

ORIGINAL ARTICLE

Dental anxiety and pain related to dental hygienist treatment

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Abstract

Objective. To evaluate different groups of patients' self-reported assessments of dental anxiety and pain related to various routine dental hygienist treatment procedures, and to investigate the relationship between anxiety concerning dental and dental hygienist treatment. **Material and methods.** A consecutive sample of 393 patients participated in the study (59.7% F, age range 20 to 85 years, mean 47.6 years). Periodontology (PC), oral medicine (OM), student and general practice (GP) clinics were included. Each patient was asked to answer a questionnaire which included different demographic information, self-reported levels of dental anxiety, and experience of pain in relation to different dental hygienist treatments. **Results.** Higher dental anxiety was found in relation to gender (women), dentist treatment, and PC and OM patients. Experiences of high or extreme pain were reported by between 7.1% and 9.7% of participants for all dental hygienist procedures except polishing (0.8%). There were significant correlations between dental hygienist fear levels and reported extreme pain experiences among all five treatment procedures. Patients treated at the PC clinic scored significantly higher on pain compared with patients at the other clinics, with the exception of the OM clinic. **Conclusions.** Patients reported higher dental anxiety levels for dentist treatment as compared with dental hygienist treatment. Moreover, dental anxiety was significantly associated with perceived pain related to different dental hygienist treatment procedures.

Key Words: Dental anxiety, dental hygienist, pain, treatment

Introduction

There is a dearth of studies in the literature on patients' experiences of dental hygienist treatments with regard to dental anxiety and pain. Few studies indicate that fear of dental treatment and pain related to dental hygienist treatment are common among adult patients [1–4]. However, differences in dental anxiety levels between both dental hygienist and dentist treatments have not been evaluated intraindividually. De Jongh & Stouthard [1] evaluated anxiety regarding dental hygienist treatment in their study and examined differences between reactions to dental hygienist treatment and dentist treatment. They found that dental hygienist patients scored higher, albeit not statistically significantly, on the measure of dental anxiety than dentist patients with regard to different types of treatment. However, the comparisons were made between two different independent groups of patients, and therefore not an intraindividual study design. In their study, Gadbury-Amyot et al. [3] reported that 6% of the

patients were more fearful of dental hygienist treatment (somewhat to very much) as compared with dental treatment. In contrast, De Jongh & Stouthard [1] on a similar question found that almost 15% in their sample reported that dental hygienist care provoked more anxiety than dentist treatment.

The prevalence of dental anxiety has been estimated among adults for a large number of different countries and cultures [5–8]. Extreme dental anxiety is found to be between approximately 3% and 15% in a population depending, among other things, on measurement methods and sample selection. Thus, a significant proportion of adult individuals are affected by dental anxiety which may have implications for dental visiting habits, oral health, quality of life, and well-being [9–13].

In Sweden, the ratio between dental hygienists and dentists is currently approximately 1:3; the estimated ratio prognosis for the coming 10–12 years is 1:1. The effect of such a change will be, among other things, a shift in dental hygienists' treatment responsibilities and spectrum of tasks with regard to

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treatment options and patient groups treated. Dental hygienists in Sweden diagnose caries and periodontitis, perform conservative treatments (not hard tissue removal), and apply local anesthesia. Thus, it is important to elucidate patients' perceptions and experiences of different treatments carried out by dental hygienists and, accordingly, emotions and attitudes in relation to such treatments, e.g. dental anxiety and dental beliefs [14].

The aim of this cross-sectional, questionnaire study was to evaluate different groups of patients' self-reported assessments of dental anxiety and pain related to various routine dental hygienist treatment procedures. Moreover, the relationship between anxiety for dentist and dental hygienist treatment was analyzed. Our main hypothesis with regard to dental anxiety was that patients were likely to report higher levels of anxiety in relation to dental care performed by a dentist as compared with dental hygienist treatment.

