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Oral health-related quality of life among adults 68–77 years old in Nord-Trøndelag, Norway

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Abstract: Dental health has mostly been measured by dental staff disregarding patient's experiences. However, clinical conditions alone do not fully indicate how people feel affected by their oral status. The aim of this study was to investigate how clinical recorded dental health, self-rated dental health, satisfaction with dental health were related to oral health-related quality of life (OHRQoL) assessed by Oral Health Impact Profile (OHIP-14) in 68–77 years old. A total of 151 individuals completed a questionnaire on self-rated dental health, satisfaction with dental health and the short form of OHIP-14. Clinical examination was performed registering number of teeth and dental caries. In total 63% of the individuals rated their dental health as good, and 59% were satisfied with their dental health. Using the OHIP-14 42% reported no problems or oral discomfort at all. The proportion of individuals reporting problems or discomfort varied between 13% and 43% according to the dimensions of OHIP-14. The most frequently reported problems were physical pain (43%), psychological discomfort (28%) and psychological disability (28%). Individuals who rated their dental health as poor and those who were dissatisfied with their dental health had significantly lower OHRQoL than other individuals. The study showed relationship between self-evaluations of dental health and OHRQoL in 68–77 years old. Individuals with few teeth reported lower OHRQoL than others, but no association between clinical caries status and OHRQoL could be found.

Key words: dental health; elderly; Oral Health Impact Profile-14; oral health-related quality of life; satisfaction with dental health; self-rated dental health

Introduction

Dental research has traditionally focused mostly on dental status and outcome of treatment assessed by dental personal, disregarding patient experiences. However, clinical condition alone does not fully indicate how people feel affected by their dental status (1). It is thus important also to assess patients' perspective of dental health and possible impact of dental health on daily living. Considerable efforts have been invested by research groups internationally to develop instruments/questionnaires to assess impacts of diseases on well-being and quality of life (2–4). During the last decades, there has been a growing interest in dentistry to assess patient's experiences denoted oral health-related quality of life (OHRQoL) (3, 5, 6). OHRQoL is a multidimensional concept dealing with

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quality of life related specifically to oral health and diseases (7–9). The most widely used, specifically among elderly, is the short form of Oral Health Impact Profile (OHIP-14) (3–5). The questionnaire measures impact of oral problems and covers physical, psychological and social dimensions of daily living. It has previously been tested and found to be valid, reliable and precise (6, 9, 10).

Studies have shown that oral conditions have a negative impact on the daily life for substantial proportions of older people (11–14). The negative impact have been shown to be particularly evident among elderly individuals who did not visit a dental clinic on a regular basis (15) Several studies have reported association between number of teeth and oral health-related to quality of life (16–20). Nutall *et al.* (16) found that nearly half of dentate adults reported that oral problems of some kind had affected their quality of life. Pain and discomfort eating food were the most frequently experienced problems. Similar findings have been reported in two Scandinavian studies, but with lower prevalence in Sweden (15, 21). Lahti *et al.* (21) and Nutall *et al.* (16) also reported a strong association between number of missing teeth and OHIP-14 score. This is in agreement findings by Åstrøm *et al.* who observed a relatively strong relationship between higher number of missing teeth and impaired daily performance in Norwegian adults (14).

Recent studies have reported relatively weak relationships between clinical indicators of oral disease and OHRQoL, providing paradoxical evidence of discordance between professionally assessed and self-rated oral health status (19, 20). There is a paucity of studies on the relationship between OHRQoL and other measures of clinical dental status than number of teeth. Little is known on the impact of dental caries on OHRQoL, even though Acharya and co-workers concluded that dental caries had a strong effect on OHRQoL (22).

The aim of this study was to investigate how clinical recorded dental health, self-rated dental health and satisfaction with dental health were related to OHRQoL assessed by OHIP-14 in 68–77 years of age.

Materials and methods

This study was part of an international collaborative health study (WHO-ICS-I) initiated by the World Health Organization in 1973, where samples from the birth cohort 1929–1938 have been examined in 1973, 1983, 1994 and 2006 (23).The cross-sectional sample from 2006 was used in this study. The Norwegian study included a random sample of adults in the county of Nord-Trøndelag (HUNT 3) in Norway (24).

Participants

A sample was drawn from four municipalities comprising 129 000 inhabitants in the county of Nord-Trøndelag, Norway (24). A stratified randomization was used with regard to municipalities: Levanger, Steinkjer, Verdal and Stjørdal. The selection procedure was computerized and the sample was randomly selected from the birth cohorts 1929–1938 using the birth register. Participants were offered an oral health examination free of charge at dental clinics in The Public Dental Service. Invitation to participate and information about the study was sent to 250 individuals.

