Original Article

Evaluation of Dental Anxiety and of its Determinants in a Greek Sample

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Abstract

Background: Dental anxiety and phobia are commonly exhibited among dental patients -thus, there is an imperative need to evaluate the existing status.
Aim: To examine the dental anxiety while identifying several contributory demographic and medical/dental characteristics.
Methodology A cross-sectional study was conducted with a convenience sample of 270 dental patients in a private dental clinic in Athens, Greece. The duration of the study was three months (December 2018-February 2019). It was conducted with the aid of a elaborate questionnaire including socio-demographic data, medical and dental information, Modified Dental Anxiety Scale (MDAS), State Anxiety Inventory subscale of STAI (SAI) and Zung Self-Rating Anxiety Scale (SAS). The data analysis was performed by SPSS v.24.0.
Results: The majority of the participants were women (63.3 %), married (46.3%), high school graduates (38.9 %) and did not have any previous traumatic experience in a dentistry (72.2%). The mean score in MDAS was calculated to be 10.59, in SAS 35.55 and in SAI 42.45 respectively. 7 % of the patients were dentally phobic in line with MDAS. Based on SAS, the vast majority (84.8%) exhibited normal anxiety, while 14.4% exhibited mild to moderate anxiety and a meager 0.7% exhibited extreme anxiety levels. Interestingly enough, there were not any significant differences between males and females in dental phobia [$\chi^2(1) = 0$, p= 0.99]. Patients who fluctuated in age between 46 and 65 years old and those who did not exhibited signs of previous traumatic experience in a dental clinic manifested lower dental anxiety [$\chi^2(2) = 6.827$, $p = 0.033$ and U = 4880.5, $p = 0.0001$ correspondingly). A significant negative correlation was established both between MDAS and SAI score (rho=0.429, p<0.05) and between MDAS and SAS score (rho=0.249, p<0.05).
Conclusions: 7% of the patients were classified as dentally phobic with the main determinants of dental anxiety being age, state anxiety and previous traumatic experience in a dental clinic. Future research is suggested to further clarify the study results in more detail.

Keywords: dental anxiety, dental phobia, MDAS, determinants, oral health

Introduction

Dental anxiety is reported to be a global public health concern affecting populations of all ages and from all geographical locations and influencing individuals' oral health status and quality of life (Minja & Kahabuka, 2019). Although the terms dental *anxiety*, *fear*, and *phobia* are often used interchangeably, they differ significantly depending on the situation within which they occur. *Dental fear* is a reaction

to threatening stimuli in dental situations and involves a "*fight-or-flight*" response. On the antipode, *dental anxiety* is a reaction to any unknown danger, and *dental phobia* is basically the same as fear in its nature, but it is much stronger and the "*fight-or-flight*" response occurs when just thinking about or being reminded of the threatening situation (Armfield, 2010).

The prevalence of dental anxiety in adults ranges from 1% to 52% (Minja & Kahabuka, 2019). In terms of high dental anxiety, its prevalence ranges from 10% to 20% in adult populations (Humphris, Crawford, Hill, Gilbert, & Freeman, 2013; Nicolas, Collado, Faulks, Bullier, & Hennequin, 2007; Humphris, Dyer, & Robinson, 2009). In a relevant study conducted by White, Giblin, & Boyd (2017), the prevalence of high dental anxiety was 6.82% and of moderate to high dental anxiety reached 19%. In another study conducted by Humphris, Crawford, Hill, Gilbert, and Freeman (2013) in England, Wales and Northern Ireland the prevalence of high dental anxiety was in the region of 11.6%.

Dou, Vanschaayk, Zhang, Fu, Ji, and Yang (2018) examined patients with irreversible pulpitis and concluded that 83.1% of them suffered from moderate or high dental anxiety, and 16.2% met criteria for specific phobia. In addition, 36.2% of the participants displayed moderate or severe anxiety based on data as recommended by dentists.

Dental anxiety is considered multifarious and is attributed to a wide range of causes (Beaton, Freeman, & Humphris, 2014). The patient-related causes include previous negative or traumatic experience, pain, family or peer influence, personality characteristics (eg. neuroticism, coping style, perception of body image, and so forth), whereas health professional related causes include a gap in communication techniques and/or unprofessional conduct. Environmental-related causes include one's reaction to the sight of needles or blood, to the drill sound or to the presence of other apprehensive patients, unpleasant smell/clinic area, the vulnerable position of lying back in a dental chair and local anesthetic injections (Hmud & Lj, 2009; Appukuttan, 2016).

