Self-Reported Oral Health and Denture Satisfaction in Partially and Completely Edentulous Patients

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Purpose: The aim of this study was to explore variables that might influence self-reported oral health and denture satisfaction in partially and completely edentulous patients. ***Materials and Methods:*** The study sample was recruited from 294 patients treated with complete dentures at the Department of Prosthodontics, Faculty of Dentistry, University of Bergen, Norway, between 1997 and 2005. The 172 respondents completed a self-administered questionnaire regarding demographics, denture status, appetite, avoiding food items, satisfaction with dentures, various aspects of wearing dentures, and the Oral Health Impact Profile (OHIP-20). ***Results:*** The mean age of patients was 67 years; 52% were men. Sixty-seven percent of patients had complete maxillary and mandibular dentures, while 33% had a complete maxillary denture and a dentate mandible. There were no significant group differences regarding age, sex, general health, appetite, avoiding food items, chewing, speech, maxillary denture esthetics, or the OHIP-20. However, striking group differences were found in the number and nature of significant variables associated with reported oral health and denture satisfaction at all levels of analyses. Thus, oral health in the completely edentulous was associated with the OHIP-20, avoiding food items, and satisfaction with dentures, while in the partially edentulous, it was associated with maxillary denture retention and age. Similarly, satisfaction with dentures in the completely edentulous was associated with the OHIP-20, global oral health, and some clinical variables, while in the partially edentulous, it was associated with the OHIP-20 and some clinical variables. Predictors for oral health in the completely edentulous were the OHIP-20, speech, and avoiding certain food items; in the partially edentulous, they were denture retention and age. Predictors for denture satisfaction in the completely edentulous were the OHIP-20 and maxillary denture esthetics; in the partially edentulous, only maxillary denture comfort served as a predictor. Also, the completely edentulous reported better oral health and satisfaction with their dentures than the partially edentulous. ***Conclusion:*** The results of this study suggest that the completely and partially edentulous differ in variables associated with, and predictive for, both self-reported oral health and denture satisfaction. *Int J Prosthodont 2011;24:9–15.*

Oral health is a multidimensional concept that reflects the oral status of an individual at any point in time. It is influenced by numerous factors, such as the existing pathology, experiencing dental problems, tooth loss, prosthesis wear,[1,2] and age, as well as additional cultural, psychologic, social, educational, dietary, and financial considerations.[3] It also tends to change over the patient's lifetime,[4] and its measurement is complicated. Moreover, there is not a generally accepted definition of the concept, which is proven to be elusive to date. However, there is agreement that oral health cannot be defined in exclusive clinical evaluation terms alone,[5,6] since subjective aspects must also be included. Oral health–related quality of life measurement scales, such as the Oral Health Impact Profile (OHIP), have been developed[7] based on perceived oral health problems and attempt to assess their impact on an individual's quality of life (QoL). It also appears that the patient's acceptance

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and satisfaction with dentures is an equally complex consideration, since conflicting results have been reported regarding such factors and their associations with the technical quality of the dentures, demographic factors, personality features, oral health, and other clinical variables.[8–12]

Self-reported oral health and satisfaction with complete dentures may also be influenced by the nature of the dentition in the opposing arch. However, there is an absence of published reports comparing edentulous patients wearing two complete dentures and partially edentulous ones wearing a complete maxillary denture. Indirect evidence is provided from studies on subjects wearing removable partial dentures where one group had a natural dentition in the opposing arch and another wore a complete denture.[13–16] Neither category reported similar results regarding denture satisfaction or oral health.

It has been suggested that the influence of the opposing dentition on self-reported oral health and satisfaction in patients with complete dentures is not completely understood and warrants further investigation. The aim of the present study, therefore, was to explore a wide range of variables that might influence self-reported oral health and denture satisfaction in partially and completely edentulous patients.

Materials and Methods

The study sample was recruited from 294 patients (age: ≤ 76 years) who had been treated with complete dentures at the Department of Prosthodontics, Faculty of Dentistry, University of Bergen, Norway, between 1997 and 2005. All patients were invited by letter to an interview and clinical examination free of charge. Two weeks after mailing the letter, the patients were contacted by telephone and an appointment was made with the 176 respondents (60%) who accepted the invitation. Subsequently, 1 subject did not attempt to fill out the OHIP 20-item questionnaire (OHIP-20, specifically designed for the edentulous) and was excluded from the analysis; 3 subjects with a single mandibular denture were regarded as outliers and also excluded from analysis. Thus, the remaining 172 respondents constituted the study sample.

