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Effect of Consuming Smokeless Tobacco on Total Protein Content in Saliva

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Abstract: ***Consumption of Smokeless Tobacco possesses a grave concern on the oral health of the consumers. The aim of this study was to explore the correlation between consumption of such products with the total protein content in saliva and its effect on taste buds. This studyrepresents a population from a socio-economically lower background in the Southern Part of Mumbai, India who are associated with consuming various forms of Smokeless Tobacco products. The subjects were categorized into classes of age groups ranging from 20-60 for ease of analysis. The data for this study was gathered using a self-administered questionnaire and collecting oral swabs from the subjects. Fort-five subjects who consumed tobacco were analyzed. The oral swab samples were analyzed using Folin-Lowry method of protein estimation. The test samples were compared to a set of samples from non-consumers that were used as controls.44.44% of subjects indulged in consumption of multiple tobacco products which in turn affected the total protein content in their saliva. 51% of the population preferred to have sweet food while35.53% of the population preferred food that tasted bitter. 28.87% preferred food that was spicy and 6.66% preferred food that was salty. This study shows a definite correlation between the amount and type of tobacco consumed on the total protein content in the oral cavity and a preference for sweet and bitter food amongst consumers.***

Keywords: Oral health, Smokeless Tobacco, Saliva, Survey, Questionnaire, Oral swabs, Total protein

1. Introduction

India is gripped with the uprising problems of consuming smokeless tobacco, on large scale. There are many researches and surveys have been carried out to understand the demographics and health effects [1]. These products are consumed by chewing or swallowing. The first thing that gets affected due to the consumption is the oral cavity. The saliva in the human cavity is a viscous fluid that is slightly acidic and is made up of a complex mixture of fluids containing oral microflora [2]. Although saliva is majorly made up of 99% water, total proteins in saliva are the components that are of great importance. The multifunctional nature of the proteins makes it an excellent biomarker to trace any changes or effect caused my consumption of harmful substance [3].

Smokeless Tobacco (ST) contains more than three thousand chemicals including 28 carcinogens that include formaldehyde, arsenic, cadmium, nickel, acetone, nicotine, etc. The tobacco-specific nitrosamines constitute the most harmful carcinogens that are majorly formed during the process of growing, aging, curing and fermentation of tobacco. These carcinogens are detected at a level that is hundred folds higher than what is detected in any food items [4]. These chemicals impose a greater risk on altering the taste buds of the consumers by causing a sensory deficit. There have been many studies conducted that have observed a substantial change in the sensory taste receptors in tobacco consuming population in the past [5,6].

This study aims at carrying out an analysis based on the consumption of tobacco and its effect on the total protein and taste buds in the consumers.

2. Materials and Methods

The study was conducted in Mumbai, Maharashtra, India. Forty-five healthy males ranging between the age of 20-60 years participated in this study. The participants were asked to fill a questionnaire that would help us access the kind of products consumed, oral health of the subjects, consumption frequency, etc. Unstimulated oral swab was taken from the participants at 8 am in the morning before their first consumption for the day and then again after a few hours after their first consumption for the day. The swabs were dipped it in a tube containing 1.5ml of saline and further analyzed.

The amount of proteins present in the sample was estimated by using Folin-Lowry's method of estimation of protein[7]. Two other methods were also tried: Bradford method of estimation of protein and Biuret method. The results obtained in Folin- Lowry method seemed to be better than the latter two methods. Hence, Folin-Lowry method was continued further. The absorbance of standards was measured at 660 nm against blank and a standard curve was generated. From this standard curve, the protein concentration for samples was calculated.

3. Results

28% of the respondents consumed raw form of tobacco while 23% and 14% of the respondents consumed it with pan (betel leaf) and pan masala respectively.

Around 8% of the respondents consumed smokeless tobacco in other forms like Khaini, Gutkha and Mawa. 44.44% respondents were indulging in consuming more than just one type of product. Along with Smokeless Tobacco

consumption, 32% of the total respondents were indulging in smoking cigarettes which is another form of tobacco (Fig1).