Material and methods

During the spring of 2005 a convenience sample of 409 adult individuals was collected from six different clinics. Three clinics represented specialist treatments, two in periodontology (PC) and one in oral medicine (OM). In addition, two general dental clinics (public dental services) and one student dental hygienist clinic (GP) were included. The individuals were chosen consecutively among patients having previous experiences from dental hygienist treatment at participating clinics, and at the time of the study the patients were receiving dental care. Among the patients asked to participate in the study, 16 refused to answer the questionnaire. It was not possible to elicit the reasons for non-participation, because of the anonymous nature of the study design. Thus, the sample included 393 individuals, but the questionnaires had random missing values on variables why the number of patients varies in the statistical analysis.

In the waiting-room at the respective clinics before treatment, each patient was asked to answer a questionnaire which included different demographic information, self-reported levels of dental anxiety, and experience of pain in relation to different dental hygienist treatments. Age, gender, and educational level were assessed. Questions concerning regularity of dental visiting habits specifically with regard to dental hygienist care and perceived dental health (scale 1 = poor – 4 = very good), satisfaction with the appearance of own teeth (scale 1 = very dissatisfied – 5 = very satisfied), and previous pain experiences in relation to dental hygienist treatments (scale 1 = no pain – 5 = extreme pain) were all measured on verbal rating scales.

Levels of dental anxiety were measured by the Dental Anxiety Scale (DAS) [15,16] and by two

single, global questions, one indicating fear of being treated by a dental hygienist (DHfear) and one by a dentist (Dfear). The items of these two questions were categorized from 1 (no fear) to 5 (extreme fear). The DAS sum of scores range from 4 to 20, where a score ≥ 13 indicates a high level of dental anxiety [17]. The different measurements of dental anxiety were used in order to reveal differences between dental anxiety specifically for the dentist and the dental hygienist. The DAS items generally pertain to fear experienced in association with treatments by the dentist, which is why the single questions about dental anxiety for the different professions were added. However, the word "dentist" in the DAS was replaced with the word "dental hygienist". Moreover, DAS has been used extensively for more than three decades in a multitude of countries and cultures, and has shown high reliability and validity [5,8,16,17].

Perceived experiences of pain in relation to different dental hygienist treatments were measured on verbal rating scales (1 = no pain – 5 = extreme pain) for each of the following variables: polishing, gingival probing pocket depth, manual and ultrasonic scaling, and local anesthesia.

The research ethics regulations according to the Declaration of Helsinki and School of Health Sciences, Jönköping University, Sweden were fulfilled prior to the start of the study.

Statistical analysis

Descriptive statistics with means, medians, standard deviations (SD), and frequency tables were calculated in the initial analyses. Bivariate statistics using the chi-squared test, the *t*-test, and the Mann-Whitney test (depending on distributional assumptions) as well as logistic regression were applied and one-way analysis of variance. Multivariable logistic regression was also used (odds ratio (OR) and 95% confidence interval (CI)). All analyses were performed with SPSS version 14.

Results

The mean age of subjects in the sample was 47.6 years (SD 16.7) with a range of 20 to 85 years and 59.7% of the participants were females, but no significant difference was found between gender and age. The number of patients per clinic is shown in Table I. The educational levels in the total sample were 23.2%, 38.1%, 38.7% for elementary school, high school, and university education, respectively. There was no statistically significant difference in educational level and gender.

Women reported higher anxiety than men with regard to dental hygienist treatment (7.1% versus 3.9%, $\chi^2 = 8.7$ df 2, $p = 0.013$) on the global item measuring anxiety, DHfear, when the variable was

Table I. Cross-tabulation of gender and clinics (number of individuals)

	OM	PC	GP
Men	12	44	99
Women	10	77	143

Clinics: OM = Oral medicine; PC = Periodontology; GP = Public dental care and dental hygienist student clinic.

