

The impact of dental fear on the dental attendance behaviors: A retrospective study

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ABSTRACT

Objective: The aim is to investigate the causes of dental fear and its impact on dental attendance behaviors. **Materials and Methods:** A short questionnaire was distributed to participants at different dental clinics and by emails to evaluate their perceptions of dental fear. The questionnaire contained questions related to gender and age group. The remaining part of the questionnaire investigated the causes of dental fear and its impact on dental visits. **Results:** A total of 2264 participants aged 18 years and above agreed to complete the questionnaire. There were 1177 (52%) male participants and 1095 (48%) female participants. There was a response rate of approximately 60%. Drilling tooth devices and their sounds was the option that caused the highest dental fear among the participants who had it ($n = 248$; 37.7%). Pain was the second most frequently chosen option to cause dental fear ($n = 165$; 25%). Around 70% ($n = 1257$) of the participants who had dental fear overcame their fear and decided to seek treatment when they experienced annoying pain. At the same time, 18% ($n = 323$) of them sought the treatment once they noticed a large carious lesion. **Conclusion:** People from both genders responded similarly to dental fear, and age was not found to be a significant factor in individuals' reactions to dental treatment. The sounds of teeth-drilling devices and related sounds may be responsible for the dental fear, as reported by many people. People with dental fear are more likely to avoid regular dental visits.

Keywords: Dental Attendance, dental fear, dental pain

Introduction

Regular dental visits are essential for maintaining good oral health to avoid the occurrence of dental diseases, instead of delaying or avoiding visits. When a dental disease does emerge, regular dental visits can help in detecting it in its early phase, which may ease the process of dealing with it.^[1]

There are many reasons why people do not visit the dentist regularly. One of the reported reasons for avoiding visiting

the dentist is the presence of dental fear. This type of fear can be defined by the unpleasant emotional reaction to threatening stimuli that is related to dental treatment. People with dental fear usually show common behaviors to avoid their dental visits, such as postponing, canceling, or missing appointments.^[2] Some cross-sectional studies have revealed that people with high levels of dental fear are more likely characterized by such behaviors, compared to people with moderate or low levels of dental fear.^[3] According to the literature, the prevalence of dental fear in the population varies from 4%^[4] to around 50%.^[5] This wide variation has been suggested as a result of the economic and social differences among populations.^[6] Another explanation for the differences in the prevalence of dental fear is the use of various evaluation methods, which may range from a single question on one hand to more complex scales on the other.^[7]

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Several factors can play a role in developing dental fear; these are related to a patient's gender, age, and, most often, a previous negative dental experience.^[8] It is believed that negative dental experiences may be the result of traumatic experiences during dental treatment with unfriendly dentist contacts.^[9] In addition to traumatic dental experiences, common reasons reported for high dental fear include feelings of weakness and the absence of control during treatment.^[10] Meanwhile, some patients are characterized by general fearfulness, which is reported as an etiological factor that may initiate dental fear.^[6]

Gender differences related to dental fear have been investigated several times in the literature.^[11,12] Many studies have suggested that women show higher rates of fear of dental treatment than men do.^[12] Some claim that this is the result of differing gender attitudes toward both pain and perceived control.^[11] By contrast, other studies have suggested that dental fear declines with increasing age.^[12] Liddell and Locker^[13] suggest that the differences in fear that accompany age might be due to a general decrease in fear with aging combined with greater exposure to other diseases and treatments.

It is commonly expected that dental fear has a negative influence on oral health because fearful patients avoid dental care.^[14] A study by Hägglin *et al.*^[15] indicated that middle-aged and elderly women in Sweden with dental fear had more missing teeth, when compared to women without dental fear. Thus, it is believed that the impact of dental fear should be extensively investigated, as it affects many people, in addition to the information gaps related to its long-term effects.

The aim of this study is to investigate the dental procedures or related factors that contribute to developing dental fear. In addition, the study investigates the impact of dental fear on the dental attendance behaviors of the adult Saudi population.

Materials and Methods

Ethical approval

Ethical approval was obtained from the Ethics Committee at the College of Dentistry in Qassim University. Data were anonymously collected without any identifiers.

Study design

In this study, a short questionnaire was created to investigate the causes and the impact of dental fear among the Saudi adult population [Table 1]. Only participants aged 18 years and older were included in this study.

