

ORIGINAL RESEARCH

Measurement of salivary pH level and uric acid before and after complete denture insertion

¹Dr. Rohit Sharma, ²Dr. Yogendra Paharia, ³Dr. Harsha Tiwari

¹Senior Resident, Garjra Raja Medical College, Gwalior, M.P, India

²HOD & Professor, Department of Dentistry, Garjra Raja Medical College, Gwalior, M.P, India

³Private Practitioner, India

Corresponding Author

Dr. Rohit Sharma

Senior Resident, Garjra Raja Medical College, Gwalior, M.P, India

Received Date: 16 October, 2023

Acceptance Date: 21 November, 2023

ABSTRACT

Background: Three pairs of big glands and the smaller oral mucosa glands create saliva. The present study was conducted to assess pH level and uric acid in saliva before and after complete denture insertion. **Materials & Methods:** 40 completely edentulous patients of both genders were selected. Subjects' saliva samples were taken right before their dentures were inserted to estimate pH and uric acid levels. **Results:** Out of 40 patients, males were 18 and females were 22. The mean pH of saliva before denture insertion was 6.2 and after denture insertion was 5.6. The difference was significant ($P < 0.05$). The mean uric of saliva before denture insertion was 4.9 and after denture insertion was 3.8. The difference was significant ($P < 0.05$). **Conclusion:** In total denture wearers, there were statistically significant reductions in salivary pH and uric acid levels.

Keywords: Completely edentulous, pH, uric acid

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

INTRODUCTION

Three pairs of big glands and the smaller oral mucosa glands create saliva. Taste, mastication, swallowing, and speaking all depend on saliva. Additionally, it preserves and guards the hard and soft tissues of the mouth. Either stimulated or unstimulated (resting) secretion can provide saliva. The following techniques can be used to gather unstimulated saliva: (1) draining; (2) spitting; (3) suction; and (4) swabbing.^{1,2} The makeup of saliva is influenced by numerous things. The pace of secretion has a circadian pattern; it rises during the day and falls during sleep. Flow rate, stimulation, age, diet, illnesses, medications, and hormones are some of these variables. Saliva pH varies from person to person. With an average reading of 6.7, the usual range is 5.6 to 7.0.³

The main antioxidant in saliva that is clinically significant for tracking oral oxidative stress is uric acid. OS is a symbol for the imbalance that exists between the antioxidant defense mechanisms and the synthesis of extremely reactive chemical species such as reactive oxygen species (ROS).⁴ Unimer discharged from dentures could be the source of harmful biological consequences like genotoxicity and cytotoxicity. The gene mutation has been linked to a few of these methacrylates. Resin monomers have the

potential to change how the cells in the oral cavity function.^{5,6} Numerous studies have examined the effects of smoking and aging on salivary uric acid and pH, but the effects of smoking on uric acid and pH levels have not been studied in persons who are entirely edentulous before and after wearing complete dentures from two different age groups.^{7,8} 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 consisted of 40 completely edentulous patients of both genders. All enrolled patients gave their written consent to participate in the study.

Data such as name, age, gender, etc. was recorded. Subjects' saliva samples were taken right before their dentures were inserted. One month following the denture placement, the subjects were brought back to provide a second set of saliva samples. The first container's saliva was used to estimate pH. Uric acid was estimated using the saliva from the second container. A semi-automated clinical chemistry analyzer is used to estimate uric acid and a digital pH meter is used to estimate pH. Data thus obtained were

subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 40		
Gender	Males	Females
Number	18	22

Table I shows that out of 40 patients, males were 18 and females were 22.

