

ORIGINAL RESEARCH

Assessment of flow rate and pH of stimulated and unstimulated saliva and compare their values before and after denture insertion

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ABSTRACT

Background: Saliva plays a profound role in the maintenance of oral health in the denture wearing patient. Indeed, the presence of a thin salivary film layer is essential for the comfort of the mucosa beneath a denture base and for denture retention. The importance of this film is evident from the multitude of problems associated with denture wear in the xerostomic patient. **Material and method:** A total of 120 patients were enrolled in this study. The flow rates of stimulated and un-stimulated whole saliva were collected and compared before, during and 3 months after the delivery of complete denture. Similarly the pH of whole saliva was calculated before, during and 3 months after the delivery of complete denture using a digital pH meter. SPSS software was used for statistical analysis. **Results:** The mean flow rate of resting saliva before, after denture insertion and after 3 months was 0.38, 0.91 and 0.69 ml/min respectively. There was a significant difference in the flow rate of resting saliva at all three occasions (P-value 0.02). The mean flow rate of stimulated saliva before, after denture insertion and after 3 months was 0.72, 0.99 and 0.84 ml/min respectively. There was a significant difference in the flow rate of stimulated saliva at all three occasions (P-value 0.03). The pH of resting saliva before, after denture insertion and after 3 months was 7.32, 7.51 and 7.43 respectively. There was a non-significant difference in the pH of resting saliva at all three occasions (P-value 0.86). The pH of stimulated saliva before and after denture insertion was 7.40 and 7.62 respectively. The pH after 3 months was 7.53. There was a non-significant difference in the pH of stimulated saliva at all three occasions (P-value 0.08). **Conclusion:** The flow rate and the pH of the resting and the stimulated saliva were significantly higher immediately after and 3 months after denture insertion as compared to the values before denture insertion.

Key words: Stimulated saliva, Complete denture, Xerostomia.

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INTRODUCTION

Saliva is the most valuable oral fluid, one of the most important factors regulating oral health. It is an essential component required for maintenance of the ecologic balance in the oral cavity¹⁻². Saliva contributes to the maintenance of oro-esophageal, mucosal integrity by lubrication, hydration, clearance, buffering as well as repair. Saliva also performs several important functions such as mineralization, facilitating taste, tissue coating, and antimicrobial activity³⁻⁴.

Among some of the common problems of the elderly people that leave a significant impact on their life are edentulism, xerostomia, and salivary gland

hypofunction⁵. There are various factors, including saliva, that aid in the proper functioning of removable complete denture and increase their longevity, which may be influenced by a number of variables⁶.

Normally, dentures do not rest on bare mucous membranes but on an interposed salivary film. The functions of this film include protection of tissues from forces of the denture base and hydration of these tissues in order that a prosthesis can rest on this layer rather than directly on the oral tissues. The importance of this film is evident from the multitude of problems associated with denture wear in the xerostomic patient. Soreness and ulceration of the denture bearing tissues, decreased denture retention, burning

sensations, alterations in taste perception, and difficulty in mastication and swallowing are among the problems encountered by these patients⁷. The purpose of this study was to calculate the flow rate and pH of stimulated and unstimulated saliva and compare their values before and after denture insertion.

MATERIAL AND METHODS

This study was carried out in the Prosthodontic department of the dental institute. A total of 120 patients were enrolled in this study. Patients with a known history of xerostomia and radiation therapy were excluded from this study. All the demographic details of the patients were obtained. The purpose of the study was explained in detail to the patients and a written consent was obtained from them.

The patients were initially asked to rinse the oral cavity with 15 ml of distilled water for 5 seconds. After spitting the water and the initial swallow a graduated measuring flask was used for collection of the patients whole saliva. This process had to be repeated every 20 seconds. The flow rates of stimulated and un-stimulated whole saliva were collected and compared before, during and 3 months after the delivery of complete denture. Similarly the ph of whole saliva was calculated before, during and 3 months after the delivery of complete denture using a digital pH meter. Entire data was recorded in the Microsoft excel sheets. SPSS software was used for statistical analysis. Chi square test and student T test were use to compare the variables. P-value of less than 0.05 was considered significant.

RESULTS

In this study it was observed that the mean flow rate of resting saliva before and after denture insertion was 0.38 and 0.91 ml/min respectively. Flow rate after 3 months was 0.69 ml/min. There was a significant difference in the flow rate of resting saliva at all three occasions (P-value 0.02). The mean flow rate of stimulated saliva before and after denture insertion was 0.72 and 0.99 ml/min respectively. Flow rate after 3 months was 0.84 ml/min. There was a significant difference in the flow rate of stimulated saliva at all three occasions (P-value 0.03). There was a significant difference between the resting and stimulated saliva at all the three occasions (table 1).