categorized into three categories: 1 = no fear; 2 = low to moderate fear; 3 = high to extreme fear. A parallel result was found for fear of dentist treatment (Dfear) ($\chi^2=10.9$ df 2, $p=0.004$). DAS revealed a mean sum score of 6.5 (median = 5.0, SD = 3.2) indicating a highly skewed distribution. The proportion of patients reporting high dental anxiety, a DAS score ≥ 13 , was found to be 7.3%. A gender difference was revealed for mean DAS sum of scores with 7.0, 5.7 for women and men, respectively ($t=3.8$ df 376, $p<0.001$). The correlation between DAS sum of scores and the global questions on fear of the dental hygienist treatment (DHfear) and dentist treatment (Dfear)

were $r=0.84$, $n=381$ ($p<0.001$) and $r=0.75$, $n=380$ ($p<0.01$), respectively. In addition, the association between dental anxiety for the dentist, Dfear, and dental hygienist treatment, DHfear, was $r=0.74$, $n=385$ ($p<0.01$). Moreover, the subjects reported higher dental anxiety for the dentist as compared to the dental hygienist. The means (SD) were 1.5 (0.9) and 1.9 (1.0) for dental hygienist (DHfear) and dentist (Dfear) fear, respectively ($t=9.6$ df 384, $p<0.001$).

There were more periodontology patients (PC) who reported higher levels of dental anxiety for dental hygienist treatment (DHfear) as compared to other clinics ($F=6.5$ df 385, $p<0.001$) but not in relation to oral medicine patients, although the former had a higher group mean value. Similar findings for anxiety for dentist treatment (Dfear) were revealed, but OM patients had non-significantly higher mean scores compared with those for PC patients ($F=4.1$ df 385, $p=0.007$).

High or extreme pain experiences were reported among 7.1% to 9.7% of participants for all dental hygienist procedures except polishing (0.8%) (see

Table II. Associations between pain experiences and fear of dental hygienist treatment procedures, respectively (number of patients)

	Pain experiences							
	No pain		Polishing Moderate		Extreme		Total	(%)
	n	(%)	n	(%)	n	(%)		
Dental hygienist fear								
No	244	(64.4)	8	(2.1)	1	(0.3)	253	(66.8)
Moderate	86	(22.7)	18	(4.7)	0	(0)	104	(27.4)
High	14	(3.7)	6	(1.6)	2	(0.5)	22	(5.8)
Total	344	(90.8)	32	(8.4)	3	(0.8)	379	(100)
					$\chi^2=51.1$ df 4		$p<0.001$	
Probing pocket depth								
No	86	(23.6)	154	(42.3)	4	(1.1)	244	(67.0)
Moderate	15	(4.1)	72	(19.8)	13	(3.6)	100	(27.5)
High	2	(0.5)	6	(1.6)	12	(3.3)	20	(5.5)
Total	103	(28.3)	232	(63.7)	29	(8.0)	364	(100)
					$\chi^2=100.8$ df 4		$p<0.001$	
Manual scaling								
No	97	(25.7)	154	(40.8)	3	(0.8)	254	(67.4)
Moderate	10	(2.7)	80	(21.2)	13	(3.4)	103	(27.3)
High	2	(0.5)	5	(1.3)	13	(3.4)	20	(5.3)
Total	109	(28.9)	239	(63.4)	29	(7.7)	377	(100)
					$\chi^2=134.1$ df 4		$p<0.001$	
Ultrasonic scaling								
No	86	(26.5)	124	(38.2)	8	(2.5)	218	(67.1)
Moderate	10	(3.1)	66	(20.3)	12	(3.7)	88	(27.1)
High	3	(0.9)	8	(2.5)	8	(2.5)	19	(5.8)
Total	99	(30.5)	198	(60.9)	28	(8.6)	325	(100)
					$\chi^2=55.7$ df 4		$p<0.001$	
Local anesthesia								
No	80	(22.8)	144	(41.0)	7	(2.0)	231	(65.8)
Moderate	16	(4.6)	66	(18.8)	16	(4.6)	98	(27.9)
High	1	(0.3)	10	(2.8)	11	(3.1)	22	(6.3)
Total	97	(27.6)	220	(62.7)	34	(9.7)	351	(100)
					$\chi^2=66.2$ df 4		$p<0.001$	

Extreme pain = categories high pain + extreme pain. Moderate pain = categories low + moderate pain.