Data collection

The questionnaire was distributed through email. A hard copy of the questionnaire was also distributed to several dental clinics to be filled out by patients in the waiting rooms. The participating patients were invited to fill out the questionnaire by answering all the questions. When the completed questionnaires were

Table 1: Summary of the questionnaire contents

Patients' demography	Gender	Male	
		Female	
Age group		(18-25)	
		(26-35)	
		(36-45)	
		(46-55)	
		(56-65)	
		Older than 65	
Prevalence and impact of dental fear on the attendance behaviors of patients	Do you fear any part of dental treatment?	Yes	
		Kind of	
		No	
	If you have dental fear, which part of dental treatment causes this kind of fear?		Pain
			Drilling teeth devices and their sounds
			Previous conceptions of some dental treatment procedures
			Fear of medical mistakes,
			Fear of medical procedures in general
	If you have dental fear, when do you overcome your fear and seek the treatment?		Others
			When I see extensive dental caries on one of my teeth
		When I feel slight pain	
		When I feel an annoying pain.	

submitted, the authors checked if all the questions had been answered. All incomplete questionnaires were excluded from the study.

Sample size and study duration

A total of 3700 copies of the questionnaire were distributed from January 2021 to July 2021.

Guidelines for reporting

The reporting guidelines of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist^[16] were followed during this study.

Statistical analyses

Then, the collected data were extracted from the completed forms and saved in a Microsoft Excel spreadsheet. Statistical evaluation was performed using Statistical Package for the Social Sciences (SPSS) software version 27 (SPSS Inc., Chicago, IL, USA). Descriptive statistical calculations were performed to generate means and standard deviations using a Chi-square test. Tukey's post hoc test was used to detect significance within subgroups. A logistic regression analysis, which included gender, the wording variable (coded 1, Yes; 2, No), was used to test the interaction between gender and words. Values of $P < 0.05$ were accepted as statistically significant.

Results

A total of 2264 participants aged 18 years and above agreed to complete the questionnaire [Table 2]. There were 1177 (52%) male participants and 1095 (48%) female participants. There was a response rate of approximately 60%. The main reason for nonresponse was the unwillingness of patients to spend time filling out the questionnaire. The demographic characteristics of the sample were identical to those of the Saudi population due to weighting by gender and age group. More than 80% of the adult participants had age ranging from 18 to 35 years.

Table 2: Patients' demographic characteristics (N = 2264)		
Gender	Responses	
Female	1089	48.1%
Male	1175	51.9%
Age group	Responses	
(18-25)	1494	66%
(26-35)	556	24.6%
(36-45)	127	5.6%
(46-55)	68	3.0%
(56-65)	14	0.6%
Older than 65	5	0.2%

A slight difference in dental fear levels was noted between male and female participants, where the prevalence of dental fear among male participants was 35% ($n = 408$) and among female participants was 41% ($n = 446$) [Figure 1]. However, this difference was not statistically significant ($P = 0.985$). Furthermore, participants from different age groups gave similar responses when asked about their dental fear ($P = 0.122$). However, a tendency for a decrease in dental fear among participants with increase in age was found [Figure 2].

Drilling tooth devices and their sounds was the option that caused the highest dental fear among the participants who had it ($n = 248$; 37.7%). Pain was the second most frequently chosen option to cause dental fear ($n = 165$; 25%). The fear of medical mistakes came in third place ($n = 110$; 17%), followed by the previous conception of some dental treatment procedures ($n = 118$; 18%). No significant difference was found between male and female participants from different age groups regarding the causes of dental fear [Tables 3 and 4].

Around 70% ($n = 1257$) of the participants who had dental fear overcame their fear and decided to seek treatment when they experienced annoying pain. At the same time, 18% ($n = 323$) of them sought the treatment when they experienced slight pain and 10% ($n = 180$) sought the treatment once they noticed a large carious lesion [Figure 3]. No significant difference was found when comparing the responses of participants based on gender ($P = 0.078$). Meanwhile, the feeling of annoying pain was a significant reason for both male and female participants to overcome their dental fear ($P = 0.008$).

According to the logistic regression, there was an interaction between gender and the wording variable. Participants from all genders answered similarly regarding their fear of pain during painful dental events [Table 5].

