

## Assessment of flow rate and pH of unstimulated and stimulated whole saliva before and after complete denture placement

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### ARTICLE INFO



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### ABSTRACT

#### Background

Saliva plays an important role in the maintenance of oral health by exhibiting multiple host defense functions. This study assessed flow rate and pH of unstimulated and stimulated whole saliva before and after complete denture placement.

#### Materials & Methods

The present study was conducted on 60 completely edentulous patients of both genders. The flow rates of whole saliva and pH were measured at three different stages, resting (unstimulated) and stimulated whole saliva and pH before complete denture placement, after complete denture placement; and after 3 months of complete denture placement.

#### Results

The mean flow rate of resting saliva before denture insertion was 0.35 ml/ min and stimulated saliva was 0.67 ml/ min. The mean flow rate of resting saliva after denture insertion was 0.81 ml/ min and stimulated saliva was 0.94 ml/ min. The mean flow rate of resting saliva after 3 months of denture insertion was 0.72 ml/ min and stimulated saliva was 0.82 ml/ min. The difference was significant ( $P < 0.05$ ). The mean pH of resting saliva before denture insertion was 7.32 and stimulated saliva was 7.40. The mean pH of resting saliva after denture insertion was 7.51 and stimulated saliva was 7.62. The mean pH of resting saliva after 3 months of denture insertion was 7.43 and stimulated saliva was 7.53. The difference was non-significant ( $P > 0.05$ ).

#### Conclusion

Authors found that stimulated salivary flow rates and pH were significantly higher than unstimulated whole salivary flow rates and pH obtained before, immediately after, and after 3 months of complete denture insertion.

### INTRODUCTION

Saliva plays a major role in local and systemic defense of the oral cavity, the oropharyngeal region, and the upper gastrointestinal tract. Saliva plays an important role in

the maintenance of oral health by exhibiting multiple host defense functions. It fosters and protects the integrity of the soft and hard oral tissues and supports important oral functions. Saliva is the most valuable oral

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fluid, one of the most important factors regulating oral health.<sup>1</sup> It is an essential component required for maintenance of the ecologic balance in the oral cavity. 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 activity.<sup>2</sup>

The presence of optimal salivary flow, consistency and composition is even more critical in the completely edentulous patients. It is imperative for the prosthodontist to give due attention to these salivary characteristics before, during and after denture fabrication. This article highlights the importance of saliva in oral health and gives an insight into the significant role played by saliva in the successful rehabilitation of completely edentulous patients with complete dentures.<sup>3</sup>

The role of saliva in maintaining the overall wellbeing of the oral cavity in dentate individuals is well documented. In edentulous subjects, who have lost all their teeth and are dependent upon artificial prosthesis to carry out the basic oral functions of mastication, the presence of appropriate quantity and quality of saliva becomes even more critical.<sup>4</sup> This study assessed flow rate and pH of unstimulated and stimulated whole saliva before and after complete denture placement.

## MATERIALS & METHODS

The present study was conducted in the department of Prosthodontics. It comprised of 60 completely edentulous patients of both genders. The study was approved from institutional ethical committee. All patients were informed regarding the study and written consent was obtained.

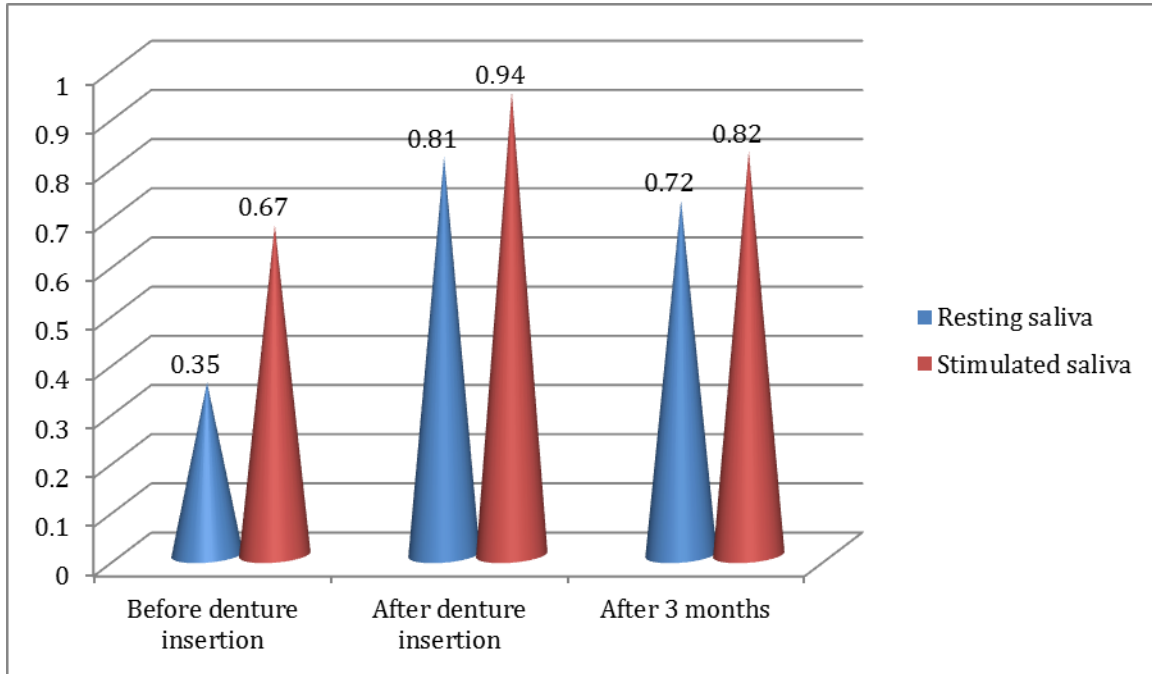
Data such as name, age, gender etc. was recorded. The participants were asked to rinse their mouths for 5 seconds with 10 mL distilled water. Following the spitting out of the water and initial swallow, whole saliva was collected by spitting into a graduated measuring jar every 30 seconds for unstimulated saliva. The flow rates of whole saliva and pH were measured at three different stages, resting (unstimulated) and stimulated whole saliva and pH before complete denture placement, after complete denture placement; and after 2 to 3 months of complete denture placement. Flow rate was calculated as collected volume/collection time. pH was determined using a digital pH meter. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

