

# Factors Related to Patient Satisfaction With Complete Denture Therapy

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**Background.** Except for denture quality, many other factors are related to a patient's satisfaction with complete dentures (CDs).

**Methods.** A total of 222 patients with CDs took a part in this study. A questionnaire divided into 3 parts was completed by both the patients and the dentist, independently. The patients rated their dentures using a scale ranging from 1 to 5 (1 = dissatisfaction to 5 = excellent), and a dentist rated the quality of the denture and the denture-bearing area.

**Results.** Patients were mostly satisfied with the quality of their CDs. Only 7.2% of the patients were absolutely not satisfied with their dentures. Patients with a low level of education were more satisfied in general with their aesthetic appearance. Patients with better self-perception of their affective status and quality of life showed higher levels of general satisfaction. Patients with better self-perception of their economic status showed lower levels of satisfaction. Younger patients wearing dentures for the first time, with short periods of being edentulous, and with better quality maxillary denture-bearing areas were more satisfied with the retention of *maxillary* CDs. In contrast, younger patients with first-time dentures, a short period of being edentulous, and with better quality mandibular denture-bearing areas gave lower ratings to the retention and comfort of wearing *mandibular* dentures.

**Conclusions.** Level of education, self-perception of affective and economic status, and quality of life are all related to patient satisfaction. However, the quality of dentures shows the strongest correlation with patient satisfaction. Not only the quality of the denture-bearing area but the denture-wearing experience itself seems to be more important in determining patient satisfaction with mandibular CDs.

**I**N spite of the increasing use of dental implants, the most common way to treat edentulousness is still by means of a conventional full denture. Except for the dentist's skill, many other factors, depending entirely on the patient, are also very important in achieving optimum retention and stability of full dentures. These factors include adhesion and cohesion, viscosity and flow of saliva, the shape and degree of resorption of alveolar ridges, and the quality and quantity of alveolar bone as well as mineral density, resiliency of soft tissue, relationship between the upper and lower alveolar ridges, neuromuscular coordination, status of oral mucosa, depth of vestibular sulcus, and presence of hypertrophy of the tongue (1–6).

According to Berg (7), construction of a good complete set of dentures depends on technical, biological, and physiological interactions between the patient and dentist. The great majority of patients are satisfied with their complete dentures (2). However, even if the dentures are constructed to all accepted criteria, some patients will still be dissatisfied with their prosthetic treatment and new dentures.

In a number of studies over the past 30 years, the proportion of full-denture patients who are dissatisfied with new and well-made prostheses are found to range between 10% and 15% (8,9). The degree of satisfaction appears to decrease rapidly during the first couple of years after insertion (9). In epidemiological studies on patients' satisfaction with their dentures of varying ages and qualities, the proportion of unsatisfied patients is reported to range between 20% and 35% (3,4,7–12).

However, many patients are satisfied and have adapted to their inadequate complete dentures (12,13). Patients' evaluations of their prostheses sometimes neither correlate with the clinicians' assessments nor with anatomic factors (14–17). Evaluation of patients' acceptance and satisfaction with their complete denture therapy is limited by the various methods used in collecting and rating all the influential factors (7,18–31), such as number of corrections after insertion, psychological characteristics of patients, self-evaluation of affective state or of quality of life, demographic and socioeconomic factors (e.g., age, gender, level of education, level of income, transcultural differences), patient expectation of dentures, quality of denture construction, occlusal factors, factors that are connected with anatomic and physiologic characteristics of the patient (e.g., degree of alveolar ridge resorption, quality of saliva, tongue hypertrophy, status of oral mucosa, quality of denture-bearing area). According to Berg (7), Sato (24), and Van der Waas (25), seven factors are the most important in assessing patient satisfaction with complete denture therapy.

The aim of this study was to evaluate patients' overall satisfaction with their complete dentures of various age and quality as well as to evaluate their satisfaction with denture retention, speech, chewing ability, and the comfort of wearing dentures. Also, the aim was to relate the influence of some factors (e.g., age, gender, level of education, level of income, self-evaluation of affective status, economic status and quality of life, period of denture-wearing experience, number of previous dentures worn, duration of

edentulousness, quality of denture-bearing area, and quality of dentures) with patient satisfaction.