The study was approved by the Norwegian Committee for Medical Research Ethics in Norway, Health Region West, and registered at the Norwegian Social Science Data Services.

Participants completed a self-administered questionnaire. The questionnaire contained items regarding demographics, denture status, appetite, avoiding food items as a consequence of wearing dentures, perceived general and oral health, satisfaction with dentures, various aspects of wearing dentures (edentulous patients responded separately for maxillary and mandibular dentures), and the OHIP-20. The data were then registered and dichotomized.

Age was dichotomized into ≤ 67 years and ≥ 68 years (0 vs 1). Denture status was recorded as either a complete maxillary denture opposing natural teeth or complete dentures in both arches (0 vs 1). Whether certain food items were avoided as a consequence of wearing dentures was a yes or no question (0 vs 1). Information about appetite was registered on a 3-point Likert scale with the response categories "good," "neither good nor not good," and "not good." Perceived general and oral health were registered by responses to separate global questions with a 5-point Likert scale ranging from "very good" to "very bad." Responses to a third global question on patient satisfaction with dentures were registered on a 4-point Likert scale ranging from "very satisfied" to "dissatisfied." Information regarding six self-rated aspects of wearing dentures (comfort, retention, pain from wearing dentures, fit, esthetics, and chewing) was registered on a 4-point Likert scale ranging from "very satisfied" to "dissatisfied." Speech was registered on a 3-point Likert scale with the response categories "no problems," "some problems," and "major problems."[17]

The 3-point Likert scales were dichotomized separating the most positive answer from the neutral and negative one (1 vs 0); the 4- and 5-point Likert scales were dichotomized separating the two most positive answers from the rest (1 vs 0).

The OHIP-20 was also included to indicate oral health–related QoL.[7] The 20 questions assess specific oral health problems associated with wearing dentures, and each question ranks the problems on a 6-point Likert scale ranging from "at no time" to "all of the time." This instrument is closely related to other versions of the scale (eg, OHIP-49 and OHIP-14), which have been validated satisfactorily in Sweden, a neighboring country with cultural and social settings very similar to Norway.[18] A report on the validation of a Norwegian OHIP-20 scale, not yet published, indicates satisfactory validity (T. Trovik et al, personal communication, 2009). The use of the OHIP-20 in this study, therefore, should be acceptable. For each patient, the OHIP-20 sum score is in the range 20 to 120, where a high figure indicates that oral health problems have a negative impact on QoL. To dichotomize this variable, the grouping was made as follows: code 0: > 40, code 1: ≤ 40.

In completing the OHIP-20, 29 subjects (17%) failed to report on at least 1 of the 20 items. Excluding these subjects might have biased the results. To reduce

this error, missing data were substituted using the mean value of the other items in the specific domain for each person. Equally, 35 patients (20%) failed to report on avoiding food items. Regarding these subjects, it seemed logical to assume that failure to respond to this item indicated that the question was irrelevant because there were no problems of this nature. The missing data, therefore, were substituted with the response that they did *not* avoid food items.

Statistical Analysis

Analysis was carried out using SPSS for Windows version 15.0 (IBM). A 5% significance level was chosen. The dichotomized variables were used in all analyses. A chi-square test was performed to test for differences in response distribution between the partially and completely edentulous for each variable. Further analyses were made separately for the two groups. The chi-square test was used to evaluate the relationship between pairs of variables (step I), where one of the variables was either global self-reported oral health or global satisfaction with dentures (the outcome variables). For each of the outcome variables, all independent variables revealing statistically significant associations at the 5% level were included in a forward stepwise logistic regression analysis (step II). In addition, age and sex were included even if they were not significantly associated with the outcome variable. Finally, a multiple logistic regression analysis was carried out (step III) by applying the enter-option in the SPSS software. The selection of predictive variables in this analysis was based on the result of the stepwise analysis. In compliance with the recommendation that the number of variables in the final analysis should not be more than 1/10 of the number of subjects in the smallest subgroup of the outcome variable,[19,20] age and sex were not included in the final analysis (step III) if not predictive in the stepwise analysis (step II). If the final regression equation included more than one predictor, the colinearity between these variables was evaluated.

Results

Nonresponse Analysis

Nonresponse was 40% (n = 118). Analysis of the data disclosed the following reasons: the patient was satisfied with the dentures and saw no point in having an examination (n = 20, 7%), deceased (n = 11, 4%), illness (n = 5, 2%), not attending the appointment (n = 21, 7%), and others/unable to contact (n = 61, 21%).