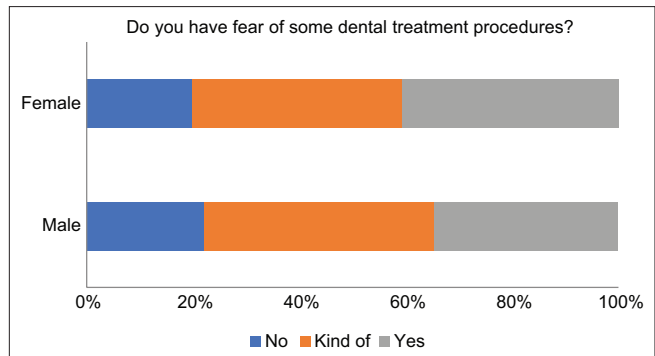


Figure 1: Prevalence of dental fear based on gender (P -value = 0.985)

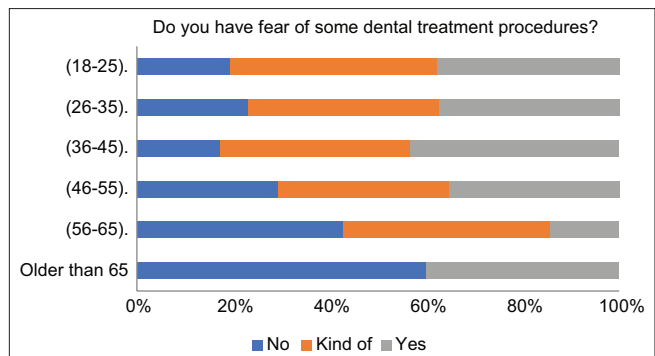


Figure 2: Fear based on age groups (P -value = 0.122)

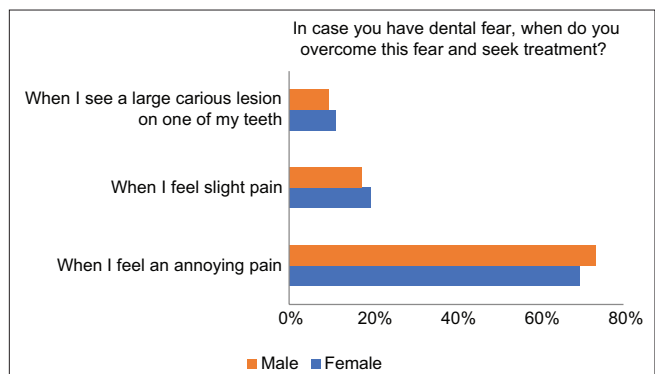


Figure 3: Reasons why participants with dental fear overcome their fear and seek the treatment (P -value = 0.008)

Discussion

Study design

With the aims of the study in mind, a questionnaire was distributed via several means to ensure a high response rate. Although many people did not choose to participate, the achieved response of 60% was satisfactory and indicates that the questionnaire was clear and easy to complete. Several studies on the same topic reported a response rate much less than 60%.^[17] The methods used for collecting patients' responses may also have allowed for the easy monitoring and documenting of all sent and received questionnaires. The use of online surveys, however, may limit or exclude people who are not available online or who are not interested in engaging

Table 3: Main causes of dental fear reported based on gender

Main cause of dental fear	Gender		Total	P
	Female	Male		
Pain, like needle injection pain	66 (22.40%)	99 (22.40%)	165 (25.10%)	0.225
Fear of medical mistakes	59 (20.10%)	51 (14.00%)	110 (16.70%)	
Stereotype about some dental procedures like teeth extraction	49 (16.70%)	69 (19.00%)	118 (17.90%)	
Device of drilling teeth and its sound	113 (38.40%)	135 (37.10%)	248 (37.70%)	
Other reasons	7 (2.40%)	10 (2.70%)	17 (2.60%)	

Table 4: The reported main causes of dental fear based on age group

Main cause of dental fear	Age group							Total	P
	Less than 18	18-25	18-25	36-45	46-55	56-65	Older than 65		
Pain, like needle injection pain	12 (30.00%)	100 (27.00%)	32 (19.80%)	12 (23.50%)	9 (36.00%)	0 (0.0%)	0 (0.0%)	165 (25.10%)	0.159
Fear of medical mistakes	2 (5.0%)	54 (14.60%)	34 (21.0%)	13 (25.50%)	3 (12.0%)	3 (42.90%)	1 (50.0%)	110 (16.70%)	
Stereotype about some dental procedures like teeth extraction	9 (22.50%)	64 (17.30%)	33 (20.40%)	9 (17.60%)	3 (12.0%)	0 (0.0%)	0 (0.0%)	118 (17.90%)	
Device of drilling teeth and its sound	14 (35.0)	147 (39.60%)	57 (35.20%)	16 (31.40%)	9 (36.0%)	4 (57.10%)	1 (50.0%)	248 (37.70%)	
Other reasons	3 (7.50%)	6 (1.60%)	6 (3.70%)	1 (2.0%)	1 (4.0%)	0 (0.0%)	0 (0.0%)	17 (2.60%)	

Table 5: Logistic regression results in the analysis of gender differences in reports of specific fear of dental pain

