

Research Article

Impact of Intervention on Dental Anxiety among Patients: A Pre–Post Study Using the Modified Dental Anxiety Scale (MDAS)**Hayyam Fatima Sheikh¹, Asma Hafeez², Saba Anjum³, Sakina Qazi⁴, Tehmeena Atiq⁵, Uswah Fatima Javaid⁶**¹BDS, House Officer, CMH, Lahore, Pakistan²BDS, DHM, Demonstrator, University Medical and Dental College (UMDC), Faisalabad, Pakistan³BDS, Demonstrator, University Medical and Dental College (UMDC), Faisalabad, Pakistan⁴BDS, MCPS, Assistant Professor, University Medical and Dental College (UMDC), Faisalabad, Pakistan⁵BDS, MPhil, Assistant professor, University Medical and Dental College (UMDC), Faisalabad, Pakistan⁶BDS, Demonstrator, University Medical and Dental College (UMDC), Faisalabad, Pakistan**Correspondent author:** Asma Hafeez, BDS, DHM, Demonstrator, University Medical and Dental College (UMDC), Faisalabad, Pakistan, **Email:** asma.Hafeez15@gmail.com

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ABSTRACT

Background: Dental anxiety is a significant barrier to oral healthcare utilization and is associated with delayed treatment seeking and poorer oral health outcomes. This study aimed to assess the level of dental anxiety among patients and evaluate the effect of a structured psychological intervention on anxiety reduction.

Materials and Methods: A pre–post interventional study was conducted among patients attending a dental outpatient department. Dental anxiety was assessed using the validated Modified Dental Anxiety Scale (MDAS) before and immediately after a structured counseling session that included explanation of procedures, reassurance, and behavioral guidance. Sociodemographic data, previous dental experiences, and treatment-seeking patterns were recorded using a structured questionnaire. Inclusion criteria comprised adult patients requiring routine dental procedures, while medically compromised or cognitively impaired individuals were excluded. Data were analyzed using statistical software, and paired statistical tests were applied to compare pre- and post-intervention MDAS scores, with $p < 0.05$ considered statistically significant.

Results: Baseline findings indicated moderate to high levels of anxiety, particularly related to tooth drilling and local anesthetic injection. Following the intervention, a statistically significant reduction in overall MDAS scores was observed, with increased reports of relaxation and reduced fear across procedural domains. Participants also demonstrated improved attitudes toward dental visits.

Conclusion: Structured psychological support significantly reduces dental anxiety and may enhance patient cooperation and timely dental attendance. Incorporating routine anxiety-management strategies in clinical practice can improve patient experience and oral health outcomes.

Keywords: Dental Anxiety; Oral Health; Patient Compliance; Health Behavior; Anxiety Reduction; Dental Care

INTRODUCTION

The most common psychological barrier, which is believed to prevent people in seeking and obtaining the required oral healthcare, is dental anxiety, which is a

fear, apprehension, or stress experienced by a patient anticipating dental treatment [1]. It is not just a matter of emotional reaction but a matter of clinical concern because high levels of anxiety may result

in avoiding dental treatment, greater levels of pain, and worse outcomes of oral health. Validated tools have been used in measuring dental anxiety and the most common ones are the Modified Dental Anxiety Scale (MDAS) that provides standardized procedure to measure the anxiety levels and compare them among people [2].

The dental anxiety is one of the problems that are still evident worldwide. Systematic reviews suggest prevalence of dental fear and anxiety in adults to have wide ranges, some meta-analyses describe levels as moderate and high in significant proportions of the population based on the measure and the setting [3,4]. Some areas have reported prevalence rates of about 13 to more than 40, and females and younger persons tend to exhibit the most levels of anxiety [5]. These global statistics highlight the general use of dental anxiety to patient behaviour and dental service use which underlines its applicability in different cultural and healthcare environments.

The same has been witnessed in low and middle income countries including those in the South Asian region. Research in the surrounding areas like Bangladesh shows that dental phobia in adult patients is a problem that is significant and therefore anxiety is a barrier to dental treatment and care attendance by patients [6]. These results point to the fact that dental anxiety is universal, and it is necessary to comprehend the ways anxiety appears in different social cultural contexts.