#### PATIENTS AND METHODS

A total of 222 patients with complete maxillary and complete mandibular dentures took part in this study. The patients were examined at the Department of Prosthodontics, School of Dental Medicine, University of Zagreb. Included were 73 men and 149 women aged 41 to 89 years. A questionnaire divided into three parts was devised for the purpose of the study, and was completed by both the patients and the dentist (Specialist of Prosthodontics), independently. In order to ensure an objective assessment, the patients were assigned an identifying number/index when responding to the questionnaire (on a sheet of paper). In the first part, the dentist, assessing the maxillary and mandibular denture-bearing area independently, as well as quality of the dentures, referred only to those identifying numbers and not to the patients' names, for the same reasons of objectivity. A rating scale of 1–5 was used, where 1 = poor quality and 5 = excellent quality. The dentist assessed the quality of patients' dentures based on the quality of fit, extension, vertical relation, and occlusion.

In the second part, the patients were required to answer questions regarding gender, age, level of education (1 = 8 years of primary school, 2 = 3 years of vocational school, 3 = 4 years of gymnasium, 4 = 2 to 3 years of high school, 5 = university level), marital status (married, divorced, single, or widowed), self-supporting lifestyle (1 = ability to live by themselves, 2 = supported by their families, and 3 = able to live alone), smoking habits, period of tooth loss, period of wearing present dentures, and number of previous complete dentures worn.

Patients were also asked to assess their economic status (depending on their assessment of level of income and housing tenure), affective status (depending on patients' self-evaluation of loneliness, helplessness, and relationships with friends, children, and partners), and quality of life (evaluating the contribution of their health problems, daily exercise, fatigue, sleep quality, physical comfort, mutual communication, and hobbies). The 1–5 scale was used, where 1 = poor quality and 5 = excellent quality.

In the third part of the questionnaire, patients were required to rate their complete dentures, depending on the level of satisfaction. They first rated them in general, and then they rated separately retention, aesthetics, speech ability, chewing ability, and comfort of wearing maxillary and mandibular complete dentures (CDs). The patients rated them by using a scale ranging from 1 to 5 (where 1 = dissatisfaction and 5 = excellent), which is a common grading scale used in the Croatian educational system.

The first part of the questionnaire was completed by the dentist. Prior to the assessment, three different dentists (Specialists of Prosthodontics) separately evaluated the maxillary and mandibular denture-bearing areas, as well as the quality of dentures in 35 patients. The Kappa test (0.76–0.94) revealed sufficient consistency between the dentists, but it was decided that only one dentist should evaluate all patients. In evaluation of the maxillary denture-bearing area, the Kappa value between the first and second dentist was

0.88, between the first and third dentist it was 0.88, and between the second and third dentist it was 0.76. In evaluation of the mandibular denture-bearing area, the Kappa value between the first and second dentist was 0.82, between the first and third dentist it was 0.94, and between the second and third dentist it was 0.76. In the evaluation of quality of dentures, the Kappa value between the first and second dentist was 0.94, between the first and third dentist it was 0.82, and between the second and third dentist it was 0.76.

The subsequent statistical analysis was made by using the statistical software SPSS 10.0 for Windows (SPSS, Inc., Chicago, IL). Descriptive statistics were made and the normality of distribution was tested by the one-way Kolmogorov-Smirnov test. Finally, in order to test the relation between patient satisfaction and the different variables, Spearman's rank correlation coefficient was calculated. The Mann-Whitney U was used to test the significance of differences between gender and smoking habits.

#### RESULTS

In this study, 33% of the dental patients were men and 67% were women. Forty-four percent of the patients were married, 13% of the patients were divorced, 15% were single, and 28% were widowed. Twenty percent of the patients were smokers and 80% were nonsmokers. Most of the patients were able to live by themselves (71%), 8% of the patients received support from their families, and 21% of the patients were unable to live alone.

The biggest percentage of the patients had a medium level of education (primary school + 4 years of gymnasium or vocational school) (54%), 31% of the patients had a low level of education (primary school), and 15% of the patients had a high school and/or university level of education.

Patients were divided into 3 age groups: <50 years, 50 to 65 years, and >65 years. According to the number of previous dentures, 31% of the patients were first-time complete denture wearers, 53% of the patients had their second set of CDs, 13% had their third CDs, 2% had their fourth, and 16% had their fifth pair of CDs.

