

**COMPARISION OF SALIVARY FLOW RATE AND ORAL HEALTH BETWEEN TOBACCO CHEWERS, SMOKERS AND HEALTHY CONTROLS**

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**ABSTRACT**

**INTRODUCTION:** Side effects of cigarete smoking are among the major concerns. These complications can adversely affect the oral environment. Since reduced salivary flow rate increases the incidence of tooth decay and other dental and oral problems, the present research aimed to investigate the relationship between cigarette smoking and salivary flow rate.

**MATERIALS AND METHODS:** This analytical cross-sectional study which was conducted on patients reporting to the Outpatient Department of Oral Medicine department saveetha dental college. An ethical clearance was obtained from the Institutional Ethical Committee. A total of 100 patients satisfying the inclusion and exclusion criteria were included in the study.

**RESULTS AND CONCLUSION:** Based on the results of the present study, it is concluded that salivary flow rate was significantly reduced in smokers and tobacco chewers when compared to healthy individuals. It was observed that the salivary flow rate was reduced with increase in the duration and frequency of the smoking habit. Reduced salivary flow rate has a significant impact on oral health and may further lead to several oral complications. Therefore, measures should be taken by counseling the smokers to quit the habit and educating them about the ill-effects of xerostomia.

**KEYWORDS:** smoking, Tobacco, xerostomia, salivary flow rate

## INTRODUCTION

Saliva is a clear mucoserous fluid, secreted by major and minor salivary glands of oral cavity. Appropriate ecological balance of oral health is maintained by salivary functions such as lubrication, protection, buffering action and pH balance, tooth integrity maintenance, taste sensation digestion<sup>[1]</sup> and antibacterial activity through antimicrobial peptides. The source of saliva, location and anatomy of salivary glands has an impact on salivary flow rate in relation to localised and systemic disease. It is widely used in diagnosis of various oral and systemic conditions as it is easily accessible, reliable and non-invasive diagnostic medium <sup>[2]</sup>

Xerostomia, a condition in which saliva is se-creted in reduced amounts, is an annoying condition that may have a life-long duration. It can cause complications such as dysphagia, increased risk of candida infection, dysgeusia, impaired nutritional status, tongue papillae atrophy, lobulated tongue, halitosis and cervical tooth decay.<sup>[3]</sup>

The most common causes of xerostomia are salivary gland atrophy, usage of certain drugs, head and neck radiotherapy, Sjögren's syndrome and systemic diseases.<sup>[4]</sup> smoking is one of the most important risk factors for developing oral lesions, tooth discoloration, halitosis, hairy tongue, increased calculi, periodontal diseases, mouth dryness, and oropharyngeal and respiratory cancers.<sup>[5]</sup> One-third of the adult population is comprised of smokers<sup>[6]</sup>. The number of cigarette smokers is declining, but the frequency is increased in those who do smoke<sup>[7]</sup>. As of now, smoking is known to be one of the main risk factors for developing numerous oral conditions like tooth discoloration, mouth dryness, oral lesions, halitosis, increased calculi, periodontal diseases, hairy tongue, and oropharyngeal and respiratory cancers<sup>[8]</sup>.

Saliva being the first biological fluid exposed to cigarette smoke, which consists of numerous toxins, causes structural and function changes in saliva<sup>[9]</sup>.It is known that smoking tobacco influences general and oral health.All in all, oral and dental problems can substantially influence a person's quality of life by undermining his/her physical performance and social performance<sup>[10]</sup>.

The use of tobacco is well-known to affect the oral health. The active ingredient of tobacco is nicotine which stimulates cholinergic receptors in brain and other organs which results in neural activation leading to altered salivary secretion.Widely consumed chewable form of tobacco is the areca nut. Adverse effects of areca nut includes attrition, staining, caries, periodontal diseases, lichenoid reactions, burning sensation in oral mucosa, oral sub-mucous fibrosis, oral leukoplakia and oral squamous cell carcinoma.15Saliva is the first fluid that gets exposed to tobacco whether smoked or smokeless form.<sup>[11]</sup>

The aim of this study is to compare the salivary flow rate and oral health between tobacco chewers, smokers and healthy controls

