Community Dent Oral Epidemiol 2007; 35: 357–363

COMMUNITY DENTISTRY AND ORAL EPIDEMIOLOGY

Oral health-related quality of life in patients with dental anxiety

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Mehrstedt M, John MT, Tönnies S, Micheelis W. Oral health-related quality of life in patients with dental anxiety. Community Dent Oral Epidemiol 2007; 35: 357–363. © The Authors. Journal compilation © 2007 Blackwell Munksgaard

Abstract – *Objectives:* To investigate the frequency of impaired oral health-related quality of life (OHRQoL) in patients with dental anxiety. *Methods:* OHRQoL was measured with the German version of the 14-item Oral Health Impact Profile (OHIP) developed by Slade and Spencer (1994) in 173 adult patients with dental anxiety [Dental Anxiety Scale (DAS) score 15 or above *and* Dental Fear Survey (DFS) score 60 or above]. The OHIP summary scores were characterized with an empirical cumulative distribution function and compared with the level of impaired OHRQoL in the general population ($n = 2026$, age: 16–79 years). In addition, OHIP item prevalences (responses 'fairly often'/'very often') were compared between patients and population subjects. The correlation between DAS, DFS and OHIP scores was calculated using the Pearson correlation coefficient. *Results:* A median value of 1 and a 90th percentile value of 13 were observed for general population subjects. In contrast, patients with phobic dental anxiety had a median OHIP-14 of 21 and the 90th percentile of 40. All problems mentioned in the OHIP-14 were more prevalent in patients than in population subjects. The most frequently occurring items in patients were 'self-conscious', 'life in general was less satisfying', and 'feeling tense' with prevalences of 50% or greater. In contrast, these items had prevalences of only 1–3% in the general population. A low to moderate relationship between OHRQoL and both dental anxiety measures (DAS and DFS) was observed ($r = 0.25/0.26$, $P < 0.01$). *Conclusions:* Patients with dental anxiety/fear suffer considerably from impaired OHRQoL and the degree of this impairment is related to the extent of dental anxiety/fear.

Key words: dental anxiety; dental health; quality of life

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Submitted 29 May 2006;
accepted 9 November 2006

Increasingly, subjective oral health indicators are used to assess and compare the impact of oral disease across populations. Oral health-related quality of life (OHRQoL) has gained particular consideration because of the importance and breadth of the concept – Locker provided a conceptual model for it that characterizes structural, behavioral and psychosocial consequences of oral disease using the framework of the World Health Organization (WHO) International Classification of Impairments, Disabilities and Handicaps. Well-investigated psychometric characteristics in typical settings, i.e., the measurement properties are known, are available for many of the proposed instruments (1). The Oral Health Impact Profile (OHIP), originally developed in Australia by Slade and Spencer, is one of the most widely used OHRQoL questionnaires (2). It was used to assess the impact in different populations.

Patients suffering from dental anxiety are a population of public health importance because of the extensive dental health problems caused by dental avoidance as a result of fear and the suboptimal dental health behaviors that are highly prevalent in this group. Dental anxiety is still a serious barrier to dental treatments and prolonged dental avoidance may lead to severe general health problems such as pneumonia, urinary tract infections, fever, septicemia, mediastinitis, intracranial extension of periapical abscess, facial osteomyelitis, sinusitis and sepsis (3). Deteriorating dental health may also become a serious source of insecurity and

doi: 10.1111/j.1600-0528.2007.00376.x

dwindling self-respect and thus lead to increasing social isolation which in turn may cause depressions and other serious psychiatric and psychosomatic conditions, or exacerbate such conditions which are often already present in this group (4). People with strong dental fears are also characterized by an above-average consumption of alcohol and illicit drugs and a high frequency of sick-leave days, which, on a national scale, may cause considerable financial costs to the community (5). Behavioral therapy of dental fears has been shown to cause a substantial reduction in these behaviors and in the frequency of health problems (6).

