Dental anxiety in Iceland: an epidemiological postal survey

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In this study, we examined the prevalence of specific (dental) phobia among a sample of the Icelandic population. In addition to dental anxiety we explored factors that could be related to dental anxiety. In the period 1972–73, a stratified sample of 1641 schoolchildren in Reykjavík was selected for a study on malocclusion, dental maturation and other factors. Twenty-two years later (1995), a postal survey conducted in this group looked at many variables relating to oral health, including orofacial pain, functional oral disorders, self-perception of dental and general appearance and need for orthodontic treatment. Out of 1529 individuals contacted, 1192 completed questionnaires were returned (response rate 78%). Questions based on DSM-IV criteria of specific (dental) phobia (DP) were included. Ninety-six participants reported that they had avoided dental treatment during the previous 6 months. Twenty-one respondents fulfilled DSM-IV criteria for specific (dental) phobia (DP) and 75 admitted to many symptoms of dental anxiety (DA). Specific (dental) phobia (DP) was more prevalent among women than among men. The divorced or widowed were most at risk, as were non-salaried respondents. Most respondents attributed the onset of their phobias to a specific painful or fearful experience. There was a significant difference between the total dentally anxious (TDA = DA + DP) and the not dentally anxious (NDA) with regard to sex (women-higher TDA) and marital status (divorced or widowed-higher TDA). The TDA had statistically fewer teeth than the NDA and received dental treatment less frequently. □ *Dental anxiety; dental phobia; epidemiology; postal survey*

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Negative perception and anxiety toward dental treatment has long been a problem causing concern among dentists and their patients. In the United States it has been estimated that 80% of the population exhibit some anxiety toward dental treatment, while between 5% and 14% suffer from marked anxiety (1). In a Japanese study it was found that more than 80% of those surveyed reported some dental fear, while 6–14% reported marked dental anxiety (2). In an English survey of 6000 people, 43% reported avoiding going to the dentist unless necessary, i.e. due to an emergency problem with their teeth (3), and 58% of this group stated that a major reason for not seeking regular treatment was fear of the dentist (4). In an Icelandic study, 21% of the cohort reported fear of going to the dentist (5). Fear and anxiety are frequently associated with fear of the dentist. A minority who fear going to the dentist suffer from dental phobia, in which fear of dentistry is a major impediment.

Dental anxiety can be acquired either by direct exposure to a fearful or painful situation or by vicarious learning (6). When fear and anxiety are inordinate in relation to a situation, a phobia is said to exist (7). Öst (8) has shown that the acquisition of most phobias can be traced to a specific situation or incident. It has been demonstrated that children can acquire dental fears from family and friends (9). Families of dental phobics are more afraid of dental treatment than control families (10). Dental phobia can either be limited to this specific problem or it can accompany other types of phobia (11). Treatment of dental phobia is less successful when it is comorbid with other phobias (12). Patients with dental phobia show poorer dental health than individuals who are not phobic (13–15). The relationship between poor dental health and dental anxiety may impair the patient's self-esteem, confidence, and social functioning (14).

Various methods and questionnaires have been employed primarily to identify patients with dental phobia. A dental anxiety scale (DAS) was developed in 1969 by Corah (16). One survey using the DAS found that patients who were highly dentally anxious had a negative attitude towards treatment that made them more difficult to treat (17). It has also been demonstrated that women score significantly higher on the DAS than men and exhibit greater dental fear (18). In another study employing the Dental Fear Survey (DFS) (19), women were found to be 1.8 times more likely to report high dental fear than men were (2). Other studies evaluating general fear in behavior therapy have also found that women score higher than men (20). This is consistent with findings showing neurotic disorders to be more prevalent among women than among men (21, 22). In Iceland, the total prevalence rates for simple phobias was 4.5% in men and 6.7% in women, resulting in a male/female ratio of 1:1.5 (5).