Participant Characteristics

The mean age of the 172 participants was 67 ± 6.9 years (range: 38 to 76 years); 52% (n = 89) were men. With regard to dental status, 67% (n = 116) had complete maxillary and mandibular dentures and 33% (n = 56) had one single complete maxillary denture with an opposing dentate arch.

In the completely edentulous group, the mean age was 68 years (range: 38 to 76 years), and the sexes were represented equally (57 men, 59 women). A majority (82%) reported satisfaction with their dentures, whereas 18% were dissatisfied (95 vs 21 patients). Good or very good oral health was reported by 67% (n = 78); 62% (n = 72) reported good or very good general health.

In the partially edentulous group, the mean age was 66 years (range: 44 to 76 years); 57% (n = 32) were men. In this group, 66% (n = 37) reported satisfaction with their dentures, whereas 34% were dissatisfied (n = 19). Good or very good oral health was reported by 46% (n = 26); 63% (n = 35) reported good or very good general health.

Bivariate Relationships

All significant associations between pairs of variables were in the positive direction of the dichotomized scales, going from 0 to 1.

Comparing the completely edentulous and partially edentulous groups, no significant differences were found regarding age, sex, general health, appetite, avoiding food items, the OHIP-20, chewing, speech, or maxillary denture esthetics (range: P = .131 to .956). However, there was a significant difference between the two groups regarding satisfaction with dentures, self-reported oral health, and the clinical variables for the maxillary denture: retention, comfort, fit, and pain (P < .05).

Within the completely edentulous group, the global question of self-reported oral health was associated with the OHIP-20 (P < .001), avoiding certain food items (P < .001), and the global question on satisfaction with dentures (P < .001). The clinical variables chewing, speech, comfort, pain, fit of both dentures, maxillary denture esthetics, and mandibular denture retention were also significantly associated with self-reported oral health (P < .05). No such associations were found regarding age, sex, global general health, appetite, or maxillary denture retention (range: P = .062 to .508).

Within the partially edentulous group, self-reported oral health was associated only with maxillary denture retention (P = .018), the OHIP-20 (P = .038), and

age, where the older age group reported better oral health than the younger ($P = .043$). No such associations were found regarding sex, global general health, appetite, avoiding certain food items, denture satisfaction, or any other clinical variable (range: $P = .076$ to .551).

Within the completely edentulous group, global satisfaction with dentures was associated with the OHIP-20 ($P < .001$) and global oral health ($P < .001$). The clinical variables chewing, comfort, fit of dentures, esthetics, and pain regarding the maxillary denture were significantly associated with satisfaction ($P < .05$). No such associations were discerned with respect to sex, age group, global general health, avoiding certain food items, appetite, or the clinical variables retention of either denture, pain from the mandibular denture, or speech (range: $P = .053$ to .343).

Within the partially edentulous group, global satisfaction with dentures was associated with the OHIP-20 ($P < .001$) and the clinical variables chewing, speech, maxillary denture comfort, retention, and pain ($P < .05$). No such associations were found with respect to sex, age group, global general health, avoiding certain food items, appetite, global self-reported oral health, or the clinical variables fit and maxillary denture esthetics (range: $P = .068$ to .397).

Multivariate Relationships

Oral Health. In the completely edentulous group, the final model for global self-reported oral health contained three independent variables: the OHIP-20, speech, and avoiding certain food items ($P < .001$; Table 1). This result indicates that the model was able to distinguish between participants reporting good or not good oral health. The model correctly classified 79.1% of patients and explained 37% of the variance in reporting oral health (Nagelkerke R square). As shown in Table 1, only two independent variables made a statistically significant contribution to the model: the OHIP-20 and speech, recording odds ratios (ORs) of 4.2 and 3.5, respectively. This indicates that participants reporting few impacts from oral health on QoL were more than four times more likely to report good oral health compared to those reporting many. Also, participants reporting no problems with speech were more than three times more likely to report good oral health than those reporting speech problems (adjusted for the other factors in the model).

In the partially edentulous group, the final model contained two independent variables: denture retention and age group ($P = .002$; Table 2). This result indicates that the model was able to distinguish between participants reporting good or not good oral health. The model correctly classified 69.6% of patients and explained 26% of the variance in reporting oral health (Nagelkerke R square). As shown in Table 2, both variables made a statistically significant contribution to the model, with ORs of 5.1 and 4.2, respectively. This indicates that participants reporting satisfactory maxillary denture retention were about five times more likely to report good oral health than those who were dissatisfied. Also, participants in the older age group were about four times more likely to report good oral health than those in the younger age group.