To characterize this population with an internationally compatible OHRQoL instrument such as the OHIP would allow characterizing the consequences of dental anxiety and fear on oral health from the patients' perspective. From a practical point of view, the information about OHRQoL could potentially be helpful for clinical decision making.

It was the aim of this study to describe the level of impaired OHRQoL in patients with dental anxiety and to compare the findings with population-based normative data.

Material and methods

Subjects, sampling, and setting

Study subjects were 173 adult patients (mean age: 35.0 years, max. age: 75 years, 60% women) with phobic dental anxiety. Phobic dental anxiety was defined as at least 15 points on the Dental Anxiety Scale (DAS) *and* at least 60 points on the Dental Fear Survey (DFS) (7, 8). Study subjects were recruited from consecutive new patients ($n = 311$) in a private dental practice in Hamburg, Germany specializing in the treatment of patients with dental anxiety. Patients could attend the practice at their own initiative or were referred by their dentist or physician. In the period from March 2005 through March 2006, all new patients were asked to fill out DAS, DFS, and OHIP forms. All adult patients meeting the definition of phobic dental anxiety were included in this study.

Patients were compared with subjects from the general population ($n = 2026$, age 16–79 years) sampled in a national survey. The study was performed in 2001 at 255 sampling points in Germany (response rate: 60%) targeting German-speaking subjects living in private households and registered at the community population register office [for details of the study see John et al. (9)].

Permission for this study was granted by the Board of Ethics of the Hamburg Medical Association.

Assessment of oral health-related quality of life and dental anxiety

OHRQoL was measured using the German version of the English-language OHIP with 14 items (10–11). For each OHIP question, subjects were asked how frequently they had experienced the impact in the last month. Responses were made on a scale 0-never, 1-hardly ever, 2-occasionally, 3-fairly often, and 4-very often. The OHRQoL impairment was characterized by the OHIP-G14 summary score – the simple sum of all 14 item frequencies ranging from 0 to 56 ($0–4 \times 14$) OHIP units. '0' indicates the absence of any problem, higher OHIP scores represent more impaired OHRQoL, i.e., the total instrument score is a 'problem index'. Dental anxiety was assessed using the DAS (7) and the DFS (8).

The DAS is a 4-item written questionnaire measuring the anxiety about dental appointments. Results range from 4 (no anxiety) to 20 (extreme anxiety). Scores of 15 and above are generally considered as extremely anxious (12).

The DFS is a more detailed 20 item written questionnaire with a range from 20 (no fear) to 100 (extreme fear). Scores of 60 and above are generally considered as extremely anxious (13). Both instruments were initially validated in English and have subsequently been validated in German (12, 14, 15).

Statistical analysis

To characterize the distribution of OHIP-G14 summary scores, empirical cumulative distribution functions were used. Summary scores of phobic patients were compared with those of general population subjects. The level of impaired OHRQoL was categorized using quartiles of both samples' distribution. For the three quartiles, OHIP-G14 summary scores including their 95% confidence intervals were computed for phobic patients and general population subjects as well as for gender and age (two categories based on the split at the age median of phobic patients) strata.

Internal consistency of OHIP scores was investigated in patients with dental anxiety (Cronbach's alpha: 0.92) and general population subjects (Cronbach's alpha: 0.94).

In addition to the evaluation of summary scores, the prevalence (including 95% confidence intervals)

of frequently occurring problems (response categories 'fairly often' and 'very often' versus 'never', 'hardly ever', 'occasionally') contained in the OHIP-G14 were compared between patients with dental anxiety and general population subjects.

The correlation between dental anxiety measures and OHIP-14 was determined using the Pearson correlation coefficient. All analyses were performed using the statistical software package STATA, (Stata Statistical Software: Release 9. College Station, TX: StataCorp LP).

