Assessment of Salivary Flow Rate in Edentulous Patient

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Abstract

Background: Complete denture help to re-establish the occlusion and aesthetic to such extent it mimic the previously missing teeth and other features which may be lose over the time. In a complete denture wearer, saliva is responsible for the retention of the prosthesis due to its lubricating function. It also aid in integrity, adhesion and stabilisation of dentures in position after the placement. It act as interposed salivary film which allowed the prosthesis to lie on the film rather than on the bare mucosa. This would help to protect the tissues from the hydration and forces of the denture base that acting on it. Therefore, maintaining normal pH and salivary flow rate is required, in order to achieve a better retention of denture as well as good oral health.

Aim: To investigate the relationship between the salivary flow rate before and after the placement of complete denture.

Materials and Method: There were 15 participants in the age group of 55 to 70 years old, which required complete denture prosthesis for the first time. The unstimulated or resting whole saliva and stimulated whole saliva was collected by using spitting method. Saliva production was stimulated by chewing paraffin wax. The time taken for saliva collection of 5 mL was recorded by using stopwatch. The data obtained was analysed by using paired t-test.

Results: There was significant difference between the unstimulated whole salivary flow rate and stimulated whole salivary flow rate before the placement of the denture, which was by 0.20 mL/min. Whereas, the difference between the unstimulated whole salivary flow rate and stimulated whole salivary flow rate after the placement also show significant changes which was about 0.14 mL/min. Chewing of paraffin wax as well as placement of denture act as stimulatory agents in production of saliva.

Conclusion: Stimulated salivary flow rate were higher than the unstimulated salivary flow rate which obtained before and immediately after the placement of complete denture. There was significant differences of the salivary flow rate before and after the placement of denture.

Keywords: *Salivary flow rate, complete denture, edentulous patient*

Introduction

All part of oral cavity play a vital role in maintaining the function, environment and also the harmony of the mouth and body. They are responsible for the mastication, phonetics, nutrients supply to the body and even for aesthetic purpose. Among these parts, teeth is considered as the most important in contributing to all of this action and function. Hence, most individuals and also dentist are focusing more on maintaining and restoring the status health of the dentition. However, saliva also help teeth as lubricating agents to protect soft tissues and also maintaining a good oral health and function [1]

In a completely edentulous individuals, complete denture is one of the mode of treatment in replacing

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the missing teeth. This type of denture is usually a removable prosthesis, where it can be easily placed and removed from the oral cavity. Complete denture help to re-establish the occlusion and aesthetic to such extent it mimic the previously missing teeth and other features which may be lose over the time. In a complete denture wearer, saliva is responsible for the retention of the prosthesis due to its lubricating function [2].

It also aid in integrity, adhesion and stabilisation of dentures in position after the placement [3]. It act as interposed salivary film which allowed the prosthesis to lie on the film rather than on the bare mucosa. This would help to protect the tissues from the hydration and forces of the denture base that acting on it [4,5]. Therefore, maintaining normal pH and salivary flow rate is required, in order to achieve a better retention of denture as well as good oral health.

In addition to this, retention of denture not only depend upon the physical factors like atmospheric pressure, vacuum, adhesion, cohesion, wettability, surface tension and viscosity, but it also related to flow rate of saliva [6,7]. Reduced in salivary secretion will result to discomfort to the wearer with oral functional impairment and also affecting the quality of life of the denture wearers [8]. In most of the situations, as complete denture is usually given to elderly individuals, age also give an effect on the flow rate of saliva as well as the overall status of the tissues in the mouth [9].

Hence, the optimum salivary flow rate should be recorded before and after complete denture placement, as complete denture may affect the salivary flow rate. In fact, increased or decreased of the salivary flow rate also may cause alteration in the pH as we'll as the environment of the oral cavity. Therefore, this study was conduct to investigate relationship between the salivary flow rate in complete denture patient.

Materials and Method

1.1 Sample selection

The participants of this study were consisted of 15 edentulous patients in the average age group of 55 years to 70 years old. The participants were complete edentulous patient and received their treatment in department of prosthodontics of Saveetha Dental College and Hospital. The participants were given information about the study and their consents were obtained.

