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Relationship between dental anxiety, general anxiety level and depression in patients attending a university hospital dental clinic in Turkey.

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Objective: To evaluate the relationship between dental anxiety, general anxiety and depression levels in patients attending a university hospital dental clinic in Turkey. ***Basic research design:*** A cross sectional study. ***Participants:*** 250 first visit patients seeking dental treatment. ***Main outcome measures:*** Modified Dental Anxiety Scale (MDAS), Beck Anxiety Inventory (BAI) and Beck Depression Inventory (BDI) were used to assess the dental anxiety, general anxiety and depression level in these patients. ***Results:*** The mean MDAS, BAI, and BDI scores were 10.5, 9.4, and 10.7, respectively. The prevalence of dental anxiety was found to be 20.8% (52/250) at the cut-off point ≥ 15 and 6.8% (17/250) at the cut-off point ≥19 according to MDAS score evaluation. MDAS and BAI scores were significantly higher in women ($p<0.001$ and $p<0.01$, respectively). BDI and BAI scores were significantly higher in MDAS cut-off point of 15 ($p<0.05$ and $p<0.001$, respectively). When the cut-off point was taken as 19, age and BAI scores were significantly higher in MDAS ≥ 19 ($p<0.05$, $p<0.001$ and $p=0.477$, respectively) but there was no association with BDI. There was significant correlation between MDAS scores and age, BDI and BAI mean scores ($r = - 0.166$, $p<0.01$; $r = 0.148$, $p<0.05$; $r = 0.273$, $p<0.01$ respectively). ***Conclusions:*** Dental anxiety was positively correlated with patients' general anxiety level and was higher in women and at younger age.

Key words: Anxiety, dental anxiety, depression, modified dental anxiety scale

Introduction

Despite the technological advances that have made dentistry less painful and less uncomfortable, dental fear, anxiety, and phobia have consistently been reported (Lahti *et al.*, 2005). Fear is an emotional, physiological, and behavioral response to a recognized external threat. Anxiety is an unpleasant emotional state, the causes of which are less clear. It is often accompanied by physiological changes and behaviors similar to those caused by fear (Anttila *et al*., 2006; Locker *et al*., 2001).

The prevalence of dental fear and/or anxiety is reported to be between 4% and 20% in the adult population (Ekanayake and Dharmawardena, 2003; Firat *et al.*, 2006; Locker *et al*., 1991; Moore *et al.*, 1993). High levels of dental fear, anxiety, and phobia have been denoted to correlate positively with long intervals between dental visits, episodic use of dental services, and frequent use of emergency care (Klages *et al*., 2006; Ter Horst and De Wit, 1993).

Dental fear and anxiety are a problem for many patients and can be a barriers to treatment. Patients with high dental anxiety avoid going to the dentist (Ter Horst and De Wit, 1993), and they report more pain (Klages *et al*., 2006) and poorer oral health than the regular dental population (Schuller *et al.*, 2003). Women consistently speak of dental fear more often than men do (Moore *et al.*, 1993; Schuller *et al.*, 2003). In general, dental fear has been reported to be more common among younger than older adults (Lahti *et al.*, 2005; Locker *et al*., 1991; Moore *et al.*, 1993).

The need to evaluate and measure dental anxiety has led to the development of a variety of measures. Corah's Dental Anxiety Scale (DAS) is probably the most widely used; however, one of the alternative scales that has been proposed to overcome the shortcomings of DAS is Modified Dental Anxiety Scale (MDAS) (Corah *et al.*, 1978; Freeman *et al*., 2007). The reliability and validity of MDAS have proved that it is appropriate for Turkish population (Firat *et al.*, 2006; Ilguy *et al.,* 2005; Moore *et al.*, 1993; Tunc *et al.*, 2005).

In psychiatry, comorbidity of anxiety and depressive disorders is common and women are more vulnerable to disorders like depression and anxiety (Anttila *et al*., 2006; Weeks and Heimberg, 2005). Besides, general anxiety disorders and other psychiatric disorders, including depression, and phobia disorder are all important factors, which may also cause the perception of more pain during dental procedures ending with phobic avoidance of further dental procedures (Engin *et al*., 2008; Klages *et al*., 2006). Patients with dental anxiety report also impaired social life with compromised interpersonal relationships (Anttila *et al*., 2006). On the other hand, various studies suggest that individuals experiencing anxiety during dental visits may have more psychiatric disorders than others (Economou, 2003; Locker *et al*.,

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2001). Conceivably, psychiatric disorders may worsen dental anxiety and the application of dental procedures may become more difficult. For this reason, it is important to diagnose comorbid psychiatric disorders.