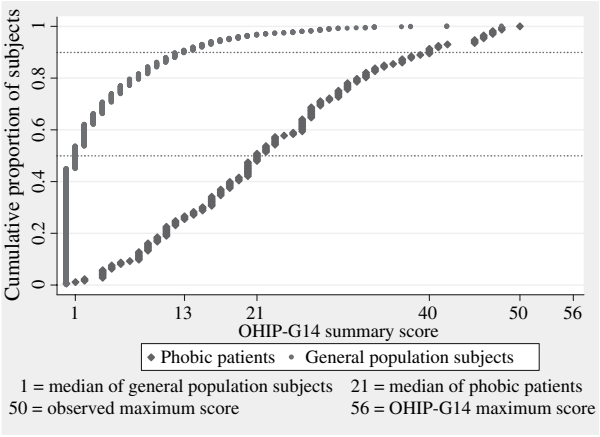

Fig. 1. Empirical cumulative distribution functions of impaired OHRQoL in patients with dental anxiety and general population subjects.

Results

Comparison of oral health-related quality of life between patients with dental anxiety and general population subjects

In the general population, a low overall burden in terms of OHRQoL impacts was observed (Fig. 1). All patients with dental anxiety had at least one symptomatic answer to the 14 questions, whereas 45% of the general population had none. A median value of 1 and a 90th percentile value of 13 were observed for general population subjects. In contrast, patients with phobic dental anxiety had a median OHIP-14 of 21 and the 90th percentile in these subjects was 40. The majority, i.e., about three quarters, of the patients with phobic dental anxiety expressed equal and higher impaired OHRQoL than the 10% of general population subjects with the highest OHRQoL impairment.

When quartiles of OHIP-14 were compared, the precision of the results was considered sufficient in both the general population subjects and patients. The OHIP summary score quartiles of phobic patients were 12.5 (95% CI) (11–16), 21 (20–24), and 30.5 (27–31). For population subjects, those values were 0 (0–0), 1 (1–1), and 6 (5–6). The 95% confidence interval for the OHIP-14 median in patients was between 20 and 24. In contrast to the general population, where an age influence on OHRQoL was observed (Table 1), i.e., higher age was associated with higher OHIP scores, in phobic patients, substantial OHRQoL differences in the two age categories were not observed. All quartiles in both age groups were close to each other (1 OHIP-14 point).

For both populations, i.e., the general population and dental phobic patients, no substantial OHRQoL differences related to gender were present. Men and women differed only by 1 OHIP-14 point.

Comparison of oral health problem prevalence between patients with dental anxiety and general population subjects

All problems mentioned in the OHIP-14 were more prevalent in patients than in population subjects (Fig. 2). Looking at the whole profile of item prevalences, it appeared that dental phobic patients had 10 times or more the problem prevalences compared with subjects in the general population. Results in the general population were

Table 1. OHIP-G14 summary scores and 95% confidence intervals for patients with dental anxiety and general population subjects at three levels of impaired OHRQoL stratified according to gender and age

Level of impaired OHRQoL categorized by OHIP-G14 summary score quartiles	General population subjects		Phobic patients		General population subjects		Phobic patients	
	≤35 years (n = 744)	36+ years (n = 1282)	≤35 years (n = 90)	36+ years (n = 83)	Women (n = 1047)	Men (n = 979)	Women (n = 104)	Men (n = 69)
1. Quartile	0 (0–0)	0 (0–0)	12.75 (9–18)	12 (10–16)	0 (0–0)	0 (0–0)	11.5 (10–17)	12.5 (8–16)
2. Quartile (median)	0 (0–1)	2 (1–2)	22 (20–26)	21 (17–23)	1 (0–1)	1 (1–2)	21 (20–26)	21 (16–26)
3. Quartile	4 (3–4)	7 (6–8)	31.25 (28–37)	30 (26–33)	5 (4–6)	6 (5–7)	31 (28–37)	30 (26–33)

