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Evaluation of dental anxiety in school going children using modified dental anxiety scale and facial image scale

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Abstract

Background: Dental anxiety refers to patient's response toward stresses associated with dental procedures. It can present problem for both dentist and patient, particularly in paediatric dentistry. Hence, it is important to identify anxious patients for improved patient management and development of better treatment strategies.

Objectives: To evaluate the prevalence of dental anxiety in schoolchildren using Modified Dental Anxiety Nepali version (MDAS-N) and Facial Image Scale (FIS).

Methods: An analytical cross-sectional study was carried out in 401 schoolchildren (11.34 ± 1.85 years) using convenience sampling method from 2022 June to 2022 August after ethical approval was obtained from Nepal Medical College. The dental anxiety was assessed by questionnaire provided in MDAS-N and FIS. Independent t-test was done in SPSS v.20.0 to analyse the data.

Results: The data have shown that 375 (93.52%) had dental anxiety (mean MDAS-N = 11.83 ± 3.59) with low and moderate anxiety in 153 (38.15%) and 140 (34.92%) respectively. Seventy (36.08%) females presented with moderate anxiety and 92 (44.44%) males had low anxiety. The mean score difference was statistically significant (p-value <0.001) between the genders. Statistically significant difference (p-value = 0.023) was found between FIS mean score of primary and middle school level students. Injection and drilling the tooth were the procedures with high anxiety score in both scales. There was a moderate positive correlation between MDAS-N and FIS (r = 0.574).

Conclusion: Assessing dental anxiety and factors provoking fear and anxiety in dental clinic is useful, as behaviour management can be applied accordingly for child patients.

Key words: Dental fear anxiety; Facial image scale; Modified dental anxiety scale.

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INTRODUCTION

Dental fear is a normal emotional reaction to one or more specific threatening stimuli within the dental situation, while dental anxiety denotes a state of apprehension that something dreadful will happen in relation to dental treatment.[1,2] It takes fourth place among common fears.[3] The prevalence of dental fear and anxiety (DFA) varies among different population[4] impeding them from accessing dental care.[5] Multiple factors can be attributed to the aetiology of dental fear and anxiety.[6-8] It may postpone the treatment and aggravate the oral condition.[9] Dental anxiety in children has been recognised as a problem in patient management.[10] If unaddressed, the burden of oral health problems will likely increase.[11]

Early identification of anxious patient is important so that dentist can properly approach[12] and plan the treatment. Several scales have been developed to assess patients' DFA level. These assessments may depend on the child's

cognitive and comprehensive abilities.[13,14] The Modified Dental Anxiety Scale (MDAS)[15] was translated and validated by Giri et al.[16] in Nepali language. Facial Image Scale (FIS) is considered one of the easiest methods to assess anxiety.[13] The objective of this study was to evaluate the dental anxiety in schoolchildren using Modified Dental Anxiety Scale Nepali version (MDAS-N) and FIS.

METHODOLOGY

This analytical, cross-sectional observational study was carried out in the school going children from 2022 June to 2022 August. Ethical approval was obtained from Institutional Review Committee (IRC) of Nepal Medical College (Ref. 064-078/079). Total 401 children were included with completion of the self-administrated questionnaire using convenience sampling technique. Sample size for the study was derived using the formula $n = z^2pq/d^2$; where n is sample size; z = 1.96 at 95% confidence interval; p = 0.5 (50% conventional value chosen due to the lack of a clear prevalence in the literature in Nepali population); q = 1-p; and d = 0.05 = 5 % margin of error. Thus, the minimum sample size was determined as 385 participants.