Milgrom, Weinstein and Getz (1995) identified four different groups of anxious patients based on their source of fear: 1) anxiety of specific dental stimuli, 2) distrust of the dental personnel, 3) generalized dental anxiety, and 4) anxiety of catastrophe. According to the Seattle system, patients are classified as follows: category I (simple conditioned phobia) =49.6%; category II (fear of catastrophe) =7.8%; category III (generalized anxiety) =19.4%, category IV (distrust of dentists) =9.9%. The remaining 13.3% remained uncategorized (Locker, Liddell and Shapiro (1999).

Many studies have established that females exhibit more anxiety than males when it comes to dental treatment (Saatchi, Abtahi, Mohammadi, Mirdamadi, & Binandeh, 2015; White, Giblin, & Boyd, 2017). However, other studies (Minja et al., 2016; Giri, Pokharel, Gyawali, & Bhattarai, 2017) illustrated no gender differences in relation to dental anxiety.

Any association between age and level of dental anxiety still remains unclear. Several studies have concluded that younger patients are more anxious than older patients (Klingberg & Brogerg, 2007; Humphris, Dyer, & Robinson, 2009; Minja, Jovin, &, Mandari, 2016) and high dental anxiety decreases as age increases (White, Giblin, & Boyd, 2017). In contrast, Tunc et al. (2005) have established higher levels of dental anxiety among older patients. Furthermore, no association was noticed between age and dental anxiety in other studies (Gisler, Bassetti, Mericske-Stern, Bayer, & Enkling, 2012; Saatchi, Abtahi, Mohammadi, Mirdamadi, & Binandeh, 2015). In addition, patients of lower educational background are more at risk of exhibiting dental anxiety (Klingberg & Brogerg, 2007; Minja, Jovin, &, Mandari, 2016).

Moreover, individuals with poor oral health status (with many decayed and/or missing teeth and few restored teeth) and those with previous negative/traumatic dental experiences are prone to exhibit greater dental anxiety (Eitner, Wichmann, Paulsen, & Holst, 2006; Nicolas, Collado, Faulks, Bullier, & Hennequin, 2007). Conversely, patients who visit the dentist frequently are less likely to manifest signs of dental anxiety (Armfield, 2010; Saatchi et al., 2015) and are more likely to have adopted better oral hygiene practices (DeDonno, 2012).

Dental anxiety and phobia are associated with high tendency to self-medication and negligence of dental care (Sohn & Ismail, 2005; Appukuttan, 2016). Such a negligence has been described as part of the vicious cycle of dental anxiety (dental anxiety, poor oral health, feelings of guilt, shame, inferiority, and worry of being

reprimanded by a dentist for oral neglect – all the aforementioned contribute to further increase dental anxiety) (Armfield, Stewart, & Spencer, 2007). Dental anxiety affects also the individuals' daily living and eating habits. Furthermore, dentally anxious patients are usually dissatisfied with the appearance of their teeth and for this reason manifest social avoidance behavior (Doerr, Lang, Nyquist, Ronis, 1998). Furthermore, treating such anxious patients is also stressful for the dentist (Brahm, Lundgren, Carlsson, Nilsson, Corbeil, Hägglin, 2012).

The aim of this study was to examine the dental anxiety in a Greek sample and to identify several contributory demographic and medical/dentist characteristics. Based on the findings of the aforementioned literature, the following hypotheses are formed: 1) dental patients manifest high levels of dental anxiety (Hypothesis 1); 2) there are differences in dental anxiety in line with the patients' demographic characteristics (e.g. gender, marital status, level of education) (Hypothesis 2); 3) there are differences in dental anxiety based on the patients' medical/dental characteristics (e.g. chronic diseases, time elapse since the last visit to a dentist, times of tooth brushing per day, previous traumatic experience in a dentistry etc.) (Hypothesis 3).

Methods

Procedure: A cross-sectional study was conducted with a convenience sample of 270 dental patients in a private dental clinic in Zografou Municipality, Athens, Greece, all of whom eagerly conceded to participate in the study. The study covered the three-month period from December 2018 to February 2019.