Pakistan also shows evidence of significant prevalence of dental anxiety and diverse determinants. A study carried out in Gilgit-Baltistan found moderate anxiety among about a third of the dental patients in that area, and that the younger the age, female gender and negative past experience were involving high levels of anxiety [7]. Other Pakistani investigations in various areas, such as Lahore and Sheikhpura, show that there is a broad range of the extent of anxiety levels,

which validates the notion that dental anxiety is also a major issue among the local community [8,9]. However, a significant number of such studies are cross-sectional and descriptive, having little evaluation of the changes over time or the effect of particular intervention to minimize dental anxiety.

Although this research accumulation is increasing, there still is a gap in the longitudinal evidence or controlled tests that compare the dental anxiety levels before and after the administration of specific strategies to enhance the patient attitude and experiences in the dental practice during the routine. The relationship between changes in anxiety levels during intervention is important to develop effective anxiety-reduction procedures, maximize the cooperation of patients, and improve clinical outcomes in the daily routine in the field of dentistry. This gap highlights the necessity of the research that will not only measure prevalence but also assess the effect of the interventions on dental anxiety.

Thus, the initial purpose of the current research was to compare the level of dental anxiety prior to and after the implementation of a structured treatment with the help of the MDAS on dental patients, and the question to be answered was whether it is possible to effectively alter the patients in the perceptions of dental anxiety and the reaction to it in the clinical setting.

MATERIALS AND METHODS

The purpose of this pre-post interventional study was to determine the increase or decrease in the level of dental anxiety among patients who visited the outpatient section of a dental hospital/clinic. This study was conducted within a given study period upon receiving the approval of the Institutional Ethical Review Committee. Everything was done under ethical considerations, and the adult participants signed an informed written consent. The participants who were below 18 years old

had parents or legal guardians give their consent. The study was voluntary and the responses were kept confidential.

There were 100 enrolled participants through non-probability convenience sampling method. The patients who were 5 years and above and could comprehend the questionnaire and answer it were included. Patients with known psychiatric conditions and impaired cognition, communication problems, or those who did not want to take part were excluded. Demographic data were taken (age and gender). Furthermore, the respondents were questioned concerning the time interval between the beginning of their dental symptoms and the time they attended treatment facilities in order to determine the healthcare-seeking behavior.

The anxiety induced in dentistry was measured with the help of the Modified Dental Anxiety Scale (MDAS) which is a valid and widely used tool that comprises five items that evaluate anxiety during the usual dental context: (1) visiting the dentist tomorrow, (2) sitting in the waiting room, (3) undergoing tooth drilling, (4) scaling and polishing, and (5) receiving a local anaesthetic injection. The products were rated on a five-point Likert scale of 1 (relaxed) to 5 (extremely anxious). The overall MDAS score was between 5 and 25 with an increase in score signifying increased dental anxiety. The questionnaire was given in a language that the respondents could comprehend and help given where necessary without affecting the answers.

An examination of baseline (pre-intervention) data was undertaken prior to the explanation or counseling of the dental procedure. After conducting baseline assessment, an organized intervention was carried out. The intervention involved proper explanation of the intended dental treatment, reassurance, handling of patient concerns, demonstration of instruments where necessary, and show of empathy to minimize the fear and improve the

confidence of the patient. The MDAS questionnaire was re-administered after completion of the intervention and before the dental procedure in order to achieve post-intervention anxiety scores. Therefore, every participant acted as his/her control in this paired design.

Collected was organized in MS Excel version 2016. Statistical Package of the Social Sciences (SPSS) version 27.0 was used to enter and analyze the data. Descriptive statistics were calculated, mean and standard deviation values were presented in case of continuous variables (age and total MDAS score) and frequencies and percentages in case of categorical variables. The inferential analysis was done only after the normalcy of the continuous variables was tested. A paired-samples t-test was conducted to compare the mean MDAS scores before and after the intervention. This analysis was used to determine whether there was a statistically significant difference in dental anxiety levels following the implementation of the intervention. Effect size was calculated using Cohen's d to quantify the magnitude of the intervention effect. In case of item-wise categorical comparison, correct paired statistical tests were conducted. A p-value of less than 0.05 was counted as a statistically significant value.

