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**RESEARCH ARTICLE**

**ASSOCIATION OF XEROSTOMIA AND ASSESSMENT OF SALIVARY FLOW USING MODIFIED SCHIRMER'S TEST AMONG TOBACCO CHEWERS, SMOKERS AND HEALTHY INDIVIDUALS.**

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**Key words:-**

Salivary flow rate(SFR), Modified Schirmer's test, Xerostomia.

**Abstract**

**Background:** Saliva is a complex biological fluid which maintains hemostasis of oral cavity and keeps oral mucosa healthy. Change in resting whole mouth salivary flow rate (SFR) plays a significant role in pathogenesis of various oral conditions. Factors such as tobacco chewing, smoking may affect SFR as well as oral and dental health.

**Aim:** Schirmer's test is used routinely by ophthalmologists to measure tear film wetness. These strips have been previously used for sialometry. So primary purpose of this study is to assess the SFR in tobacco chewers, smokers.

**Objectives:** To correlate the salivary flow rate among tobacco chewers and smokers and to assess the rate of xerostomia among tobacco chewers and smokers.

**Methodology:** 90 male individuals was divided into 3 groups – tobacco chewing group, smoking group and healthy individuals. SFR was carried out based on length and color change of strip on wetting. The results obtained will be analyzed by Mann- Whitney test and Chi-square test.

**Statistical analysis:** To analyze the salivary flow rate among 3 groups- Kruskal-Wallis test was performed and to analyze the xerostomia and mean salivary flow between chewers and smokers Mann-Whitney test was performed.

**Results:** 53% of smokers showed xerostomia when compared to chewers.

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**Introduction:-**

Oral and pharyngeal cancer, grouped together, is the sixth most common cancer in the world. The diagnosis and prognosis prediction of oral cancer can be made simple by using saliva as a tool. It can also be a cost effective method which could be easily be employed to screen large population.

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Schirmer's test is used routinely by ophthalmologists to measure tear film wetness. These strips have been previously used for sialometry. So primary purpose of this study is to assess the SFR in tobacco chewers, smokers.

**Aim**

To assess the SFR in tobacco chewers, smokers.

**Objectives**

1. To correlate the salivary flow rate among tobacco chewers and smokers.
2. To assess the rate of xerostomia among tobacco chewers and smokers

### **Materials and methods:-**

Male individuals with the habit of tobacco chewing and smoking reporting to the Department of Oral Medicine and Radiology, KLE V.K. Institute of Dental Sciences, Belagavi were included in the study after obtaining informed consent.

#### **Inclusion criteria:-**

- 1) Individuals having the habit of tobacco chewing and smoking for more than 6 months.
- 2) Individuals of age group 20-40 years.

#### **Exclusion criteria:-**

- 1) Individuals with habit of alcohol consumption.
- 2) Individuals with denture wearing.
- 3) Individuals with history of radiotherapy/ drug therapy
- 4) Individuals having systemic or salivary gland disorders.

90 male individuals were divided into 3 groups – tobacco chewing group (n=30), smoking group (n=30) and healthy individuals (n=30). Following instructions were given to participants.

1. Refrained from eating or drinking for 2 hours before the procedure.
2. Procedure has to be performed during morning hours - 9AM -12PM.
3. Participants are asked to sit upright in the dental chair.
4. They are asked to swallow the saliva once to clear the salivary secretions present in the mouth previously.
5. During the test they are instructed not to swallow the saliva.
6. Participants are asked to raise the tongue and retract it gently to allow the wetting of the test strips.

Tear strip made of filter paper was used which had bulbous end and graduated from 1-35 markings as shown in Fig.1

Procedure - Test strips were held vertically with the help of cotton pliers and the rounded end was positioned on the floor of the mouth either on right or left side of the lingual frenum as shown in Fig.2. The colour of the strip and the length of wetting will be recorded at intervals of 1, 2 and 3 minutes. In the present study, a reading of <25mm which was obtained at 3 minutes was considered as indicative of hyposalivation.<sup>1</sup>

Figure 1



Figure 2



**Statistical analysis:** To analyze the salivary flow rate among 3 groups- Kruskal-Wallis test was performed and to analyze the xerostomia and mean salivary flow between chewers and smokers Mann-Whitney test was performed.

### Results:-

The study group consisted of 30 smokers, 30 chewers and 30 healthy individuals. The mean age of the participants was 32 years. Among these participants, mean frequency and duration was twice/day and 8 mins respectively. Among smokers, 27 participants had habit of cigarette and 3 had beedi.