Four different schools from the Gokarneshwor Municipality-8, were selected. Permissions were obtained from the school authorities to conduct the study. The children were categorised as primary school children and middle school children. The questionnaires were distributed in the classrooms and children were given enough time to read and the questions individually and tick the answer which they felt for the particular question. The children who were not willing to participate in the study were excluded. Data were collected by a proforma with the first part as socio-demographic details. The second part was the questionnaire in MDAS-N.[16]

The MDAS is the most commonly used questionnaire which is a modification of Corah's Dental Anxiety Scale. It comprises five questions, each assessing the dental anxiety levels in different dental situations. All questions have five responses in Likert scale ranging from "not anxious" to "extremely anxious." Each response is scored from one to five. A "not anxious" response is scored "one" and an "extremely anxious" response is scored "five". For assessing the level of dental anxiety of the patient, response scores of all five questions are added. The scores range from minimum five to maximum 25. If the individual scores 19 and above s/he is categorised as extremely anxious patient.[17] Children were instructed to answer the given situation using the best option that they felt for that situation and also select the emotion provided in the FIS.

The FIS comprises a row of five faces ranging from very happy to very unhappy. The scale is scored by giving a value of "one" to the most positive affect face and "five" to the most negative affect face.[10] The children were not allowed to discuss the answers and were encouraged to give the response independently. However, if there was any confusion in the situation provided in the questionnaire, it was explained, especially to the primary level students.

Data were entered and coded using Microsoft Excel Sheet. The data was then transferred to IBM SPSS Statistics for Windows, version 20 (IBM Corp., Armonk, N.Y., USA) for further analysis. Independent t-test was used to see the difference in mean scores among the studied groups.

RESULTS

A total of 401 study participants were included in the study of which 207 (51.62%) were males and 194 (48.38%) were females. The mean age of the study participants was 11.34 ± 1.8 years. Of the total, 201 (50.12%) were primary level students with mean age 10.01 ± 1.33 years and 200 (49.88%) were middle school level students having mean age of 12.68 ± 1.23 years.

Of the total 401 study participants, 375 (93.52%) had anxiety with the mean MDAS-N score of 11.83+3.59 (Table 1). Among those who had anxiety, majority 153 (38.15%) had low anxiety and only 17 (4.24%) had extreme anxiety (Table 2).

Majority of the study participants were not anxious if they went to their dentist for treatment the next day (179, 44.64%), if they were sitting in the waiting room (146, 36.41%) and if they were about to have their teeth scaled and polished (304, 75.81%). Most of them were slightly anxious if they were about to have a tooth drilled (104, 25.94%) and very anxious if they were to receive a local anaesthetic (LA) injection in their gum (90, 22.44%) (Table 3).

Genderwise, male students mostly had low anxiety (92, 44.44%) while female mostly had moderate anxiety (70, 36.08%). Most of the primary level children 73 (36.32%) and middle school children 80 (40.00%) had low anxiety (Table 4).

Majority of the study participants were slightly happy (as seen in FIS) if they went to their dentist for treatment the next day (143, 35.66%) and if they were sitting in the

waiting room (139, 34.66%). Most of them were fairly worried if they were about to have a tooth drilled (140, 34.91%), very happy if they were about to have their teeth cleaned and polished (205, 51.12%) and extremely worried if they were to have a local anaesthetic injection in their gum (127, 31.67%) (Table 5).

Females had higher mean MDAS-N and FIS score than male and this difference was found to be statistically significant (p-value <0.001 in each scores) (Table 6).

No statistically significant difference was found in MDAS-N between primary level and middle school level students (p-value 0.189). Primary level students had higher mean FIS than middle school level students and this difference was found to be statistically significant (p-value 0.023) (Table 7).

There was a statistically significant correlation between MDAS-N and FIS in the study, (p-value <0.001) and the Pearson's correlation was positive and moderate (r = 0.574) (Figure 1).

Table 1: Distribution of anxiety among the children based on MDAS-N score

MDAS-N	n (%)	Mean ± SD
No anxiety	26 (6.48)	5.00 ± 0.00
Anxiety	375 (93.52%)	11.83 ± 3.59

Table 2: Categorisation of children into levels of anxiety based on MDAS-N score

MDAS-N score range	n (%)	Mean ± SD
0-5 (Not anxious)	26 (6.48)	5.00 ± 0.00
6-10 (Low anxiety)	153 (38.15)	8.45 ± 1.36
11-14 (Moderate anxiety)	140 (34.92)	12.49 ± 1.19
15-18 (High anxiety)	65 (16.21)	16.08 ± 1.12
19-25 (Extreme anxiety)	17 (4.24)	20.47 ± 1.28
Total	**401 (100.0)**	**11.38 ± 3.86**