Table I Mean flow rate of saliva

Period	Resting saliva	Stimulated saliva	P value
Before denture insertion	0.38	0.72	0.01
After denture insertion	0.91	0.99	0.04
After 3 months	0.69	0.84	0.02
P value	0.02	0.03	

The current study showed that the pH of resting saliva before and after denture insertion was 7.32 and 7.51 respectively. The pH after 3 months was 7.43. There was a non-significant difference in the pH of resting saliva at all three occasions (P-value 0.86). The pH of stimulated saliva before and after denture insertion was 7.40 and 7.62 respectively. The pH after 3 months was 7.53. There was a non-significant difference in the pH of stimulated saliva at all three occasions (P-value 0.08). There was a significant difference between the pH of resting and stimulated saliva at all the three occasions (table 2).

Table II Mean pH of whole saliva

Period	Resting saliva	Stimulated saliva	P value
Before denture insertion	7.32	7.40	0.049
After denture insertion	7.51	7.62	0.03
After 3 months	7.43	7.53	0.019
P value	0.86	0.08	

DISCUSSION

Although a common generalization about aging is that salivary gland function is reduced and that older persons suffer from xerostomia, little systemic examination of salivary gland function across the human life span has been carried out⁸. Saliva is a complex fluid which plays an important role in maintaining the well-being of oral cavity. Saliva in human being originates from three pairs of major salivary glands (parotid, submandibular and sublingual), and 300-500 minor salivary glands. These glands produce 1.5 L of whole saliva daily, at a rate of approximately ranging from 0.25 to 0.35 ml/min. The rate of normal flow rates in unstimulated and stimulated condition ranges from 0.2-0.5 ml/min to 0.9 to 2.6 ml/min⁹.

Retention of denture not only depends on physical factors but is also related to the flow of saliva. The composition of saliva varies greatly in different individuals and in the same individual under different circumstances and stimulations¹⁰.

In this study it was observed that the mean flow rate of resting saliva before and after denture insertion was 0.38 and 0.91 ml/min respectively. Flow rate after 3 months was 0.69 ml/min. There was a significant difference in the flow rate of resting saliva at all three occasions (P-value 0.02). The mean flow rate of stimulated saliva before and after denture insertion was 0.72 and 0.99 ml/min respectively. Flow rate after 3 months was 0.84 ml/min. There was a significant difference in the flow rate of stimulated saliva at all three occasions (P-value 0.03). There was a significant difference between the resting and stimulated saliva at all the three occasions (table 1). B C Muddugangadhar et al compared the flow rate and

pH of resting (unstimulated) and stimulated whole saliva before and after complete denture placement in different age groups. Statistically significant differences were seen in resting (unstimulated) and stimulated whole salivary flow rate and pH obtained before, immediately after, and after 2 to 3 months of complete denture placement. No statistically significant differences were found between the different age groups in resting (unstimulated) as well as stimulated whole salivary flow rate and pH. They concluded that Stimulated whole salivary flow rates and pH were significantly higher than resting (unstimulated) whole salivary flow rates and pH obtained before, immediately after, and after 2 to 3 months of complete denture placement¹¹.

The current study showed that the pH of resting saliva before and after denture insertion was 7.32 and 7.51 respectively. The pH after 3 months was 7.43. There was a non-significant difference in the pH of resting saliva at all three occasions (P-value 0.86). The pH of stimulated saliva before and after denture insertion was 7.40 and 7.62 respectively. The pH after 3 months was 7.53. There was a non-significant difference in the pH of stimulated saliva at all three occasions (P-value 0.08). There was a significant difference between the pH of resting and stimulated saliva at all the three occasions (table 2). Abhishek Shekha et al studied changes in different salivary factors before and after complete denture insertion and to measure the maxillary denture retention in different arch forms. They concluded that complete denture acts as a mechanical stimulant thus increasing flow rate and pH immediately after complete denture insertion. Density, total protein, and viscosity of saliva decreased after complete denture insertion which may be due to increase in water content of saliva. The retention of maxillary complete denture does not seem to depend on the rate of change of the salivary factors, before and after complete denture insertion. Total basal surface area and maxillary denture retention values were highest in square arch form and least in tapered arch form¹². Abhay Sonthalia et al evaluated the effect of complete denture wear on the flow rate of saliva in both medicated and apparently healthy patients. They found no significant difference in the salivary flow rate was found 3 months after denture insertion when compared to before denture insertion for both the medicated and unmedicated groups¹³.

CONCLUSION

From the above data the author concluded that the flow rate and the pH of the resting and the stimulated saliva were significantly higher immediately after and 3 months after denture insertion as compared to the values before denture insertion. The author

recommends further studies on this topic to validate his claim.

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