RESEARCH ARTICLE

Afraid of the Drill? A Study of Dental Anxiety in Greek Nursing Students

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ABSTRACT

Introduction: Dental anxiety has been attributed to negative dental experiences and various socioeconomic factors. It can be the cause of poor dental and oral health, creating social and functional impairment. The objective of this study was to evaluate perceived dental anxiety, estimating its prevalence and determinants, in a Greek nursing student population.

Methods: Sample included 204 students of a nursing school in Athens, Greece, who were surveyed from April to May 2011. Data were collected with a comprehensive questionnaire consisted of: a) a set of demographic questions b) the MDAS measure (Modified Dental Anxiety Scale), c) the DVSS (Dental Visit Satisfaction Scale) and d) the Trait Anxiety Inventory (TAI).

Results: Regarding the prevalence of dental anxiety, the mean value for the MDAS tool was 10.6 (±4.2, 95% CI: 9.9-11.2) and according to the MDAS cut-off points 5.9% of the students had high fear/anxiety. It was found that women reported significant higher levels of dental anxiety (p=0.015) and had more trait anxiety (p=0.013) compared to males, but no other socioeconomic determinant seemed to correlate with dental anxiety. Patient satisfaction was found to correlate with dental anxiety.

Conclusions: Dental staff should obtain a deeper understanding of the triggering mechanisms of dental anxiety and the coping strategies for minimizing the dental anxiety, by proper education in order to built a therapeutic relationship with their patients and to eradicate dental fear as much as possible.

Keywords: dental anxiety; dental health behavior; satisfaction; student

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HIGHLIGHTS / KEY POINTS

- **Dental anxiety significantly correlates positively with trait anxiety**
- **Patient satisfaction is associated with dental anxiety and previous experiences**
- **Dental staff should eliminate the factors that could increase anxiety**

INTRODUCTION

Anxiety is a multi-system natural response that helps individuals cope with potentially threatening conditions. It reflects a combination of biochemical changes that affect the nervous and other systems of the body and causes unpleasant symptoms. It varies among people according to their idiosyncratic characteristics, cognitive skills, experiences and supporting environment (Armfield et al 2006, Carrillo-Diaz et al 2012). Dental anxiety or fear in general population estimation is high (Armfield et al 2006), but it is not easy to make comparisons, especially when different scales are involved.

According to Weiner and Sheehan (1990) there are two types of dental anxiety: exogenous and endogenous. Exogenous dental anxiety is defined as anxiety emerging from traumatic dental experiences, while endogenous is thought to be caused by overall vulnerability to anxiety disorders. Locker et al (1999) examined the issue of the onset of dental anxiety and their results indicated that childhood dental anxiety is related to exogenous etiologies and adult-onset of dental anxiety was mostly due to endogenous factors.

The prevalence of dental anxiety/fear ranges among geographic regions (Berggren et al 1997) and it is difficult to generalize the results of the studies, because of cultural diversities. Dental anxiety has been attributed to negative dental experiences (Berggren et al 1997), lower socioeconomic status, gender (Stouthard & Hoogstraten 1990) and personality traits (Thomson et al 2009). It is often reported as a cause of poor dental and oral health (Gisler et al 2012), because of irregular dental visits (Schuller et al 2003, Sohn & Ismail 2005) and deferment of care, creating social and functional impairment (Thomson et al 1996). Delayed visit to the dentist could cause more severe dental problems and symptom-driven treatment, which is known as the vicious cycle of dental fear (Armfield et al 2007). Patients, who experience dental anxiety or fear, still have to undergo dental treatment, because if pain due to an oral health problem becomes unbearable, people will inevitably visit the dentist.