1.2 Criteria of the sample selection

Inclusion Criteria

- Completely edentulous
- First time wearer
- Healthy individuals
- No smoking or chewing habits

Exclusion Criteria

- Partially edentulous
- History of wearing denture or prosthesis
- Having systemic disease like diabetes mellitus, xerostamia or hypertension
- Smoking or chewing habits

1.3 Materials and armamentarium

- Distilled water
- Paraffin wax
- Disposable glass
- Graduated measuring jar
- Stopwatch

1.4 Saliva collection

For this study, two types of saliva were collected which were resting or unstimulated whole saliva and stimulated whole saliva. Saliva samples were collected from each participants on two different conditions which were before denture placement and immediately after placement of denture, by asking the patients to spit into the disposable glass. During both occasions, both unstimulated and stimulated saliva was taken for measuring the salivary flow rate of the participants.

Initially, the participants were asked to be seated in dental chair comfortably in upright positions where head were tilted downward in order to avoid postural changes [4], as well as to enhance the accumulation of saliva inside of the mouth. The participants were asked to rinse their mouth with 5mL of distilled water for 10 seconds followed by spitting of the watered initial swallow. This was done in order to remove any food debris and other non salivary elements which may influences the stimulation of salivary flow or interfered

with the measurements of salivary flow rate [10].

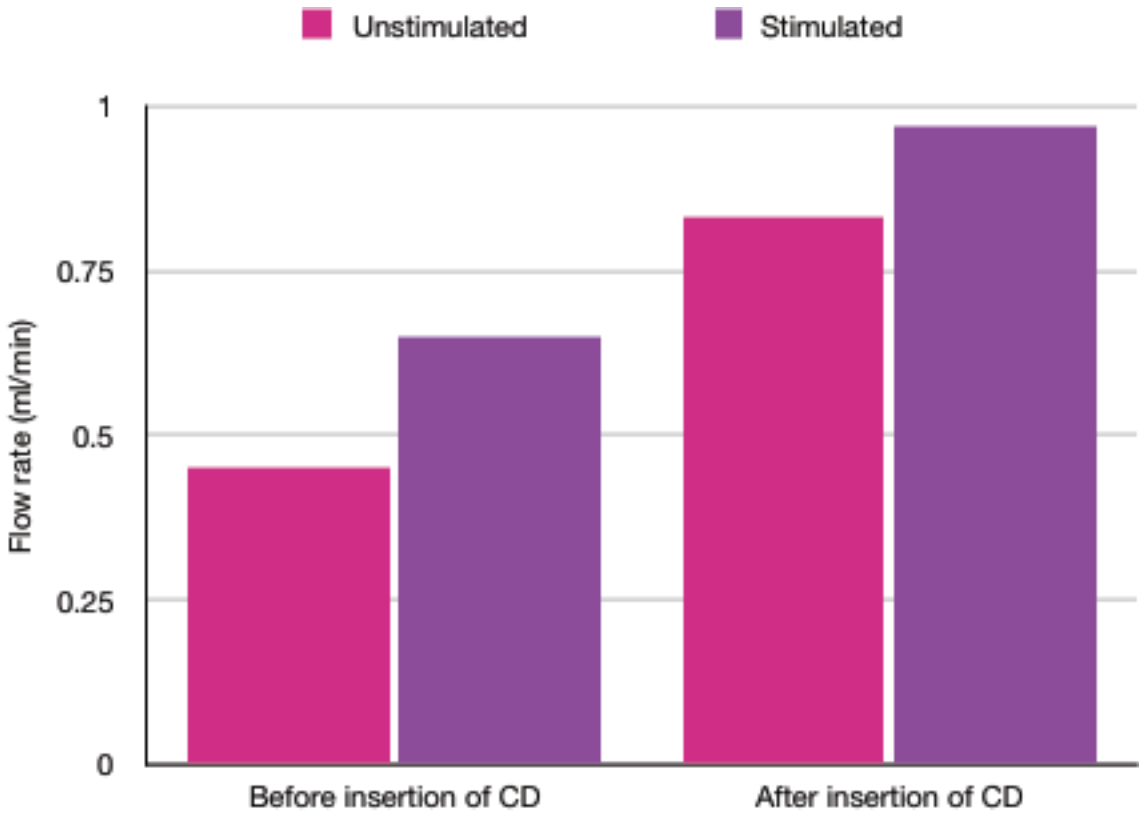
Then the unstimulated whole saliva was collected inside the disposable glass until 5mL of saliva is collected. The time taken for collection of the saliva was measured by using the stopwatch. After completion of the collection of unstimulated saliva, participants were asked to chew the paraffin was, to stimulate the production of whole saliva inside the mouth. Then, the saliva was collected similar as the unstimulated saliva method over a period of time.

