Study of Unstimulated Salivary Flow rate and pH Before and After Partial and Complete Removable Denture Wearers

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Abstract

Back ground and aim: A*mong the main functions of saliva, lubricant activity maintains the tissue integrity and provide adhesion and cohesion that lead to effective denture retention. In addition, normal salivary flow maintains pH of oral cavity. Beside these Unstimulated whole salivary flow rate best describes the status of oral cavity. Therefore, in this study both Salivary flow rate and pH of saliva was investigated before and after one month of partial and complete denture placement.*

Material and method: *this study was conducted on 25 volunteer participants with 68% female and 32% male. From all samples 72% were partial removable denture and 28% were complete removable denture wearers. Salivary flow rate was calculated according to volume collected per collection time and pH was determined by digital pH meter. For comparing salivary flow rate and pH before and after removable denture placement, paired sample test was performed.*

Result: *In this study 17 female and 8 males with mean age of 48 years old were participated Mean salivary flow rate before and after wearing denture were 0.84±0.037 and 0.98±0.037 respectively that was statistically significant. But differences in Salivary pH before and after denture wear were not significant. There was no Correlation of age, gender and pH on salivary flow rate before and after denture wear. There was positive correlation between salivary flow rate before and after partial removable denture placement.*

Key word: removable denture, salivary flow rate, salivary pH

Introduction

Saliva is important for regulating oral health [1]. One of the main functions of saliva is lubrication and demulcent activity that maintain the tissue integrity and protects the oral cavity from damage by rough objects [2]. Normally removable dentures do not rest directly on mucosa instead interposed by saliva film that protects the tissue from forces created by denture therefore providing adhesion, cohesion and surface tension which lead to effective prosthesis retention. Thus, salivary flow rate is one of the essential factors for proper functioning of

removable denture, and lack of flow rate decrease lubrication in surface of denture and oral mucus that will lead to denture sores and ulceration [1,3].

It should be mentioned that removable denture as a foreign substance increase microbial growth and pH of saliva indirectly affect the growth of these microorganisms [4]. on the other hand, normal salivary flow maintains pH of oral cavity [5]. So, in this study both flow rate and pH of saliva in partial and complete removable denture wearers was studied.

Saliva can be collected in stimulated and unstimulated form directly from salivary glands or from oral cavity which is known as whole saliva [6]. Whole saliva contains the secretion of all salivary glands and describes better the status of oral cavity so unstimulated whole saliva was collected in this study [3].

Method and Material

This is a case crossover study considered on volunteer 25 participants who were registered in dental clinic of Kabul university of medical sciences (KUMS) and required complete or partial denture. Participants who were smokers and who had systemic and mucosal oral cavity diseases and used drugs that affects salivary flow were not included. Saliva of participants was analyzed in laboratory of biochemistry Department of KUMS immediately after collection.

Saliva collection and analysis: unstimulated whole Saliva was collected before and one month after partial or complete removable denture. Totally 5 ml of saliva was collected between 9-12 am in a sterile tube by drooling method in setting position. The following formula was used to calculated salivary flow rate.
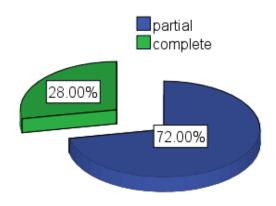
Flow rate = total volume of saliva collected(ml)/ collected period(min)

pH of saliva was determined by digital pH meter (phs-3s digital pH meter) from each sample.

Data analysis: Data was analyzed in SPSS version 21 with CI=95% and $\alpha=0.05$ concerned. All data was divided in two groups of partial and complete removable denture. Descriptive statistic was presented. correlation of age and gender was considered on flow rate and pH of saliva in each group. In all data differences of salivary flow and difference in pH before and after removable denture was analyzed by paired t test and these differences was analyzed in each group by Wilcoxon test. Pearson test for correlation of salivary flow rate before and after, as well as pH before and after wearing denture with age, gender was considered.
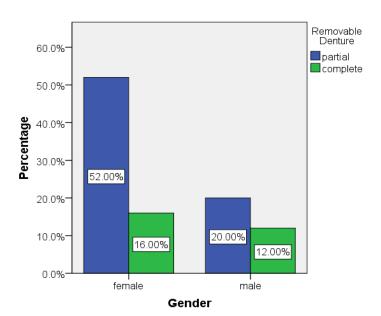
Result

In this study twenty-five patient were included with 17(68%) female and 8(32%) male. Mean age was 48 years old with range of 31- 65 years old. Mean pH before and after wearing denture were 6.87 ± 0.036 and 6.90 ± 0.052 respectively in addition Mean salivary flow rate before and after wearing denture were0.84 ± 0.037 and 0.98 ± 0.037 respectively. Percentage of Partial wearing denture and complete wearing denture patients and gender percentage in each group were shown in graph 1 and 2 respectively. Complete descriptive statistics for pH and salivary flow rate before and after wearing denture in both groups are shown in Table1.