The examination of the prevalence of dental anxiety in students is particularly important since this group of population will require oral health services for a long period of time. Furthermore, they are still at a proper age for obtaining cognitive skills about oral health which could follow them throughout their adult life. It is found that dental students have less dental anxiety than medical students or engineering students in Jordan (Al-Omari & Al-Omiri 2009). Moreover, a study of 1024 undergraduate students in UK showed that divinity students reported a higher level of anxiety compared to medical students (28.6% and 9.1% respectively above the cut-off point of Modified Dental Anxiety Scale – MDAS) (Humphris & King 2011). Another reason for further investigation of dental anxiety in younger people is that dental anxiety was found to be four times greater in the youngest participants (18–39 yrs) compared to older age groups (60+ yrs) (Humphris et al 2009).

Dental anxiety studies in Greece are scarce and mainly focus on juvenile population (Kotsanos et al 2005, Kyritsi et al 2009). The purpose of the present study was to evaluate perceived dental anxiety, estimating its prevalence and determinants, in a Greek nursing student population. The study tested also the hypothesis that there are factors which influence dental anxiety, such as demographic and personality predictors or influencers from previous dental visits.

METHODS

Study design

This study is a cross-sectional survey of a student population in Athens, Greece. Participants were all university students from a nursing school, who were surveyed after classes in the university amphitheaters during one academic day of May 2011. Envelopes with enclosed questionnaires were distributed to the students and they were informed publicly about the scope of this study. Students, who agreed to participate, placed their completed forms in the envelope and then in an opaque box positioned in each class exit. The research protocol of this study was approved by the Ethics committee of the National and Kapodestrian University of Athens and completion of the survey was assumed to be informed consent.

Study measures

Data were collected using a comprehensive questionnaire consisted of: a) a set of demographic questions concerning age, gender, marital status, year of studies and nationality, b) the Modified Dental Anxiety Scale measure (MDAS), c) the Dental Visit Satisfaction Scale (DVSS) and d) the Trait Anxiety Inventory (TAI).

A set of four questions concerning perceived oral health problems (chewing, oral pain and self perceived need for dental treatment in the last four weeks and

self rating of oral health status, based on the paper of Locker and Liddell (Locker & Liddell 1991), were also added. Respondents were asked to self evaluate their general health status in a 5-point scale (categorized as very bad, poor, fair, good and excellent).

The MDAS tool, which measures dental anxiety, includes 5 items scored in a 5-point Likert scale. (Humphris et al 1995) Items include "If you had to go to the dentist tomorrow, how would you feel about it?"; "When you are waiting in the dentist's office for your turn in the chair, how do you feel"; "When you are in the dentist's chair waiting while the dentist gets the drill ready to begin working on your teeth, how do you feel?"; "You are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments which will be used to scrape your teeth around the gums, how do you feel?" and "When you are about to receive a local anaesthetic injection in your gums, how do you feel?" The Greek version of MDAS has been found to have good internal consistency and test-retest reliability, as well as good construct and criterion validity. The psychometric properties appear to be similar to those previously reported in other countries (Coolidge et al 2008). The total possible scoring on the MDAS range from 5 to 25 and answers are summed to create an overall score. Higher scores refer to higher levels of dental fear and subjects who score above 19 are considered to have high dental anxiety (HDA) that may require special attention by dental personnel (Humphris et al 1995). In this study, reliability assessed by internal consistency for MDAS was good (Cronbach's a=0.849).

The DVSS (Corah et al 1984) is a 10-item questionnaire which evaluates satisfaction from dental services in three dimensions: information-communication (IC), understanding-acceptance (UA) and perceived technical competence (TC), with each dimension consisting of 3-4 items. Each of the ten items in the DVSS are written in a five point Likert format with a score ranging from 1 (strongly disagree) to 5 (strongly agree). These dimensions are assumed to reflect the cognitive, affective and behavioral satisfaction of patients. An overall general satisfaction score derived from the sum of all items was also calculated. To the best of our knowledge this study is the first published paper to utilize the DVSS in Greek population. All 10 items therefore were translated into Greek by a bilingual dentist, then independently back-translated by a second bilingual member of the research team. Minor deviations were discussed and corrected until both translators agreed on the final wording. Analysis of the internal consistency of the DVSS indicated sufficient reliability for the measure (Cronbach's a=0.749).