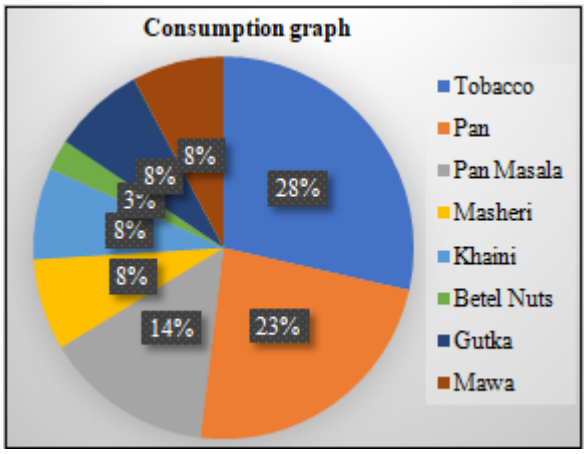

Figure 1: Type of product consumed in the cohort

The observations made with respect to age and food preference (Fig 2) were that 51% of the population preferred to have sweet food while 35.53% preferred food that tasted bitter. 28.87% preferred food that was spicy and 6.66% preferred food that was salty. Only 2.22% of the population said they preferred food that was tasteless.

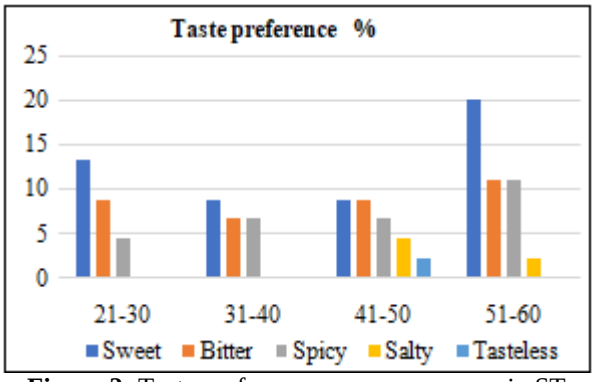

Figure 2: Taste preference across age group in ST consumers

The total Protein content in the sample was estimated before and after consumtpion of the tobacco product. The quantity of salivary proteins between the consumers and non consumer control was compared. The salivary protein before consumption was observed to be a mean of 48mg% with a Std dev $\pm$ 0.88 and below 25mg% after consumption. This value was compared to that of non-consumers who had a mean of 50 mg% with std dev of $\pm$ 0.248

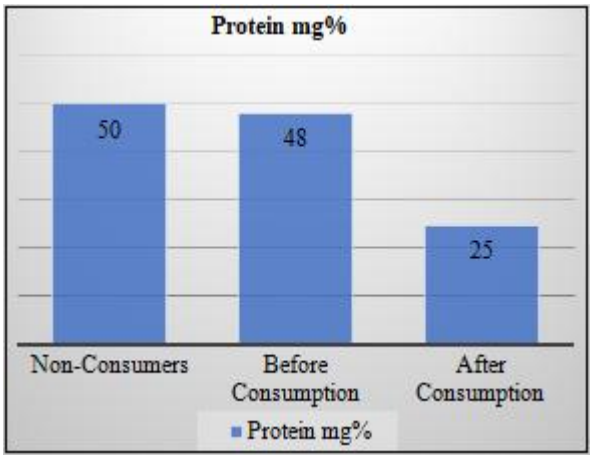

Figure 3: Effect of tobacco on total protein content

4. Discussions and Conclusions

A previous study conducted by us in *Racheal et al*[14] outlines the effect of ST consumption on certain health parameters. In this study we aim to correlate its effect on total salivary proteins.Out of the 45 male respondents that were examined across the age group between 20-60, a significant decrease in the content of salivary proteins was observed post consumption which can be attributed to significant changes in the biochemical activity of saliva [8]. Another study by Abhay et al and *Bafghi et al*[9, 10] show that the concentration of total proteins along with minerals were decreased in the saliva of smokers. 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.

In our study population, 51% of the population chose to have extreme sweet food and 35.53% of the population preferred to have food that tasted bitter. It is a known fact that tobacco has harmful effect on the taste buds of the consumers. A previous study by *Pavlos et al*[12] enlightens on endoscopic results that show proof for morphological differences in taste buds and vascularization in fungiform papillae. The preference for sweet food or bitter food could be due to a loss on sense to taste the food thus increasing the tolerance to sweet and bitter food. The results obtained in this study is an indicator on harmful consequences of tobacco in any form.

The findings in this study can be considered important for studies that research around implications for oral diseases. Additionally, it has also been shown in a study that there is no significant correlation between age on the content of total protein in ST consumers [11]. This is one parameter that can be considered to be evaluated in further research.

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