Each participant willingly signed an informed consent and enrolled. The purpose of the study, the procedures, possible risks and benefits, networking the possibility of secrecy of the research, and their freedom to leave the study at any moment without penalty were clarified in the consent form. Participants were given sufficient time to go through the form and enquire on issues raised.

The information about all participants was retained in high levels of confidentiality. To ensure that identities are not identified, we were using coded identification numbers rather than names. Certain items such as questionnaires and consent forms were stored with only the research team

being able to access it. The data, which was done electronically, were kept in limited access password-protected computers. The research processes were to be risk-minimizing. No invasive intervention was used: it was a non-invasive one, centered on anxiety-management methods. The

participants were told that they could terminate the intervention or pull out in case they felt that they did not feel comfortable. There was no monetary reward and there were no withdrawal penalties. Summary of study flow is shown in Figure 1.

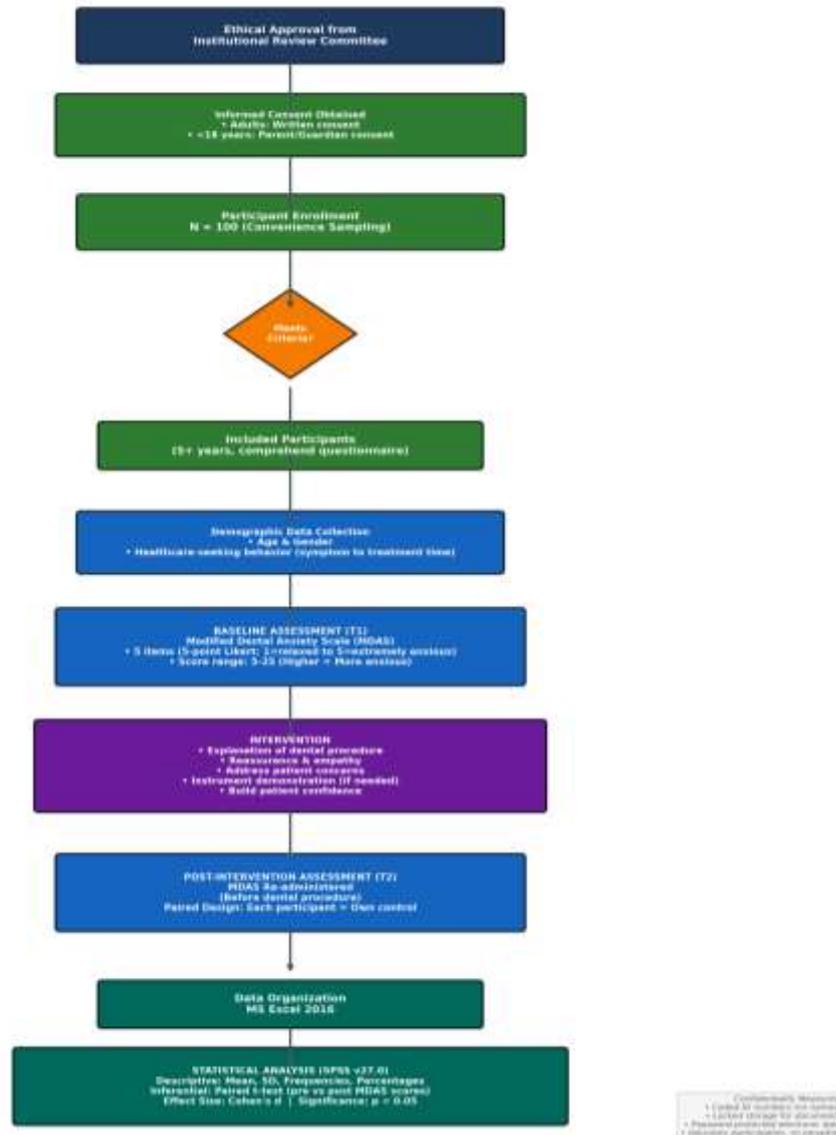


Figure 1: Study Flowchart

RESULTS

The study comprised 100 participants with a mean age of 34.43 ± 15.32 years (range 5–76), indicating substantial variability across age groups. The wide age span reflects inclusion of both younger and older individuals, enhancing the generalizability of findings. Gender

distribution was almost equal, with 51 participants (51%) males and 49 participants (49%) females, ensuring balanced representation and minimizing gender-related sampling bias in the assessment of dental anxiety.