Trait anxiety as a general personal disposition to experience transient states of anxiety or otherwise individual determinants to experience anxiety was assessed with the Greek version of the Trait Anxiety Inventory (TAI) (Kafetsios 2002), which is based on Spielberger's State-Trait Anxiety Inventory (STAI) (Spielberger et al 1983). TAI is a scale consisting of 20 items, in a 4-point Likert scale ranging from almost never (1) to almost always (4). A score was computed by summing the ratings for all 20 items. Higher values indicate higher tendency to experience anxiety after a stressful condition. In this study, Cronbach's alpha coefficient was 0.791.

Statistical Analysis

All continuous variables were expressed with mean values, standard deviation (SD) and 95% confidence intervals (95% CI), while dichotomous and categorical variables are demonstrated with frequencies. For this paper, dental anxiety measured by MDAS was considered both as continuous variable (mean value) and as dichotomous variable using the suggested cut-off point of 19 (high dental anxiety-HDA and moderate-low MLDA). This threshold was adopted as the level for which it is likely that a dental practitioner would consider using additional approaches such as relaxation, systematic desensitization or pharmacological adjunct (Humphris et al 1995). For continuous variables that are not normally distributed, non parametric tests like Mann-Whitney U and Kruscal-Wallis Tests were used while for dichotomous and categorical variables, chi-square and Fischer's exact test were used. Intercorrelations between continuous variables were tested with the Spearman's rho coefficient. All analyses were completed with the PASW Statistics v18. A p value of <0.05 was considered as statistically significant.

RESULTS

Two hundred-twenty four students completed the questionnaires, for a response rate of 85%. Remarkably, the survey completion was overall excellent with no missing values for MDAS, DVSS or TAI. Mean age was 20.8±2.5 years (95% CI: 20.4-21.1). Most students were female (164/202-80.4%), came from rural areas (146/202-72.3%), almost all (98.5%) were of Greek nationality and half were in their second year of studies. With reference to oral health related symptoms, almost all respondents (96.6%) did not report any problem with chewing and 81.8% did not complain for any pain in the oral cavity during the last weeks. However, one third of the students felt they had to visit a dentist during the last 4 weeks and 73% valued their oral health status as 'good'.

In table 1, the mean MDAS scores and classification in HDA and MLDA are demonstrated. Regarding the prevalence of dental anxiety, the mean value for the MDAS tool was 10.6 (±4.2, 95% CI: 9.9-11.2) and according to the MDAS cut-off points, only 5.9% of the students had HDA. Female students reported significant higher levels of dental anxiety (p=0.015), although due to the

small number of male students, no significant difference was found between gender when using the HAD classification (p=0.278). MDAS scores did not differ significantly among students that reported having chewing problems, oral pain during last 4 weeks or need for dental visit. Still, students that rated their oral health status as excellent, reported significant less dental anxiety compared to students that rated their oral health as good (p=0.001) or fair (p=0.001). Nevertheless, this finding is not consistent to self rated general health, where no significant difference was detected.

The TAI scale had a mean value of 2.2±0.4 (95% CI: 2.1-2.3).Female respondents scored higher for trait anxiety (p=0.013) compared to males. Overall, HDA

Table 1: Demographic, and oral health characteristics in relation to Dental Anxiety (High vs Moderate/Low [n(%)]