## RESULTS

**Table I:** Mean flow rate of saliva

Period	Resting saliva	Stimulated saliva	P value
Before denture insertion	0.35	0.67	0.02
After denture insertion	0.81	0.94	0.05
After 3 months	0.72	0.82	0.03
P value	0.01	0.02	

Table I, graph I shows that mean flow rate of resting saliva before denture insertion was 0.35 ml/ min and stimulated saliva was 0.67 ml/ min. The mean flow rate of resting saliva after denture insertion was 0.81 ml/ min and stimulated saliva was 0.94 ml/ min. The mean flow rate of resting saliva after 3 months of denture insertion was 0.72 ml/ min and stimulated saliva was 0.82 ml/ min. The difference was significant ( $P < 0.05$ ).



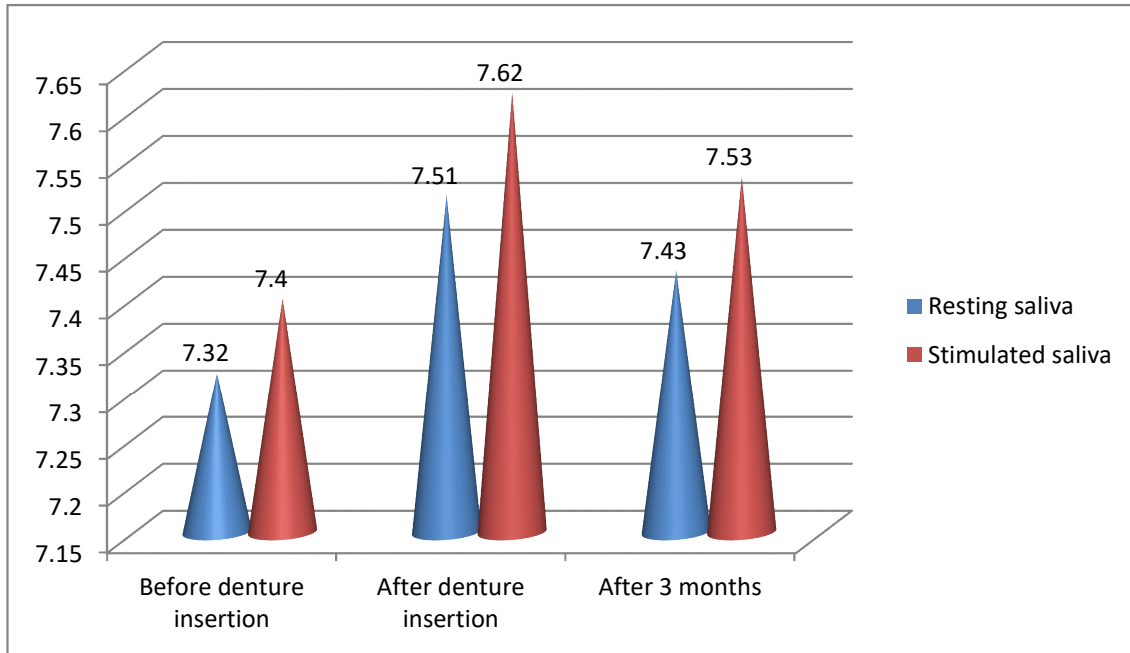
**Graph I:** Mean flow rate of saliva

**Table II:** Mean pH of whole saliva

Period	Resting saliva	Stimulated saliva	P value
Before denture insertion	7.32	7.40	0.05
After denture insertion	7.51	7.62	0.04
After 3 months	7.43	7.53	0.02
P value	0.91	0.09	

Table II, graph II shows that mean pH of resting saliva before denture insertion was 7.32 and stimulated saliva was 7.40. The mean pH of resting saliva after denture insertion was 7.51 and stimulated saliva was 7.62. The

mean pH of resting saliva after 3 months of denture insertion was 7.43 and stimulated saliva was 7.53. The difference was non-significant ( $P > 0.05$ ).