In this study, the relationship between dental anxiety, depression, and general anxiety level and their differences among genders were investigated in patients attending Dumlupinar University Hospital Dental Clinic in Kutahya, Turkey.

Method and materials

Data sources

The ethics committee approval of Dumlupinar University, Training and Research Hospital, Kutahya, Turkey was obtained before the study. In a cross-sectional design, patients seeking orthodontic and conservative dental treatment, endodontic, periodontal and surgical treatment, who visited the admission clinic of the university hospital dental clinic in one month, were asked to participate in the study. A written informed consent was taken from each patient. Patients under 18 years old were excluded from the study. Seven patients refused to get involved in the study. Finally, the study consisted of 250 patients which were all adult patients seen in the dental clinic in one month. Patients, who participated in the study, received tooth extraction, periodontal surgery, endodontic treatment or restorative procedures after diagnostic and radiographic evaluations where needed.

Instruments

Patients were asked to complete self administered questionnaires of Modified Dental Anxiety Scale (MDAS), Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI) in a waiting room before dental procedures.

MDAS is a five-question instrument asking about the patient's underlying anxiety about specific dental procedures, which does not contain any question about past experiences but pointing general anxiety level towards dental procedures. Each question is scored from 1 (not anxious) to 5 (extremely anxious). Two separate groups have studied its reliability and validity in Turkish populations and both found it to be appropriate for the Turkish population but they suggested different cut-off points in each study. Tunc *et al.* (2005) suggested its cut-off point as 15, and Ilguy *et al*. (2005) suggested it as 19. In this study, both cut-off points were considered.

BAI is a self-report inventory that consists of 21 items, each one describing a common symptom of anxiety. The respondent is asked to rate how much he or she has been bothered by each symptom over the past week on a 4-point scale ranging from 0 to 3. The items are summed to obtain a total score that can range from 0 to 63. The higher points of this scale reflect higher level of anxiety.

BDI is also a multiple choice 21-question self-report with 4-point scale ranging from 0 to 3 that is one of the most widely used instruments for measuring the severity of depression with a total score of 63. The higher the total BDI score, the higher the level of depression.

The BDI and BAI inventories are designed to measure patients' current symptom severity of depression and anxiety but do not consider their histories. In various studies, the reliability and validity of Turkish versions of these instruments have been examined and found appropriate for Turkish populations (Engin *et al*., 2008; Firat *et al.*, 2006; Ilguy *et al.,* 2005; Tunc *et al.*, 2005).

Means and standard deviations were calculate. Pearson correlation analysis was used to evaluate correlations of variables. SPSS 13.0 for Windows (SPSS Inc., Chicago, IL, USA**)** statistical software was used for the analyses. Independent samples t-test were used to determine the differences in the means between BAI and BDI of MDAS $\geq$15 and MDAS<15 groups, BAI and BDI of MDAS $\geq$19 and MDAS<19 groups, and age, in the means between BAI, BDI and MDAS of two genders.

Results

In this study, mean age of the patients was 32.9 years with a range of 18 to 68 years. There were 120 men (48%) and 130 women (52%). Mean (SD) MDAS score was 10.50 (4.60). Mean (SD) BAI and BDI scores were 9.42 (9.50) and 10.80 (8.26), respectively (Table 1).

MDAS, BAI and BDI scores were compared between the genders with independent samples t-test and found that MDAS and BAI scores were significantly higher in women than men ($p<0.001$ and $p<0.01$, respectively) (Table 1). Unexpectedly, there was no statistically significant difference in depression scores between genders ($p>0.05$).

When the correlation was evaluated between mean scores of MDAS, BAI and BDI, there was significant correlation between MDAS scores and age, BDI and BAI scores ($r = - 0.166$, $p<0.01$; $r = 0.148$, $p<0.05$; $r = 0.273$, $p<0.01$, respectively) (Table 2).

As seen in Table 3, when MDAS cut-off point was taken as 19, as Ilguy *et al.* (2005) suggested, there were 17 (6.8%) patients above it in which nine of them were women and eight of them were men. At this cut-off point, taking MDAS as the grouping variable in an independent samples t-test, age and BAI score differed significantly ($p<0.05$, $p<0.001$, respectively). Patients scoring $\geq$19 in MDAS were significantly younger and more anxious according to BAI scores. But there was no significant difference in depression scores ($p>0.05$).