The sample consisted of patients who came in the dental clinic for dual reasons: either for preventive examination or for treatment. Non Greek patients speakers were excluded from the study. 40% of them were new patients – namely they were visiting the dental clinic for the first time. All patients were hosted in the examination room and completed the respective questionnaires before the dental examination.

The data was collected by interviews conducted by the dentist of the clinic. An elaborate questionnaire was applied, which included socio-demographic data, information about the medical and dental history and Modified Dental Anxiety Scale), State Anxiety Inventory subscale of STAI and Zung Self-Rating Anxiety Scale (SAS). All these scales have been translated and culturally adapted for the Greek population by distinguished scholars.

Participants: According to the eligibility criteria, 270 patients were selected to participate in the study, all of whom answering in the affirmative (response rate: 100%). The majority of the participants were women (63.3 %), while the rest were men (36.7 %). With regards to their age, the majority were 31-45 years old or 46-65 years old, both reaching the same percentage (34.4%). The demographic characteristics of the sample and information about the medical/dental history are presented in Table 1.

Measures

Socio-demographic and medical data: Patients reported their gender, age group (18-30 years, 31-45 years, 46-65 years), marital status, educational level background and occupation. Concerning their medical and dental history, the patients reported the time that had elapsed since the last visit to the dentist, the reason for both the last and the current visit to the dentist, the times per day they brush their teeth. They also answered if they suffered from any chronic disease and if they had undergone a traumatic experience concerning their dental care.

Modified Dental Anxiety Scale (MDAS) (Humphris et al.,1995): The Modified Dental Anxiety Scale (MDAS) is a brief, self-complete questionnaire consisting of five questions. It can be used in the everyday dental practice as a clinical aid and screen for dental anxiety (Humphris, Dyer, & Robinson, 2009). MDAS asks participants to rate their emotional reaction:
a) to the prospect of a dental visit the day before
(*"if you went to your dentist for treatment tomorrow, how would you feel?"*),
b) then, when in the waiting room
[*"if you were sitting in the waiting room (waiting for treatment), how would you feel?"],*
c) being receptive to drilling
(*"if you were about to have a tooth drilled, how would you feel?"*),
d) scaling
(*"if you were about to have your teeth scaled and polished, how would you feel?"*) and
e) a local anesthetic injection

(*"if you were about to have a local anesthetic injection in your gum, about an upper back tooth, how would you feel?"*).

Pre-coded responses range from "not anxious" (scoring 1) to "extremely anxious" (scoring 5), with the total score being a sum of all five items, ranging from 5 to 25, with the higher the score the higher the dental fear. Cut-off is 19 or above, which indicates a highly dentally anxious patient, possibly dentally phobic.

MDAS has been translated into different languages (eg. Arabic, Chinese, Greek, Romanian, Spanish, Turkish, Italian and so forth), presenting sound cross-cultural reliability and validity (Humphris, Freeman, Campbell, Tuutti, & D' Souza, 2000; Appukuttan et al., 2013). The reliability of the English language version of the MDAS is also sound enough (internal consistency = 0.89; test-retest = 0.82) (Humphris, Dyer, & Robinson, 2009). In this study, the Greek version of the scale (Aravou, 2008) was used and Cronbach's α was equal to .89.

SAI (State Anxiety Inventory) (Spielberger, 1983): SAI is one of the two subscales of the State-Trait Anxiety Inventory (STAI) and evaluates the person's emotional state at the time of the survey (state anxiety) (e.g., "I feel calm"), consisting of 20 questions. The items of the questionnaire are rated on a 4-point Likert scale (1 =Not at all, 4 = Very much). Questions 1,2,5,8,10,11,15,16,19, 20 are reversely scored. Total score ranges from 20 to 80 and higher score indicates greater anxiety at the time of the survey. The STAI (and consequently SAI subscale) have been translated in many languages and have been used in several studies, presenting adequate psychometric properties. Its Greek version (Fountoulakis et al., 2006) presents reliable psychometric properties. In this study, Cronbach's α for this subscale was equal to .85.

The Zung Self-Rating Anxiety Scale (SAS) (Zung, 1971) : SAS is a 20-item self-report questionnaire that measures anxiety levels, based on scoring in cognitive, autonomic, motor and central nervous system symptoms, e.g. "I feel more nervous and anxious than usual", "my arms and legs shake and tremble" and the like. The respondents should indicate the degree that each statement applies to them within a period of one or two weeks prior to taking the test. Each question is scored on a 4-point Likert scale (1=a little of the time, 4=most of the time). Questions 5,9,13,17,19 are reversely scored.