**Graph II:** Mean pH of whole saliva

## DISCUSSION

Retention in complete denture prosthodontics is defined as the quality inherent in the prosthesis which resists the forces of dislodgement along the path of insertion.<sup>10</sup> Successful rehabilitation of edentulous patients with complete dentures is largely contributed to by satisfactory denture retention.<sup>5</sup> Two important factors that contribute to retention of complete dentures include the establishment of an accurate and intimate fit of the denture base to the mucosa and the achievement of a proper peripheral seal. The physical factors that contribute to denture retention include Adhesion, Cohesion, Interfacial surface tension, Atmospheric pressure, Capillary attraction and Gravity. An optimal flow, consistency and volume of saliva is considered to be a major factor in enabling these physical factors to act in unison and aid in denture retention.<sup>6</sup> Optimal salivary flow and consistency plays an important role not only in the denture fabrication process

but also in the maintenance of integrity of the prosthesis.

In patients who present with an excessive secretion of saliva, proper impression making becomes difficult. Also, the minor palatal glands are known to secrete saliva rich in mucins. The presence of such highly mucous saliva may distort the impression material and prevent the ideal reproduction of posterior portion of the palate in the impression.<sup>7</sup> This study assessed flow rate and pH of unstimulated and stimulated whole saliva before and after complete denture placement.

In this study, mean flow rate of resting saliva before denture insertion was 0.35 ml/ min and stimulated saliva was 0.67 ml/ min. The mean flow rate of resting saliva after denture insertion was 0.81 ml/ min and stimulated saliva was 0.94 ml/ min. The mean flow rate of resting saliva after 3 months of denture insertion was 0.72 ml/ min and stimulated saliva was 0.82 ml/ min.

Saliva also plays a very important role in preserving denture integrity by keeping the denture surfaces clean

and in maintaining proper oral hygiene by physically washing away food and other debris from the soft tissues and from the polished surface of the prosthesis. The lubrication provided by saliva in dentate subjects is equally important in the edentulous as this makes the surface of the dentures more compatible with the movements of the lips, cheek and tongue. Salivary glycoproteins facilitate the movement of soft tissues during speech, mastication and swallowing of food. Denture retention is also to a large extent dependent upon saliva.<sup>8</sup>

We found that mean pH of resting saliva before denture insertion was 7.32 and stimulated saliva was 7.40. The mean pH of resting saliva after denture insertion was 7.51 and stimulated saliva was 7.62. The mean pH of resting saliva after 3 months of denture insertion was 7.43 and stimulated saliva was 7.53. Muddugangadhar et al<sup>9</sup> found that 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.

The main factor affecting the composition of saliva is the flow rate. As the flow rate increases, the pH and concentration of some constituents rise, among them notably are bicarbonate, protein, sodium, and chloride. Bicarbonates rise dramatically in stimulated saliva, which is an effective buffer system.<sup>10</sup>

## CONCLUSION

Authors found that stimulated salivary flow rates and pH were significantly higher than unstimulated whole

salivary flow rates and pH obtained before, immediately after, and after 3 months of complete denture insertion.

## REFERENCES

1. Mese H, Matsuo R. Salivary Secretion, taste and hyposalivation. *J Oral Rehabil.* 2007; 34(10):711-23.
2. de Almeida PDV, Grégio AMT, Machado MÂN, de Lima AAS, Azevedo LR. Saliva Composition and Functions: A Comprehensive Review. *J Contemp Dent Pract.* 2008; 9(3):72-80.
3. Bergdahl M, Bergdahl J. Low unstimulated salivary flow and subjective oral dryness: association with medication, anxiety, depression, and stress. *J Dent Res.* 2000; 79(9):1652-8.
4. Niedermeier WH, Krämer R. Salivary secretion and denture retention. *J Prosthet Dent.* 1992; 67:211-6.
5. Osterberg T, Birkhed D, Johansson C, Svanborg A. Longitudinal study of stimulated whole saliva in an elderly population. *Scand J Dent Res.* 1992; 100:340-5.
6. Edgar WM. Saliva: Its secretion, composition and functions. *Br Dent J.* 1992; 172:305-12.
7. Percival RS, Challacombe SJ, Marsh PD. Flow rates of resting whole and stimulated parotid saliva in relation to age and gender. *J Dent Res.* 1994; 73:1416-20.
8. Navazesh M, Wood GJ, Brightman VJ. Relationship between salivary flow rates and *Candida albicans* counts. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1995; 80:284-8.
9. Muddugangadhar BC, Sangur R, Rudraprasad IV, Nandeeshwar DB, Dhanya Kumar BH. A clinical study to compare between resting and stimulated whole salivary flow rate and pH before and after

complete denture placement in different age groups.

J Indian Prosthodont Soc. 2015; 15:356-66.

10. Ferguson DB. The flow rate of unstimulated human labial gland saliva. J Dent Res. 1996; 75:980-5.