Table II Assessment of salivary pH

pH	Mean	P value
Before denture insertion	6.2	0.02
After denture insertion	5.6	

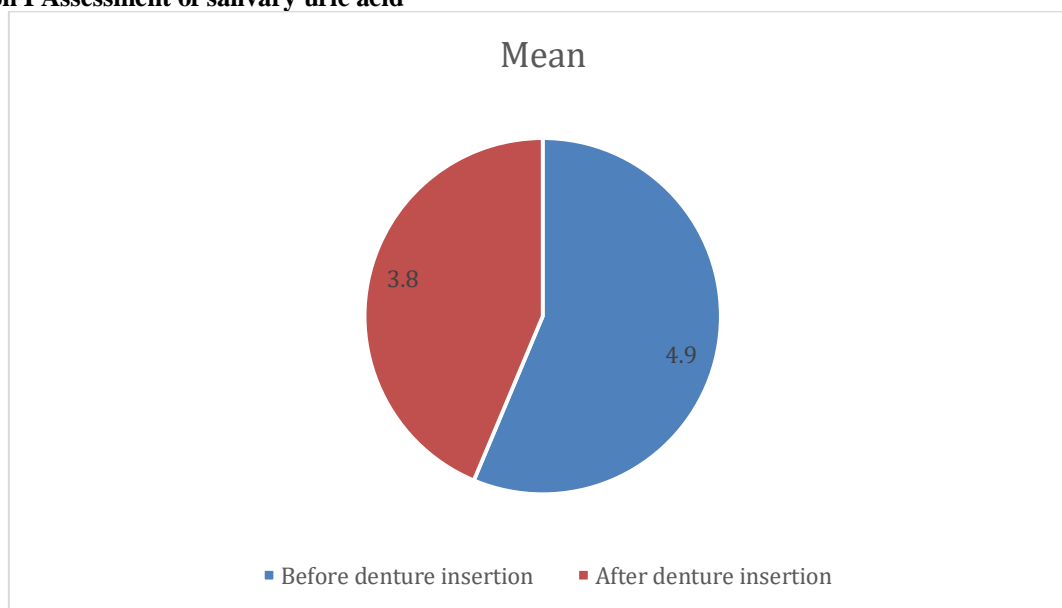
Table II shows that the mean pH of saliva before denture insertion was 6.2 and after denture insertion was 5.6. The difference was significant ($P < 0.05$).

Table III Assessment of salivary uric acid

Uric acid	Mean	P value
Before denture insertion	4.9	0.04
After denture insertion	3.8	

Table III, graph I show that the mean uric of saliva before denture insertion was 4.9, and after denture insertion was 3.8. The difference was significant ($P < 0.05$).

Graph I Assessment of salivary uric acid



DISCUSSION

The pH is influenced by numerous causes, and saliva's ability to act as a buffer shields the oral tissues. Saliva has a pH of 6 and is slightly acidic before it is secreted into the mouth.⁹ As a result of the gland's evacuation of carbon dioxide, it becomes somewhat alkaline.¹⁰ High flow rates result in a higher pH level because bicarbonate concentration rises with flow rate.^{11,12} The composition and pH of saliva alter as a result of the spontaneous release of CO₂ following collection. As a result, the amount of time that passes between collection and analysis affects the pH and accuracy of several assays.^{13,14} 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 40 patients, males were 18 and females were 22. The mean pH of saliva before denture insertion was 6.2 and after denture insertion was 5.6. When corrosion develops around titanium implants, the pH levels are determined by Ravnholt¹⁵, who discovered that they are roughly 10. They concluded that local tissue injury could occur if the buffer systems of nearby tissues in vivo are unable to handle the high pH produced surrounding the titanium. According to Duffo et al¹⁶, salivary pH has a significant impact on the corrosion of titanium implants. When implant samples were submerged in a solution with a lower pH (5.2), such as that found in chronic inflammatory processes (wine or drinks), a high level of corrosion was seen.

We observed that the mean uric of saliva before denture insertion was 4.9 and after denture insertion was 3.8. The pH of resting saliva before and after prosthetic treatment in implant denture wearers was measured by Nikoloupoulo et al.¹⁷ Two sets of edentulous patients, aged 50 to 80, who had never worn complete dentures before made up the study sample. Sixty individuals in the first group were scheduled for full denture therapy. Fifteen individuals made up the second group; their treatment plan involved implant dentures. For every individual, the pH of their unstimulated saliva was measured twice. Prior to the manufacture of complete dentures and fifteen days following implantation, the pH of the saliva was assessed. Saliva's pH was measured with an Electro pH meter. The study's findings demonstrated statistically significant variations on the the values of saliva's pH 15 days after the insertion of complete dentures and dentures supported by implants.

