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### Assessment of pH level and uric acid in saliva before and after complete denture insertion

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#### Abstract

**Background:** Many factors influence the composition of saliva. The rate of secretion follows a circadian rhythm, decreasing during sleep and increasing during day. The present study was conducted to assess pH level and uric acid in saliva before and after complete denture insertion.

**Materials & Methods:** 80 completely edentulous patients of both genders were divided into two groups of 40 each and each group was further divided into two groups of 20 each. Group I was age ranged 40-60 years contains two subgroups: group A1 for smokers and group A2 for non-smokers. Group II age ranged 61-80 years contains two subgroups: group B1 for smokers and group B2 for non-smokers. Saliva samples were collected from subjects immediately before the insertion of dentures and pH & uric acid estimation was done.

**Results:** Out of 80 patients, males were 45 and females were 35. The mean pH of saliva before denture insertion was 6.7 and after denture insertion was 5.1. The difference was significant ( $P < 0.05$ ). The mean uric of saliva before denture insertion was 4.5 and after denture insertion was 3.7. The difference was significant ( $P < 0.05$ ). There was significant difference in pH and uric acid level while comparing A1 vs A2 and B1 vs B2 ( $P < 0.05$ ).

**Conclusion:** There was no significant decrease in levels of salivary pH and uric acid in complete denture wearer.

**Keywords:** Complete denture wearer, pH, uric acid

#### Introduction

Saliva is produced by 3 pairs of large glands and the smaller glands of the oral mucosa. Saliva is vital for taste, mastication, swallowing, and speech. It also maintains and protects the oral soft and hard tissues. Saliva may be obtained from either stimulated or unstimulated (resting) secretion [1]. Methods of collection unstimulated saliva are: (1) draining, (2) spitting, (3) suction, and (4) swab. Many factors influence the composition of saliva. The rate of secretion follows a circadian rhythm, decreasing during sleep and increasing during day. These factors are: flow rate, stimulation, age, nutrition, diseases, drugs, and hormones. pH of saliva varies in any one individual. The normal range is 5.6 to 7.0 with an average value of 6.7 [2].

Uric acid is the dominant antioxidant present in saliva with clinical importance in monitoring oral oxidative stress. OS represents the imbalance between the production of highly reactive molecular species such as reactive oxygen species (ROS) and the antioxidant defence systems [3]. Monomer released from denture may be the cause of adverse biological effects such cytotoxicity and genotoxicity. Some of these methacrylates have been identified to cause gene mutation. Resin monomers may be able to alter the functions of the cells of the oral cavity [4]. Many works have been done on effect of smoking and aging on salivary uric acid and pH but changes in uric acid and pH level in completely edentulous individuals before and after wearing complete dentures of two different age group in smokers and non-smokers has not been done before [5]. The present study was conducted to assess pH level and uric acid in saliva before and after complete denture insertion.

#### Materials & Methods

The present study comprised of 80 completely edentulous patients of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. Patients were divided into two groups of 40 each and each group was further divided into two groups of 20 each. Group I was age ranged 40-60 years contains two subgroups: group A1 for smokers and group A2 for non-smokers. Group II age ranged 61-80 years contains two subgroups: group B1 for smokers and group B2 for non-smokers. Saliva samples were collected from subjects immediately before the insertion of dentures. Subjects were recalled one month after the denture insertion for collecting their second set of saliva samples. Saliva of first container was used in pH estimation. Saliva of second container was used in uric acid estimation. pH estimation is carried out using digital pH meter & uric acid estimation is done by Semi-automated clinical chemistry analyzer. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

**Results**

**Table I:** Distribution of patients

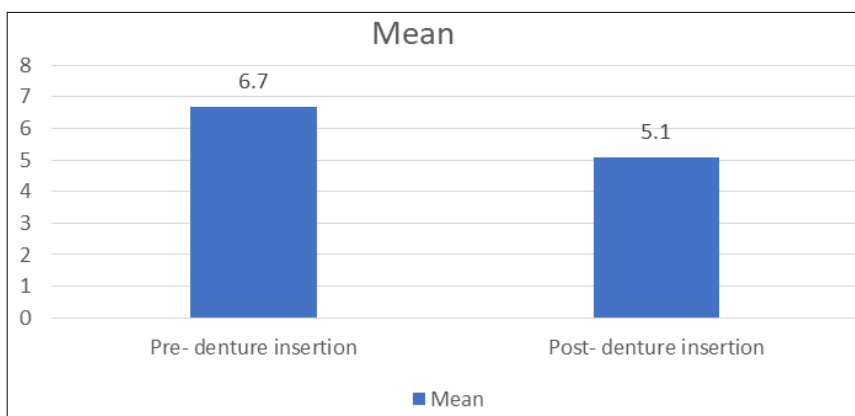
Total- 80		
Gender	Males	Females
Number	45	35

Table I shows that out of 80 patients, males were 45 and females were 35.

**Table II:** Saliva pH values before and after wearing complete dentures

pH	Mean	P value
Pre- denture insertion	6.7	0.04
Post- denture insertion	5.1	

Table II, graph I shows that mean pH of saliva before denture insertion was 6.7 and after denture insertion was 5.1. The difference was significant ( $P < 0.05$ ).



