Relationship between Masticatory Performance and Patients' Satisfaction toward Complete Denture Treatment (Measured Using Color Changeable Chewing Gum and Validated Indonesian Version of Patient's Denture Assessment [PDA])

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Abstract

Satisfaction with a complete denture treatment in some patients is related to comfort, the absence of pain and the ability to masticate, while denture aesthetics and retention also seem to be important. The success of prosthodontic treatment, however, is evaluated differently by dentists and patients. Therefore, using a valid and reliable multidimensional self-assessment instrument to evaluate patients' satisfaction with their complete denture is needed, as well as a clinical examination of the complete denture, so that we can see the factors affecting treatment success. The purpose of this study was to analyze the relationship between patients' satisfaction toward their complete denture (evaluated using the Indonesian version of the PDA questionnaire) and masticatory performances (evaluated using color-changeable chewing gum), age, sex, education level, denture experience and the duration of their recent complete denture. A total of 101 subjects (50 men, 51 women) aged 45 years and older participated in this study. Masticatory performances were measured using color-changeable chewing gum with 100 strokes, and patients' satisfaction toward their complete denture was measured with the validated Indonesian version of the PDA questionnaire. The Spearman correlation was used to analyze the correlation between the masticatory performances and patients' satisfaction (p=0.001 r=0.633). Statistically, a significant correlation (p<0.05) was found among patients' satisfaction with their complete denture, masticatory performances (p=0.000) and the duration of the recent complete denture (p=0.017). Meanwhile, age (p=0.721), sex (p=0.759), education level (p=0.339) and denture experience (p=0.580) showed no statistically significant correlation. In conclusion of this study, masticatory performances and the duration of use of the current, complete denture have a strong positive correlation with patients' satisfaction toward their complete denture.

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Introduction

Some of the reasons why patients seek treatment with a complete denture include restoring mastication and speech ability, reducing or preventing pain, maintaining general oral health, better appearance, increased self-esteem and advice from relatives.[1] Each treatment will have a different success rate, and a perfect result will be difficult to achieve. Therefore, it is necessary to explain to the patient that the success of the treatment depends on both the dentist and patient. Before starting treatment, the dentist should discuss and evaluate the specific needs of the patient. The success of the treatment will largely depend on the patient's motivation and cooperation during the treatment procedure, use and maintenance of the denture and post-insertion procedures.[2]

The increase of complete denture patients indicates the need for a measuring instrument to determine the patient's satisfaction with a denture. Patients' satisfaction with their dentures had been evaluated by a method that does not represent the overall quality of the complete denture. Patient satisfaction is usually determined by various factors including pain,

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fitness, aesthetic, retention, stabilization, sense of comfort and the denture's ability for chewing.[3] Until now, there is a measuring instrument in Indonesia to evaluate the denture's quality that is reliable and has been tested for its validity.

Mastication ability in complete denture users is affected by various factors that can be divided into two groups: denture and biological factors.[4] Denture factors include retention and denture stability, occlusion scheme, denture base form, polished surface of the denture, etc. Biological factors include age, sex, motoric ability, tongue movements, size and shape of the residual ridge, quality and quantity of saliva and duration of using the current, complete denture.[4] Compatibility between the results of the clinical examination and the patient's assessment is expected because the success rate of a denture is obtained from the results of the clinical examination and the patient's perception of their dentures.

In this study, the use of color-changeable chewing gum to assess masticatory performances was selected because of the material, weight, ability to not stick to the denture and relatively simple use and evaluation using a color scale. Self-assessment by the patient is a method that is economical and is expected to be more specific and more valid in measuring the success rate of a denture.[3]

After getting the results of a clinical examination by a clinician, we can compare them with patient satisfaction based on the completed questionnaires. The researchers at the Tokyo Medical and Dental University, Department of Gerodontology have recently discovered a multidimensional self-assessment measuring instrument that is valid, reliable and specific to assess the condition of complete dentures, which can observe the positive and negative sides of the other factors that affect the denture. The questionnaire used for patient self-assessment is called the Patient's Denture Assessment (PDA).[3]

The main objective of this research is to analyze the relationship between the patients' satisfaction toward their complete denture and masticatory performances, age, sex, education level, denture experience, and the duration of the current, complete denture, which has not been studied in Indonesia.