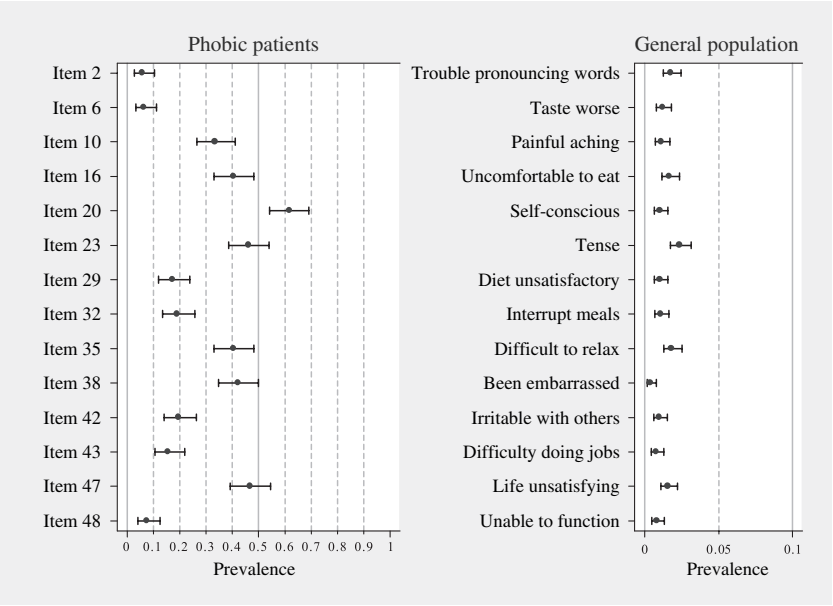

Fig. 2. Pattern of item prevalence (including 95% confidence intervals) of oral health problems mentioned 'very often' or 'fairly often' in patients with dental anxiety and general population subjects.

Table 2. Prevalence (including 95% confidence intervals) of oral health problems mentioned 'very often' or 'fairly often' in patients with dental anxiety and general population subjects

	Prevalence (95% confidence interval)	
	Phobic patients	General population subjects
Trouble pronouncing words	6 (3–10)	2 (1–2)
Taste worse	6 (3–11)	1 (1–2)
Painful aching	34 (27–41)	1 (1–2)
Uncomfortable to eat	40 (33–48)	2 (1–2)
Self-conscious	62 (54–69)	1 (1–2)
Tense	46 (39–54)	2 (2–3)
Diet unsatisfactory	17 (12–24)	1 (1–2)
Interrupt meals	19 (14–26)	1 (1–2)
Difficult to relax	40 (33–48)	2 (1–3)
Been embarrassed	42 (35–50)	0 (0–1)
Irritable with others	20 (14–26)	1 (1–2)
Difficulty doing jobs	16 (11–22)	1 (0–1)
Life unsatisfying	47 (39–55)	2 (1–2)
Unable to function	8 (4–13)	1 (0–1)

precise (because of the low prevalence) with very narrow 95% confidence intervals widths. As a result of higher prevalences in phobic anxiety patients the precision of prevalences was lower, but for most items within ±5% points.

The profile of item prevalences was different in both populations (Table 2). Almost two-thirds of the phobic patients indicated that they were 'fairly often' or 'very often' 'Self-conscious'. That 'life in general was less satisfying' was mentioned by almost half of the patients. Not only did these two problems have a frequency of about 1% in the general population, they were also less frequent than other OHIP-14 impacts ('feeling tense' and 'had trouble pronouncing any words' were with about 2–3% the most frequently occurring problems).

The most uncommon problems reported by dental anxiety patients (in comparison with other OHIP-14 impacts were 'Trouble pronouncing words', 'Taste worse', and 'Unable to function'. These items were still more frequent for dental phobics than the general population. This indicated that these problems were still of importance for dental phobic patients.

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

Within the group of phobic anxiety patients, a low to moderate correlation between the extent of dental phobic anxiety and OHRQoL was observed. More dental anxiety was associated with more impaired OHRQoL. A correlation coefficient of 0.25 (95% confidence interval: 0.10–0.38) was found for the relationship between DAS and OHIP-14 summary scores, a correlation coefficient of 0.26 (95% confidence interval: 0.11–0.39) was found for the relationship between DFS and OHIP-14 summary scores. DAS and DFS correlated with 0.60 (95% confidence interval: 0.50–0.69).