The total raw scores range from 20-80 with the higher score the greater anxiety level exhibited. The "Anxiety Index" score can then be applied to determine the clinical interpretation of one's anxiety level s: 20-44=Normal Range, 45-59=mild to moderate anxiety levels, 60-74=marked to indicate severe anxiety levels, 75-80=extreme anxiety levels. Good psychometric properties have been demonstrated for the Greek version of the scale (Samakouri, Bouhos, Kadoglou, Giantzelidou, Tsolaki, & Livaditis, 2012). In this study Cronbach's α was equal to .82.

Data analysis : Data analysis was performed by SPSS v.24.0. The Kolmogorov-Smirnov test was used to examine the normality of continuous variables. The analysis included descriptive statistics and Spearman's correlation coefficient for the examination of linear correlations among quantitative variables. Mann-Whitney and Kruskal-Wallis tests were used to check statistically significant differences between two or more than two groups, correspondingly. Non parametric tests were used because of the non normal distribution of the data. Moreover, a hierarchical multiple linear regression analysis was performed. Statistical significance level (p-value) was set to 5%.

Ethics: The patients were fully informed of the aim of the study and a signed consent form was obtained. All patients took part in the study voluntarily while no one was remunerated for participating. All participants were guaranteed anonymity and confidentiality with regards to the information provided and were informed that they could stop completing the questionnaire at any given time. They were also assured that the collected data would be used only for the purpose of the study, and that their decision to withdraw would not compromise in any way the standards of the care provided.

Results

The majority of the participants were women (63.3 %), married (46.3%), high school graduates (38.9 %) and private employees (40.7%). Moreover, most of them brushed their teeth twice a day (57%), did not report suffering from a chronic disease (90%) and had not undergone any previous traumatic experience in a dentistry (72.2%). The most frequent reason for their visit

to the dentist was preventive examination/scaling (47.4%).

Demographic characteristics of the sample and medical/dental information are presented in table 1. The mean score in MDAS was 10.59, in SAI was 42.45 and in SAS was 35.55.

Descriptive Statistics on Modified Dental Anxiety Scale (MDAS), State Anxiety Inventory (SAI) and Zung Self-Rating Anxiety Scale (SAS) are presented in Table 2.

Patients were also classified in categories according to their score in Zung Self-Rating Anxiety Scale (SAS) (table3).

The vast majority of the respondents (84.8%) exhibited normal score, while 14.4% exhibited mild to moderate anxiety levels. The percentage of the patient with extreme anxiety levels was rather low (0.7%). In MDAS, cut-off is 19 or above, which indicates a highly dentally anxious patient, possibly dentally phobic. According to this cut-off score, 19 patients (7%) were dentally phobic and the rest 251 (93%) were not dentally phobic. There were no significant differences between males and females in dental phobia [$\chi^2(1) = 0$, $p = 0.99$].

Descriptive Statistics on Modified Dental Anxiety Scale (MDAS) and Differences among patients are presented in Table 4.

The impact of *age* on Modified Dental Anxiety Scale (MDAS) score was significant [$\chi^2(2) = 6.827$, $p = 0.033$]. Patients who were 46-65 years old exhibited significantly lower mean ranks (118.75) than patients who were 18-30 age group (147.47) and 31-45 years (141.42). The impact of *previous traumatic experience in a dental clinic* on MDAS score was also significant (U = 4880.5, $p = 0.0001$). Patients who had undergone a previous traumatic experience exhibited significantly higher mean ranks (167.93) than patients who did not have such an experience (123.03).

Concerning the score in the remaining in-question questionnaires, the following significant results were found: a) the impact of *gender* on State Anxiety Inventory (SAI) score was significant (U = 10179, $p = 0.006$) and women had higher mean ranks (145.53) than men (118.18). b) the impact of *previous traumatic experience in a dental clinic* on both Zung Self-Rating Anxiety Scale (SAS) score and on State Anxiety Inventory (SAI) score was significant (U = 5932.5, $p = 0.016$ and U = 5464, $p = 0.001$ correspondingly). Patients who had undergone a previous traumatic experience exhibited significantly higher mean ranks than patients who did not have such an experience (153.9 vs 128.42 and 160.15 vs 126.02 correspondingly).