Table II). For patients having high dental hygienist fear, a majority reported extreme pain (42–65%) in relation to all treatment procedures with the exception of polishing (9%). Moreover, there were significant relationships between dental hygienist fear levels and reported extreme pain experiences among all five treatment procedures. A correlation matrix between pain experience variables showed for polishing coefficients between 0.20 to 0.34, probing $r=0.34-0.52$, local anesthesia $r=0.20-0.37$, manual scaling $r=0.27-0.62$, and ultrasonic scaling $r=0.28-0.62$. The highest correlation was found for manual and ultrasonic scaling ($r=0.62$). Levels of perceived pain related to the five treatment modalities are presented in Table III. Polishing had a low mean value, while the other procedures had similar means greater than 2. Gender differences were found for three situations: polishing, probing, and local anesthesia. Scores for patients treated at the PC were significantly higher on pain compared with those for patients at the other clinics, with the exception of local anesthesia (data not shown). In addition, PC- and OM patients did not differ significantly for any treatment type.

Multivariable logistic regression (backward stepwise procedure) with DAS sum of scores dichotomized with a cut-off ≥ 13 for high anxiety as the dependent variable revealed four statistically significant predictor variables (Table IV). The model assessment showed acceptable values with a Nagelkerke R-square of 0.35 and Hosmer-Lemeshow C-statistic of 0.91. Gender displayed an odds ratio (OR) of 4.46, with women having the higher risk. Being older was protective, with OR=0.96 per year. Perceived dental health was significant, indicating that the better one's health the less risk of being highly fearful of going to a dental hygienist for treatment. Moreover, experience of pain during dental hygienist treatment was significantly related to dental anxiety.

Discussion

The results from this cross-sectional study showed several important features of dental anxiety related to either dental hygienist treatment or dentist treatment. In addition, pain experiences were reported

for different dental hygienist procedures. Thus, dental anxiety was found more frequently among women than men irrespective of type of therapy, but patients were more anxious about dentist treatment as compared to dental hygienist treatment. A prevalence of close to 10% was found for perceived high or extreme pain for different dental hygienist procedures such as probing, scaling, and injection with local anesthesia.

One main research question in this study was designed to evaluate possible differences between perceived dental anxiety for dental hygienist and dentist treatment. The results were not in accordance with a previous study [1]. Both types of treatments showed a gender-related higher anxiety, i.e. women reported significantly more anxiety than men. Moreover, patients were more anxious about dentist treatment in comparison with dental hygienist treatment. In their study, De Jongh & Stouthard [1] found no significant difference between which type of therapist carried out the dental care. Moreover, 15% reported that being treated by a dental hygienist was more frightening than dentist treatment, while 40% expressed similar levels of fear. However, in that study two independent samples were compared with regard to dentist and dental hygienist dental fear [1]. In the present evaluation the comparisons were made intraindividually. Furthermore, parallel levels of anxiety were found for a hierarchy of dental-care situations. In our study the correlation coefficient between DAS and the global question concerning anxiety for dental hygienist treatment (DHfear) was higher as compared to DAS and the item for dentist anxiety (Dfear), which also contributed to the reliability of the results.

Interestingly, patients given specialist dental care at a periodontology clinic reported the highest dental anxiety mean scores in relation to dental hygienist treatment in the bivariate statistical analyses. One might speculate that the perception of such treatment could be associated with more experiences of frequent hygienist treatments as well as more specific and intensive therapies. The latter could possibly exceed individuals' pain thresholds and generate anxiety-related emotions and behaviors. It has been found that one main reason for the development of dental anxiety during the adult life-span is experi-

Table III. Means and SDs for the different pain assessments according to gender

	Total		Women		Men		t	p	df
	Mean	(SD)	Mean	(SD)	Mean	(SD)			
Polishing	1.1	0.5	1.2	0.5	1.2	0.3	2.20	0.03	372
Probing	2.1	0.9	2.2	1.0	2.0	0.9	1.96	0.05	357
Manual scaling	2.1	0.9	2.2	1.0	2.1	0.9	1.44	0.15	370
Ultrasonic scaling	2.1	1.0	2.2	1.0	2.0	1.0	1.53	0.13	321
Local anesthesia	2.2	1.0	2.3	1.0	2.0	0.9	2.87	0.004	345

t = t-value; p = p-value; df = degrees of freedom.