## **MATERIALS AND METHODS**

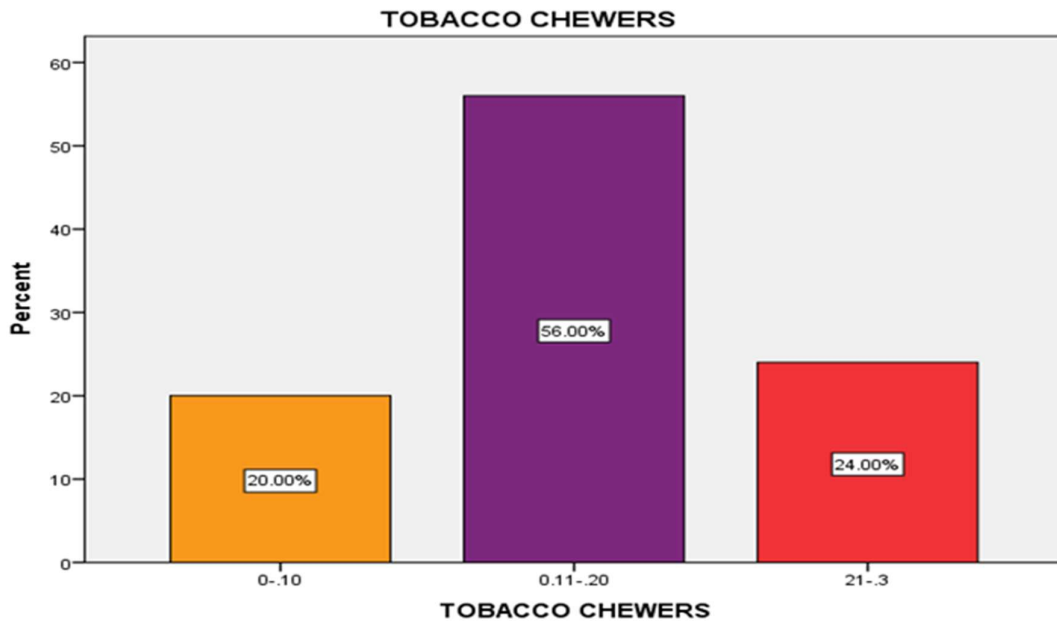
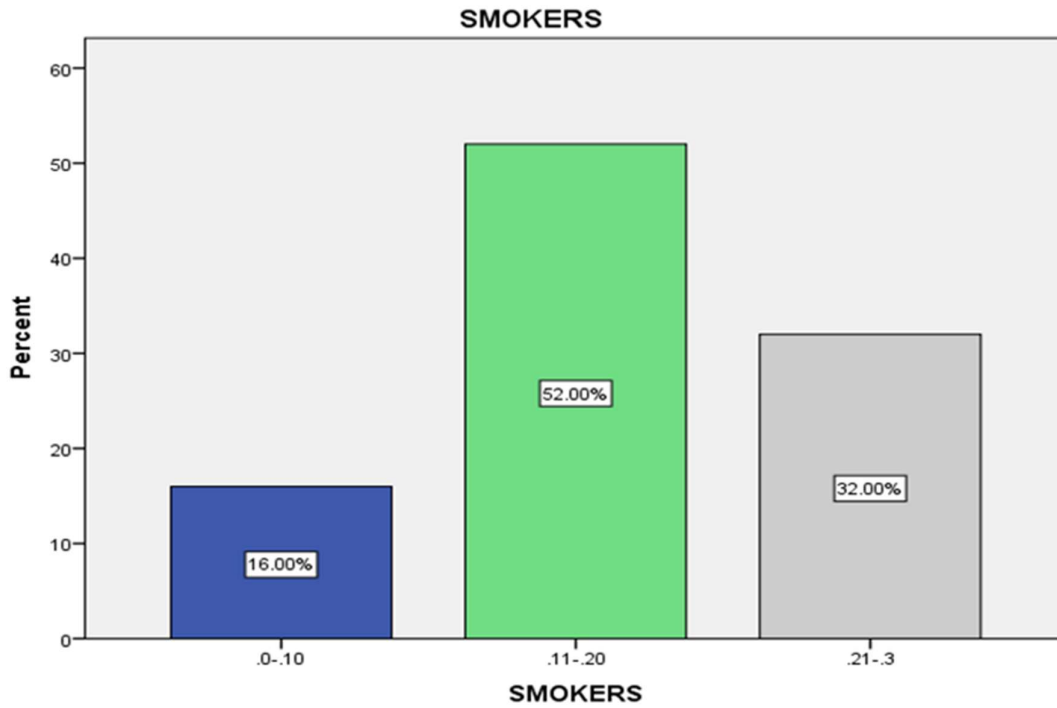
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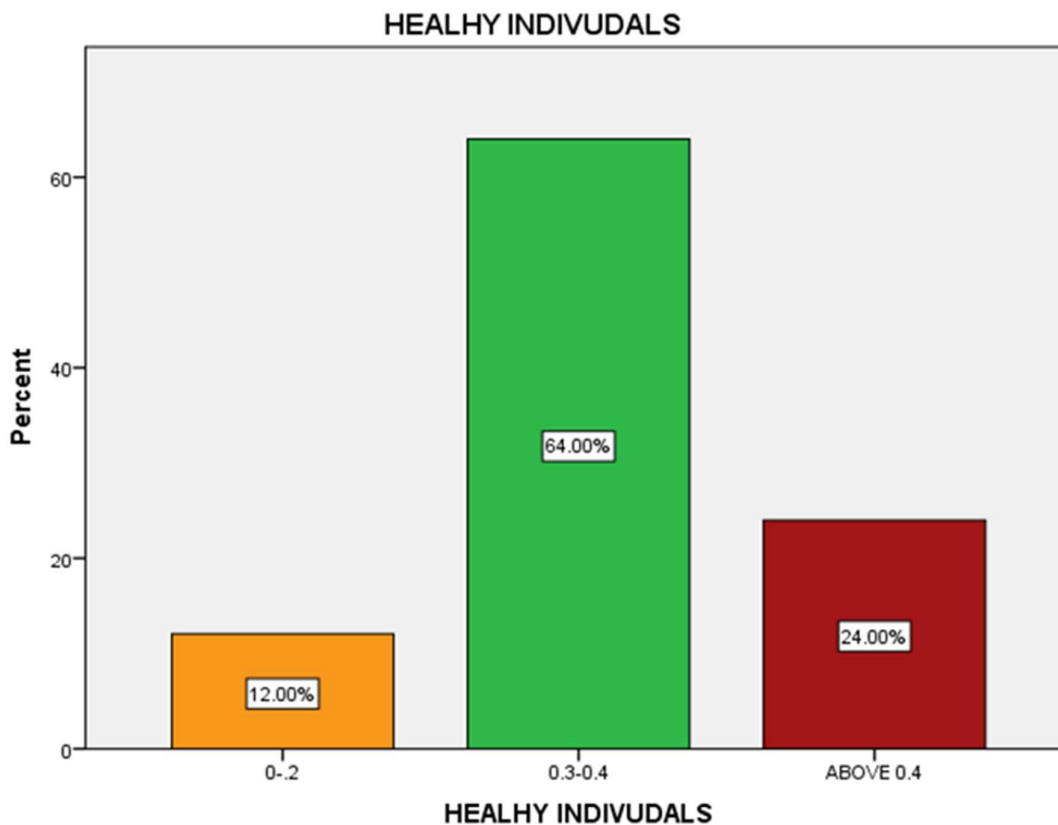
Study group: 25 cigarette smokers and 25 tobacco chewers aged between 18 to 49 years. Control group: 25 systemically healthy non smokers and non tobacco chewers aged between 18 to 49 years.