When MDAS cut-off point was taken as 15 there were 52 (20.8%) patients above it in which 15 of them were men and 37 of them were women (Table 1). At this cut-off point, analyzed with an independent samples t-test, the differences in depression scores were significantly higher at $p<0.05$ level. BAI scores were still significantly higher in patients with MDAS scores 15 or above ($p<0.001$). However, age did not differ significantly at this threshold ($p>0.05$).

Discussion

In this study, two cut-off points based on the MDAS scores were used to divide the sample into a dentally anxious and non-anxious group. At cut-off 15, the prevalence of dental anxiety in dental patients was 20.8% and at cut-off 19 it was 6.8%. The prevalence of dental anxiety in the sample is in accordance with that of the Turkish population which has been measured as 23.5% with MDAS cut-off point 15 and 8.8% a cut–off of 19

Table 1. Means of variables according to genders.

	Age		*BDI*		*BAI*		*MDAS*	
	Mean (S.D.)		*Mean (S.D.)*		*Mean (S.D.)*		*Mean (S.D.)*	
Men (n=120)	32.06 (11.51)		9.84 (7.19)		7.13 (7.48)		9.55 (4.61)	
Women (n=130)	33.71 (10.43)		11.67 (9.07)		11.53 (10.62)		11.37 (4.42)	
	t=1.189	p=0.236	t=1.758	p=0.080	t=3.759	p=0.0002	t= 3.186	p=0.0016

Mean ± S.D. = Arithmetic mean ± Standard deviation
BDI = Beck Depression Inventory,
BAI = Beck Anxiety Inventory,
MDAS = Modified Dental Anxiety Scale

Table 2. Correlation analysis of MDAS with age, BDI and BAI.

	AGE		*BDI*		*BAI*	
	r	*p*	*r*	*p*	*r*	*p*
MDAS	-0.166	0.009	0.148	0.019	0.273	0.0001

BDI = Beck Depression Inventory,
BAI = Beck Anxiety Inventory,
MDAS = Modified Dental Anxiety Scale

Table 3. Results of independent samples t-test analyses of age, BDI and BAI with the MDAS cut-off scores of 15 and 19.

MDAS	*Age*		*BDI*		*BAI*	
	Mean (S.D.)		*Mean (S.D.)*		*Mean (S.D.)*	
≥ 19 (n=17)	26.47 (6.93)		12.17 (6.15)		17.11 (9.29)	
< 19 (n=233)	33.39 (11.07)		10.69 (8.39)		8.85 (9.28)	
	t	*p*	*t*	*p*	*t*	*p*
	t=2.539	p=0.0117	t=0.231	p=0.8173	t=3.543	p=0.0005
MDAS	*Age*		*BDI*		*BAI*	
	Mean (S.D.)		*Mean (S.D.)*		*Mean (S.D.)*	
≥ 15 (n=52)	30.88 (10.35)		12.88 (8.83)		15.09 (12.65)	
<15 (N=198)	33.45 (11.09)		10.24 (8.03)		7.92 (7.86)	
	t	*p*	*t*	*p*	*t*	*p*
	t=1.507	p=0.133	t=2.066	p=0.0399	t=5.082	p<0.0001

Mean ± S.D. = Arithmetic mean ± Standard deviation
BDI = Beck Depression Inventory,
BAI = Beck Anxiety Inventory,
MDAS = Modified Dental Anxiety Scalec

(Firat *et al*., 2006; Ilguy *et al.*, 2005; Tunc *et al*., 2005). Also the prevalence values did not differ from other studies (Ekanayake and Dharmawardena, 2003; Firat *et al.*, 2006; Ilguy *et al.,* 2005; Moore *et al.*, 1993; Tunc *et al.*, 2005). However, the variation in the prevalence of dental fear and anxiety could reflect real differences between populations or population groups, or could be the consequence of methodological differences (Ekanayake and Dharmawardena, 2003; Lahti *et al*., 2005; Moore *et al.*, 1993).