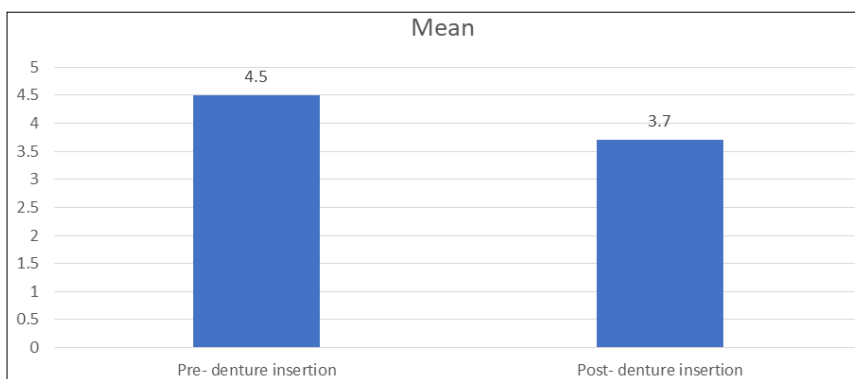
**Graph I:** Saliva pH values before and after wearing complete dentures

**Table III:** Saliva uric acid values before and after wearing complete dentures

Uric acid	Mean	P value
Pre-denture insertion	4.5	0.05
Post-denture insertion	3.7	

Table III, graph II shows that mean uric of saliva before denture insertion was 4.5 and after denture insertion was 3.7.

The difference was significant ( $P < 0.05$ ).



**Graph II:** Saliva uric acid values before and after wearing complete dentures

**Table IV:** Effect of age group and smoking status on the changes in saliva parameters

Parameters	Age group	Mean difference	P value
pH	A1 vs A2	0.75	0.05
	B1 vs B2	0.82	
Uric acid	A1 vs A2	0.51	0.04
	B1 vs B2	0.64	

Table IV shows that there was significant difference in pH and uric acid level while comparing A1 vs A2 and B1 vs B2 ( $P < 0.05$ ).

**Discussion**

Many factors affect the pH, and the buffering capacity of saliva protects the oral tissues [6]. pH of saliva is slightly

acidic before secretion into the oral cavity. It becomes slightly alkaline on expulsion from the gland owing to loss of carbon dioxide [7]. Because bicarbonate concentration increases with increasing flow rate, the pH level is elevated at high flow rates. The spontaneous loss of CO<sub>2</sub> after collection causes changes in the composition and pH of saliva [8]. Therefore, the accuracy of some analyses and pH depends on the length of time elapsing between collection and analysis [9]. The present study was conducted to assess pH level and uric acid in saliva before and after complete denture insertion.

We found that out of 80 patients, males were 45 and females were 35. Sahu *et al.* [10] evaluated uric acid & pH level in saliva before and after complete denture wearing. 100 completely edentulous patients (between 40-80-year ages) for the clinical study are taken. The test subject 100 in number was divided into two groups of 50 each and each group was further divided into two groups of 25 each. Group A (age between 40-60 years) contains two subgroups: group A1 for smokers and group A2 for non-smokers. Group B (age between 61-80 years) contains two subgroups: group B1 for smokers and group B2 for non-smokers. Saliva samples were collected and pH & uric acid estimation was done. It was found that salivary uric acid and pH was significantly decreased after one month of denture insertion. Effect of age on pH is not significantly decreased but effect of age on uric acid is significantly decreased. Effect of smoking on pH and uric acid is slightly higher significant as compared to non-smokers. Some remedies are suggested to minimize this problem.

We observed that mean pH of saliva before denture insertion was 6.7 and after denture insertion was 5.1. Nikoloupoulo *et al.* [11] determined changes of pH of resting saliva before and after prosthetic treatment in implant denture wearers. The study sample comprised 2 groups of edentulous patients, ranging in age from 50 to 80, who had not worn complete dentures in the past. First group was composed of 60 patients, who were planned for complete denture treatment. Second group consisted of 15 patients, who were planned for implant dentures treatment. Two measurements of pH of unstimulated saliva were carried out for each person. The salivary pH was measured before the construction of complete dentures and 15 days after the insertion. The measurements of pH of saliva were made using Electro pH meter CONSORT-P903. The outcome of this study showed, significant statistical differences on the values of saliva's pH 15 days after the insertion of complete dentures and dentures supported by implants ( $P < 0.001$ ).

We found that mean uric of saliva before denture insertion was 4.5 and after denture insertion was 3.7. Duffo *et al.* [12] reported that the pH of saliva plays an important role in the corrosion of titanium implant. A high corrosion was observed when the samples of implants were immersed in a lower pH (5.2) as in chronic inflammatory processes (wine or beverages).

There was significant difference in pH and uric acid level while comparing A1 vs A2 and B1 vs B2 ( $P < 0.05$ ). Ravnholt [13] measured the pH values, when corrosion occurs around titanium implants, and found it about 10. The researcher concluded that if the buffer systems of adjacent tissues *in vivo* are not able to cope with the high pH generated around the titanium, local tissue damage may ensue.

The limitation of this study is small sample size. A larger study would be needed to ascertain whether any changes of salivary pH are large enough to be of clinical significance.

## Conclusion

Authors found that there was no significant decrease in levels of salivary pH and uric acid in complete denture wearer. Findings on saliva characteristics such as these can help the dentist suggest remedial measures such as adoption of better oral hygiene, denture cleaning practices and additionally, recommend adequate intake of antioxidants such as Vitamin C to prevent the possible oxidative damage caused by decreased saliva uric acid.

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