Overall, 151 (60.4%) accepted to participate in the study and informed consent was obtained. All individuals who declined to participate were contacted by phone. A total of 17 individuals were not possible to contact and 14 individuals had moved from the area. The remaining 68 individuals (27%) were not interested in participating, among those 49 (20%) stated poor general health as reason to decline. No statistically significant difference could be found between those who participated and those who did not regarding age or gender.

Data collection

The data collection was conducted in October and November 2006 and comprised a clinical examination and a self-administered questionnaire. The participants completed the questionnaire in the dental clinic before the oral examination.

Questionnaire

The questionnaire comprised questions about demographics (gender and length of education), self-evaluations of dental health self-rated dental health and satisfaction with dental health. OHRQoL was assessed using the short form of the OHIP-14. OHIP-14 was selected because it is easy to fill in and has been widely used in studies of elderly populations (12, 13).

Education was categorized into elementary school <8 years, high school 8–12 years and higher education more than 12 years.

Self-rated dental health was measured by the question: how do you rate your dental health? Satisfaction with dental health was measured by the question: how satisfied are you with your teeth/dentures? The responses were given using a five point Likert-scale from very poor/very dissatisfied to very good/very satisfied. The responses were condensed into three categories (0 + 1, 2, 3 + 4) in the analyses, because very few answered very poor/very dissatisfied (0) and very good/very satisfied (4).

OHIP-14 is a 14-item questionnaire measuring the responses on a five point Likert-scale from never (0) to very often (4). It is divided into seven dimensions each with two items. The OHIP-14 scores were categorized into never (0), occasionally (1 + 2) and often (3 + 4) in some of the analyses as very few reported never or very often, and were dichotomized into never and all other alternatives in some analyses. The response never indicated the highest possible OHRQoL. The overall OHIP-14 score was calculated by adding the scores from the 14 items giving a scale from 0 to 56 with higher scores indicating poorer OHRQoL. The time frame was the last 12 months.

The OHIP-14 questionnaire was originally translated into Norwegian by an experienced researcher (DH). The translated version was applied in a national study in 2004 and was evalu-

ated to fulfil its intentions (25). The Norwegian version was in this study translated back to English independently by two dental researchers with English as their first language. The translations were almost identical to the original OHIP-14 questionnaire. Internal consistence reliability between the items was assessed using Cronbach's alpha = 0.87.

Clinical examination

The clinical examinations were performed by one dentist and one dental hygienist (KED) in a fully equipped dental clinic using a mirror and a probe (sond, Holst LM 28). A calibration session was preformed prior to the study in which three patients were examined independently and the results were identical. Number of teeth and dental caries experience were recorded. Dental caries experience was registered using the decayed missing filled teeth (DMFT)-index according to the WHO criteria (23). Number of teeth and number of decayed teeth were registered. A tooth was registered as decayed when caries extended into the dentin.

The clinical dental status was described by the proportion of edentulous individuals and the number of teeth in dentate individuals. The number of decayed teeth was used to indicate the caries status of the remaining teeth.

Statistical analyses

Associations between categorical variables were tested using Pearson's Chi-square with Yates correction and Fisher's exact test and between continuous variables using analysis of variance and Spearman's Rho. Because of the skewed OHIP-14 scores non-parametric tests were performed to confirm the results.

Data analyses were performed using SPSS, version 16.0. *P*-values <0.05 were considered statistically significant.

The study was approved by the Regional ethical committee Middle of Norway (ref 4.2006. 250 – date 06.04.06) and approved by the Norwegian Council of Research.

Results

The mean age of the respondents was 72.1 (SD = 2.8) years. There were 77 women (51%) and 74 men (49%). A total of 81 (54%) had <8 years of education, 44 (29%) had 8–12 years of education and 26 (17%) had more than 12 years of education.

Oral health-related quality of life

The mean OHIP score in the sample was 3.4 (SD 5.1) (range 0–23).

The number and percentages of individuals reporting problems never, occasionally and often are shown in Table 1. No problems or discomfort at all in the OHIP-14 questionnaire was reported by 42% of the individuals. The proportion of individuals reporting problems or discomfort varied between the dimensions in OHIP-14 from 13% to 43%. Physical pain was reported by 43%, psychological discomfort by 28% and psychological disability by 28%. Only 13% reported social disability (Table 1). The most prevalent problem was aching in mouth followed by discomfort eating food both belonging to the dimension physical pain (Table 1).

Clinical dental health

The clinical dental status of the individuals is shown in Table 2. Of the 151 respondents, 19 (13%) were edentulous. The dentate individuals had an average of 19.6 teeth (SD 6.9) and 3.4 teeth (SD 5.1) with decay. None of the individuals were caries free.