Methods

This cross-sectional study was done in the Dental Teaching Hospital Faculty of Dentistry, University of Indonesia and was approved by the Ethical Committee Faculty of Dentistry, University of Indonesia (No. 79/Ethical Approval/FKGUI/XII/2015). The subjects of this research were 101 edentulous patients 45 years' old and older wearing complete dentures who were treated in the prosthodontic specialist clinic and undergraduate clinic at the Hospital Faculty of Dentistry, University of Indonesia.

The inclusion criteria are complete denture wearers who were patients in the Dental Teaching Hospital Faculty of Dentistry, University of Indonesia; all participants gave their informed consent before enrollment. Each subject's masticatory performance was assessed using color-changeable chewing gum, and patients' satisfaction toward their complete denture was measured with the Indonesian version of the PDA questionnaire. The subject was instructed to chew color-changeable chewing gum with 100 strokes and to fill out the Indonesian version of the PDA questionnaire.[5] Immediately after the subject chewed the gum, it was compressed between two glass plates until 1.5mm in thickness (Fig.1) and was measured using a color chart (Fig.2).[5]

Figure 1. Sample of color-changeable chewing gum after chewing based on color scale (masticatory performance evaluating gum xylitol from Lotte Co., Ltd., Saitama, Japan).
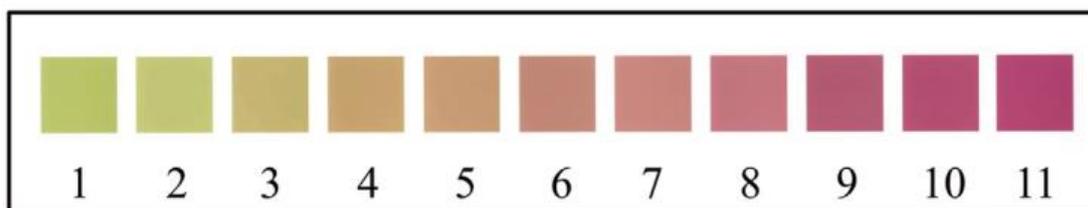
Figure 2. The visual analog scale for color-changeable chewing gum (masticatory performance evaluating gum xylitol from Lotte Co., Ltd., Saitama, Japan).

Table 1. Frequency Distributions of Subjects

		Frequency n =101	Percentage
Age	45–59 years old	22	21.8
	>60 years old	79	78.2
Sex	Male	50	49.5
	Female	51	50.5
Education level	Basic	37	36.6
	Intermediate	36	35.6
	Advance	28	27.7
Denture experience	Never	62	61.4
	Have used	39	38.6
Duration of current, complete denture	0–6 months	67	66.3
	>6 months	34	33.7
Patients' satisfaction (*PDA questionnaire*)	Satisfied	47	46.5
	Not satisfied	54	53.5
Masticatory performance (*color-changeable chewing gum*)	Good	56	55.4
	Poor	45	44.6

Statistical analysis was performed using SPSS software. Statistical significance was set at p<0.05. The normality and variance homogeneity of the data were calculated using the Shapiro-Wilk test, in which the confidence level was set at 95%. The data was analyzed with univariate, bivariate and multivariate tests. Spearman's rank correlation coefficients (r) were used to analyze the correlation between masticatory performances and patients' satisfaction. A chi-square test was used to analyze the relationship between patients' satisfaction toward their complete denture and age, sex, education level, denture experience, and the duration of the current, complete denture. Multivariate logistic regression was used to analyze which factors affected patients' satisfaction the most.

Results

A total of 101 subjects, consisting of 50 men and 51 women, agreed to participate in this study. Their ages ranged from 45 years and older, which were then classified into two categories: 45–60 and >60 years old. Of the subjects, 78.2% were>60 years old and 21.8% were 45–60 years old. A total of 61.4% had used a complete denture before. The majority (66.3%) had used the current denture for less

than 6 months. The majority (53.3%)were not satisfied with their complete denture when assessed with the Indonesian version of PDA questionnaire, but the majority (55.4%)had good masticatory performances. (Table 1)

The Spearman correlation was used to analyze the correlation between the masticatory performances and patients' satisfaction (p=0.001 r=0.633)and showed a strong, positive correlation. Statistically, a significant correlation (p<0.05) was found among patients' satisfaction with their complete denture, masticatory performances (p=0.000) and the duration of the recent complete denture (p=0.017). Meanwhile, age (p=0.721), sex (p=0.759), education level (p=0.339) and denture experience (p=0.580) showed no statistically significant correlation. (Table 2)

Table 2. Correlation among Patient's Satisfaction and Masticatory Performances, Age, Sex, Education Level, Denture Experiences and Duration of Current Denture.