This steps were repeated immediately after the placement of complete denture, to measure the flow rate of saliva. Both unstimulated as well as stimulated saliva was collected. The salivary flow rate was calculated based upon the saliva collection, over the time taken to obtained 5 mL of saliva and was expressed in unit of mL/min. The data was tabulated and analysed by using paired t-test method by using SPSS software.

Results

Based on the experiments, the salivary flow rate of stimulated whole saliva was higher than unstimulated saliva in both occasions, which were before and immediately after the placement of denture. The mean of salivary flow rate was the highest immediately after the placement of complete denture.

Based on Graph 1, there was significant difference between the unstimulated whole salivary flow rate and stimulated whole salivary flow rate before the placement of the denture, which was by 0.20 mL/min. Whereas, the difference between the unstimulated whole salivary flow rate and stimulated whole salivary flow rate after the placement also show significant changes which was about 0.14 mL/min. Chewing of paraffin wax as well as placement of denture act as stimulatory agents in production of saliva.



Graph 1: Salivary flow rate before and immediately after insertion

Table 1: Mean, SD, paired t test and P values whole salivary flow rate.

	Before placement of Complete denture	After placement of Complete denture	Difference between before and after placement of Complete denture
Resting (unstimulated) whole salivary flow (ml/min)	0.45	0.65	0.20
Mean	11.18	6.05	1.80
Standard deviation (SD)	1.84	0.66	0.10
Paired t test	t (14) = -12.98 p < 0.00		
Stimulated whole salivary flow (ml/min)	0.83	0.97	0.14
Mean	7.64	5.14	0.60
Standard deviation	0.49	0.72	0.14
Paired t test	t (14) = - 18.61 p < 0.00		

Discussion

Whole saliva is the mixture of secretion that enter the mouth in the absence of exogenous stimuli like chewing or talking. In general, unstimulated salivary flow rate can be defined as the salivary flow in absence of exogenous stimuli or pharmacological stimulation, while stimulate salivary flow rate is produced by the pharmacological stimulation or gustatory stimuli [11]. Production of saliva in oral cavity was produced through secretions from the salivary glands, mainly parotid, submandibular and sublingual salivary gland [12]. Average daily secretion of saliva in oral cavity is in a ranges of 500 to 700 mL [13].

Submandibular and sublingual salivary glands are mainly responsible to produce saliva at rest in ranges between 0.25 to 0.35 mL/min. Whereas, on stimulation the secretion rate is about 1.5 mL/min [14,15]. There is significant difference in secretion of saliva at rest and also stimulation. This is similar to the result obtained in this study, where the unstimulated salivary rate was at minimal and stimulate salivary rate was at the highest is both conditions.

In this study spitting method was used to collect the saliva, which able to be applied in a normal condition and even in condition of low rate of salivary flow. Therefore, this method can be accepted and the most reproducible for the collection of saliva. Next, paraffin wax was used as stimuli to trigger or stimulate the secretion of saliva. This was done in order to mimic the masticatory process and also phonetics.

The results obtained in this study was similar to the study done by Muddugannadhar et al [11] and Yurdukoru et al [16]. They stated that there was increased in the unstimulated saliva after the placement of denture. In Sonthalia, A et al study [4], they stated that unmedicated group (healthy), mean salivary flow rate was high at 24 hours after denture insertion when compared to before denture insertion. This show that the Placement of the complete denture inside of the oral cavity also act as the mechanical stimuli to enhance the production of saliva, along with chewing of paraffin wax.

However, increased in the secretion of saliva also may be due to psychological effect of the participants due to their anxiety during the denture insertion and

also due to anxiousness about the success rate of the treatment in placing their missing teeth. Increased in the production of saliva will help to in retention of the dentures they provide a better adhesion, cohesion and wettabilty between the denture and tissues. Thus, it help to prolong the span of denture and provide a good integrity and stability for the denture. In addition to this, if the denture wearer is having systemic disease like diabetes mellitus or xerostomia, the medication taken to treat this diseases may influenced the flow rate of saliva. Therefore, healthy individual was included as the inclusion criteria in this study.

Conclusion

Stimulated salivary flow rate were higher than the unstimulated salivary flow rate which obtained before and immediately after the placement of complete denture. There was significant differences of the salivary flow rate before and after the placement of denture.

Ethical Clearance - Not required

Source of Funding- Self

Conflict of Interest - Nil

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