Twenty percent of patients were edentulous over a period of 1 year, 32 were edentulous over a period ranging from 1 to 5 years, and 48% were edentulous for more than 5 years. Depending on how old the existing CDs were, 39% of CDs had been in use for 1 year, 42% had been in use for 1 to 5 years, and 19% were more than 5 years old.

Percent distribution of the frequencies, for the variables assessed by the patients (scale from 1 to 5), depending on how satisfied they were with their CDs, are shown in Figure 1. The ratings of patient assessments of their dentures were surprisingly high. More than half of the examined patients claimed all the examined variables to be in the highest category and only 7.2% of the patients were absolutely dissatisfied with CDs. The parameters with the best ratings (the highest percentage of the best ratings) were as follows: retention of maxillary CDs was 78.4%, speech was 79.3%, comfort of wearing a maxillary CD was 88.7%, and aesthetics was 72.1%. Parameters with the highest percent of the lowest ratings: retention of mandibular CDs was 14.4% and comfort of wearing mandibular CDs was 11.7%.

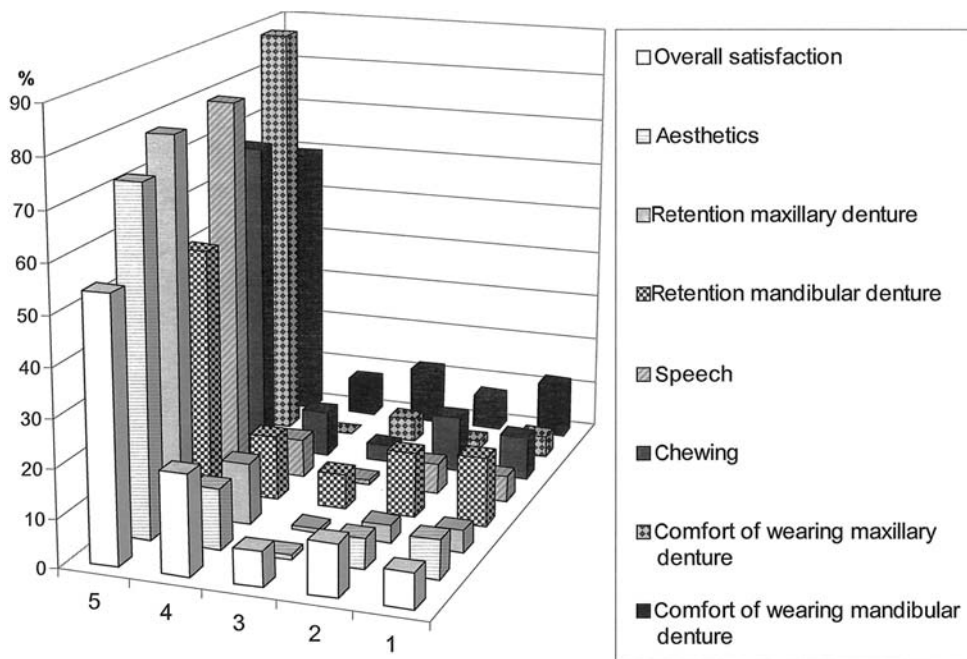


Figure 1. Patients' ratings of their complete dentures.

The normality of the distribution for patients' assessment of their CDs in general, retention of maxillary and mandibular CDs, speech, mastication, and comfort differed from the normal distribution ( $p < .05$ ), as tested by one-way Kolmogorov-Smirnov test.

The examined patients also assessed their economic status, affective status, and quality of life (Figure 2). The best economic status was in 3% of the patients, 27% of the patients described their economic status as very good, 37% of the patients described their economic status as good, and 33% of the patients described their economic status as sufficient. There was a surprising lack of any patients who would describe their economic status as insufficient. Affective status was rated by most of the patients with a score of 2, 3, or 4, while only 7% were completely unsatisfied and 14% were completely satisfied with their affective life. The majority of the patients rated their quality of life as average (score 3); however, more patients rated this category with scores of 4 and 5 rather than 1 or 2.

