

## REMOVABLE DENTURES TREATMENT SATISFACTION OF PATIENTS WITH TYPE-2 DIABETES

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received: June 27, 2018      accepted: August 17, 2018  
available online: September 23, 2018

### Abstract

**Background and aims:** The aim of this study was to find out which was the impact of the treatment with removable dentures on the satisfaction of the type 2 diabetes patients. **Material and method:** 50 patients, 27 females (54%) and 23 males (46%) were included in the study. 37 were treated by using a partial removable denture and 13 were receiving a complete denture. Each patient included in the study had answered to a questionnaire after the first year of wearing the dentures and the blood glycemic level and the salivary flux were assessed. Chi-square test was applied to investigate the statistical significance of observed differences in proportions. Kruskal -Wallis test was applied to compare distributions across the groups. **Results** The age of the enrolled patients was between 40 and 85 years, with a mean of 64.3 years (standard deviation = 9.77). The mean values of the glucose levels were decreasing proportional with the age of the patients until 85 years and were inconstant for the group 81-90 years. The saliva at 5min was significantly decreasing with the age ( $p < 0.001$ ). The most satisfied patients with the removable dentures were in the group 61-70 years. **Conclusions:** The prosthodontic treatment of the type -2 diabetic patients with removable denture should be started after stabilizing the blood glycemic levels and treating the xerostomia, when present.

**key words:** removable denture, satisfaction, type 2 diabetes, xerostomia

### Background and Aims

The aim of this study was to find out which was the impact of the treatment by using removable dentures on the satisfaction of the diabetes senior patients. Even the senior patients are asking rarely for prosthetic treatment, the necessities are increasing. Type 2 diabetes (T2DM) is associated with severe micro- and macro-vascular complications. Some researchers

are pointing to the necessity to launch a national discussion on a disease management program for diabetic patients [1]. Diabetic patients are suffering of xerostomia (dry mouth) to a significantly higher extent than non-diabetic ones. Diabetic subjects showed a greater need of periodontal treatment, caries prevention and prosthetic corrections. Close collaboration between the patient, the primary health care and oral health professionals could be a way of

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improving the diabetic patient's general and oral health [2]. Xerostomia adversely affects oral functions and overall satisfaction with dentures. The aim of this study was to assess when is indicated to realize the treatment with removable dentures in patients with T2DM and also the overall satisfaction of these patients.

## Material and Methods

### *Study design and patients*

The study was realized in the Department of Prosthodontics, Faculty of Dentistry, University of Medicine and Pharmacy “Victor Babes” in the period 2016-2017. All participants provided written informed consent, and the study protocol was conducted in accordance with ethical principles, including those of the World Medical Association Declaration of Helsinki (version 2002) and additional requirements. The inclusion criteria were: 1. T2DM patient; 2. receiving one removable denture; 3. to return for a check-up after 12 months from the insertion of the dentures in the oral cavity and finalizing the treatment. The single exclusion criterion was missing the follow-up appointment. Initially there were 57 patients but 7 of them missed the follow-up appointments so, in the end 50 patients were included in the study. There were 27 females (54%) and 23 males (46%). From these patients 37 were treated by using a partial removable denture and 13 were receiving a complete denture. Each patient included in the study had answered to a questionnaire after the first year of wearing the dentures. During the following appointment the glucose level, the quantity of saliva, and the overall satisfaction were registered. The glucose level was determined by using EasyGluco Auto Coding OSANG Healthcare (Republic of Korea). The overall satisfaction was registered using two simple questions: “Are you satisfied with your denture? Answer: yes/no”. The second question

was: “Which is your main complaint” (comments)?” The quantity of saliva was assessed to find out if the hyposalivation or xerostomia are present or not. The saliva was collected by using the Saliva –Check Buffer (GC- Japan). The patients were instructed to chew a piece of wax to stimulate the salivary flow. After every 30 seconds the patient spat the saliva in the graduated glass. The saliva was collected for 5 minutes into this graduated glass (Figure 1). The collection of the saliva was realized by an experienced prosthodontist (no.1). The glucose level for each patient was determined by another experienced prosthodontist (no.2). The check-up after one year of service was realized by the experienced prosthodontist no.1.



**Figure 1.** *Collecting saliva.*

### *Statistical analysis*

Descriptive statistics included the observed frequency counts (percentage) for category variables and median (Inter Quartile Range) for numerical variables. When comparing category variables, a Monte Carlo simulation for the Chi-square test was applied (with 10,000 replicates). For comparing numerical variables' distribution across multiple groups, the Kruskal-Wallis test was applied. The normal distribution for the numerical variables was tested with the Shapiro-Wilk statistical test. All reported probability values were two-tailed and a 0.05 level of

significance was considered and values under 0.01 were distinctively marked.