There is agreement regarding patients' psychopathological traits and conditions influencing the expression of their dental fear. According to a report by Moore *et al.* (1991), dental fear was categorized as a consequence of simple conditioned phobia in 19%, as fear of somatic reactions in 7%, as generalized anxiety in 28%, or as distrust of dentists in 46% of cases. In the current study, the authors' aim was to investigate the relationship between dental anxiety, general anxiety and depression. Results of this study indicated that the relation between general anxiety level and dental anxiety was significant

at both cut-off points of the MDAS and also at mean score level when correlations were evaluated. This means that dentally anxious people tend to be also generally anxious. Moore and Brodsgaard (1995) indicated that in severe dental anxiety patients, symptoms of general anxiety disorder (GAD) were present in 30 of 80 patients, which were, in fact, in accordance with our study. In a study, psychiatric disorders were evaluated by Diagnostic Interview Schedule (DIS), which is a scale diagnosing psychiatric disorders according to DSM-III-R (The Diagnostic and Statistical Manual of Mental Disorders III-R) (Locker *et al.*, 2001). Agoraphobia, simple phobia, and social phobia were found to be more prevalent in severe dentally anxious patients. However, in that study, GAD was not a significant comorbidity to dental anxiety in contrast to our study. Panic disorder is a common comorbidity to agoraphobia, which was found to be high in dentally anxious patients (Locker *et al*., 2001). Our study did not distinguish between categories of anxiety disorder. BAI is not a diagnostic scale; therefore, the authors could not claim that higher scores in BAI will exactly give any anxiety disorder diagnosis but may give a clue for general anxiety level.

Depression and anxiety comorbidity is a commonly seen diagnosis in psychiatric patients (Beck *et al.*, 1988; Weeks and Heimberg, 2005; Anttila *et al.*, 2006). For this reason, we evaluated the association between MDAS and BDI scores. Since, we have found a relationship between dental anxiety and general anxiety levels of patients, we also expected to find some relationship with depression. Even though, there was a correlation between dental anxiety and depression at mean scores, when we analyzed the association between dental anxiety and depression, the statistical significance with depression was at $p<0.05$ level at the cut-off point 15 and was lost at the cut-off point 19 of the MDAS. Eventually, we can conclude that depressive symptoms and dental anxiety are related in a way but severe dental anxiety (MDAS$\geq$19) may be independent of depressive symptoms, although, we did not classify the patients as non-anxious, moderately anxious, and highly anxious as Locker *et al.* (2001) did.

In general, women and younger people tend to be more dentally anxious (Lahti *et al*., 2005; Locker *et al.*, 1991; Moore *et al.*, 1993). The high level of dental anxiety in females can be traced to various conditions such as infrequent visits to the dentist, the long wait in the dental office, previous traumatic dental experiences, pain during dental treatment, the type of treatment received, and how invasive the treatment is (Ter Horst and De Wit, 1993; Moore *et al.*, 1993). Therefore, it is usual to expect women to be more dentally anxious. Furthermore, in psychiatry settings, anxiety disorders and depression are all more common in women (Weeks and Heimberg, 2005). Our findings were in accordance with these expectations, since both MDAS and BAI scores were significantly higher in women. Nevertheless, depression scores of women were not statistically different from men with a mean BDI score of 11.7 in women and 9.8 in men.

This study revealed that dental anxiety level declines with age. This finding is also in accordance with the literature (Locker *et al.*, 1991; Moore *et al.*, 1993; Lahti *et al.*, 2005). In behavioural therapies one method for treating phobias uses exposure to anxiety inducing experiences so it might be argued that older patients, having experienced more treatment, may be expected to be less anxious. They may have learned to handle anxiety and stay calm during dental procedures. At the MDAS cut-off point 19, dental anxiety changed significantly with age though this was not observed at cut-off point 15. Differing findings from different measures or cut-off points make it difficult to compare findings between studies. In fact, dental anxiety is an expected behaviour from younger patients, since unfamiliar procedures are likely to be more frightening and their age makes it more likely that any procedure will be being encountered for the first time.

In general, depression is more common in women (Weeks and Heimberg, 2005). However, the authors could not have achieved this result in dental patients as there was no statistical difference between genders according to depression scores. Even though, there was no significant difference in age and gender distribution, the sample size of the study might have affected these results.

It should be mentioned that there may be a possibility that our sample does not include people with severe dental anxiety or people with severe general anxiety or severe depression that are not likely to seek comprehensive dental treatment. This may leave out high scores of MDAS, BDI and BAI.

In our study design, we asked patients to complete scales before any dental procedure in the waiting room. Of course, this may cause a bias in respect to anxiety causing higher anxiety scores. Other confounding variables may be any medication history or physical or psychiatric disorders which were not investigated, like usage of anxiolytics at the time of dental visit or before, was also not taken into consideration.