Discussion

The psychosocial impact of dental anxiety and fear is well-documented (16). The present study described

this impact (and that of the patients' other oral conditions) using the construct oral OHRQoL.

Using OHRQoL in a population of patients with dental anxiety/fear has several advantages. It is a broad concept targeting the patient's perception of oral health. Phobic patients suffer from a variety of oral problems ranging from pain and functional limitations to disability. The concept OHRQoL seems to be well-suited in its ability to capture many consequences of dental anxiety and fear. Several instruments are available to measure the construct (17). The OHIP, especially its short form with 14 items, is a widely used questionnaire (2, 11).

Although OHRQoL seems such a suitable concept to characterize perceived oral health, unfortunately, we were only able to locate one study describing OHRQoL using one of these instruments. In a random sample of 3 000 UK residents, McGrath and Bedi studied the interaction of dental anxiety, dental health, OHRQoL (with the OHQoL-UK) and socioeconomic status and found that people with high rates of dental anxiety were twice as likely to be among the group with the poorest OHRQoL as others (18). We did not find studies describing OHRQoL in populations of patients with dental anxiety/fear.

We found studies describing the health-related quality of life in patients with dental anxiety; [Reisine, Fertig, Weber and Leder, (19)] and found impaired quality of life among people with dental anxiety, but even more so in patients with temporomandibular disorders (19). Berggren found that many patients who had been referred to a dental fear clinic scored high on the Nottingham Health Profile, with 52% indicating that their dental fear caused problems with social activities, 46% with going on vacation and 41% with family relationships (20).

Hakeberg and Berggren showed an overall improvement and a reduced number of sick-leave days for patients who had successfully been treated for dental phobias compared with control groups (21). In a study of 67 dental phobics (22), Abrahamsson et al. found strong negative social consequences from dental anxiety in that group, and in a later study of 169 dental phobics (23), they investigated the differences between phobics who avoided dental care and those who managed to seek dental help in spite of their fears. They concluded that differences between high dental fear patients with regular dental care and patients with avoidance behavior were mainly related to anticipated fear and anxiety, oral health effects, and negative life consequences. Mehrstedt, Tönnies and Eisentraut showed in a study of 137 patients in a dental fear clinic in Hamburg, Germany, that dental fears were negatively related to quality of life, especially as measured in areas such as psychological well-being, vitality, and social functioning (24).

Comparison of oral health-related quality of life of dental anxiety patients with other populations

Our finding of substantially impaired OHRQoL in dental anxiety patients can be compared with other populations having specific dental conditions. First of all, there is a striking difference in the amount of problems compared with the general population. This is not surprising but patients with dental anxiety and fear suffer also from a lot more problems than usual dental patients. For example, patients seeking prosthodontic treatment have a compromised oral status — Szentpetery et al. report the most frequent problems ('difficulty chewing') with a prevalence of 31% (25). The most frequently occurring item ('being self-conscious') in our patient sample had the double prevalence.

Summary scores in our dental anxiety patients can be compared with patients attending an oral medicine clinic with diagnoses such as keratosis, ulcer/blister/cracks, lichen, candiosis/stomatitis, dry mouth, burning mouth, benign conditions, pain/neuralgia/TMJ (26). Most patients' groups had a considerably lower perceived impact from their conditions indicated by OHIP-14 medians between 3 and 12 than phobic patients. Patients with burning mouth, ulcer/blister/cracks, dry mouth had medians of 18–21 which was almost at the same level of psychosocial distress as that seen in phobic patients. In patients diagnosed with Behçet's disease or recurrent aphthous stomatitis, OHIP-14 mean summary scores were 20.5 and 15.3, respectively (27). We used the median to characterize the typical OHIP score in our patients because the distribution of OHIP scores is usually skewed, but the mean OHIP-G14 summary score for dental anxiety patients was with 22.4 (95% confidence interval: 20.6–24.2) still slightly higher than the mean for Behçet's disease or recurrent aphthous stomatitis patients. Our upper limit of the confidence interval was equal to the mean values of the Chinese OHIP-14 in a subject with high/severe periodontal attachment loss (28).