A statistically significant negative correlation was established between Modified Dental Anxiety Scale (MDAS) and State Anxiety Inventory (SAI) score (rho=0.429, $p<0.05$) and between Modified Dental Anxiety Scale (MDAS and Zung Self-Rating Anxiety Scale (SAS) score (rho=0.249, $p<0.05$). Moreover, score on Self-Rating Anxiety Scale (SAS) was significantly correlated with score on State Anxiety Inventory (SAI) (rho=0.524, $p<0.05$).

Following the above findings, a hierarchical linear regression analysis was performed. Demographic characteristics (age, gender), medical/dental characteristics (chronic diseases, previous traumatic experience in a dentistry and SAS-SAI score were classified as predictor variables in block 1,2 and 3, respectively and score in MDAS was the resulting variable.

The blocks were included in the model independently by stage. No evidence of multicollinearity among the variables was suggested producing tolerance levels over 0.1 and VIF (Variance Inflation Factor) values under 10. In addition, no evidence of outliers or influential points was suggested upon the examination of Mahalanobis and Cook distance, Centered Leverage Value and Dffits and DfBetas. The results of the hierarchical regression analysis are presented in Table 5.

The results of the above illustrated that patients with previous traumatic experience on a dentistry had higher score on MDAS (b*=-.166), compared to those who did not have such an experience. Score on State Anxiety Inventory (SAI) was also positively associated with score on MDAS and this relationship was statistically significant (p=0.001). The proportion of variance in MDAS score accounting for by all independent variables was equal to 0.243 (24.3%). The best predictor variable of MDAS score in the model was Score on State Anxiety Inventory (SAI) followed by previous traumatic experience within the dentistry premises.

Table 1. Demographic Characteristics of the Sample and Medical/Dental Information

	N	Percent %
Gender		
Men	99	36.7 %
Women	171	63.3 %
Age group		
18-30 years old	84	31.1 %
31-45 years old	93	34.4 %
46-65 years old	93	34.4 %
Marital status		
Single	122	45.2 %
Married	125	46.3 %
Divorced/separated	16	5.9 %
Widow/widower	7	2.6 %
Level of education		
Primary school	8	3.0 %
Secondary school	9	3.3 %
High school	105	38.9 %
Technical institution	44	16.3 %
University	75	27.8 %
Master of Science	29	10.7 %
Job		
Private employee	110	40.7 %
Civil servant	40	14.8 %
Freelancer	36	13.3 %
Farmer	4	1.5 %
Other	80	29.6 %
Last visit to a dentist		
1 years ago	226	83.7 %
>1-3 years ago	27	10.0 %
>3 years ago	17	6.3 %

Reason for the last visit to a dentist		
Dental/oral pain	97	35.9 %
Prosthetics	48	17.8 %
Preventive examination/scaling	125	46.3 %
Reason for the current visit to the dentist		
Dental/oral pain	82	30.4 %
Prosthetics	60	22.2 %
Preventive examination/scaling	128	47.4 %
Chronic diseases		
Yes	27	10.0 %
No	243	90.0 %
Previous traumatic experience in a dental clinic		
Yes	75	27.8 %
No	195	72.2 %
Times of toothbrushing/ day		
None	4	1.5 %
Once	79	29.3 %
Twice	154	57.0 %
Three times	30	11.1 %
>three times	3	1.1 %

Table 2. Descriptive Statistics on Modified Dental Anxiety Scale (MDAS), State Anxiety Inventory (SAI) and Zung Self-Rating Anxiety Scale (SAS)

	Mean	SD	Min	Max	Range
Modified Dental Anxiety Scale (MDAS)	10.59	4.46	5	25	20
State Anxiety Inventory (SAI)	42.45	10.23	26	72	46
Zung Self-Rating Anxiety Scale (SAS)	35.55	7.98	20	62	42

Table 3. Classification of Patients According to their Score in Zung Self-Rating Anxiety Scale (SAS)

	Frequency	Percent %
Normal range	229	84.8 %
Mild to moderate anxiety levels	39	14.4 %
Marked to severe anxiety levels	2	0.7 %
Extreme anxiety levels	0	0 %
Total	270	100 %

