


**ORIGINAL ARTICLE****Analysis of pH alteration in Saliva of Smokers and Non Smokers- A Clinical Study**M Jyothsna<sup>1</sup>, Kiran Kumar<sup>2</sup><sup>1</sup>Associate Professor, Govt Dental College and Hospital, Vijayawada, AP, <sup>2</sup>Associate Professor, Dept of Oral Pathology, SDM College of Dental Sciences and Hospital, Dharwad.**ABSTRACT:**

**Background:** Tobacco is harmful for health. The effect varies depending upon the type of tobacco used. It is used in either smoking tobacco or non smoking tobacco. The adverse effects of tobacco on oral health have been well documented. It has deleterious effect on gingival, periodontium and on teeth. This study was conducted to analyze the effect of tobacco on pH of saliva in study population. **Materials & Methods:** This study was conducted in department of oral & maxillofacial pathology in year 2015. It consisted of 60 subjects with 30 males and 30 females. They were divided into 3 groups. Group I - containing 20 subjects (10- males, 10- females) that consumed smoke form of tobacco. Group II - containing 20 subjects (10- males, 10- females) that consumed smokeless form of tobacco. Group III - containing healthy subjects (10 - males, 10- females). Saliva collection of each subject was done under resting condition. Salivary pH was determined using the specific salivary pH meter. **Results:** Group I, group II and group III contained equal number of males (10) and females (10). The difference was non – significant ( $P > 0.05$ ). Group I had 6.7pH, group II had 6.5pH and group III had 7.2 pH. The difference was significant ( $P < 0.05$ ). Paired t test showed significant difference in pH of saliva in all three groups. The difference was significant ( $P < 0.05$ ). **Conclusion:** Saliva plays an important role in maintaining equilibrium in oral cavity. There is an alteration in pH of saliva of tobacco user which may be using smokeless tobacco or smoking tobacco. Smokeless tobacco has more decrease in pH which ultimately leads to gingival and oral diseases.

**Key words:** Periodontium, Saliva, Smokers, Tobacco

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**INTRODUCTION**

Tobacco is harmful for health. The effect varies depending upon the type of tobacco used. It is used in either smoking tobacco or non smoking tobacco. The adverse effects of tobacco on oral health have been well documented. It has deleterious effect on gingival, periodontium and on teeth.<sup>1</sup>

Saliva is a body fluid which is very essential for oral health. Saliva plays a critical role in oral homeostasis because it modulates the ecosystem within the oral cavity. The saliva is secreted by major and minor salivary glands.<sup>2</sup> Among major salivary glands, parotid, submandibular and sublingual glands contribute to produce saliva. Saliva can be stimulated or non stimulated. Resting whole saliva is the mixture of secretions and enters the mouth in the absence of exogenous stimuli. It has many functions. It has cleansing effects. Lubrication of the alimentary bolus, protection against virus, bacteria and fungi, buffer capacity,

protection and repair of the oral mucosa and dental remineralization are some of the functions of saliva.<sup>3</sup>

Any alteration in quantity or quality of salivary secretion may lead to local effects such as caries, oral mucositis, candidiasis, oral infections, chewing disorders or extraoral effects like dysphagia, halitosis, weight loss etc. Smoking effects secretion of saliva which ultimately is harmful for health of oral cavity. Saliva is containing numerous toxic compositions, the first biological fluid that is exposed to cigarette smoke which is responsible for structural and functional changes in saliva.<sup>4</sup> Tobacco contains arecanut which has four major alkaloids: Arecaidine, arecoline, guvacine and guvacoline. In the presence of lime, arecoline and guvacoline are largely hydrolyzed into arecaidine and guvacine, respectively. Arecoline is parasympathomimetic while arecaidine lacks it. There are several studies concerning the effect of chewing tobacco and smoking on salivary secretion, though, long-term effect of tobacco use

on pH is still not clear.<sup>5</sup> This study was conducted to analyze the effect of tobacco on pH of saliva in study population.

**MATERIALS & METHODS**

This study was conducted in department of oral & maxillofacial pathology in year 2015. It consisted of 60 subjects with 30 males and 30 females. They were informed regarding the study and written consent was obtained. Patient’s information such as name, age, gender etc was recorded on case history performa. They were divided into 3 groups. Group I - containing 20 subjects (10- males, 10- females) that consumed smoke form of tobacco. Group II - containing 20 subjects (10- males, 10- females) that consumed smokeless form of tobacco. Group III - containing healthy subjects (10 - males, 10- females). Saliva collection of each subject was done under resting condition. Salivary pH was determined using the specific salivary pH meter. Saliva collection was carried out between 9:00 am and 12:00 pm to avoid any diurnal

variation. Each subject was requested not to drink, eat or perform oral hygiene or chew or smoke 60 min before and during the procedure. Subjects were then asked to be seated on the dental chair and asked to spit 2-3 times in 1 min in a disposable container. During saliva collection, subjects were instructed not to speak or swallow. Measurement of salivary pH was done immediately after collection using salivary pH meter. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered positive.