Main cause of dental fear	Age group							Total	P-value
	less than 18	18-25	18-25	36-45	46-55	56-65	Older than 65		
Pain, like needle injection pain	12 (30.00%)	100 (27.00%)	32 (19.80%)	12 (23.50%)	9 (36.00%)	0 (0.00%)	0 (0.00%)	165 (25.10%)	
Medical mistakes fear	2 (5.00%)	54 (14.60%)	34 (21.00%)	13 (25.50%)	3 (12.00%)	3 (42.90%)	1 (50.00%)	110 (16.70%)	
Stereotype about some dental procedures, like teeth extraction	9 (22.50%)	64 (17.30%)	33 (20.40%)	9 (17.60%)	3 (12.00%)	0 (0.00%)	0 (0.00%)	118 (17.90%)	0.159
Device of drilling teeth and its sound	14 (35.00%)	147 (39.60%)	57 (35.20%)	16 (31.40%)	9 (36.00%)	4 (57.10%)	1 (50.00%)	248 (37.70%)	
Other reasons	3 (7.50%)	6 (1.60%)	6 (3.70%)	1 (2.00%)	1 (4.00%)	0 (0.00%)	0 (0.00%)	17 (2.60%)	

in online discussions. This could lead to bias among the replies collected.

Only participants aged 18 and older were included in the study. The main reason for this inclusion criterion was that adult patients own the decision to seek or avoid the treatment, which makes measuring the influence of dental fear on their behavior related to treatment seeking valid. Meanwhile, children were excluded since seeking treatment can be influenced by their parents' decisions. Thus, it could be difficult to collect accurate answers from them.

The questionnaire used in this study contained several sections and was designed using direct questions with clear answering options. This design was used to help participants complete the questionnaire easily and in a short time. Securing a high number of participants can also help to achieve a more representative

sampling of the general population. The questions regarding dental fear were presented to participants using no dental or medical terminology to ensure that they were clear and easy to understand. Some questions that evaluated participants' degree of dental fear offered only three possible replies: "no," "kind of," and "yes." This limited number of choices can reveal if a patient has dental fear or not. Kent *et al.*^[18] reported that even a scale constructed of items scored using a simple "yes/no" response format can perform well compared to the frequency response format. In some studies that investigated the same topic, patients were asked to define the degree of their fear using a number or terms such as "neutral," "strong," and "very strong." This kind of question design could allow for further analyses of the obtained outcomes. It has been reported that assessing dental anxiety using questionnaires is a common and simple measuring method when working with both children and adults.^[19] However, it may not reveal a clear sense of the existence of dental fear. Nevertheless, fear is subjective, which means attempts to find its degree or level could lead to inaccurate measurements.

Prevalence of dental fear

The prevalence of dental fear among the participants of this study was 37.7%, which is considered a high percentage compared to other studies conducted in other countries, which found dental fear prevalence ranging from 5% to 30%.^[4] Given that this study showed a response rate of 60%, it is possible that participants in this survey were not representative of the Saudi population in their perception of dental fear.

Our findings showed that both men and women hold the same level of dental fear. This was different from numerous reports that suggested greater fear in females compared to males. It has been reported that dental fear is reported more by women,^[4] and

they are also more likely to seek treatment for their dental fear than men.^[20] It was suggested by some researchers that women are more open to expressing their dental fear, which could explain some of these differences.^[21] Although it was clear in this study that both men and women reported similar experiences of dental fear, this similar way of expressing dental fear could indicate that variations in experiences are individual, rather than gender, differences.

The same assumption can be made when investigating dental fear among different age groups, since no significant findings were observed among the groups [Table 4]. A trend was detected, however, wherein lower levels of dental fear were found with increase in age. These findings are similar to what has been reported in other studies which suggest that fears and phobias decrease with age.^[22] In their review, Silveira *et al.*^[23] found that dental fear is less prevalent among older adults, compared to younger ones. Meanwhile, Armfield *et al.*^[17] described the different correlation of a patient's age with dental anxiety; they found that adults between the ages of 40 and 64 showed the highest levels of anxiety. The association between dental anxiety and age has also been reported in other studies.^[3] In his study, Locker examined the negative psychosocial impacts of dental anxiety and concluded that dental fear may have pervasive psychosocial consequences. Furthermore, his study suggested that young people with high levels of dental anxiety showed higher rates of psychological disorders.^[24]

It is worth mentioning that most people in Saudi Arabia tend to seek dental treatment at a later age, when compared to people in other developed countries. Thus, the majority are not familiar with the dental setting, which could eventually lead them to fear the unknown. In this study, participants were not asked about their past dental experiences, though some reports have suggested that irregular dental visits could be another factor in developing dental fear.^[25]

Causes of dental fear

The literature reports on several factors that cause dental fear, with the fear of pain being the main cause.^[9-11] In the present study, several factors were presented to participants to indicate as the cause of their dental fear. These factors, such as fear of pain from needles or drilling sounds, were suggested because they have been reported by numerous studies as possible causes of dental fear.^[26] Of course, people can be afraid of other pain-invoking dental procedures, apart from those factors mentioned in this study.