Table 1: Descriptive Statistics

Variable	Descriptive Statistics
Age (years)	34.43 ± 15.32 (Range 5–76)
Female	49 (49%)
Male	51 (51%)

A clear tendency toward delayed dental consultation was observed in Figure 2, with 16 participants (16%) seeking treatment after 1 year, making it the most common duration. This was followed by 12 participants (12%) after 2 months and 8 participants (8%) after 3 weeks, suggesting that many participants

postponed care beyond the early symptomatic phase. Immediate consultations were comparatively less common, such as 7 participants (7%) after 1 week and 5 participants (5%) after 2 days, indicating a behavioral pattern of waiting until symptoms persist or worsen before visiting a dentist.

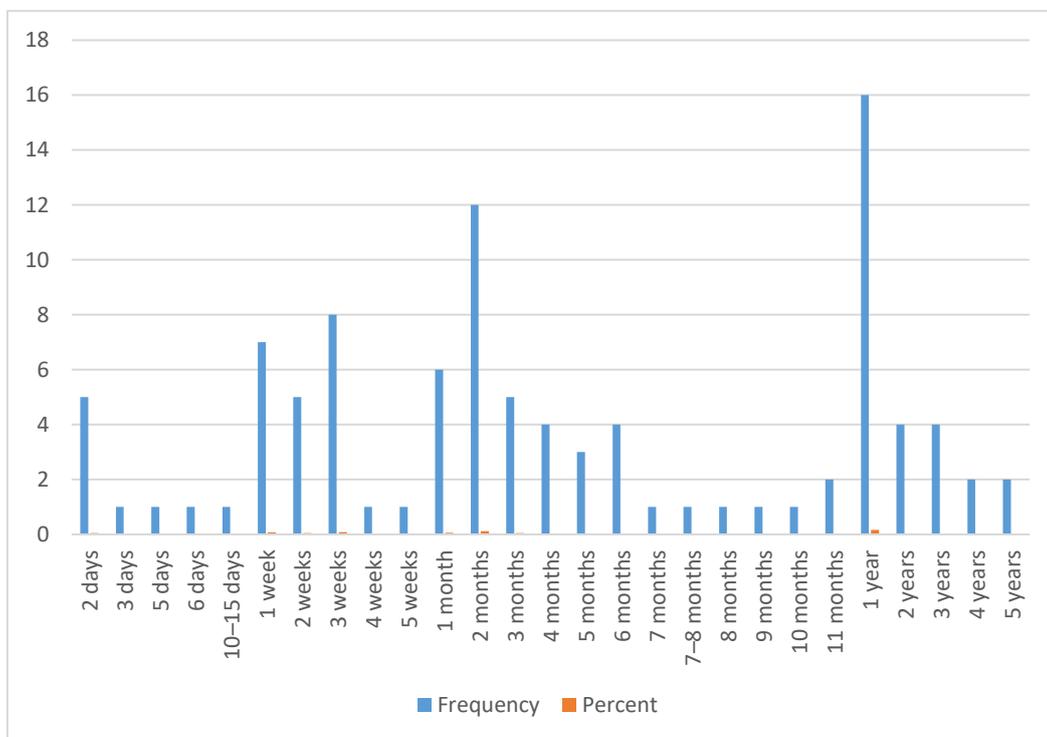


Figure 2: How long after the initial symptoms did you come for treatment

Before intervention, the most common response was “I wouldn’t care” reported by 35 participants (35%), reflecting a neutral attitude among many. Following the intervention, a notable positive shift occurred, with 48 participants (48%) indicating they would look forward to the visit, becoming the dominant response.

