptococcus mutans* and *Streptococcus sanguis* in the presence of smokeless tobacco extracts[19,22]. It has been also found that extracts from chewing tobacco with high sugar content increased *in vitro* growth of *Lactobacillus casei* [19,21], a bacterium implicated in root surface caries [19,23]. One *in vivo* study found that micro-flora associated with root caries comprised a significantly larger proportion of colony-forming units on the root surface of teeth adjacent to the tobacco placement than on the teeth on the contralateral side of the mouth. The study also found significantly high level of collagenase on the side of the mouth where tobacco was placed. It was speculated that increased collagenase activity may interact with specific bacteria to enhance the development of root caries due to the organic nature of cementum [19, 24]. Another possible contributing mechanism in the development of root-surface caries among chewing tobacco also results in loss of keratinized gingival and tooth abrasion, yielding periodontal problem at the site where tobacco is held. A significant amount of root surface will be exposed, reflecting the degree of gingival recession and bone loss. The exposed root surface caused by the loss of cementum and some dentin are at increased risk to develop caries [25]. ST users are also associated with poor oral hygiene and less sophisticated outlook on health care[26].

The respondents knew about the ill effects of smokeless tobacco but they still continued the habit due to their addiction towards it. This reflected a degree of ignorance which could manifest itself in the respondent succumbing to major illnesses due to the habit. The lack of basic healthcare facilities for this class of people reflects the States apathy toward their problems. The authors wish to recommend the setting up of mobile healthcare vans that could provide dental and medical examination and regular follow up, for these people. Through this study information gathered about the knowledge of users and their behaviours related to smokeless tobacco can be useful for designing and implementing comprehensive tobacco prevention programs. The findings, especially those related to the content of smokeless tobacco should prompt research in the field of chemistry and toxicology of local smokeless tobacco varieties used in India.

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