The obtained results showed that drilling teeth and the accompanying sounds were the main cause of dental fear, followed by fears of needle injections and medical mistakes. These findings were similar for both male and female respondents. These findings were different from other reports, which indicated greater fear of specific stimuli, such as injections or tooth drilling, in women compared to men.^[21] It is believed

that pain is felt more often with treatment procedures that include injections and vibrating sensations, particularly in dentally fearful patients.^[27] Other factors, such as a fear of tissue damage, fear of unpredictable events, and fear of being closed-in (claustrophobia), were also reported as possible causes of dental fear.^[28] In addition, a bad prior experience and dental trauma were associated with high dental fear survey scores, as reported by Heaton *et al.*^[25] These factors may be responsible for patients' avoidance of dental care, which may lead to poor oral health and the eventual development of posttraumatic stress disorder.^[14] Subsequently, the vicious cycle may increase dental fear and have a great impact on oral health.^[29]

Impact of dental fear

The obtained results showed that most people admitted that they avoid visiting dentists, even in the presence of signs of caries, decay, or if they feel mild pain, because of their dental fear. This finding corresponds with the "vicious cycle" model that describes the avoidance of dental treatment due to dental fear.^[29] In this model, patients with high levels of dental fear are characterized by poor oral hygiene and several dental complications, which are the result of their avoidance of regular dental care. Locker^[24] reported that poor oral health can make individuals feel embarrassed and inferior, which consequently may reinforce their dental fear and increase their avoidance of dental care. Meanwhile, many patients reported that they may overcome their fear only when they can no longer tolerate their dental pain. Thus, it is believed that, with a lack of routine dental check-ups, when fearful patients visit the dentist, more invasive treatments are needed, which then increases their sense of fear.^[29]

Many reports have suggested that dental fear has a great influence on dental care behaviors.^[12,24] Most participants in this study admitted that they can only overcome their dental fear in the presence of severe pain. Thus, dental fear will prevent them from seeking regular treatment that is not associated with such pain. These findings correspond with other reports that investigated the influence of the development of dental fear on dental attendance.^[14] In fact, it has been claimed that attendance patterns can be considered a predictor of dental fear.^[30] Meanwhile, people with low dental fear revealed higher objective oral care scores, compared to those with high dental fear.^[12] Furthermore, some studies indicated that dental fear has an impact on how people experience dental pain and worsens their anxiety related to dental pain.^[25]

In summary, it was shown in this study that several factors can be responsible for dental fear, and these findings were similar in patients of both genders. Dental and medical practitioners should know that patients with high anxiety can avoid and delay their checkups and treatment visits.^[14] There is a risk that dental problems for patients with high levels of dental fear may be associated with general health problems that appear due to the persistent pain and stress caused by this fear.^[31] The primary care physician should be able to detect patients under stress or

continuous pain, as this type of patients could have risks of other physical and psychological illnesses and need quick intervention.

Possible strengths and limitations of the study

One possible strength of this study is that it included a large and representative sample of 2264 participants. This study also tried to identify the specific causes of dental fear and how far patients would avoid treatment because of their fears. There is a lack of information in the literature regarding the exact causes of dental fear and its impact. The study employed a self-administered survey, which can be seen as a risk of various biases; thus, the obtained results should be evaluated with caution. One possible limitation of this study is that it did not investigate the patients' past dental histories, which could have a direct influence on their dental fear. For instance, it has been reported that some people may overestimate their fear of pain experienced in a dental clinic, even when they have not experienced the pain itself.^[32]

Conclusion

People from both genders responded similarly to dental fear, and age was not found to be a significant factor in individuals' reactions to dental treatment. The sounds of teeth-drilling devices and related sounds may be responsible for the dental fear, as reported by many people. People with high dental fear will more likely avoid regular dental visits. Additional investigations about the relationship between past dental experiences and dental fear may provide important information for the management of dental patients.

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Ethical approval number

The Ethics Committee at the College of Dentistry in Qassim University approved the study (Code #: M-2018–3013).

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Conflicts of interest

There are no conflicts of interest.

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