Fear-related responses, such as being very frightened, reported by 22 participants (22%), were more prominent initially but showed relative reduction afterward. Overall, the findings suggest improved confidence and reduced anticipatory anxiety toward dental visits.

Table 2: How would you feel if you were about to visit the dentist tomorrow?

Statement	Before		After		95% CI	t-value	P-value
	Frequency	Percent	Frequency	Percent			
I would be a little uneasy about it	28	28.0	1	1.0	-31.87-31.87	.000	.412
I would be afraid that it would be unpleasant and painful	19	19.0	15	15.0			
I would be very frightened of what the dentist would do	3	3.0	22	22.0			
I would look forward to it	15	15.0	48	48.0			
I wouldn't care	35	35.0	14	14.0			

Feeling relaxed was the most frequent response both before (54 participants, 54%) and after (61 participants, 61%) the intervention, demonstrating an overall calm perception. Importantly, reports of being a little uneasy decreased from 40 participants (40%) to 19 participants

(19%), indicating a meaningful reduction in waiting-room anxiety. Although tense responses slightly increased to 11 participants (11%), relaxation remained the prevailing sentiment, suggesting that the intervention positively influenced anticipatory stress levels.

Table 3: How would you feel if you were in the waiting room of a dental clinic?

Statement	Before		After		95% CI	t-value	P-value
	Frequency	Percent	Frequency	Percent			
A little uneasy	40	40.0	19	19.0	-23.60-23.60	.000	.188
Anxious	1	1.0	8	8.0			
Relaxed	54	54.0	61	61.0			
Tense	4	4.0	11	11.0			

Tooth drilling initially elicited considerable discomfort, with 63 participants (63%) reporting feeling uneasy, making it the dominant reaction before intervention. Afterward, a substantial improvement was observed, as 58 participants (58%) reported feeling

relaxed, reflecting a reversal in perception. While 13 participants (13%) still reported feeling anxious, the marked decline in uneasiness highlights enhanced tolerance and reduced procedural fear following the intervention.

Table 4: How would you feel if you were about to have your tooth drilled?

Statement	Before		After		95% CI	t-value	P-value
	Frequency	Percent	Frequency	Percent			
Anxious	1	1.0	13	13.0	- 38.64- 39.04	.014	.822
Relaxed	21	21.0	58	58.0			
So anxious that I sometimes break out in a sweat	1	1.0	1	1.0			
Tensed	14	14.0	13	13.0			
Uneasy	63	63.0	14	14.0			

Scaling and polishing were generally perceived more comfortably compared to invasive procedures. Relaxation was the leading response both before (71 participants, 71%) and after (73 participants, 73%) intervention, showing consistent positive perception. Notably,

tense responses declined sharply from 11 participants (11%) to 2 participants (2%), reinforcing the effectiveness of the intervention in minimizing discomfort associated with routine dental cleaning procedures.

Table 5: How would you feel if your teeth were about to be scaled or polished?

Statement	Before		After		95% CI	t-value	P-value
	Frequency	Percent	Frequency	Percent			
Anxious	1	1.0	5	5.0	- 4.00- 10.40	1.233	.003
Relaxed	71	71.0	73	73.0			
Tense	11	11.0	2	2.0			
Uneasy	16	16.0	9	9.0			

Local anaesthetic injection initially provoked apprehension, with 42 participants (42%) reporting feeling uneasy, making it the most common pre-intervention response. Post-intervention, 48 participants (48%) reported feeling relaxed, indicating a substantial shift

toward comfort and reassurance. Additionally, tense reactions decreased from 17 participants (17%) to 7 participants (7%), suggesting improved psychological preparedness and reduced injection-related fear after the intervention.

Table 6: How would you feel if you were about to receive a local anaesthetic injection?

