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Oral health and oral treatment needs in patients fulfilling the DSM-IV criteria for dental phobia: Possible influence on the outcome of cognitive behavioral therapy

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Abstract

Objective. To describe oral health and oral treatment needs in a group of dental phobic patients (DSM-IV) and to explore possible relationships between these factors and changes in self-reported dental anxiety before and after phobia treatment. ***Material and Methods.*** Forty patients (25 women) fulfilling the DSM-IV criteria for specific phobia were included in the study. Mean age of the group was 34.9 years (range 19–60) and mean dental avoidance was 11.2 years (range 3–30 years). They were treated with cognitive behavioral therapy (CBT) during either one session (3 h) or five sessions (1 h each). Oral health was evaluated by orthopantomogram and clinical examination. The outcome of the CBT was measured by the change in dental anxiety scores (DAS, DFS) and in positive and negative thoughts during a standardized dental behavior test from pretreatment to 1-year follow-up. ***Results.*** Mean (SD) DMFT was 16.5 (5.8), range 3–26; DT was 6.6 (4.2). Mean number of teeth with dental treatment need (restorative, periodontal, extractions, etc.) was 9.6 (6.9), range 1–28. There were statistically significant correlations between number of decayed teeth and decrease in negative thoughts ($r = -0.39$, $p = 0.048$) and maximum anxiety ($r = -0.65$, $p = 0.001$). The total number of teeth with treatment need correlated with an increase in positive thoughts ($r = 0.60$, $p = 0.001$) and decrease in maximum anxiety ($r = 0.50$, $p = 0.015$). ***Conclusions.*** There are large variations in oral health and treatment needs among patients fulfilling the DSM-IV criteria for dental phobia. Patients with the best dental health and lowest treatment needs experience the largest increase in positive cognitions during exposure to dental treatment at 1-year follow-up.

Key Words: *CBT, dental anxiety, DMFT*

Introduction

Patients with high dental anxiety avoid going to the dentist [1], and they report more pain [2] and poorer oral health status than the regular dental population [3]. They also report higher dissatisfaction with their mouth [4], impaired social life with compromised interpersonal relationships [5], and reduced oral health-related quality of life [6].

Phobia is a marked and persistent fear of clearly discernible, circumscribed objects or situations. In both the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) [7] and the International Classification of Diseases (ICD) [8], dental phobia is classified as a specific phobia. Being diagnosed as a dental phobic, the distress, anxiety, and avoidance behavior influence the person's daily routines and social and occupational functioning. The prevalence of dental phobia is estimated to be between 2% and 5% of the adult population [9,10].

The psychotherapeutic treatment approaches for dental anxiety and phobia are usually applied during a number of treatment sessions over long periods of time, although one-session cognitive treatments have also been evaluated [11,12]. Little is known about the factors that influence the prognosis of anxiety treatment. Patients who qualify for the DSM-IV diagnosis of dental phobia are reported to require more anxiety treatment than patients who do not qualify [13]. In a follow-up study, it has been found that number of treatment visits might explain the reduction in dental anxiety [14].

Previous studies have described the oral health of patients with high dental anxiety as poor [15–18]. To our knowledge, there is only one study available considering oral health in patients with a formal

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diagnosis of dental phobia [12]. No studies are available of a possible relationship between oral health and treatment needs and the self-reported outcome of the phobia treatment in such patients. In a recent intervention study, we tested the effect of the one-session versus five-session treatment approach [19]. We included oral health data of the odontophobic patients and were able to relate the oral health and treatment needs to self-reported outcome variables of the phobia treatment.

The aims of the present study were: 1) to describe oral health and dental treatment needs in a group of patients diagnosed with dental phobia (DSM-IV), and 2) to relate oral health to self-reported changes in maximum anxiety and positive and negative thoughts in the feared dental situation at 1-year follow-up.

Material and methods

This study was part of a treatment study [19] of dental phobia patients treated according to principles of cognitive behavior treatment (CBT) either in one or five sessions according to the one-session manual developed by Öst [20].