The dentist rated the quality of the patients' dentures, as well as the quality of the denture-bearing area (Figure 3). The maxillary denture-bearing area was rated with scores of 4 or 5 in most of the patients and, in contrast, the mandibular denture-bearing area was rated with scores of 1 or 2 in the majority of examined patients. The dentist, assessing the quality of dentures, gave a score of 5 to 31.4%, 4 to 31.8%, 3 to 14.8%, and 2 to 14.8% pairs of dentures; a score of 1 was not given to any pair of dentures. The correlation between different variables and patients' satisfaction with their dentures (at a 95% or 99% level of significance) is presented in Table 1.

Each patient's age was negatively correlated ( $p < .05$ ) with their satisfaction of maxillary denture retention (younger patients gave higher ratings) and positively cor-

related ( $p < .05$ ) with mandibular denture retention (older patients gave higher ratings). There were no significant differences in satisfaction between men and women, as well as between smokers and nonsmokers ( $p > .05$ ).

The level of education was negatively correlated with general satisfaction, aesthetics, speech, and comfort of wearing maxillary dentures ( $p < .05$ ). Patients with a low level of education were significantly more satisfied in general and were more satisfied with the aesthetics of their dentures, speech, and comfort of wearing maxillary dentures than patients with a higher level of education.

The number of previous dentures was negatively correlated with retention of maxillary dentures, and was positively correlated with retention of mandibular dentures ( $p < .05$ ). Patients who had more than two previous dentures gave lower ratings to retention of their maxillary CDs, but surprisingly, they gave higher ratings to retention of mandibular CDs than patients with first-time dentures.

The period of edentulousness was negatively correlated with retention of maxillary dentures and was positively correlated with retention of mandibular dentures ( $p < .05$ ) (more years edentulous: lower ratings for retention of maxillary CD and higher ratings for retention of mandibular CD).

The age of existing dentures was negatively correlated with aesthetics and positively correlated with general satisfaction, chewing, retention of mandibular dentures, and comfort of wearing mandibular dentures ( $p < .05$ ) (older dentures were scored lower for aesthetics and higher for chewing, general satisfaction, retention, and comfort of wearing mandibular dentures).

Patients with lower ratings for self-perceived economic status gave higher ratings to general satisfaction with CDs (economic status and general satisfaction with dentures were negatively correlated) ( $p < .05$ ).

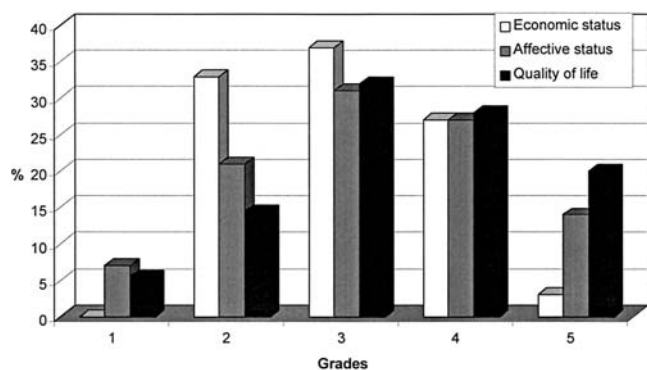


Figure 2. Patients' ratings of economic status, affective status, and quality of life.

Patients who were more satisfied with their affect gave better ratings to general satisfaction and aesthetics (positive correlation,  $p < .05$ ).

Patients who were more satisfied with the quality of their life gave higher ratings to overall satisfaction (positive correlation,  $p < .05$ ).

The quality of the maxillary denture-bearing area was positively correlated with retention of maxillary dentures, comfort of wearing maxillary dentures, and chewing ( $p < .01$ ). Patients with lower quality maxillary denture-bearing areas gave lower ratings for retention of maxillary CD, comfort, and chewing than those patients with higher quality maxillary denture-bearing areas. Surprisingly, a negative correlation existed between the quality of the mandibular denture-bearing area and retention ( $p < .05$ ), as well as the comfort of wearing mandibular dentures ( $p < .01$ ), general satisfaction, and chewing ( $p < .05$ ). Patients whose mandibular denture-bearing area was assessed as excellent and very good gave the lowest ratings to overall satisfaction, retention of mandibular CD, chewing quality, and comfort of wearing mandibular dentures. However, the strongest correlation existed between the dentist's assessment of the quality of the dentures and patients' general satisfaction ( $\sigma = .61, p < .01$ ), as well as with the patients' satisfaction with retention of mandibular dentures ( $\sigma = .59, p < .01$ ), chewing, retention of maxillary dentures, speech, aesthetics, and comfort of wearing mandibular and maxillary dentures ( $p < .01$ ) (Table 1).