Statement	Before		After		95% CI	t-value	P-value
	Frequency	Percent	Frequency	Percent			
Anxious	19	19.0	13	13.0	- 27.48- 27.88	.020	.866
Relaxed	18	18.0	48	48.0			
Uneasy	42	42.0	17	17.0			
Tense	17	17.0	7	7.0			

DISCUSSION

A remarkable decrease in the levels of dental anxiety was created by the structured intervention conducted in the current research which was reflected in the better responses to the majority of

items of the MDAS. The participants demonstrated the reduction of fear of dental care, waiting bays, drilling, and local anaesthetic injection. These results are consistent with the global literature that organized communication,

reassurance, and behavioral direction significantly decrease the levels of dental anxiety. Indicatively, Armfield and Heaton found out that anxiety-management interventions contribute to improving patient compliance and reducing avoidance behaviours in clinical practices [10].

Dental anxiety is a common social health issue in the world. According to the past studies, it has been established that around 10-20 percent of adults are characterized by high dental fear, thus, influencing with significant influence the use of oral health services [11,12]. In Europe and Australia, similar studies identified that pre-procedural education and cognitive interventions provide statistically significant results of MDAS score reduction [13,14]. These findings support the positive changes that were orchestrated in our research especially the significant reduction in moderate-high anxiety levels to the levels of lower anxiety after the intervention.

Fear of pain, injections and drilling is often related to dental anxiety in South Asian populations. The studies carried in Ecuador [15], India [16], and Bangladesh [17] have revealed that the most anxiety-inducing elements of treatment are invasive dental stimuli. Our pre-test results indicated that there was high anxiety reaction on drilling and local anaesthetic injection that significantly reduced after counseling. This analogy argues that procedure-specific fears can be well treated by culturally-flexible psychological reassurance.

Pakistan is also another evidence that dental anxiety is such a heavy burden. Research carried out in Pakistan recorded moderate to high anxiety among 30-45 percent of dental patients with younger age and female gender to be among the important predictors [18,19,20]. In contrast to these largely cross-sectional studies, our pre-post study design allowed direct determination of change after organized engagement. This

methodological difference supports the practical consequences of our findings in the form of proving modifiability instead of prevalence.

Late dental attendance in our study members also correlates with the so-called vicious cycle of dental fear which has been introduced by Gerry Humphris and Markus Armfield as the cause of anxiety which results in avoidance, poor oral health and consequently complex and fearful treatment [21]. The decrease in anxiety post intervention in our study indicates that there could be a break in this cycle and thus promote earlier healthcare seeking behaviour and better long term oral outcome.

The professional organisations have supported the behavioural and communication-based strategies as the effective non-pharmacological measures to deal with anxious patients [22]. These suggestions are backed by our findings, which underline the idea that, even without complicated, high-cost, or chairside psychological methods, simple psychological interventions involving inexpensive comfort can be achieved but do not require complex sedation or drugs.

Strengths and Limitations

There are a number of strengths in the study. With an approved MDAS, reliability is enhanced and we will also be able to compare our results with an international study. The pre-post design allows observing real change in anxiety, as opposed to its prevalence. Lastly, it introduces new evidence on the basis of dental anxiety interventions in Pakistan where the studies are relatively scarce. However, the study have some limitations. The study was conducted in a single clinic, and thus it might not be applicable in other environments. Despite the adequacy of the sample to give a preliminary examination, it might not represent a representative of all the groups of people. In the absence of a control group, we cannot be as certain that the change was caused by the intervention.

The findings of this study should be replicated and extended by future work conducted using multicenter randomized trials by larger samples and extending the results over a long period.

CONCLUSION

The present study demonstrated a noticeable improvement in dental anxiety levels following the intervention, as reflected by increased positive responses and reduced fear-related reactions across most MDAS domains. A greater proportion of participants reported feeling relaxed or even looking forward to dental visits after the intervention, particularly in situations previously associated with higher anxiety such as tooth drilling and local anaesthetic injection. Waiting-room uneasiness and procedural discomfort also showed meaningful reductions, indicating an overall enhancement in patients' psychological comfort toward dental care. These findings suggest that structured educational or behavioral interventions can effectively reduce anticipatory and procedural dental anxiety. Practically, incorporating simple counseling, reassurance strategies, or patient-centered communication in routine dental practice may significantly improve patient cooperation and treatment compliance. Future studies should involve larger multi-center samples, longer follow-up periods, and evaluation of specific intervention components to determine sustained effects and optimize anxiety-reduction protocols in diverse populations.

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