Subjects

The sample comprised 40 patients (25 F), aged between 19 and 60 years (mean (SD) 34.9 (10.5) year), who had been referred by medical doctors, dentists, or psychologists to the Center for Odontophobia at the University of Bergen or who had contacted the center on their own. To be included in the study, the patients had to meet the DSM-IV criteria [7] for specific phobia (dental phobia); these include a history of avoidance of dental treatment. The avoidance time ranged from 3 to 30 years, with a mean of 11.2 years.

Dental health and treatment needs were evaluated for all the patients included in the study. The relationship between oral health and treatment needs and positive and negative thoughts during a behavioral avoidance test (BAT) was evaluated for the 31 patients who attended the 1-year follow-up assessment.

Procedure

Before the patients were scheduled for an interview with a specialist in clinical psychology, they were given written information about the treatment procedure. They were informed that the phobia treatment consisted of either one session or five sessions and that thereafter they would be referred to an extramural dentist.

At the first appointment, the patients completed a set of questionnaires, including the Dental Anxiety Scale (DAS) [21] and the Dental Fear Survey (DFS) [22]. The phobia was diagnosed by the psychologist using the Structural Clinical Interview (SCID) [23].

Immediately after the diagnostic interview, the patient completed a BAT conducted by a general dentist. The test comprised 14 steps (Table I) based on a hierarchic approach to dental treatment. The patients could discontinue the test at any time and the number of steps completed was recorded.

The patients were randomly allocated to one of the treatment conditions, i.e. either one session or five sessions. Twenty patients received the one-session treatment, which lasted for a maximum of 3 h, while 20 patients received the five-session treatment, each session of maximum 1 h duration. Anxiety was treated by one dentist (ES) who had previously received supervised training in CBT.

After the phobia treatment, the patients were referred to general practitioners recruited based on an advertisement in the local dental association journal. No special qualifications were required. The dentists received a summary of the treatment, but no information about the number of treatment sessions.

One year after the dental phobia treatment, the patients were recalled to the research center for a follow-up interview with a psychologist and to have a new BAT, including recording of maximum anxiety and negative/positive thoughts in the feared dental situation.

The study design was approved by the National Committee for Research Ethics in Norway.

Measures

Since there were no statistically significant differences in pretreatment and follow-up measures between subjects treated in one versus five sessions, all measures in the present study were pooled from the two groups.

Dental anxiety

The DAS [21] is a four-item self-report scale. The person's subjective reactions in four dental situations are rated on a 5-point Likert scale. Summation of

Table I. Steps in the behavioral test.

1.	Enter dental treatment room
2.	Sitting in the treatment chair
3.	Fasten paper bib around neck
4.	Lower back of chair
5.	Lower lamp towards patient's face
6.	Put instrument table closer toward the patient
7.	Open mouth
8.	Clinical exam with mirror
9.	Offer to drill and fill a cavity
10.	Topical anesthesia
11.	Injection of local anesthesia
12.	Saliva suction
13.	Drilling a cavity
14.	Filling a cavity

the scores gives an overall anxiety score ranging from 5 (not anxious at all) to 20 (extremely anxious). The Dental Fear Survey (DFS) [22] records behavioral, psychological, and cognitive aspects related to dental treatment and comprises 20 items with scores graded 1–5. The higher the sum-score achieved, the higher the dental anxiety.

Treatment outcome variables

DAS and DFS were evaluated pretreatment and at follow-up. The differences between pretreatment scores and follow-up scores were estimates of reduction in dental anxiety and negative beliefs of the dentist. Immediately after the BAT, the patients reported the frequency from 0 to 4 (0 = never, 4 = very often) of 5 negative and 5 positive thoughts. The negative thoughts were: *I can't do this; I'm going to fail; I'll faint; I need to get out of this situation* and *I can't stand this*. The positive thoughts were: *I have control over the situation; It's going well – better then I thought it would; it's not as unpleasant as I thought; I feel calm and safe* and *I'm satisfied with myself*. These cognitions have been used previously by Öst et al. [24]. Maximum anxiety during the test was recorded on a VAS scale graded from 0 (no) to 10 (maximum). The pretreatment values of these self-reports were compared to follow-up values.