	MDAS score		MDAS score categories		
	Mean (SD)	P value	High (>19)	Moderate/low(<19)	P value
Total	**10.6 (4.2)**		**12(5.9)**	**192 (94.1)**	
Gender					
Female	10.8 (4.2)	0.015	11 (6.7)	153 (93.3)	0.278
Male	9.6 (4.5)		1 (2.5)	39 (97.5)	
Year of studies					
1st	10.5 (3.9)	0.168	3 (4.9)	58 (95.1)	0.417
2nd	10.9 (4.4)		5 (4.9)	97 (95.1)	
3rd	7.6 (1.0)		0 (0)	7 (100)	
4th	10.4 (4.5)		4 (11.8)	30 (88.2)	
Origin					
Urban	9.7 (3.5)	0.162	1 (1.8)	55 (98.2)	0.296
Rural	10.9 (4.4)		10 (6.8)	136 (93.2)	
Nationality					
Greek	10.5 (4.2)	0.967	10 (5.1)	185 (94.5)	0.158
Other	11.7 (7.4)		1 (33.3)	2 (66.7)	
Chewing problems					
Yes	11.1 (4.4)	0.702	0 (0)	7 (100)	1
No	10.6 (4.2)		12 (6.1)	185 (93.9)	
Oral pain during the last 4 weeks					
Yes	9.7 (3.5)	0.242	2 (5.4)	35 (94.6)	1
No	10.8 (4.4)		10 (6)	156 (94)	
Self perceived need for dental care					
Yes	11.0 (4.2)	0.2	6 (8.8)	69 (91.2)	0.222
No	10.4 (4.3)		6 (4.5)	127 (95.5)	
Self rating of oral health					
Poor	10.0 (2.8)	0.002*	0 (0)	2 (100)	0.873
Fair	11.3 (4.3)		1 (3.4)	28 (96.6)	
Good	10.8 (4.2)		9 (6)	140 (94)	
Excellent	8.5 (4.2) **		2 (8.3)	22 (91.2)	
Self rating of general health					
Poor	9.2 (1.6)	0.276	0 (0)	10 (100)	0,718
Fair	9.6 (2.7)		0 (0)	16 (100)	
Good	10.9 (4.3)		10 (7.2)	129 (92.8)	
Excellent	10.1 (4.6)		2 (5.1)	37 (94.9)	

*Kruscal-Wallis test for between groups analysis

**Mann-Whitney test (excellent-fai,r p=0.001 and excellent-good, p=0.001)

Table 2: Comparison of Satisfaction from Dental Services and Trait Anxiety between genders and Dental Anxiety categories (High vs Moderate/Low [n(%)]

	Dental anxiety score categories			
	Mean (SD)	High (>19)	Moderate/low(<19)	P value
DVSS total	38.6 (3.9)	37.3 (1.8)	38.7 (4.1)	0.148
DVSS IC	12.0 (1.9)	11.4 (1.0)	12.1 (1.9)	0.099
DVSS UA	12.1 (1.8)	11.5 (0.9)	12.1 1.9)	0.136
DVSS TC	14.5 (1.3)	14.4 (0.8)	14.5 (1.3)	0.766
TAI	2.2 (0.4)	2.4 (0.3)	2.1 (0.4)	0.039
		Gender		
		Male	Female	
DVSS total		38.0 (3.4)	38.8(4.1)	0.34
DVSS IC		11.9 (1.8)	12.1 (1.9)	0.6
DVSS UA		11.8 (1.6)	12.1 (1.9)	0.29
DVSS TC		14.3 (1.6)	14.6 (1.2)	0.2
TAI		1.9 (0.4)	2.2 (0.4)	0.013

students had a statistical significant higher trait anxiety score. Regarding satisfaction from dental services, the mean value for the instrument was 38.6 (±4.0, 95% CI: 38.1-39.2) and no significant differences were detected between gender or dental anxiety categories (Table 2).

In Table 3, intercorrelations between MDAS, DVSS (both total score and subscales) and TAI are demonstrated. Dental anxiety was found to significantly correlate negatively with satisfaction from dental services and positively with trait anxiety, but only low intensity correlations were found. Specifically, dental anxiety, measured with MDAS was found to have a significant low negative correlation with IC (rho=-0.184, p=0.008) and TC (rho=-0.131, p=0.003), while there was also a low correlation with UA, but only with a statistical significant tendency. Obviously, a reverse relationship between dental anxiety and satisfaction from dental services was observed in all cases, even when the overall score of DVSS was calculated (rho=-0.196, p=0.005). Dental anxiety was also found to positively correlate at a significant but weak level with trait anxiety (rho=0.206, p=0.003), suggesting that individual characteristics also associate with dental anxiety.