Table 4. Descriptive Statistics on Modified Dental Anxiety Scale (MDAS) and Differences Between Patients

	Mean	*p*
Gender		
Men	10.06	*NS*
Women	10.90	
Age group		
18-30 years old	11.27	
31-45 years old	10.76	***0.033***
46-65 years old	9.81	
Marital status		
Single	10.77	
Married	10.13	*NS*
Divorced/separated	11.38	
Widow/widower	14	
Level of education		
Primary school	12.38	*NS*
Secondary school	10.11	

High school	10.62	
Technical institution	9.25	
University	10.93	
Master of Science	11.31	
Last visit to a dentist		
1 years ago	10.33	*NS*
>1-3 years ago	11.30	*NS*
>3 years ago	12.94	*NS*
Reason for the last visit to a dentist		
Dental/oral pain	10.64	*NS*
Prosthetics	10.35	*NS*
Preventive examination/scaling	10.65	*NS*
Reason for the current visit to the		
Dental/oral pain	11.23	
Prosthetics	10.10	*NS*
Preventive examination/scaling	10.41	
Chronic diseases		
Yes	10.74	*NS*
No	10.58	
Previous traumatic experience in a dental clinic		
Yes	12.53	***0.001***
No	9.85	
Times of toothbrushing/ day		
None	9.50	
Once	11.20	
Twice	10.45	*NS*
Three times	10	
>three times	9	

Note: NS= No significant

Table 5. Hierarchical linear regression with Modified Dental Anxiety Scale (MDAS) score as the dependent variable.

Predictor	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	4.448	1.584		2.808	**.005***	1.329	7.567
Age ≤45 years old** *versus* >45 years old	-.799	.506	-.085	-1.580	.115	-1.795	.197
Sex women** *versus* men	-.201	.508	-.022	-.395	.693	-1.201	.800
Chronic diseases Having chronic diseases** *versus* no having chronic diseases	.105	.804	.007	.131	.896	-1.477	1.688
Previous traumatic experience in a dentistry yes** *versus* no	-1.655	.553	-.166	-2.996	**.003***	-2.743	-.567
State Anxiety Inventory (SAI)	.195	.028	.447	7.027	**.000***	.140	.249
Zung Self-Rating Anxiety Scale (SAS)	-.019	.035	.034	-.533	.595	-.088	.051

Note: *p < 0.01, **Reference category, *** Number of observations = 270; R-squared = .263; Adjusted R-square = .243

Discussion

This study aimed to assess the dental anxiety and its determinants in a convenience sample in Greece. The literature review suggested that dental anxiety is a global public health concern, affecting many people of all ages and influencing individuals' oral health status and quality of life (Minja & Kahabuka, 2019), thus highlighting the importance of the present study.

The main results indicated that 7% of the patients are dentally phobic, with 14.4% exhibiting mild to moderate anxiety levels and 0.7 % exhibiting extreme anxiety levels. The percentage of 7% is not high enough, and, consequently, hypothesis 1 was not confirmed. This finding is consistent with that found in other relevant studies (White, Giblin, & Boyd, 2017) and slightly lower of that established by Humphris, Crawford, Hill, Gilbert, & Freeman (2013). In contrast, higher percentage of dental anxiety (16.2%) and of moderate or severe anxiety levels (36.2%) was suggested by Dou, Vanschaayk, Zhang, Fu, Ji, and Yang (2018) in a sample of patients with irreversible pulpitis. The incompatibility of the findings may be attributed to differences in the cultural context and in the dental characteristics of the patients of the latter sample (irreversible pulpitis versus several reasons for the current visit to the dentist in the present study).

The main determinants of dental anxiety and phobia were age and previous traumatic experience in a dental clinic. Consequently, hypotheses 2 and 3 were partially confirmed. Many studies have established that females are more anxious than males when it comes to dental treatment (Saatchi, Abtahi, Mohammadi, Mirdamadi, & Binandeh, 2015; White, Giblin, &

Boyd, 2017). Though, other relevant studies (Minja et al., 2016; Giri, Pokharel, Gyawali, & Bhattarai, 2017) illustrated no gender differences with regards to dental anxiety. In the in-question study, no significant differences between males and females in dental phobia were noticed, confirming the findings of Minja et al. (2016) and Giri, Pokharel, Gyawali, & Bhattarai (2017).