The Dental Cognition Questionnaire (DCQ) was developed to assess the occurrence and believability of negative cognitions related to dental treatment. This

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questionnaire was constructed on the basis of the results of a study examining thought content in dentally anxious patients (23), and studies examining differences in thought content between individuals high and low in dental anxiety (24–26). The DCQ was found to be reliable (27). On this scale, phobic patients not only reported a higher frequency of negative and catastrophic cognitions than non-phobic controls, but also showed a greater degree of belief in their negative cognitions. Frequently, the thoughts of patients suffering from phobia related to ideas of suffocating or loss of control. The authors proposed that negative thinking patterns play an important role in fear arousal and that reducing negative thoughts could be important in accepting dental treatment and diminishing psychological distress. Moore (28) related a number of commonly used scales of dental fear and anxiety to the diagnostic criteria of the DSM-IV (29). He found that the DSM model successfully described and differentiated extreme dental anxiety. Criteria relevant to specific (dental) phobia based on the most recent edition (DSM IV) were adopted in the current study. The aim of this study was to examine the prevalence of specific (dental) phobia and dental anxiety in a sample of the Icelandic population. It was hypothesized that dental phobia and anxiety were more common: 1) among females than among males, 2) among those with fewer teeth, and 3) among those who go infrequently to the dentist. It was also hypothesized that dental phobia can be traced to a specific incident or situation. Furthermore, difference was predicted between the dentally phobic and dentally anxious in relation to the duration of anxiety prior to dental appointment.

Material and methods

Subjects

The study took the form of a postal survey in 1995 using the Total Design Method (TDM) in accordance with established guidelines (30) using the Icelandic National Register. This register has the current address of every Icelandic citizen who is alive and living in Iceland. TDM is a well-established method frequently used in mail surveys.

In 1972–73 an epidemiological study of malocclusion and of dental, skeletal, and sexual maturation was performed on a stratified sample of all schoolchildren (between the ages of 5 and 17 years) attending primary and secondary schools in Reykjavík, Iceland (31). At that time, 17,202 children were enrolled in the city's primary and secondary schools. All children born on the 7th, 17th, and 27th of each month were selected from the school registers, resulting in a stratified sample of 1641 subjects (791 boys (48.2%) and 850 girls (51.8%)). This was 9.5% of the total number of students.

At the time of the 1995 survey, 1529 (93%) of the 1641 children participating in the 1972–73 study were located. Twenty-two years had passed and the subjects were between the ages of 27 and 39. The number of returned questionnaires was 1192 (78% response rate). Questionnaires were received from 517 men (43.4%) and from 675 (56.6%) women. Mean age of the sample was 34.8 years ($s = 3.1$ years).

Questionnaire and diagnoses

The questionnaire comprised questions relating to specific (dental) phobia based on DSM-IV criteria (29) and fear of dental treatment. The questions concerning phobia consisted of subscales relating to, in order: 1) psycho-physiological responses to phobic stimuli, 2) attributions regarding the origins of phobias, and 3) various aspects of phobias. This part of the questionnaire was adapted from a previously published version by Hugdal & Öst (32) and Öst (8, 33), who had demonstrated satisfactory psychometric properties of reliability and specificity in several of their studies.

As it was regarded as less complicated and more reliable, the respondents were asked about the number of remaining teeth separately in the upper and lower jaws rather than all teeth together. Additionally, questions relating to socio-demographic variables, e.g. sex, marital status, number of years of education and occupation, were included. Decisions for differential categorization based on symptoms for specific (dental) phobia (DP) were assessed using flow chart criteria of DSM IV, Appendix A (29). Dental anxiety (DA) was confirmed by an affirmative response to the question whether the respondent had avoided going to the dentist during the previous 6 months as a result of great fear of going to the dentist but not fulfilling the criteria for DP.

Procedure

An introductory letter and a business reply envelope were enclosed with the questionnaire and mailed to 1529 recipients. One week later a postcard was sent to all recipients thanking those who had already responded and as a reminder to those who had not. A second reminder was mailed to non-responders 3 weeks after the initial mailing. This was a cover letter indicating that the completed questionnaire had not yet been received, along with a restatement of the initial request for participation, a replacement questionnaire, and a return envelope. The third and final follow-up letter mailed out 7 weeks after the first mailing consisted of a cover letter, a copy of the questionnaire, a stamped and addressed envelope, and it was sent by certified mail to the remaining non-responders (30). The study was approved by the Icelandic Data Protection Commission and the National Bioethics Committee in Iceland.