Table 1. **Individuals (%) reporting score >0 according to dimensions in OHIP-14. OHIP-14 score (mean and SD) and distribution of individuals (%) according to item (*n* = 151)**

				Individuals according to score		
Dimension	Individuals with score >0 *n* (%)	Item	OHIP-14 score mean (SD)	Never (0) %	Occasionally (1–2) %	Often (3–4) %
Functional limitations	33 (22)	1 Trouble pronouncing words	0.2 (0.5)	85	15	0
		2 Worsened taste	0.2 (0.5)	89	10	1
Physical pain	65 (43)	3 Aching in mouth	0.5 (0.8)	69	29	2
		4 Discomfort eating food	0.4 (0.7)	72	27	1
Psychological discomfort	43 (28)	5 Feeling self-conscious	0.3 (0.7)	78	21	1
		6 Feeling tense	0.3 (0.6)	79	20	1
Physical disability	33 (22)	7 Poor diet	0.3 (0.6)	90	9	1
		8 Interrupted meals	0.1 (0.5)	80	19	1
Psychological disability	43 (28)	9 Difficulty relaxing	0.3 (0.6)	77	22	1
		10 Embarrassment	0.3 (0.6)	81	18	1
Social disability	19 (13)	11 Irritability with other people	0.1 (0.4)	90	9	1
		12 Difficulty doing usual jobs	0.1 (0.4)	91	8	1
Handicap	27 (18)	13 Life less satisfying	0.2 (0.7)	84	14	2
		14 Inability in function	0.1 (0.4)	88	11	1
OHIP score	87 (58)	All items	3.4 (5.1)	42	53	5

The percentage of edentulous individuals, the number of teeth and the number of teeth with decay was similar among males and females. Of the 19 edentulous individuals 17 had <8 years of education. Among the dentate individuals having long education was significantly associated with having a higher number of teeth, while the number of teeth with decay was not associated with education.

Self-evaluated dental health

The majority, 63% of the individuals (n = 93) rated their dental health as good and 59% (n = 89) were satisfied with their dental health (Table 2). Satisfaction with dental health was correlated with self-rated dental health (Spearman's $R = 0.41$, $P < 0.01$).

Neither self-rated dental health nor satisfaction with dental health was associated with length of education or with gender.

Self-evaluated dental health and clinical dental health

Neither self-rated dental health nor satisfaction with the teeth was different between edentulous and dentate individuals. In the dentate group individuals with 1–10 teeth, 35% rated their dental health as good while 73% of individuals with 21–28 teeth rated their dental health as good ($P < 0.05$). No other statistically significant associations were found between clinical dental health and self-evaluated dental health variables.

Relationship between oral health-related to quality of life and dental health

Table 2 shows the bivariate associations between, self-rated dental health, satisfaction with dental health, clinical recorded dental health, demographic variables and the OHIP-14 score.

No statistically significant difference in OHIP-14 scores could be found between edentulous (mean 3.9, SD 7.0) and dentate (mean 3.3, SD 4.8) (Table 2), and the proportions of individuals that had at least one score on the OHIP-14 were similar among edentulous and dentate individuals. The number of teeth with decay was not associated with OHIP-14 score. However, among dentate individuals the number of teeth was associated with OHIP-14 score. Those who had more teeth (21–28) had lower OHIP-14 score than those with fewer teeth (11–19, 21) and (1–10) (Table 2).

Self-rated dental health and satisfaction with dental health were related to OHIP-14 score. The individuals who rated their dental health as poor or reported to be dissatisfied with dental health had higher OHIP-14 score than those who rated their dental health as good and those who were satisfied (Table 2).

The mean OHIP-14 score was not statistically significantly associated with gender or level of education in bivariate analyses, but more men than women reported problems according to the OHIP-14 (Table 2).

Table 2. **Mean OHIP-14 score (SD) and OHIP-14 score >0 according to clinical dental health, satisfaction with dental health, self-rated dental health, gender and education**