Oral health and treatment needs

All patients had an orthopantomogram (OPG) taken before the start of the anxiety treatment. Oral health status was recorded based on the OPG and a clinical examination, which was done as soon as the patient could tolerate this. In all cases, this was done during the first treatment session. Three dentists (including the therapist) separately recorded oral health and treatment needs based solely on the OPG. With access to the initial recordings by the therapist, the registrations were then discussed among the three dentists until consensus was achieved.

Oral health measures:

Number of teeth present: All teeth with a clinical crown. The 3rd molars were excluded, except in situations where these functioned in the position of a 2nd molar (fully erupted).

Sound teeth: Number of erupted teeth with no signs of pathology (caries, periodontal disease, and periradicular lesions according to the criteria below).

Caries (DMFT): D = Primary or secondary caries in dentin. M = Missing due to caries or carious tooth beyond repair (roots). F = Filled/restored tooth with no sign of caries in dentin.

Periodontal disease: Number of teeth was recorded on two severity levels:

1) Advanced marginal bone loss: marginal bone level >4 mm from the cemento-enamel junction and coronal to the apical one-third of the root, and 2) total marginal bone loss: marginal bone level in the apical one-third of the root.

Root-filled teeth: Number of teeth with root canal treatment, and also if present as remnants of roots.

Remnants of roots: Number of destructed teeth that could not be restored. Multiple rooted teeth were recorded as one tooth.

Periradicular bone lesions: Number of teeth, excepting root remnants, with pathologically altered lamina dura and apical radiolucency.

Number of 3rd molars: All 3rd molars erupted or not erupted if not situated in the 2nd molar position.

Measures of treatment needs:

Restorations: Number of teeth in need of restorative treatment (filling or crown).

Periodontal treatment: Number of teeth with marginal bone level >4 mm from the cemento-enamel junction and coronal to the apical one-third of the root.

Root filling: Number of restorable teeth recorded with periradicular bone lesions and/or obvious pulp involvement.

Replacements: Number of teeth missing or in need of extraction in the region between the 2nd premolars.

Dentures: Number of dentures needed.

Extractions: Number of 1) root remnants, 2) teeth with marginal bone level in apical one-third of the root, 3) 3rd molars with signs of pathology, partially erupted, or retained with obvious communication to the oral cavity.

Teeth in need of treatment: All teeth with diagnoses that needed treatment (decayed, marginal bone loss, roots, or apical lesions) on the basis of the above criteria.

Statistical analyses

The data were analyzed using the SPSS statistical package, version 14.0 (SPSS, Chicago, Ill., USA). Dental health and oral treatment needs were analyzed by descriptive analyses with mean scores and standard deviation for variables with close to normal distribution, while median and min-max scores were used for variables with very skewed distribution. Spearman's correlation was used to evaluate bivariate relationships between dental health and oral treatment needs versus cognitive perceptions during the BAT and changes in dental anxiety from pretreatment to follow-up.

Results

Oral health

The mean number of teeth present was 26.03 (SD = 3.55) and ranged from 10 to 28 (median = 27.5). In total, 37 patients had more than 20 teeth and 20 had all 28 teeth.

Table II. Mean DMFT scores (SD, range) and the D, M, and F portions according to age groups and for the total sample.

Age groups	D Mean (SD) (range) (*n*)	M Median (range) (*n*)	F Median (range) (*n*)	DMFT Mean (SD) (range) (*n*)
<31	8.8 (4.7) (1–21) (18)	0.0 (0–11) (18)	5.0 (0–14) (16)	14.6 (5.8) (4–26) (16)
31–41	4.6 (3.0) (1–10) (12)	0.0 (0–4) (12)	11.0 (1–17) (11)	16.7 (5.9) (3–23) (11)
>41	5.3 (2.9) (2–11) (10)	3.5 (0–18) (10)	7.5 (2–16) (8)	19.6 (3.0) (15–24) (8)
Total	6.7 (4.3) (1–21) (40)	1.0 (0–18) (40)	8.0 (0–17) (35)	16.4 (5.6) (3–26) (35)

Caries

The DMFT score ranged from 3 to 26 with a mean of 16.4 (SD = 5.6), median = 17.0) (Table II). The D-portion comprised about 40% of the total DMFT index.