Denture Satisfaction. In the completely edentulous group, the final model contained two independent variables selected according to the same principle as explained previously: the OHIP-20 and maxillary denture esthetics ($P < .001$; Table 3). This result indicates that the model was able to distinguish between participants reporting satisfaction or dissatisfaction with their denture. The model correctly classified 89% of patients and explained 49.6% of the variance in reporting denture satisfaction (Nagelkerke R square). As shown in Table 3, both variables made a statistically significant contribution to the model, recording ORs of 19.1 and 13.0, respectively. This indicates that subjects reporting few impacts from oral health on QoL were 19 times more likely to report global denture satisfaction than those reporting many. Also, those reporting satisfaction with maxillary denture esthetics were 13 times more likely to report global denture satisfaction than those who were less satisfied.

The final model for the partially edentulous included only one variable: maxillary denture comfort (Table 4). Nonetheless, the model was able to distinguish between participants reporting satisfaction or dissatisfaction with their denture ($P < .001$). It correctly classified 83% of patients and explained 47.6% of the variance in reporting denture satisfaction (Nagelkerke R square). As shown in Table 4, maxillary denture comfort had an OR of 22.5. This indicates that subjects reporting satisfaction with maxillary denture comfort were more than 22 times more likely to report global denture satisfaction than those who were dissatisfied.

No strong colinearity was revealed between the predictive variables in the final analyses, thus indicating an individual predictive effect of the included variables and good fit of the models.

Table 5 gives an overview of all statistically significant variables, showing dissimilar responses to global self-reported oral health and global satisfaction with dentures for the partially and the completely edentulous groups at the descriptive, bivariate (step I), and logistic regression levels (steps II and III) of analysis.

Table 1 Multiple Logistic Regression Analysis Predicting Reporting of Good Oral Health in the Completely Edentulous

	B	SE	*P*	Odds ratio	95% CI
OHIP-20	1.439	0.496	.004	4.218	1.596–11.145
Speech	1.259	0.486	.010	3.515	1.356–9.111
Avoid food items	1.022	0.529	.053	2.780	0.986–7.839
Constant	−1.549	0.502	.002	0.212	

B = regression coefficient; SE = standard error;
CI = confidence interval.

Table 2 Multiple Logistic Regression Analysis Predicting Reporting of Good Oral Health in the Partially Edentulous

	B	SE	*P*	Odds ratio	95% CI
Retention	1.634	0.635	.010	5.122	1.475–17.781
Age group	1.463	0.625	.022	4.204	1.234–14.321
Constant	−1.807	0.633	.004	0.164	

B = regression coefficient; SE = standard error;
CI = confidence interval.

Table 3 Multiple Logistic Regression Predicting Satisfaction with Dentures in the Completely Edentulous

	B	SE	*P*	Odds ratio	95% CI
OHIP-20	2.954	0.750	.001	19.182	4.409–83.453
Maxillary denture esthetics	2.568	0.761	.001	13.044	2.937–57.937
Constant	−1.696	0.726	.019	0.183	

B = regression coefficient; SE = standard error;
CI = confidence interval.

Table 4 Multiple Logistic Regression Predicting Satisfaction with Dentures in the Partially Edentulous

	B	SE	*P*	Odds ratio	95% CI
Comfort	3.144	0.742	.001	22.500	5.259–96.261
Constant	−1.099	0.516	.033	0.333	

B = regression coefficient; SE = standard error;
CI = confidence interval.

Table 5 Statistically Significant Variables with Dissimilar Responses to the Two Global Outcome Variables for the Two Groups

Type of analyses/ outcome variable	Completely edentulous	Partially edentulous
Descriptive		
Good global oral health	67%	47%
Good global satisfaction with dentures	82%	66%
Cross-tabulations, explanatory variables		
Global oral health	Avoiding food items Denture satisfaction Chewing Speech Comfort (both arches) Pain (both arches) Fit (both arches) Esthetics (maxillary) Retention (mandibular)	Retention (maxillary) Age
Global satisfaction with dentures	Oral health Comfort (mandibular) Fit (both arches) Esthetics (maxillary)	Retention (maxillary) Speech
Logistic regression, step III predictive variables		
Global oral health (Tables 1 and 2)	OHIP-20 Speech	Retention (maxillary) Age
Global satisfaction with dentures (Tables 3 and 4)	OHIP-20 Esthetics (maxillary)	Comfort (maxillary)

Discussion

It might be argued that a more general, indeed simpler, way to register perceived oral health is by asking the global question, "How would you rate your overall oral health?" The response would then take into account and weigh all hypothetical domains together with subjective evaluations—life experience; personal characteristics; perceived oral function; behavioral, psychologic, and medical factors; positive or negative attitudes toward life in general; and individual health expectations—into a single statement.[1,21] However, this approach would in all likelihood fail to provide the scope for the sort of statistical evaluation that was necessary for this study, hence the decision to employ the OHIP questionnaire.