## DISCUSSION

The results of this study pointed out that the ratings of patients' assessments were surprisingly high. More than half of the patients rated all the parameters related to CDs in the best category (score of 5). The parameters with the best ratings were as follows: retention of maxillary CDs, 78.4%; speech, 79.3%; comfort of wearing maxillary CDs, 88.7%; and aesthetics, 72.1%. The parameters with the highest percentage of the lowest ratings were: retention of mandibular CDs, 14.4%, and comfort of wearing mandibular CDs, 11.7%. The number of completely dissatisfied patients, according to this study, was only 7.2% (score of 1). Even when a rating of 2 was considered not satisfactory, then only 16% of complete denture patients remained

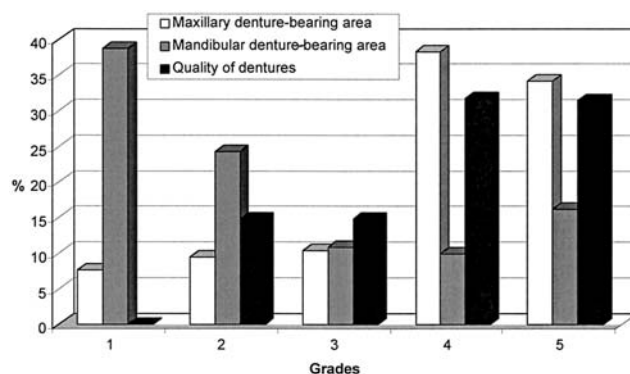


Figure 3. Dentist's ratings of quality of dentures and denture-bearing areas.

dissatisfied in general with their dentures. This result is in agreement with the findings of similar studies, where it was recorded that the number of patients dissatisfied with their complete dentures of different age varied between 20%–35% (4–13). The results are not completely comparable, as the scales of assessments were not the same (3,7–10,13,25–27). The results that are most similar to ours are those of Van der Waas (27,28). According to his results, 55% of patients were completely satisfied, 26% of patients were reasonably satisfied, and 15% of patients were dissatisfied with their CDs.

According to the results of this study, it is clear that the distribution curve showing the patients' assessments related to CDs is visibly and entirely skewed toward the highest score area (modal values and median values were 5 for all categories). Lamb and colleagues (26), who tested the level of satisfaction of their patients by using the visual analogue scale from 1 to 10, had a different result distribution than "normal" (as in the present study). Their distribution was bimodal, with results clustering around 2.5 and 7.5, which agreed with the satisfied and dissatisfied patients and was not skewed towards the highest scores.

Spearman's rank coefficients of correlation ( $\sigma$ ) revealed that there was no significant correlation between gender or smoking habits and level of patients' satisfaction with their CDs, which is in accordance with the study of Golebiewska and colleagues (19). On the contrary, Awad and Feine (17) suggest that a patient's satisfaction with their CDs is highly dependent on gender.

Patients with a lower level of education were more satisfied in general and with speech, aesthetics, and comfort of wearing maxillary CD. This is probably due to the fact that less-educated patients have a lower level of expectations or find the handicap of being edentulous to be less irritating. This is also found in other studies (see 15,16,22, 28). The better the self-perception of affective status and quality of life, the more satisfied patients were in general ( $p < .05$ ). This was also in agreement with several other findings (see 19,20,22,25,28). Self-perception of economic status and patients' satisfaction with their dentures were weakly negatively correlated (the better the economic status, the lesser the satisfaction). This is in agreement with other studies (18–20,22,23) and points out the importance of

Table 1. Significant Correlations Between Patients' Assessment of Complete Dentures and Different Factors

Variable	Overall Satisfaction	Aesthetics	Retention Maxillary Denture	Retention Mandibular Denture	Speech	Chewing	Comfort of Wearing Maxillary Denture	Comfort of Wearing Mandibular Denture
Age			-0.130*					
Level of education	0.150*	-0.255**			-0.150*		-0.157*	
Number of previous dentures			-0.131*	0.158*				
Age of existing dentures	0.132*	-0.181*		0.168*		0.158*		0.159*
Period of edentulousness	0.152*		-0.204**	0.204**				
Self-perception of economic status	-0.141*							
Self-perception of affective status	0.162*	0.176*			0.166*			
Self-perception of quality of life	0.132*					0.147*		
Quality of complete dentures	0.61**	0.368**	0.402**	0.596**	0.391**	0.451**	0.231**	0.350**
Quality of maxillary denture-bearing area			0.385**			0.268**	0.309**	
Quality of mandibular denture-bearing area	-0.131*			-0.301**		-0.145*		-0.298**

Notes: \*Significant differences between groups at  $p < .05$ .