Correlation between (dental) anxiety and oral health-related quality of life

There are studies which evaluated the correlation between (dental) anxiety and OHRQoL. Using the

OHRQoL measure, OHQoL-UK, it was found in a national study in Britain that those with high levels of dental anxiety (DAS ≥15) were approximately two times as likely to be among those below the population median OHQoL-UK score (29). Although these results were statistically significant, however, the correlation among the dental anxiety and the OHRQoL instruments' summary score was weak as indicated by a reported correlation coefficient between the DAS and OHQoL-UK of $r = 0.14$.

We found correlations of $r = 0.25/0.26$ depending on what instrument was used. If we would have included subjects with no or less dental anxiety/fear than DAS ≥15 points and DFS >60, one may speculate that we may have even found stronger correlations because the magnitude of the correlation coefficient is effected by the range of the investigated variables (and the dental anxiety scale was restricted in our sample to have a well-defined patient population). Our findings suggested that in patient population, the correlation between dental anxiety and OHRQoL is substantially stronger than in the general population and reaches a clinically significant magnitude. This hypothesis is supported by findings using general anxiety measures. In a study involving patients attending an oral medicine clinic and population-based controls, a correlation of 0.20 (which is similar to our results) between OHIP scores and anxiety scores (Hospital Anxiety and Depression Scale) was found (26).

The literature suggests that OHRQoL correlates with other psychological constructs such as negative affectivity, depression, and somatization (30, 26, 31).

Strengths and limitations of the study

Our study is cross-sectional and does not allow an inference about the direction of the observed correlation between dental anxiety and OHRQoL. In fact, both directions are possible – dental anxiety could have caused that subjects perceive their oral health as compromised, i.e., they report more problems, and impaired OHRQoL may cause higher levels of dental anxiety. The third possibility that both constructs are caused by a third factor is plausible too – impaired (physical) oral health can certainly cause dental anxiety and, of course, the patients perceive their status is compromised. The present study describes perceived oral health. Even if the observed correlation would be interpreted as causal association, only a small proportion of OHIP scores would be attributable to dental anxiety. Only 6–7% of the variability of OHIP scores is explained by dental anxiety in this population.

We would like to emphasize that the potential to generalize our results depend on the representation of our patient population. Because of convenience we choose a specialized practice. Therefore, our sample is probably not representative for the subjects for this defined level of dental anxiety in the general population. Treatment seeking behavior and oral conditions prompting treatment demand may influence OHRQoL. Our population should be similar to other treatment centers for dental phobics. How far our setting is comparable with other treatment centers for patients with dental anxiety is not exactly known. However, by using internationally well-accepted instruments to assess dental anxiety in a substantial number of consecutive patients, we were able to characterize the level of this construct well in our population which should make the findings comparable to other settings.

Conclusions

Patients with dental anxiety/fear suffer considerably from impaired OHRQoL. The extent of dental anxiety/fear is related to the magnitude of OHRQoL level.

From a public health point of view, these results emphasize the importance of dental anxiety and fear for the total burden of oral disease. From a research perspective, OHRQoL instruments seem to be well-suited in their ability to differentiate among patients with dental anxiety/fear and, probably, to evaluate treatment. For clinical practice, it is hoped that such instruments could be a useful clinical tool for dentists working with dental phobics, as the concept OHRQoL raises issues that are of profound personal importance to the patients and often makes the discrepancies obvious between the patient's present behavior and the goals the patient himself wants to reach.

Acknowledgements

The authors would like to thank Dr Christina Steger, Summit Hospital in Nashville, Tennessee, for her very valuable help with this manuscript.

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