The selected participants were explained about the study and those participants who voluntarily signed the informed consent were recalled. As per their suitable day between 9:00 am to 12:00 pm to avoid diurnal variation. They were asked to refrain from smoking, eating, drinking, or brushing their teeth for at least 2 hours prior to the collection. Stimulated saliva represents the secretion during physiologic stimulation and is present in the oral cavity for about 2 hours whereas unstimulated saliva represents basal salivary flow rate that is present for up to 14 hours a day and is responsible for maintaining the integrity of oral tissues. Therefore, measuring unstimulated salivary secretion is a precise method to analyse SFR.

During sample collection, the participants were seated in a comfortable upright position on the dental chair. The participants were asked to swallow once to clear salivary secretions that were already present in the mouth to avoid inaccuracy and not to swallow during the test. The participants were asked to spit into a sterile plastic container every 1 minute for 5 minutes [9]. After collection, the salivary flow rate was measured using a graduated glass tube. The average SFR was obtained by dividing the total SFR collected by 5 and was expressed in mL/minute. The salivary flow rate of smokers, tobacco chewers and healthy individuals were measured and compared. A comparison of SFR with duration and frequency of smoking habit and tobacco chewing was performed for the study group, the data for which was recorded and tabulated followed by which statistical analysis was done.

## **RESULTS:**





## DISCUSSION:

The aim of this study was to evaluate the salivary flow rate in tobacco chewers, smokers and systemically healthy individuals. Dawes C, reported that the flow of unstimulated whole saliva showed a very marked circadian rhythm<sup>[12]</sup>. Humans exhibit diurnal rhythms, in which the volume of salivary secretion increases during the day in the active phase and decreases at night in the resting phase. The presence of this diurnal variation impacts the normal values of SFR and therefore the time of sample collection would have a high effect on the results.

Literature suggests that saliva samples should be collected at the beginning of the working day which is a time when unstimulated SFR shows the most rapid rate of change<sup>[13]</sup>. Therefore, the collection of unstimulated saliva samples was performed in the morning hours to maintain uniformity and avoid diurnal variation. Study by Rad M et al., showed salivary flow rate of (0.38±0.13 mL/min) but on comparison of salivary flow rate in both the groups, it was observed that the mean salivary flow rate in smokers was 0.37±0.17 mL/min and 0.6±0.14 mL/min in non smokers with a statistically significant difference (p-value <0.001). Thus, it was observed that the SFR was significantly reduced in smokers than in non smokers.

Similar results were reported by Rad M et al., where they investigated the effects of long-term smoking on salivary flow rate on 200 participants in which the mean±SD level of SFR was found to be 0.38±0.13 mL/min in smokers and 0.56±0.16 mL/min in nonsmokers<sup>[14]</sup>. These results are in conformity with the present study. On the contrary, Khan KJ et al., observed that long-term smoking did not adversely affect salivary reflex and salivation in which the mean unstimulated salivary flow rate of the control group (0.44±0.04 mL/min) and smoker group (0.49±0.05 mL/min) did not show much, and no statistically significant difference was observed when the smokers were compared with controls.<sup>(1)</sup>

It is presumed that the heat generated by tobacco smoking affects the blood flow of the mouth over a period decreasing the blood supply and in due course reduces the SFR<sup>[16]</sup>. Immunoglobulins like IgA along with few other defensive agents in the blood are also altered and reduced in levels due to smoking<sup>[17,18]</sup>. The salivary parenchyma is affected by the toxins present in cigarettes which subsequently leads to impairment of the functioning of the salivary glands. Carbon monoxide, one of the leading noxious gases in cigarettes, is responsible in reducing the SFR which causes breakdown of vitamin A and thus leads to restriction of the blood(2)flow along with a reduction in bicarbonate ions <sup>[19]</sup>. Also, the nicotine present in cigarettes cause variations in the autonomic nervous system by increasing plasma levels of epinephrine and norepinephrine which may result in reduced flow rates while Kanwar A et al., and Sankepalli S et al., suggested that the decrease in SFR among study subjects is presumably because of the effect of nicotine on the taste nerve receptors<sup>1.(3)</sup>

Some studies have indicated that cigarette smoking would initially cause an apparent transient increase in SFR due to increased action of salivary glands in individuals who begin smoking, but with continued use it has been noticed that some individuals develop a tolerance to the effect of smoking on saliva, and hence it reduces SFR . On comparison of frequency of smoking with salivary flow rate. Our team has extensive knowledge and research experience that has translate into high quality publications<sup>(4-13)</sup>

## CONCLUSION:

Based on the results of the present study, it is concluded that salivary flow rate was significantly reduced in smokers and tobacco chewers when compared to healthy individuals. It was observed that the salivary flow rate was reduced with increase in the duration and frequency of the smoking habit. Reduced salivary flow rate has a significant impact on oral health and may further lead to several oral complications. Therefore, measures should be taken by counseling the smokers to quit the habit and educating them about the ill-effects of xerostomia.

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