\*\*Significant differences between groups at  $p < .01$ .

personality profiles and psychological factors on the level of satisfaction in patients. However, patients with better self-perception of their quality of life (well-being) were more satisfied in general with their dentures and chewing ability, and patients who were more satisfied with their affective status were also more satisfied with their dentures in general, as well as with aesthetics and speech.

However, the quality of patients' dentures showed the strongest correlation with patients' satisfaction, which is not a surprising finding. It was surprising that the patients with the best quality mandibular denture-bearing areas gave worse ratings to their overall satisfaction than patients with lower quality denture-bearing areas. However, these patients also gave worse ratings to retention of mandibular CDs, chewing ability, and comfort of wearing mandibular CDs than patients with better quality mandibular residual ridges. Makilla (31) found a significant correlation between quality of the denture-bearing area and patient satisfaction, while Carlsson and colleagues (8), Berg (9), and Van der Waas (27) did not. Our study showed a weak negative correlation between the quality of the mandibular denture-bearing area and general satisfaction, but the quality of the denture-bearing area was strongly correlated with the retention and comfort of wearing dentures (positively for maxillary dentures, negatively for mandibular dentures).

In assessment of retention of maxillary CDs, older patients and patients with longer period of being edentulous and a greater number of previous dentures gave lower ratings than younger patients with a shorter time of being edentulous. However, worse ratings for retention were given by patients with lower quality maxillary denture-bearing areas as well. It is well known that resorption of residual alveolar ridges, which reduces maxillary denture retention, progresses with edentulousness and age (32,33).

A surprising result concerns retention of mandibular CDs. Younger patients with the lowest number of previous dentures (first-ever CDs), the smallest period of being edentulous, and with the best quality mandibular denture-bearing areas assessed the retention of their mandibular CDs with lower scores than patients who had a greater number of previous dentures, longer periods of edentulousness, and

lower quality mandibular denture-bearing areas. This points out that the patients with the best residual alveolar ridges in the mandible and with the best quality denture-bearing areas gave the worst scores. This could be ascribed to the obviously long period of neuromuscular adaptation to the mandibular CD and the long period necessary for the muscles of the lips, cheek, and tongue, which surround the lower denture, to adapt their function to the denture flanges. The comfort of wearing maxillary dentures was higher in patients with good denture-bearing areas (better retention and stability) and, in contrast, the comfort of wearing mandibular CDs was lower in those with high quality mandibular residual ridges (nonresorbed ridges). Although we had expected to find that patients with high quality mandibular denture-bearing areas would be more satisfied, that was not found in the results. However, residual ridge resorption is a chronic, continuous process that is more rapid after tooth extraction. The residual alveolar ridge is highest immediately after extraction, and support for a mandibular CD should be optimal. Most likely due to the long period of neuromuscular adaptation (and to the possible undercutting of residual ridges immediately after extraction), mandibular dentures move and damage oral mucosa, thus causing discomfort, unfavorable retention, and low levels of chewing ability and general satisfaction.

## CONCLUSIONS

On the whole, patients were satisfied with the quality of their full dentures (score distribution of patients' assessments was skewed toward the highest scores in all examined categories, with modal and median values of 5). Only 7.2% of the patients were absolutely not satisfied with their dentures. Patients with a low level of education were more satisfied in general and with their aesthetic appearance. Patients with a better self-perception of their affective status and quality of life showed higher levels of general satisfaction. Patients with a higher self-perception of their economic status were less satisfied. Younger patients wearing dentures for the first time, with shorter period of being edentulous and with better quality maxillary denture-bearing areas were more satisfied with retention of maxillary CDs.

On the contrary, younger patients with first-ever dentures and short periods of being edentulous, and patients with better quality mandibular denture-bearing areas gave lower ratings to the retention and comfort of wearing mandibular dentures.

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