Periodontal disease

The variation in number of teeth with advanced or total marginal bone loss was large (range = 0–24; median 0). A total of 11 patients were registered with marginal bone loss in one or more teeth.

Roots, periradicular lesions, root fillings, and 3rd molars

Twenty-two patients had never had root canal treatment and no patient had had more than five teeth treated. Twenty-seven patients had no roots present and one patient had more than 10 roots present. The number of teeth with apical bone loss ranged from 0 to 6, where 24 patients had no teeth with apical bone loss and 4 patients had 3–6 teeth with apical bone loss.

Treatment needs

The number of teeth with treatment needs (restorations, extractions, root canal treatment, and/or periodontal treatment) is displayed in Table III. The most frequent type of treatment need was restoration. The reasons for extractions were roots with decay beyond treatment, teeth with total marginal bone loss, and 3rd molars with disease (caries, pericoronitis) or retained with communication to the oral cavity. Eight patients had <5 teeth in need of any kind of dental treatment, while 5 patients had 22 or more teeth in need of dental treatment. Seventeen patients had at least one 3rd molar that needed extraction. No significant differences between years of avoidance and teeth in need of restoration, root filling, periodontal treatment, or extraction were found.

Oral health and treatment need in relation to outcome of phobia treatment

Thirty-one patients were available for follow-up assessment. Two dropped out due to natural reasons (death or moving to another part of the country), while the reasons for the other drop-outs were: continuation of treatment in the clinic ($n = 2$), treatment not completed ($n = 1$), two missed follow-up appointments ($n = 1$), unable to be tracked down by mail or telephone after several attempts ($n = 2$), and not having paid for treatment or not attending follow-up ($n = 1$). Four of the 31 patients had not been treated by a general dentist during the period from post-treatment to follow-up. Drop-out patients did not differ significantly from the rest of the group in relation to their oral health and treatment needs.

Correlations between psychometric scores and measures of dental health and oral treatment need for the 31 patients who met for follow-up are given in Table IV. These showed that patients with a higher number of decayed teeth had a lower reduction in negative thoughts from pretreatment to 1-year follow-up, and that those with a high number of teeth in need of root canal treatment had less decrease in DAS and increase in positive thoughts. Finally, patients with a high number of teeth in need of any kind of treatment showed less increase in positive thoughts and less decrease in maximum anxiety.

Discussion

The primary aims of the present study were to describe oral health and dental treatment needs in patients fulfilling the DSM-IV criteria for dental phobia [7] and to relate these factors to phobia treatment outcomes. Generally, we found large

Table III. Number of teeth in need of restoration, with advanced periodontal bone loss, in need of root canal treatment and in need of extraction in different age groups.

Age groups (years) (*n*)	Restoration Mean (SD) (range)	Periodontal treatment Median (range)	Root canal treatment Median (range)	Extraction Median (range)
<31 (18)	8.7 (4.8) (1–21)	0.0 (0–7)	1.0 (0–7)	2.0 (0–10)
31–41 (12)	4.4 (2.7) (1–10)	0.0 (0–1)	0.5 (0–2)	1.0 (0–4)
>41 (10)	5.0 (3.2) (1–11)	5.0 (0–22)	1.0 (0–3)	2.5 (0–9)
Total (40)	6.5 (4.3) (1–21)	0.0 (0–22)	1.0 (0–7)	2.0 (0–10)

Table IV. Correlations (Spearman) between oral health/oral treatment need and changes in psychological measures from pretreatement to 1-year follow-up.

			Changes from pretreatment to 1-year follow-up				
No. of teeth			Decrease in DAS	Decrease in DFS	Decrease in negative thoughts	Increase in positive thoughts	Decrease in max anxiety
Oral Health	DT	r	−0.183	−0.73	−0.392	−0.326	−0.654
		p-value	0.333	0.70	0.048*	0.105	0.001*
Treatment need	Root canal treatment	r	−0.368	−0.070	−0.374	−0.400	−0.353
		p-value	0.046*	0.715	0.083	0.043*	0.098
	Any kind of treatment	r	−0.253	−0.25	−0.229	−0.595	−0.502
		p-value	0.177	0.184	0.260	0.001*	0.015*

*p-value <0.05.

variations in oral health and treatment needs in these patients. This is illustrated by the fact that 20 patients had all their teeth present, 6 had 25 or more sound teeth, while 5 patients needed treatment on more than 20 teeth.