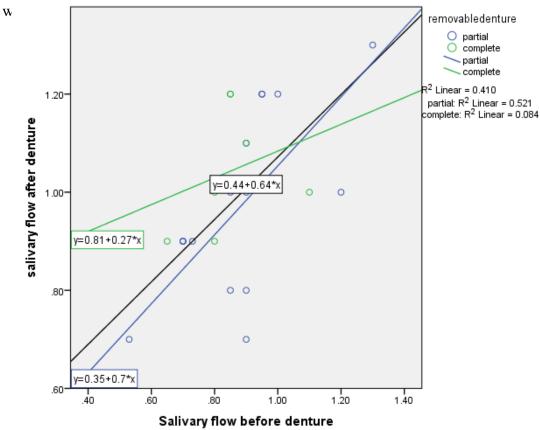**Graph1**. Percentage of patients wearing partial and complete removable denture

Graph 2. Percentage of Gender in partial and complete wearing denture groups

Table1. Descriptive statistics of partial and complete removable denture groups

Removable denture		N	Minimum	Maximum	Mean		Std. Deviation
		Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
partial	Age	18	31.00	60.00	44.5556	1.65924	7.03957
	pH before denture	18	6.56	7.12	6.8706	.04005	.16993
	pH after denture	17	6.00	7.20	6.8947	.06574	.27107
	Salivary flow before denture	18	.53	1.30	.8411	.04960	.21043
	Salivary flow after denture	17	.62	1.30	.9541	.04807	.19821
	Valid N (listwise)	17					
complete	Age	7	43.00	65.00	58.8571	2.75533	7.28991
	pH before denture	7	6.58	7.22	6.8857	.08286	.21923
	pH after denture	7	6.50	7.20	6.9286	.08650	.22887
	Salivary flow before denture	7	.65	1.10	.8500	.05118	.13540
	Salivary flow after denture	7	.90	1.20	1.0429	.04809	.12724
	Valid N (listwise)	7					

There is significant difference and positive correlation in salivary flow rate before and after denture wearing in both groups (r= 0.641,P=0.001) as shown in graph 3, in each group increase of salivary flow rate after denture placement was significant also correlation test was performed that was significant (p=0.00) in partial denture wearers and nonsignificant in complete denture wearers (p=0.19). Age and gender do not have any correlation with pH and salivary flow rate in both groups. pH differences before and after denture wearing was not significant (p=0.50). In addition, there was no correlation between pH and saliva flow rate before denture wearing as w

Graph 3. Shows correlation between salivary flow rate before and after denture placement.

Discussion

 Saliva is a complex physiological fluid that has different function such as protection, tissue repair, antimicrobial activity and pH maintenance of oral cavity [5] so reduced salivary production have negative effective on oral cavity health [1].

There are many studies that support the positive role of saliva in oral health of removable denture wearing population. Study of Maheshwar A et al shows that there are significant differences in unstimulated and stimulated salivary flow rate after denture placement and salivary flow rate was not dependent to age, this study also shows that unstimulated salivary flow rate was not correlated with age and increase after placement of denture [1]. Beside this, investigation by Abhay sonthalia revealed that increase of salivary flow rate after insertion of denture was significant [3] the same result according to flow rate of saliva is seen in this study.
 Investigation conducted by Abeshek et al revealed a marked increase in salivary flow and pH in complete denture wearers [7] but in this study although salivary flow was high there is no significant changes in pH of saliva it may be due to small sample size especially in complete

denture wearers and differences in duration of collecting saliva after denture insertion as in Abeshek et al study after insertion of denture salivary pH and flow rate was investigated but in this study after one month of denture insertion the flow rate and pH was investigated. It should be mentioned that there were no significant pH changes in study of Nirisha siriram that was the same result for this study [4].

In this study there was limitation as sample size was not large, number of males rather than female as well number of participants with complete denture than partial denture was less, with these limitations the effects of gender on salivary flow and role of denture type on salivary flow and pH could not be clarified.

It can be concluded that increase in flow rate of saliva after insertion of partial and complete denture is significant but there are no differences in pH of saliva before and after insertion of denture in this study, thus more investigation with large sample size needed to be conducted.

Conflict of Interest: The authors declare that there is no conflict of interest.

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