The grouping of respondents into 7 occupational groups was based on an occupational scale developed by Björnsson & Edelstein (34). Because of small numbers, respondents were combined into 4 groups in the statistical analysis: Group 1 was composed of craftsmen and unskilled workers; Group 2 of office workers, technicians,

Table 1. Number of subjects with dental anxiety, dental phobia, and the two groups combined with definitions

	n	%
Total respondents	1192	100
No dental anxiety (NDA)	1096	91.9
Total dental anxiety (TDA)*	96	8.1
Dental anxiety (DA)†	75	6.3
Dental phobia (DP)‡	21	1.8

* Subjects responding affirmatively to questions relating to dental anxiety were grouped together to form a Total Dental Anxiety group (TDA = DA + DP).
† Subjects who responded affirmatively to a question of having avoided going to the dentist during the previous 6 months because of great fear without fulfilling the criteria for DP.
‡ Decisions for differential categorization based on symptoms for specific (dental) phobia (DP) were assessed using flow chart criteria of DSM IV, Appendix A (34).

Table 2. Gender in relation to dental anxiety. Percent within gender

	Males		Females		Total	
	n	%	*n*	%	*n*	%
Total respondents	517	100	675	100	1192	100
No dental anxiety (NDA)	486	94.0	610	90.4	1096	91.9
Total dental anxiety (TDA)*	31	6.0	65	9.6	96	8.1
Dental anxiety (DA)	25	4.8	50	7.4	75	6.3
Dental phobia (DP)	6	1.2	15	2.2	21	1.8

* Chi square = 5.22, d.f. = 1, $P < 0.05$.

and teachers; Group 3 of professionals, executives, public officials, employers, and the self-employed; and Group 4 of non-salaried persons. Prevalence rates of DP and DA in relation to demographic variables such as age, sex, marital status, and occupation were ascertained (in terms of percentage of respondents and associated values along with attributed causes). Although these rates are the raw prevalence figures (rather than weighted figures), because of the very high response rate and fastidious implementation of the TDM survey methodology, they were considered accurate. The sampling and non-response were not problematic issues in the present study because most (95%) of the respondents answered the questionnaire within a month of the initial mailing.

The questionnaire data were analyzed via the SPSS (Statistical Packages for Social Sciences) for Windows v 8.0. The data were analyzed with chi-square analyses and *t* tests with significance set at $P < 0.05$ to compare the groups.

Results

Upon scoring the returned questionnaires, 21 (1.8%) of the respondents gave scores indicating the presence of phobic symptoms, termed dental phobics (DP) and provided data for describing occurrence, prevalence, and relationships with demographic concomitant variables (Table 1). In addition, 75 (6.3%) of the 1192 respondents said they had dental fear and had gone to great lengths to avoid dental treatment over the previous 6 months because of it. They were grouped separately and defined as a dental anxiety group (DA). A total of 96 (total dental anxiety, TDA) (8.1%) responded affirmatively to questions relating to dental anxiety, resulting in two subgroups—phobics and dentally anxious. The remaining 1096 respondents were the no dental anxiety group (NDA). The age of onset of DP was 9.3 years, *s* 2.8 and DA 10.6 years *s* 6.4 (*s* = standard deviation).

Total prevalence rates for specific phobia (DP) were found to be 1.8% (1.2% for men and 2.2% for women), giving an overall male/female ratio of 1:1.8. Total prevalence rates for DA were found to be 6.3% (4.8% for men and 7.4% for women), giving an overall male/female ratio of 1:1.5. Total prevalence rates for TDA were 8.1% (6.0% for men and 9.6% for women), giving an overall male/female ratio of 1:1.6. Gender differences for TDA were statistically significant at $P < 0.05$, where more women than men reported suffering from dental phobia or dental anxiety. With regard to marital status, there was a greater tendency for the widowed and divorced to suffer from DA or DP than there was for those who were married or cohabiting. The rate for the widowed and divorced was 5.0% in the NDA group and 12.5% in the