The clinical examination procedures had to be adapted to the ability of the phobic patients to cope with the clinical situation; bitewing radiographs and a thorough clinical examination were impossible due to their phobic reactions. Having panorama radiographs (OPG) taken, however, was accepted for all of the patients except one, and a brief intra-oral examination could be done by the dentist during the first hour of the phobia treatment.

In spite of these limitations, we conclude that the oral health of phobic patients is worse than that of the general population. When comparing our findings with a study from 1994 [25], representing a general Norwegian population aged 35–64 years, the mean number of decayed teeth among the dental phobics in our study was 6.6 versus 0.7 in the general population. The phobic patients also had a lower number of sound and filled teeth in all age groups. Furthermore, we found that 28% of the patients in our study had teeth with marginal bone loss ≥ 4 mm from the cemento-enamel junction, which is more than twice the value (12%) in a general Danish population [26]. These findings concur with previous studies showing that patients with severe dental fear [3,18], or patients diagnosed with dental phobia [12], have significantly poorer oral health status than the general population.

Comparing our findings with those of populations denoted with high dental fear, but without a formal diagnosis [3,16,18,27,28], should be done with caution. The main impression is that individual variations are large in both groups and that some have good oral health despite their high anxiety or phobia. Furthermore, the present results do not support a possible claim that patients with a formal dental phobia diagnosis have higher dental treatment needs than those screened with the use of psychometric questionnaires.

Initially, we hypothesized that patients with major oral treatment needs would experience less success from the dental phobia treatment in terms of dental anxiety reduction than patients with minor treatment needs. This hypothesis was only partly confirmed, since only the need for root canal treatment was significantly correlated with the decrease in DAS (Table IV). However, the trend of negative relationship between number of teeth in need of any kind of treatment and both DAS and DFS scores may indicate a possible significant relationship between these variables in a bigger sample. We found a significant relationship between the oral treatment needs and changes in cognitions and anxiety during the BAT test from pretreatment to 1-year follow-up. These findings support the hypothesis that patients with large treatment needs experience less positive outcomes 1 year after the anxiety treatment in terms of positive thoughts and anxiety felt during dental treatment than those with minor treatment needs. Large dental treatment needs may affect the patients' perceptions of coping in a negative way compared with patients with less need for treatment. Despite this, it must be borne in mind that even if both the one-session and five-session alternatives are fairly short duration anxiety treatments, during which the patients are exposed to a relatively small range of dental procedures, even patients with major dental treatment needs are able to go to an extramural dentist 1 year after the phobia treatment.

The relationships between oral health/treatment needs and the level of improvement of dental anxiety and cognitions during dental treatment should be further explored in bigger samples so that adequate treatment concepts can be designed for all patients.

References

[1] Liddell A, May B. Some characteristics of regular and irregular attenders for dental check-ups. Br J Clin Psychol 1984;23(Pt 1):19–26.

[2] Gilbert GH, Duncan RP, Heft MW, Dolan TA, Vogel WB. Oral disadvantage among dentate adults. Community Dent Oral Epidemiol 1997;25:301–13.

[3] Hakeberg M, Berggren U, Gröndahl HG. A radiographic study of dental health in adult patients with dental anxiety. Community Dent Oral Epidemiol 1993;21:27–30.