Table 3: Intercorrelations of MDAS with DVSS and TAI

	MDAS	
	Correlation coefficient*	p-value
DVSS (total score)	-0.196	0.005
IC	-0.184	0.008
UA	-0.131	0.062
TC	-0.172	0.014
TAI (total)	0.206	0.003

*Spearman's rho

DISCUSSION

The purpose of this study was to indentify the prevalence and explore the determinants of dental anxiety in a Greek nursing student population. Only one demographic variable (gender) seemed to correlate with dental anxiety. In the present study, females reported significant higher levels of dental anxiety compared to males. Gender differences in fear and anxiety are present in many studies (Bell et al 2012). However, the vast majority of the sample was females and this could be attributed to the female domination of nursing profession in Greece. This finding comes to agreement with several studies (do Nascimento et al 2011, Malvania & Ajithkrishnan 2011).

The prevalence of dental anxiety in our sample was rather low, since only 5.9% scored more than 19 to the MDAS compared to general population, which ranges between 4 and 20% in the industrialized countries (Dubey 2011). A possible cause could be the selection of the sample, because nursing students are familiar with invasive medical procedures such as needle handling and bleeding tissues. In another study comparing the dental anxiety of students from different scientific backgrounds, it was found that medical students had less dental anxiety than divinity students (Humphris & King 2011).

Dental anxiety was found to significantly correlate positively with trait anxiety. This means that people who are generally anxious have usually more dental anxiety

and vice versa. A Turkish study which took place at a dental school clinic arrived at similar results (Akarslan et al 2010). Moreover, the results indicated that patients with higher levels of anxiety were less satisfied with dental services. Analogous conclusions can be drawn by a recent study on the assessment of dental anxiety and its correlation with denture satisfaction in edentulous patients (Shrivastava et al 2012). Patient satisfaction was significantly correlated with certain subscales especially information – communication and perceived technical competence. This finding stresses the importance of dentist's technical competence, communication skills and personality significant which could be predictors of dental anxiety (Rouse & Hamilton 1990).

Another interesting point of this study was that although almost all respondents did not report any oral problems like chewing problems nor did they complain for any pain in the oral cavity during the last weeks and more than two third of the sample rated their oral health as good, still, one third of the students felt they had to visit a dentist during the last 4 weeks. Further investigation should be carried out to determine the reasons they did not access the dental health services, even if they felt the need to have an appointment with a dentist. New research questions arise from this report. It should be explored, whether there is a problem, like the unwillingness of the participants to dedicate any time for an appointment that a targeted health promotion could aim to eliminate. It should also more intensively be studied if there are financial barriers due to the Greek economic crisis that have a detrimental effect on the country's health – including dental – services.

Potential limitations of this study should be taken into account. All participants were students from one nursing school, and this means that findings may hardly be generalizable for the entire student population. A multicenter, interdisciplinary survey would probably be more appropriate for future research. A second limitation is that part of the study instruments depended upon the accuracy of participants' recollections which may diminish or inflate past events. Hence caution is required in interpreting these results. Cross-cultural differences on dental anxiety have been recognized (Coolidge et al 2005), thus studies should examine regionally the correlation of dental anxiety with different variables in various populations of a country, including studies examining nursing students of different regions, or researches examining the difference of dental anxiety between students of health sciences and students of other scientific fields.

The results of the present study showed that patient satisfaction is associated with dental anxiety and their previous experiences. This means that dental staff should obtain a deeper understanding of the triggering mechanisms of dental anxiety and the coping strategies for minimizing the phenomenon. They should also comprehend their role as health professionals in order to eliminate the factors that could increase anxiety and help their patients. Communication and interpersonal skills are essential components in delivering good quality dental care. Oral health professionals should be properly educated in order to initiate a therapeutic relationship and to eradicate as much as possible dental anxiety/fear.

AUTHORS' CONTRIBUTIONS

TB conceived and designed the study, contributed at the collection of the data and was available for consultation throughout the study, AM and MG analyzed the data and interpreted the results. IK and EM drafted the manuscript. All authors offered critical input and revisions on drafts of the manuscript, and approved the final version.

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