The methodologic issue of handling missing data, such as those related to the OHIP-20 and avoiding food as a consequence of wearing dentures, is debatable. The risk of biasing the result by adjusting the variables is evident, but the adjustments made in this study appear logical and statistically acceptable. Not making the adjustments would probably bias the results to a larger extent.

Also, in interpreting the results, the fact that the present study sample was recruited exclusively from one university dental clinic must be taken into account, since it may not be representative of populations elsewhere. Furthermore, such institutional treatment is less expensive, more time-consuming, and occurs in a teaching environment, thereby weakening the external validity of this study.

A particularly interesting result of this study is the striking difference in the number and nature of significant variables associated with reported oral health and denture satisfaction in the two different patient groups in the bivariate analyses, given the noted divergent perceptions. This is clearly demonstrated in Table 5, which shows all statistically significant variables with dissimilar responses to the two outcome variables for the two groups at all levels of analysis. The difference between the groups does not change even if the responses pertaining to the mandibular denture are disregarded. Furthermore, this difference in number of significant clinical variables corroborates the clinical experience that bimaxillary denture wearers have considerably more complaints and face a much more complex task in manipulating their dentures than those wearing only a single denture.

Furthermore, the direction of the differences is apparently the opposite of what might be expected. The completely edentulous group reported good oral health and a high degree of satisfaction with their dentures more frequently than the partially edentulous one (67% vs 47% and 82% vs 66%, respectively; Table 5). These results suggest that the traditional and objectively rated functional ability of the mouth may be the wrong measure to use for self-reported oral health and satisfaction, since oral function in a mouth with some teeth would be expected to be better than a completely edentulous counterpart. A probable explanation is that satisfaction is a relative phenomenon,[17–22] and partially edentulous patients relate the maxillary denture with the fixed mandibular dentition, whereas in completely edentulous patients, a loose denture is compared with another possibly even looser one.

The bivariate results illustrate this difference between the groups and are further confirmed by the results of the multivariate logistic regression. Consequently, in the completely edentulous, the OHIP-20 is a significant predictor for both outcome variables (Tables 1 and 3) but not for the partially edentulous (Tables 2 and 4), probably because this index addresses a number of clinical problems. It must be emphasized that the validity of measurement scales such as the OHIP-20 has been questioned,[22] even if its employment permits the statistical approach that this paper's research design depends on. Nevertheless, this may also explain why speech is a significant predictor of oral health in the completely edentulous group (Table 1). Wearing two dentures, with perhaps dubious retention and stability and artificial teeth in less than optimal positions, may easily compromise proper speech, leading to a lower subjective rating of oral health.

The finding that maxillary denture esthetics in the completely edentulous group is significantly associated with denture satisfaction (Table 3) agrees with other reports,[23] although in some studies, no such association was demonstrated.[24] There is no obvious explanation for why the result differs between the two patient groups. On the other hand, all patients in the partially edentulous group had functional difficulties that can be related to the one clinical variable that tends to create problems, namely the retention of the maxillary denture (Table 2). If this is satisfactory and oral function is not compromised by the denture, a perception of good oral health is the likely outcome.[23]

The older partially edentulous patients reported better oral health than the younger ones in spite of the fact that oral health certainly does not improve with age (Table 2). One possible explanation may be the differences in attitude and expectations between the age groups in this study.[25] For the younger patients , wearing a single denture may be a constant reminder that this is a sign of aging, with all the negative associations common to most western societies.

The older patients, on the other hand, might be more willing to accept that imperfections of oral function are part of the aging process. This conclusion is in agreement with results reported by others.[3,26]

The only apparent predictor for denture satisfaction in the partially edentulous group is comfort (Table 4), even if this observation is not a self-evident one. Perhaps equally interesting is the fact that none of the other variables examined in this study seem to play a decisive part in denture satisfaction for this group.

Conclusion

The results of the present study suggest that the predictive variables in the two patient groups—completely and partially edentulous—are different in terms of both self-reported oral health and denture satisfaction. However, in view of the study's inherent design limitations, the results can only be generalized with caution. The results of this study should be validated with a sample from a different cultural and ethnic setting.

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