Statistical analysis was conducted with SPSS v.20 and the R v.3.2.3 software packages.

## Results

The normal glucose levels are correlated with a good mastication and nutrition. That is why the overall satisfaction is related to normal blood glucose levels. The normal values for the glucose level are between 70 and 99 mg/dL. A normal blood sugar level two hours after eating

is less than 140 mg/dL. The general status of the patients depends of these glucose levels. The quantity and quality of saliva is important especially for the complete denture wearers. The normal values for the salivary flow are: more than 5mL/5 min – normal; 3-5 mL/5 min hyposalivemia; less than 3 mL/5 min – xerostomia.

The age of the enrolled patients was between 40 and 85 years, with a mean of 64.3 years (standard deviation = 9.77). The characteristic of the study group, blood glucose level and quantity of saliva/5min. are presented in [Table 1](#).

**Table 1.** Characteristics of the sample by each age group.

N total=50	Age groups					p <sup>(a), (b)</sup>
	40-50	51-60	61-70	71-80	81-90	
	N=4	N=14	N=19	N=11	N=2	
Gender M <sup>(a)</sup>	3(75%)	4(28.6%)	11(57.9%)	4(36.4%)	1(50%)	0.35
Blood glucose <sup>(b)</sup>	232 (150.5-314.5)	153 (138-186)	149 (135.5-197)	142 (139-177)	129-266	0.78
5minSaliva <sup>(b)</sup>	6.35 (5.7-6.5)	5.95 (5.6-6.2)	5.2 (4.85-5.4)	4.7 (4.35-4.95)	2.5-2.7	<0.001**
Satisfied with denture <sup>(c)</sup>	3(75%)	13(93%)	17(89.5%)	5(45.5%)	0	NA

<sup>(a)</sup> observed frequency count (percentage); *Chi-square* test was applied to investigate the statistical significance of observed differences in proportions (Monte-Carlo simulation with 10000 samples)

<sup>(b)</sup> median (Inter Quartile Range); *Kruskal-Wallis* test was applied to compare distributions across the groups

<sup>(c)</sup> observed frequency count (percentage); no statistical test was applied

\*\* statistically significant differences ( $p < 0.01$ )

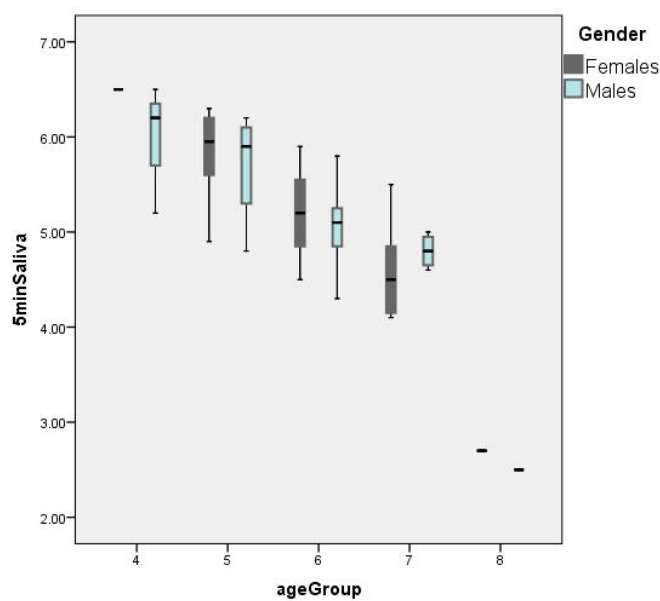
**Table 2.** Linear regression analysis for the 5-minute saliva quantity as an outcome depending on the blood glucose value measured on the site (i.e. at the clinic) and the patient's age (the normal distribution assumptions were met for the linear regression).

Predictors	B ± Std.error	Standardized coefficient	Coefficients' statistical significance	Regression model analysis
(Constant)	9.562 ± 0.634		< 0.001**	F = 34.766 (df = 2, 47); p < 0.001** adjusted R-square = 0.58
Age	-0.067 ± 0.008	-0.777	< 0.001**	
Blood glucose	0.000 ± 0.002	-0.025	0.789	