Table 3. Dental anxiety by level of occupation*

	Group 1†		Group 2‡		Group 3§		Group 4**		Total	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
No dental anxiety (NDA)	270	25.2	373	34.8	175	16.3	254	23.7	1072	100
Total dental anxiety (TDA)	26	27.1	23	24.0	5	5.2	42	43.8	96	100
Total††	296	25.3	396	33.9	180	15.4	296	25.3	1168	100

* Chi square = 24.23, d.f. = 3, $P < 0.001$.
† Group 1 = Craftsmen and unskilled workers.
‡ Group 2 = Office workers, technicians and teachers.
§ Group 3 = Professionals, executives, public officials, employers and the self employed.
** Group 4 = Non-salaried persons.
†† Total respondents were 1168 as 24 respondents did not answer the question of occupation. 2% missing values.

Table 4. Dental anxiety by self-reported number of teeth in upper and lower jaw.* Differences between NDA and TDA groups were tested with *t* tests

	No. in upper jaw			No. in lower jaw		
	Mean†	*s*	*n*	Mean‡	*s*	*n*
No dental anxiety (NDA)	14.2	1.52	1064	14.1	1.57	1065
Total dental anxiety (TDA)	12.8	3.38	93	13.1	2.54	95
Total			1157			1160

* Not all respondent answered this question.
Upper jaw = Total resopndents were 1157 as 35 respondents did not answer this question. 2.9% missing values.
Lower jaw = Total respondents were 1160 as 32 respondents did not answer this question. 2.7% missing values.
† The TDA group had fewer remaining teeth than the NDA group in the upper jaw. This difference was statistically significant at $t(95) = 4.03$ $P < 0.001$.
‡ The TDA group had fewer remaining teeth than the NDA group in the lower jaw. This difference was statistically significant at $t(101) = 3.56$ $P < 0.001$.
s = standard deviation.

TDA group. This difference was statistically significant ($\chi^2 = 11.30$, d.f. = 3, $P < 0.05$), which suggests that those not married are more anxious about visiting the dentist.

When respondents were grouped by occupation, a statistical difference was found between the NDA and TDA groups (Table 3). Although there were more respondents from Group 2 in the NDA group, the inverse was true for respondents in Group 4. This difference was statistically significant ($\chi^2 = 24.23$, d.f. = 3, $P < 0.001$).

All respondents were asked to count the number of teeth remaining in their jaws. The TDA group had fewer remaining teeth than the NDA group in both the upper and lower jaw (Table 4). This difference was statistically significant at $P < 0.001$.

There were significant differences between the groups with respect to dental visits. In the NDA group, 61.9% regularly went to the dentist, while 28.0% of the DA group and 33.3% of the DP group did so (Table 5). However, 40.0% of the DA and 52.4% of the DP groups reported never going to the dentist or only when in pain, while this only applied to 9.5% of the NDA. There were statistically significant differences between the two anxiety subgroups, the DA group and the DP group. Whereas about 4% of the DA group never went to the dentist irrespective of how serious the problem, the figure was almost 24% in the DP group ($\chi^2 = 9.98$, d.f. = 3, $P < 0.05$).

When observing how much in advance of the dental appointment dental anxiety started, a significant difference was reported between the two dentally anxious subgroups (Table 6). Interestingly, 57.1% of the DP compared to 21.9% of the DA individuals reported that dental anxiety had started more than a month before a dental appointment. Inversely, 56.2% of the DA group worried a week or less, in comparison to 19% of the DP group. These differences were statistically significant ($\chi^2 = 11.51$, d.f. = 2, $P < 0.01$).

A significant difference between the DA and DP groups was found relating to the attribution of the initial onset of dental anxiety to a specific incident or situation (not probed further) during which they had experienced pain or fear and were struck by intense fear (Table 7). When asked, 90.5% of the DP and 65.8% of the DA groups could attribute the onset of dental anxiety to a specific incident or situation ($\chi^2 = 4.87$, d.f. = 1, $P < 0.05$).