Bhat et al¹⁸ estimated and compared salivary uric acid, pH and C-reactive protein levels in completely edentulous subjects before and after wearing complete dentures. The mean values for salivary pH and uric acid after denture insertion were found to be significantly decreased whereas the estimated median concentrations of saliva C reactive Protein before and after complete denture insertion did not differ significantly. The C-reactive protein levels indicate absence of significant change in oral inflammatory status of the subjects. Decreases in saliva uric acid and pH levels after denture wearing indicate decrease in antioxidant potential and increase in acidity of saliva respectively, which are not favorable outcomes in prosthodontic interventions. 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.

The limitation of this study is the small sample size.

CONCLUSION

Authors found that in total denture wearers, there were statistically significant reductions in salivary pH and uric acid levels.

REFERENCES

1. Boere G. Influence of fluoride on titanium an acidic environment measured by polarization resistance technique. *J Appl Biomater.* 1995;6:283-288.
2. Tumelin-Chemia F, Roulle F, Burdairon G. Corrosive properties of fluoride-containing odontologic gels against titanium. *J Dent.* 1996;24:109- 115.
3. Olsen S, Solez K. Acute tubular necrosis and toxic renal injury. In: *Renal Pathology with Clinical and Functional Correlations.* 2nd ed. Philadelphia: Tisher BM Brenner; 1994:769-809.

4. Mandel ID. The diagnostic uses of saliva. *J Oral Path Med.* 1990;19:119-125.
5. Gardikas DK. *Specific Nosology.* 3rd ed. Athens: Parisianos Co.; 1981:497, 506.
6. Olsen J, Birkeland JM. Assessment of denture plaque in subjects with and without denture stomatitis. *Scand J Dent Res.* 1975;83:370-374.
7. Makila E. Properties of saliva in edentulous persons before and after wearing complete dentures. A longitudinal study. *J Dent Assoc S Afr.* 1969;14:372-830.
8. Olsen I, Birkeland JM. Denture stomatitis—Yeast occurrence and the pH of saliva and denture plaque. *Scand J Dent Res.* 1977;85:130-134.
9. Chauncey H, Feller R, Kapur K. Longitudinal age-related changes in human parotid saliva composition. *J Dent Res.* 1987;66:599-602.
10. Ferguson BD. *Oral Bioscience.* Edinburgh: Churchill Livingstone; 1999: 136-138.
11. de Muniz BR, Maresca BM, Tumlaschi OR, et al. Effects of an experimental diet on parotid saliva and dental plaque pH in institutionalized children. *Arch Oral Biol.* 1983;28:578-581.
12. Ravnholt G. Corrosion current and pH rise around titanium coupled to dental alloys. *Scand Dent Res.* 1988;96:466- 472.
13. Koda T, Tsuchiya H, Yamauchi M, et al. Leachability of denture-base acrylic resins in artificial saliva. *Dent Mater.* 1990; 6:13-16.
14. Nakagawa M, Matsuya S, Shiraishi T, et al. Effect of fluoride concentration and pH on corrosion behavior of titanium for dental use. *J Dent Res.* 1999;78:1568-1572.
15. Bartlett DW, Bureau GP, Anqqiansah A. Evaluation of the pH of a new carbonated soft drink beverage: An in vivo investigation. *J Prosthodont.* 2003; 12:21-25.
16. Duffo G, Barreiro M, Olmedo D. An experimental model to study implant corrosion. *Acta Odontol Latinoam.* 199; 12:3-10.
17. Nikolopoulou F, Tzortzopoulou E. Salivary pH in edentulous patients before and after wearing conventional dentures and implant overdentures: A clinical study. *Implant Dentistry.* 2007 Dec 1;16(4):397-403.
18. Bhat SV, Rao NL, Naushad P, Shenoy KK. Salivary uric acid, C-reactive protein and pH levels in completely edentulous patients before and after wearing complete dentures. *International Journal of Pharmaceutical Sciences Review and Research.* 2014;28(1):38-42.