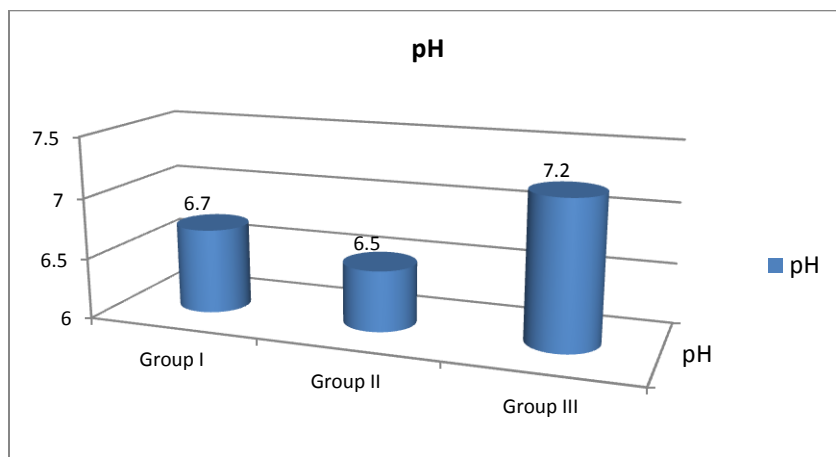
**RESULTS**

Table I shows that group I, group II and group III contained equal number of males (10) and females (10). The difference was non – significant (P > 0.05). Graph I shows that Group I had 6.7 pH, group II had 6.5 pH and group III had 7.2 pH. The difference was significant (P < 0.05). Table II shows that paired t test showed significant difference in pH of saliva in all three groups. The difference was significant (P < 0.05).

**Table I** Distribution of subjects

| Group I<br>(Smoke tobacco) |        | Group II<br>(Smokeless tobacco) |        | Group III<br>(Control) |        |
|----------------------------|--------|---------------------------------|--------|------------------------|--------|
| Male                       | Female | Male                            | Female | Male                   | Female |
| 10                         | 10     | 10                              | 10     | 10                     | 10     |

**Graph I** pH of saliva in all groups



**Table II** Means, standard deviation of mean of pH scores of saliva in all groups

| Group     | Mean | S.D   |
|-----------|------|-------|
| Group I   | 6.71 | 0.112 |
| Group II  | 6.53 | 0.246 |
| Group III | 7.25 | 0.282 |

**DISCUSSION**

Saliva has many functions such as cleansing, lubrication, maintaining homeostatis, teeth remineralization, digestion, taste sensation, pH balance and phonation. It includes a variety of electrolytes, peptides, glycoproteins and lipids which have antimicrobial, antioxidant, tissue repair and

buffering properties. Saliva is the first biological fluid that is exposed to cigarette smoke, which contains numerous toxic compositions responsible for structural and functional changes in saliva.<sup>6</sup> This study was conducted to analyze the effect of tobacco on pH of saliva in study population.

In this study, 30 subjects were selected and they were divided into 3 groups. Group I - containing 20 subjects (10- males, 10- females) that consumed smoke form of tobacco. Group II - containing 20 subjects (10- males, 10- females) that consumed smokeless form of tobacco. Group III - containing healthy subjects (10 - males, 10- females). We took saliva of patients and were subjected to pH analysis in all three groups.

We found that pH of saliva in group I was 6.7, in group II 6.5 and in group III 7.2. When we compared the pH in group I and II, the difference was non - significant but group III had slightly higher pH as compared to other 2 groups. We found that salivary pH was the lowest in Group II compared to Group I and Group III probably because of use of lime in smokeless form, which can react with bicarbonate buffering system by the loss of bicarbonate, turning saliva more acidic. The alteration in electrolytes and ions alters the pH as they interact with the buffering systems of saliva. This is in agreement with Sonies BS et al.<sup>7</sup>

We found that standard deviation (S.D) of 0.112, 0.246 and 0.282 in Group I, Group II and Group III respectively. This is similar to study by Atkinson et al.<sup>8</sup>

Ship<sup>9</sup> stated that lime could cause a free radical injury or the high alkaline content probably reacts with the salivary buffering systems and alters the pH. A salivary pH of 7.0 usually indicates a healthy dental and periodontal situation. According to Valdez<sup>10</sup>, at pH > 7.0, there is a low incidence of dental decay and little or no calculus. Therefore, stable conditions should basically be found in this environment. A saliva pH below 7.0 usually indicates academia. If a chronic condition exists, the mouth is more susceptible to dental decay, halitosis and periodontitis. Chronic acidemia can be a causative factor for a multitude of diseases affecting the whole body.

## CONCLUSION

Saliva plays an important role in maintaining equilibrium in oral cavity. There is an alteration in pH of saliva of tobacco user which may be using smokeless tobacco or smoking tobacco. Smokeless tobacco has more decrease in pH which ultimately leads to gingival and oral diseases.

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