Table 5. Visits to the dentist*

	At least once a year		More rarely		Never or only when in pain		Total†	
	n	%	*n*	%	*n*	%	*n*	%
No dental anxiety (NDA)	672	61.9	310	28.6	103	9.5	1085	100
Total dental anxiety (TDA)	28	29.2	27	28.1	41	42.7	96	100
Dental anxiety (DA)	21	28.0	24	32.0	30	40.0	75	100
Dental phobia (DP)	7	33.3	3	14.3	11	52.4	21	100
Total	700		337		144		1181	

* Chi square = 99.73, d.f. = 4, $P < 0.001$.
† Total respondents were 1181 as 11 respondents did not answer this question.

Table 6. Dental anxiety prior to dental appointment*

	Within a week		One to four weeks		More than month before		Total†	
	n	%	*n*	%	*n*	%	*n*	%
Dental anxiety (DA)	41	56.2	16	21.9	16	21.9	73	100
Dental phobia (DP)	4	19.0	5	23.8	12	57.1	21	100
Total	45		21		28		94	100

* Chi square = 11.51, d.f. = 2, $P < 0.01$.
† Total respondents were 94 as 2 respondents did not answer this question.

Table 7. Onset of dental anxiety or dental phobia caused by particular incident or situation*

	No		Yes		Total†	
	n	%	*n*	%	*n*	%
Dental anxiety (DA)	25	34.2	48	65.8	73	100
Dental phobia (DP)	2	9.5	19	90.5	21	100
Total	27		67		94	

* Chi square = 4.87, d.f. = 1, $P < 0.05$.
† Total respondents were 94 as 2 respondents did not answer this question.

Discussion

In this study, we found that 8.1% of the returned questionnaires indicated that the respondents had clear signs of dental fear and had gone to great lengths to avoid dental treatment; however, only 1.8% of total respondents fulfilled the criteria for dental phobia (DP). Our study shows a statistically significant gender difference in the TDA group and subgroups, with females having higher prevalence rates. This is consistent with findings from other studies (2, 18, 20–22). Our study showed that in a mail survey women admit to a higher level of dental anxiety than men. A significant difference was found with regard to marital status. Divorced or widowed people were more highly represented in the TDA group than in the NDA group. This is consistent with a previous study which found that divorce or death of a spouse was regarded as stressful, increased negative cognitions and strongly suggested that negative thinking patterns play a crucial role in the development of fear (27). This finding is in accord with Beck's ideas that cognitions related to the situation and their own resources have an effect on behavior resulting in increased psychological distress (35, 36).

Occupation of the respondents was significantly different for the TDA and NDA groups. Respondents from occupational Group 2 were more prevalent in the NDA group, while those from occupational Group 4 were more highly represented in the TDA group. Our study showed a significant difference in the number of teeth remaining in the upper and lower jaws between the TDA and the NDA groups with the TDA group having fewer teeth. This finding is reasonable, because more than 60% of the NDA group went regularly to their dentist and less than 30% of the TDA group did so. One can therefore expect poorer dental health in the TDA group (37). The present finding was in accordance with a previous study reporting fewer teeth left in the jaws in patients with severe dental fear (13).

A quarter of the DP but only a small number of the DA never go to the dentist irrespective of how serious the problem is. More than half of the DP and one-fifth of the DA reported that they started worrying a month or more before a dental appointment. Most of the DP and less than half of DA worried more than a week before a dental appointment. Time spent worrying before a dental appointment was also significantly greater in the DP group than the other. Nearly all DP and less than two-thirds of the DA could attribute the onset of dental anxiety to a particular incident or situation.

In conclusion, it is evident that the TDA and NDA groups differ in several respects and the same holds true for the two subgroups within the TDA group. This underscores the difference between phobia and anxiety, and the need to use criteria that differentiate between DP and DA. The present results show that using questions based on the DSM-IV to differentiate between DP and DA yields clinically relevant information. Furthermore, these differences reflect that the more pronounced the fear the greater the handicap for the afflicted person. It is evident that dental phobia and dental anxiety are problems that afflict a considerable number of Icelanders.

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