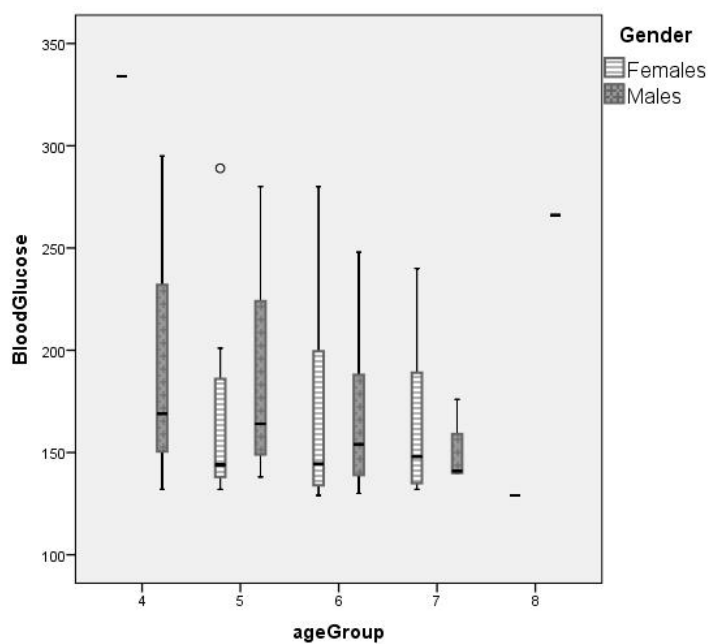
[Figures 2](#) and [3](#) show the box-plots for the blood glucose and saliva quantity, respectively. While for the blood glucose the graph visually confirms the results from the Kruskal-Wallis test (i.e. no significant differences between the age groups), the graph corresponding to the saliva

quantity suggests a steady decreasing with age. Therefore, a regression analysis was conducted, and the results are shown in [Table 2](#).

The main complaint of the study group is presented in [Table 3](#).



**Figure 2.** Saliva level related to the age and gender of the patients.



**Figure 3.** Blood Glucose related to the age and gender of the patients

**Table 3.** Main complaint related to the denture type and gender

Main complaint	Complete dentures (13)		Partial dentures (37)	
	Females	Males	Females	Males
Poor mastication/pain	1	3	1	2
Gag reflex	1	0	0	0
Poor esthetics	3	0	2	0
No complaint	2	3	17	15

## Discussions

A favorable oral condition and denture quality are important for successful complete denture therapy [3]. Denture insertion is effective in increasing the chewing ability, body weight, food-intake, and oral health related quality of life [4]. In the studied group, the 61-70 age patients were the most representative (57.9%). The main complaint in this study was for the complete denture wearers the poor retention of mandibular denture and the difficult mastication - 3 females and 5 males.

A recent study [5] found out that in patients treated with removable partial dentures (RPD) the most common complaint was aesthetic issues, which suggests that dental treatments with RPDs should be applied with care when patients have high aesthetics concerns. In the present study 37 patients were treated with RPDs. The main complaint for 2 female patients was the poor esthetics and for 2 male patients the poor mastication. The majority were satisfied with their RPDs. Regarding the factors analyzed in a study [6], denture satisfaction was the strongest predictor of oral health related quality of life (OHRQoL). This suggests that denture satisfaction is useful for assessing the effect of denture treatment on the OHRQoL of elderly individuals wearing removable dentures.

A study realized in King Saud University [7] concluded that RPDs were poorly accepted by patients treated by undergraduate students. In the present study the dentures were realized by postgraduate residents and prosthodontic specialists.

Poorer quality of life experienced by people with diabetes further diminishes dental and prosthetic management [8]. Maxillary immediate complete denture presents a good therapeutic choice for T2DM patients, as it provides possibility of adequate mastication after teeth

extractions and maintenance of nutritional status and blood glucose level. The patients in the present study group had glucose levels near normal values (see Table 1). Only 3 complete denture wearers and 2 partial denture wearers were dissatisfied of their mastication.

A high proportion of subjects had poor oral cleanliness and the prevalence of xerostomia was a high [9]. Among complete denture wearers, xerostomia is significantly more prevalent in women and associated with increased age and smoking. Xerostomia adversely affects oral functions and overall satisfaction with dentures [10]. In the present study the quantity of stimulated saliva at 5 min. was decreasing proportional with the age of the treated patients. There were significant differences between the considered age groups ( $p < 0.01$ ). The normal quantity and quality of saliva is benefic for the retention of the removable dentures (especially complete denture) through adhesion. Xerostomia adversely affects oral functions [11]. This could be the reason of dissatisfaction in the senior patients. In a pilot study realized in 2014 [12] the conclusion was that the quality of life in elderly patients may be severely diminished due to an increased subjective perception of dry mouth. They established that the dental treatment should focus on alleviating xerostomia, whereas the impact of dental status and prosthetic restoration appear to be subordinate.

## Conclusions

Within the limits of this study the following conclusions were drawn: glucose levels near normal in the patients treated with removable dentures suggest that the masticatory function was improved. Hyposialia and xerostomia are present predominant in senior type 2 diabetic patients and affects the satisfaction of these patients treated with removable partial dentures.

Further larger clinical studies would be useful to find out how to improve the life quality

of the patients with T2DM.

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