	OHIP-14 score				OHIP-14 score >0		
	n	Mean	SD	*P*-value	*n*	%	*P*-value
Dental status							
Edentulous	19	3.9	7.0	0.64	19	58	1.00
Dentate	132	3.3	4.8		132	58	
Number of teeth							
1–10	23	5.6	6.9	0.03	18	78	0.02
11–20	37	3.5	4.4		24	65	
21–28	72	2.5	3.9		34	47	
Decayed teeth							
0	87	3.4	5.3	0.91	50	57	0.82
1–2	32	3.6	5.5		23	55	
>2	22	3.1	5.2		14	64	
Satisfaction with dental health							
Satisfied	89	2.3	3.9	<0.01	45	51	0.02
Neither satisfied nor dissatisfied	40	4.3	6.3		24	60	
Dissatisfied	22	6.2	5.4		18	82	
Self-rated dental health							
Good	93	2.1	4.0	<0.01	44	47	<0.01
Neither good nor poor	45	4.8	4.7		35	78	
Poor	10	9.9	8.8		8	80	
Gender							
Female	77	3.1	4.9	0.51	37	48	0.02
Male	74	3.7	5.2		50	68	
Education							
<8 years	81	3.0	4.9	0.08	45	56	0.36
8–12 years	44	4.8	6.3		29	66	
>12 years	26	2.2	3.1		13	50	

Discussion

The impact of oral status on 14 aspects of daily life might be considered as quite obvious because more than half (58%) of the Norwegians adult aged 68–77 years reported one or more oral impacts during the last year. Eighteen per cent reported being severely affected by their oral health in that they felt their life was less satisfying or that they were totally unable to function at some time in preceding year as a result of their oral condition. The most frequently experienced problems were aching in the mouth and discomfort eating food, which are in agreement with Nutall *et al.* (16).

In this study, 63% reported good dental health and 59% were satisfied with their dental health. This is a slightly larger proportion compared to Holst *et al.* who found that 46% of a Norwegian population reported good oral health (25). It has been recognized that when evaluating quality of life, people compare their expectations and experiences, considering what they see as being normal and acceptable for a given age and specific circumstances (20, 26). Whenever the experience falls short of expectations, there is an impact on quality of life. Thus, someone who generally has good oral health might perceive significant impact on their OHRQoL from relatively minor oral problems because of high expectations regarding

their oral health. More needs to be known about the frames or the reference that people use in constructing their responses to questions designed to assess oral health perceptions (26).

OHIP-14 score was significantly related to self-rated dental health and satisfaction with dental health. The persons who rated their oral health as poor and those who were dissatisfied with their dental health had the highest OHIP-14 score. Another finding of this study was the relationship between low number of missing teeth and low OHRQoL. The findings support earlier findings by Åstrøm *et al.* (14). A total of 55% of the adults in this study had more than 20 natural teeth, which is in agreement with earlier findings (25). However, the dentate with few teeth (1–10) were more dissatisfied with their OHRQoL than those who were edentulous. The older generation who are edentulous may find prosthetics more satisfied both aesthetically and functionally than few remaining teeth even though there was a large variation within the edentulous group. This shows that the number of remaining teeth was only partly related to peoples' assessment of oral health.

Decayed teeth do not seem to have any impact on the OHRQoL. Dental caries may not have been severe enough to influence on the OHRQoL. However, among both edentulous and dentate adults physical pain were the most frequent reported problems labelled as aching in mouth and discomfort eating, which may be related to dental caries. Problems categorized as psychological in nature were also frequently reported. These results may suggest that psychological issues affect quality of life more often than issues of functionality in this population.

It would be of interest to further investigate what the concept of oral health means to people, and how the assessment affect behaviours related to oral health. The results presented provide support for the discrepancy between clinically determined dental problems such as dental caries and OHRQoL. The study showed that participants can be affected in different ways by their oral conditions and clinical condition alone does not fully indicate how elderly Norwegian feel affected by their oral condition which are in agreement with Ekbæck *et al.* (1).

The OHIP-14 scores were significantly associated with self-evaluated dental health. In clinical practise it is important to ask patients about their self-rated dental health and satisfaction with dental health. Consequently, it may be enough to use these two self-evaluated questions rather than a comprehensive questionnaire. People are responsible for their own oral health and need to be involved in treatment planning, their perspective is thus of great importance.

The OHIP-14 is one widely used instrument for self-reported of the impact of oral conditions on daily life specifically among elderly. The OHIP-14 assesses consequences of oral disorder and treatment but not necessarily OHRQoL as the questionnaire is focused on the impact of oral diseases. The OHIP-14 scores in this study may be positively overestimated because of the participation rate of 60.4%. The invited individuals, who chose not to participate, may be the most fragile elderly with possibly worse OHRQoL, because they mentioned poor general health as a reason not to participate. However, the results of OHIP-14 are in agreement with the other studies which support the validity in the findings (15, 16, 18, 21). The significant relationship between self-rated dental health, satisfaction with dental health, and OHIP-14 that was found strengthen the validity of the Norwegian version of OHIP-14.

Conclusion

Oral health affects the quality of life of elderly people. Those with fewer remaining teeth reported lower OHRQoL, but no association with clinical caries status could be found.

There was a relationship between self-evaluations of dental health and OHRQoL.

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