Association between age and level of dental anxiety is still unclear in bibliography and contradictory results have been proposed by researchers. In the present study, the impact of *age* on Modified Dental Anxiety Scale (MDAS) score was significant with patients who were 46-65 years old exhibiting significantly lower score than younger patients. This result is consistent with the one presented in several other relevant studies (Klingberg & Brogerg, 2007; Humphris, Dyer, & Robinson, 2009; Minja, Jovin, &, Mandari, 2016; White, Giblin, & Boyd, 2017).

The impact of *previous traumatic experience in a dental clinic* on MDAS score was also significant and patients who underwent a previous traumatic experience had significantly higher score than patients who did not have such an experience. This finding is fully consistent with the one established by Eitner, Wichmann, Paulsen, and Holst (2006) and Nicolas, Collado, Faulks, Bullier, and Hennequin (2007).

No differences were observed in dental anxiety and dental phobia related to the patients' marital status and level of education. However, it was established that one's educational level played a crucial role as a significant determinant of dental phobia in several other relevant studies (Klingberg & Brogerg, 2007; Minja, Jovin, &, Mandari, 2016).

No differences were observed in relation to the frequency of the visits to a dentistry (last visit 1 years ago, >1-3 years ago, >3 years ago). In contrast to this finding, Armfield (2010) and Saatchi et al. (2015) have found that patients who visit the dentist frequently are less likely to present dental anxiety.

The rest demographic and medical/dental characteristics of the patients did not significantly affect dental anxiety/phobia.

According to Eitner, Wichmann, Paulsen, and Holst (2006) and Nicolas, Collado, Faulks, Bullier, and Hennequin (2007), individuals with poor oral health status (with many decayed and missing teeth and few restored teeth) experience greater dental anxiety. However, this variable was not taken into consideration in this study.

A statistically significant negative correlation was established between Modified Dental Anxiety Scale (MDAS) and State Anxiety Inventory (SAI) score and between Modified Dental Anxiety Scale (MDAS) and Zung Self-Rating Anxiety Scale (SAS) score. Moreover, score on Zung Self-Rating Anxiety Scale (SAS) significantly correlated with score on State Anxiety Inventory (SAI), as expected, meaning that the stronger the patient's anxiety and state anxiety are, the higher the dental anxiety and phobia are. Such a result even, if expected, has not been examined in-depth by other researchers.

The results of the hierarchical linear regression analysis confirmed that state anxiety and previous traumatic experience in a dentistry premises are significant determinants of dental anxiety.

The fundamental advantages of this study include the overall response rate and the fact that the hypotheses examined provide evidence and information about dental anxiety and phobia that can be used by dentists and mental health practitioners. Furthermore, the prevalence of dental anxiety and phobia in modern times demonstrates its importance in everyday clinical practice. As for the research limitations, it must be highlighted that this is a cross-sectional study, in which it is not possible to examine causal relations. Furthermore, the patients' oral health status was not included in this study, although this variable has been suggested to be a determinant of dental anxiety and phobia in other studies. Moreover, the prerequisite on the part of the dental clinic that the respondents submit a written consent and/or the completion of the questionnaire before the examination by the dentist may have affected the answers provided to the questionnaire items.

Notwithstanding the limitations discussed above, the results of the research are useful enough as to make suggestions for convenient dental care of patients with high dental anxiety and phobia. Dental professionals have a major role to play in the management and prevention of dental anxiety (Minja & Kahabuka, 2019). Moreover, as stated above, the dental anxiety and phobia are associated with high tendency to self-medication and negligence of dental care while affecting the individuals' daily living and eating habits. However, the dentists usually fail to use suitable

scales for the diagnosis of pre-treatment dental anxiety and phobia (Dailey, Humphris, & Lennon, 2001). It is therefore necessary to recognize the susceptible patients (according to the found risk factors) and to implement interventions for their support or to refer them to a mental health professional, in order to maintain optimal oral health.

Future research is suggested, so that further investigation and clarification of the study's results to be rendered possible. Conducting a longitudinal study would be to the benefit of both dentists and patients, with the scope to overcome the limitations of a cross-sectional study. Surveys could also focus on patients with particular needs and characteristics, e.g. on patients with high comorbidity, who are subjected to a specific dental therapy (eg. endodontic treatment) and so forth. Finally, researchers could examine the dentists' experience while treating such dentally anxious and phobic patients.

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