In conclusion, results of this study indicated that there is a relation between dental anxiety and general anxiety level. Dentally anxious people tend to be also generally anxious. Dental anxiety was higher in women and at younger age. Cut-off points affected the statistical results. Depressive symptoms and dental anxiety are related in a way but severe dental anxiety may be independent of depressive symptoms.

References

Anttila, S., Knuuttila, M., Ylöstalo, P., Joukamaa, M. (2006): Symptoms of depression and anxiety in relation to dental health behavior and self-perceived dental treatment need. *European Journal of Oral Sciences* **114**, 109-114.

Beck, A.T., Epstein, N., Brown G., Steer, R.A. (1988): An Inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology* **56**, 893-897.

Corah, N.L., Gale, E.N., Illig, S.J.. (1978): Assessment of a dental anxiety scale. *Journal of American Dental Association* **97**, 816-819.

Ekanayake, L., and Dharmawardena, D. (2003): Dental anxiety in patients seeking care at the University Dental Hospital in Sri Lanka. *Community Dental Health* **20**, 112-116.

Economou, G.C. (2003): Dental Anxiety and Personality: Investigating the Relationship between Dental Anxiety and Self-Consciousness. *Journal of Dental Education* **67**, 970-980.

Engin, B., Uguz, F., Yilmaz, E., Özdemir, M., Mevlitoglu, I. (2008): The levels of depression, anxiety and quality of life in patients with chronic idiopathic urticaria. *Journal of European Academy of Dermatology and Venereology* **22**, 36-40.

Firat, D., Tunc, E.P., Sar V. (2006): Dental anxiety among adults in Turkey. *Journal of Contemporary Dental Practice* **7**, 75-82.

Freeman, R., Clarke, H.M.M., Humphris, G.M. (2007): Conversion tables for the Corah and Modified Dental Anxiety Scales. *Community Dental Health* **24**, 49-54.

Ilguy, D., Ilguy, M., Dincer, S., Bayirli, G. (2005): Reliability and validity of the Modified Dental Anxiety Scale (MDAS) in Turkish patients. *Journal of International Medical Research* **33**, 252-259.

Klages, U., Kianifard, S., Ulusoy, O., Wehrbein, H. (2006): Anxiety sensitivity as predictor of pain in patients undergoing restorative dental procedures. *Community Dentistry Oral Epidemiology* **34**, 139-145.

Lahti, S., Vehkalahti, M.M., Nordblad, A., Hausen, H. (2005): Dental fear among population aged 30 years and older in Finland. *Acta Odontologica Scandinavica* **65**, 97-102.

Locker, D., Liddell, A., Burman, D. (1991): Dental fear and anxiety in an older adult population. *Community Dentistry Oral Epidemiology* **19**, 120-124.

Locker, D., Poulton, R., Thomson, W.M. (2001): Psychological Disorders and Dental Anxiety in a Young Adult Population. *Community Dentistry Oral Epidemiology* **29**, 456-463.

Moore, R., Brødsgaard, I., Birn, H. (1991): Manifestations, acquisition and diagnostic categories of dental fear in a self-rettered population. *Behavioral Research and Therapy* **29**, 51-60.

Moore, R., Birn, H., Kirkegaard, E., Brodsgaard, I., Scheutz, F. (1993): Prevalence and characteristics of dental anxiety in Danish adults. *Community Dentistry Oral Epidemiology* **21**, 292-296.

Moore, R., and Brodsgaard, I. (1995): Differential diagnosis of odontophobic patients using the DSM-IV. *European Journal of Oral Sciences* **103**, 121-126.

Schuller, A.A., Willumsen, T., Holst, D. (2003): Are there differences in oral health and oral health behavior between individuals with high and low dental fear? *Community Dentistry Oral Epidemiology* **31**, 116-121.

Ter Horst, G. and De Wit, C.A. (1993): Review of behavioral research in dentistry 1987-1992: Dental anxiety, dentist patient relationship, compliance and dental attendance. *International Dental Journal* **3**, 265-278.

Tunc, E.P., Firat, D., Onur, O.D., Sar, V. (2005): Reliability and validity of the Modified Dental Anxiety Scale (MDAS) in a Turkish population. *Community Dentistry Oral Epidemiology* **33**, 357-362.

Weeks, J.W. and Heimberg, R.G. (2005): Evaluation of the psychometric properties of the Beck Depression Inventory in a non-elderly adult sample of patients with generalized anxiety disorder. *Depression and Anxiety* **22**, 41-44.