Table IV. The final multiple logistic regression model with dental hygienist fear as the dependent variable measured with DAS sum of scores ≥ 13 indicating high dental fear

Variable	B	SE	p-value	OR	CI
Gender	1.50	0.61	0.014	4.46	(1.39–14.64)
Age	−0.037	0.017	0.024	0.96	(0.93–0.99)
Perceived dental health	−0.70	0.33	0.032	0.50	(0.26–0.94)
Previous pain experience during dental hygienist treatment	1.18	0.23	<0.001	3.24	(2.06–5.09)

B = regression coefficient; OR = odds ratio; SE = standard error; CI = 95% confidence interval.

ence of pain in relation to different treatments [18]. However, this finding was not shown in the multi-variable statistical model. Gender was a significant predictor of the risk of being highly dentally anxious. In addition, being older and in perceived good oral health decreased this risk. A previous study also found that women were more anxious about dental hygienist care than men, but no significant difference for age was revealed [4]. In another study by Gadbury-Amyot et al. [3], it is also reported that females revealed more dental hygienist fear than men, but in contrast to the former study a significant age effect was shown.

Pain experiences related to dental hygienist treatment were frequent in this sample. Moreover, we found a gender difference with women reporting higher levels on three treatment types, but the mean differences were small. An interesting result was that PC patients perceived higher pain for dental hygienist procedures as compared to patients at the other clinics, with the exception of OM patients. These results may be due to more intensive and prolonged dental hygienist treatment at a specialist clinic while having chronic periodontitis. Moreover, the use or non-use of local anesthesia at these specific clinics may have contributed to the results, but we did not collect any data at the clinics concerning treatment protocols. It could be speculated that the non-significant difference between PC and OM patients might be due to a majority of OM patients seeking dental care because of dental anxiety at this specialist clinic. Several previous research reports also reveal a strong association between perceived pain and different types of treatment modalities [19–21]. De Jongh & Stouthard [1] showed that both actual and expected pain was ranked highest among a number of situations in the dental hygienist operator. These investigators also found a close relationship between pain and dental anxiety using DAS as a measurement of anxiety, albeit using the word “dentist” instead of “dental hygienist” in the questionnaire. Other studies reveal parallel findings of a significant correlation between dental anxiety and pain experienced during treatment such as probing and scaling [20,21]. Moreover, ratings of fears associated with dental treatment situations at the dentist’s surgery have revealed that local anesthesia, scaling, and probing are to a higher degree associated with dental fear as compared to polishing and cleaning the teeth

[22–24]. Our results do show similar reports that moderate to high dental hygienist anxiety presents higher perceived pain for local anesthesia, scaling, and probing compared to polishing treatment.

The results should be interpreted with some caution bearing in mind that the sample was not randomly selected, but consecutively included from public dental service clinics. Thus, the representativeness may be questioned and the generalizability of the results may be valid only for individuals attending general and specialist clinics with a majority reporting regular dental visiting habits to a dental hygienist. However, the sample was collected from different types of clinics which included a range of types of treatment modalities, thus increasing analytical possibilities. The result indicating the highest levels of dental hygienist anxiety for patients treated at a periodontology clinic can thus show the strength of the study. Moreover, the sample was large, indicating sufficient power for the analyses.

Conclusions

Our main hypothesis was verified since patients reported higher dental anxiety levels for dentist treatment as compared to dental hygienist treatment. Moreover, dental anxiety was significantly associated with perceived pain related to different dental hygienist treatment procedures.

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