Xerostomia was reported in 9(30%) chewers, and in 16(53%) smokers and none of them reported hyposalivation/xerostomia in healthy individuals.

(Table 1) shows that the mean salivary flow was significantly lower in the smoker group as compared to other two groups.

(Table 2) Mean salivary flow as per MST at 3 minutes found to be significantly lower ( $p < 0.001$ ) in smokers than chewers

**Table 1:-**

	group	N	Mean Rank
time	1	30	29.80
	2	30	18.61
	3	30	52.09
	Total	90	

**Table 2:-**

Ranks				
	group	N	Mean Rank	Sum of Ranks
Time	1	30	27.00	594.00
	2	30	18.00	396.00
	Total	60		

**Discussion:-**

Saliva is a complex biological fluid which maintains homeostasis of the oral cavity and keeps oral mucosa healthy <sup>1</sup>

Saliva plays an important role in oral health. It functions in protection against bacteria and fungi, transportation of nutrients and digestive enzymes, lubrication of the oral cavity, remineralization of teeth, as well as aiding in chewing, swallowing and speech.<sup>6</sup>

Secretion of saliva is a reflex function emanating from salivary centers that is dependent on afferent stimulation and involves complex integration from higher centers.<sup>5</sup>

Resting whole saliva is the mixture of secretions, which enter the mouth in the absence of exogenous stimuli. Several studies of resting whole saliva flow rates (SFR) in healthy individuals have found the value for whole saliva to be about 0.3 to 0.5 mL/minute.<sup>3,4</sup> The Stimulated salivary flow rate may be as high as 10 ml/ minute.<sup>5</sup>

SFR may greatly vary in an individual and if repeated samples are taken at different time points, varying results will be obtained. Variation in SFR can be as high as 50% over a 24-hour period due to circadian rhythms. Further normal variations have been shown to be age and gender independent.<sup>5</sup>

Xerostomia is defined as the subjective perception of dry mouth.<sup>6</sup> The perception of dry mouth is sometimes, but not necessarily accompanied by a reduction in salivary flow.<sup>6</sup>

Symptoms of xerostomia include halitosis, oral soreness and burning, difficulty swallowing and talking, and altered taste. Xerostomia can also increase the risk of dental caries, and can contribute to periodontal diseases and oral infections such as candidiasis.<sup>6</sup>

Nowadays, one-third of adults (1.3 billion people) are known to be smokers. Over 4000 bioactive chemical compounds have been isolated from cigarette smoke, of which more than 300 carcinogens have been identified in smoke or in its water-soluble components that will leach into saliva.<sup>4</sup>

Approximately 600 million people use arecanut (AN) worldwide in some form and is the fourth most commonly used psychoactive substance.<sup>5</sup>

Oral squamous cell carcinoma (SCC) is the most common malignancy of the head and neck, with a worldwide incidence of over 300,000 new cases annually.<sup>2</sup> The prevalence of oral SCC in cigarette smokers is 4–7 times higher than in non-smokers, and when alcohol or chewing tobacco habits are also present, the disease prevalence increases by 19 and 123 fold, respectively.<sup>4</sup>

The effect of smoking on salivary flow is controversial. Studies have shown that there was an increase in SFR in short term tobacco users<sup>2</sup> while others have shown that there was no significant change in SFR between tobacco and non-tobacco groups. Increase in salivary flow is seen in those who begin smoking, due to increase in activity of salivary gland, but some tolerance develops in habitual smokers.<sup>1</sup> Therefore, the aim of the present study is to document the incidence of xerostomia in smokers and non-smokers.

In the present study, we investigated the presence of xerostomia among smokers and chewers. Our results showed that 53% smokers and 30% chewers showed xerostomia based on MST value of <5mm at 3 mins.

In study conducted by Maryam Rad et al in 2010 reported, the mean resting whole mouth salivary flow rate was 0.38ml/min in non smokers by spitting method, which was significantly lower in smokers. These results were comparable to those of the present study. The mean salivary flow as per modified Schirmer test at 3 minutes was found to be significantly lower ( $p < 0.001$ ) in smokers than that in chewers.

In study conducted by Dyasanoor S et al in 2014 reported that smokers had more xerostomia and hyposalivation compared to non-smokers based on MST value of <25mm at 3mins which is comparable to the present study.

### **Conclusion:-**

The components of saliva act as a “*mirror of the body's health*”. Results showed that smoking significantly reduced unstimulated SFR. Modified Schirmer's test can be used as a reliable, objective, inexpensive, easy-to-perform, and chair-side well tolerated test. So to conclude, “*Kill the cigarette before they kill you*”.

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