Variable	N	Indonesian Version of PDA Questionnaire		P
		Good	Poor	
Age				
45–59	22	9 (40.9)	13 (59.1)	0.721
≥60	79	38 (48.1)	41 (51.9)	
Sex				
Male	50	22 (44)	28 (56)	0.759
Female	51	25 (49)	26 (51)	
Education level				
Basic	37	20 (54.1)	17 (45.9)	0.339
Intermediate	36	17 (47.2)	19 (52.8)	
Advance	28	10 (35.7)	18 (64.3)	
Denture experience				
Have used	39	20 (51.3)	19(48.7)	0.580
Never	62	27 (43.5)	35 (56.5)	
Duration of denture				
0–6 months	67	25 (37.3)	42 (62.7)	0.017*+
>6 months	34	22 (64.7)	12 (35.3)	
Masticatory performance				
Good >3.5	56	37 (66.1)	19 (33.9)	**0.000*+**
Poor ≤ 3.5	45	10 (2.2)	35 (77.8)	

Multivariate tests show that masticatory performances are the most affected factor related to patients' satisfaction toward their complete denture, as shown in Table 3.

Table 3. Results of Logistic Regression Analysis

	Coefficient	S.E	Wald	df	P value	OR	IK95%	
							Min	Max
Masticatory ability	1.747	0.473	13.615	1	**0.000**	5.736	2.268	14.506
Duration of current, complete denture	-0.617	0.486	1.615	1	0.204	0.539	0.208	1.397

Discussion

Correlation Between Indonesian PDA and Masticatory Performances, Age, Sex, Education Level, Denture Experience and Duration of Current Denture.

There was a formula found for chewing gum with a uniform level of hardness and a composition that will not attach to a denture.[5,6] With these considerations, an objective method was chosen to measure the patients' mastication performances using a color-changeable chewing gum.[1]

The Spearman test had a significant correlation, with p=0.001 and r=0.633, which showed a strong, positive correlation between masticatory performances measured by color-changeable chewing gum and patient satisfaction with the complete denture measured by the PDA questionnaire. The analysis using the chi-square test in Table 5.4 also showed that patient satisfaction had a significant relationship with masticatory performances (P=0.0). This is in line with previous research that states that complete denture quality affects the ability of mastication, retention and stabilization in the complete denture will increase mastication ability.[7]

The complete denture used by subjects of this study is of good quality, as it is based on standard operation in the Dental Teaching Hospital Faculty Of Dentistry, University of Indonesia by a prosthodontic resident who supervised with prosthodontists.

Meanwhile, age, sex, education level and denture experience do not show statistical correlation with patients' satisfaction toward their complete denture. Some previous studies have agreed with this result. The absence of a significant association between age and patient satisfaction with complete dentures in this study may be due to a decreased sensitivity to the stimulus, given that most elderly people usually have systemic compromise conditions and take medication that might affect the sensory apparatus. Many studies also show there is no relation between sex and patients' satisfaction toward their denture, even though sex does have a strong relationship with masticatory performances. Opposite from this study, education level often shows correlation with patients' satisfaction.[8]

Denture experience also often shows strong correlation with patients' satisfaction, but not in this study.[9]

Meanwhile, the PDA questionnaires had a significant correlation with the duration of the complete denture (p=0.017). This is supported by several previous studies, which suggest that prolonged use of dentures affects the patient's satisfactory level for their complete denture. In a study by Turker et al., subjects who have used a full denture for more than three years will experience an increase in mastication ability, the capacity to chew harder or bigger foods, and the sense of taste, speech and comfort, affecting overall patient satisfaction with the complete denture.[8]

Conclusion

Masticatory performances have a strong positive correlation with patients' satisfaction toward their complete denture. The duration of using the current, complete denture also has a significant correlation with patients' satisfaction toward their denture. Age, sex, education level and denture experience did not statistically show significant correlation with patients' satisfaction toward their denture.

Acknowledgement

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