[4] Hägglin C, Hakeberg M, Ahlqwist M, Sullivan M, Berggren U. Factors associated with dental anxiety and attendance in middle-aged and elderly women. Community Dent Oral Epidemiol 2000;28:451–60.
[5] Kent G, Rubin G, Getz T, Humphris G. Development of a scale to measure the social and psychological effects of severe dental anxiety: social attributes of the Dental Anxiety Scale. Community Dent Oral Epidemiol 1996;24:394–7.
[6] McGrath C, Bedi R. The association between dental anxiety and oral health-related quality of life in Britain. Community Dent Oral Epidemiol 2004;32:67–72.
[7] American Psychiatric Association. Diagnostic and statistical manual of mental disorders, DSM-IV, 4th edn. Washington, DC: 1994.
[8] World Health Organization. The ICD-10 classification of mental and behavioral disorders. Clinical descriptions and diagnostic guidelines. Geneva: WHO; 1992–3.
[9] Kent G. Dental phobias. In: Davey IGCL, editor. Phobias. A handbook of theory, research and treatment. Chichester: John Wiley; 1997. p. 107–27.
[10] Hakeberg M, Berggren U, Carlsson SG. Prevalence of dental anxiety in an adult population in a major urban area in Sweden. Community Dent Oral Epidemiol 1992;20:97–101.
[11] de Jongh A, Muris P, ter Horst G, van Zuuren F, Schoenmakers N, Makkes P. One-session cognitive treatment of dental phobia: preparing dental phobics for treatment by restructuring negative cognitions. Behav Res Ther 1995;33: 947–54.
[12] Thom A, Sartory G, Jöhren P. Comparison between one-session psychological treatment and benzodiazepine in dental phobia. J Consult Clin Psychol 2000;68:378–87.
[13] Kvale G, Raadal M, Vika M, Johnsen BH, Skaret E, Vatnelid H, et al. Treatment of dental anxiety disorders. Outcome related to DSM-IV diagnoses. Eur J Oral Sci 2002;110:69–74.
[14] Aartman IHA, de Jongh A, Makkes PC, Hoogstraten J. Dental anxiety reduction and dental attendance after treatment in a dental fear clinic: a follow-up study. Community Dent Oral Epidemiol 2000;28:435–42.
[15] Abrahamsson KH, Berggren U, Hakeberg M, Carlsson SG. The importance of dental beliefs for the outcome of dental-fear treatment. Eur J Oral Sci 2003;111:99–105.
[16] Eitner S, Wichmann M, Paulsen A, Holst S. Dental anxiety – an epidemiological study on its clinical correlation and effects on oral health. J Oral Rehabil 2006;33:588–93.
[17] Samorodnitzky GR, Levin L. Self-assessed dental status, oral behavior, DMF, and dental anxiety. J Dent Educ 2005;69: 1385–9.
[18] Schuller AA, Willumsen T, Holst D. Are there differences in oral health and oral health behavior between individuals with high and low dental fear? Community Dent Oral Epidemiol 2003;31:116–21.
[19] Haukebø K, Skaret E, Öst LG, Raadal M, Berg E, Sundberg H, et al. One-session vs. five-session treatment of dental phobia: a randomized controlled study. J Behav Ther Exp Psychiatry (2007), doi:10.1016/j.jbtep2007.09.006.
[20] Öst LG. One-session treatment for specific phobias. Behav Res Ther 1989;27:1–7.
[21] Corah NL. Development of a dental anxiety scale. J Dent Res 1969;48:596.
[22] Milgrom P, Weinstein P, Getz T. Treating fearful dental patients: a patient management handbook, 2nd rev. edn. Seattle: Continuing Dental Education, University of Washington; 1995.
[23] Kleinknecht RA, Klepac RK, Alexander LD. Origins and characteristics of fear of dentistry. J Am Dent Assoc 1973;86: 842–8.
[24] Spitzer RL, Williams JB, Gibbon M, First MB. The structured clinical interview for DSM-III-R (SCID). I: History, rationale, and description. Arch Gen Psychiatry 1992;49:624–9.
[25] Öst LG, Sterner U, Fellenius J. Applied tension, applied relaxation, and the combination in the treatment of blood phobia. Behav Res Ther 1989;27:109–21.
[26] Holst D, Schuller AA. Oral health changes in an adult Norwegian population: a cohort analytical approach. Community Dent Oral Epidemiol 2000;28:102–11.
[27] Bahrami G, Isidor F, Kirkevang LL, Vaeth M, Wenzel A. Marginal bone level in an adult Danish Population. Oral Health Prev Dent 2006;4:119–27.
[28] Abrahamsson KH, Berggren U, Hakeberg M, Carlsson SG. Phobic avoidance and regular dental care in fearful dental patients: a comparative study. Acta Odontol Scand 2001;59: 273–9.