Table 3: Distribution of the study participants based on responses to MDAS-N questions

Questions	Not anxious n (%)	Slightly anxious n (%)	Fairly anxious n (%)	Very anxious n (%)	Extremely anxious n (%)	Mean ± SD
Visit to dentist	179 (44.64)	111 (27.68)	60 (14.96)	45 (11.22)	6 (1.50)	1.97 ± 1.09
Sitting in the waiting room	146 (36.41)	125 (31.17)	66 (16.46)	58 (14.46)	6 (1.50)	2.13 ± 1.11
Drill the tooth	84 (20.95)	104 (25.94)	80 (19.94)	102 (25.44)	31 (7.73)	2.73 ± 1.26
Scaling and polishing	304 (75.81)	56 (13.97)	17 (4.24)	19 (4.73)	5 (1.25)	1.42 ± 0.87
LA injection	67 (16.71)	78 (19.45)	79 (19.70)	90 (22.44)	87 (21.70)	3.13 ± 1.39

Table 4: Distribution of study participants based on MDAS-N score according to gender and school level

Variables	MDAS-N score range				
	Not anxious n (%)	Low anxiety n (%)	Moderate anxiety n (%)	High anxiety n (%)	Extreme anxiety n (%)
Gender					
Male	24 (11.59)	92 (44.44)	70 (33.82)	16 (7.73)	5 (2.42)
Female	2 (1.03)	61 (31.44)	70 (36.08)	49 (25.26)	12 (6.19)
Level of education					
Primary	11 (5.47)	73 (36.32)	72 (35.82)	33 (16.42)	12 (5.97)
Middle school	15 (7.50)	80 (40.00)	68 (34.00)	32 (16.00)	5 (2.50)

Table 5: Distribution of the study participants based on responses using FIS

Questions	Very happy (1) n (%)	Slightly happy (2) n (%)	Fairly worried (3) n (%)	Slightly Worried (4) n (%)	Extremely worried (5) n (%)	Mean ± SD
Visit to dentist	111 (27.68)	143 (35.66)	96 (23.94)	26 (6.48)	25 (6.24)	2.28 ± 1.12
Sitting in the waiting room	68 (16.96)	139 (34.66)	115 (28.68)	57 (14.21)	22 (5.49)	2.57 ± 1.09
Drill the tooth	34 (8.48)	71 (17.71)	140 (34.91)	97 (24.19)	59 (14.71)	3.19 ± 1.15
Scaling and polishing	205 (51.12)	124 (30.92)	37 (9.23)	21 (5.24)	14 (3.49)	1.79 ± 1.04
LA injection	38 (9.48)	44 (10.97)	67 (16.71)	127 (31.67)	125 (31.17)	3.64 ± 1.28

Table 6: Comparison of MDAS-N and FIS between male and female

Scales	Gender	Mean ± SD	S.E. of mean	t-value	95% Confidence Interval of the difference		p-value
					Lower Limit	Upper Limit	
MDAS-N	Male	10.13 ± 3.56	0.25	7.138	1.885	3.318	<0.001*
	Female	12.73 ± 3.72	0.27				
FIS	Male	12.68 ± 3.93	0.27	4.398	0.897	2.348	<0.001*
	Female	14.30 ± 3.46	0.25				

S.E standard error, Independent t-test, p-value <0.05 statistically significant*

Table 7: Comparison of MDAS-N and FIS between primary and middle school level students

Scales	Level	Mean ± SD	S.E of mean	t-value	95% Confidence Interval of the difference		p-value
					Lower Limit	Upper Limit	
MDAS-N	Primary	11.64 ± 4.03	0.284	1.315	-0.251	1.264	0.189
	Middle school	11.13 ± 3.68	0.260				
FIS	Primary	13.90 ± 4.05	0.286	2.284	0.120	1.601	0.023*
	Middle school	13.04 ± 3.47	0.245				

S.E standard error, Independent t-test, p-value <0.05 statistically significant*

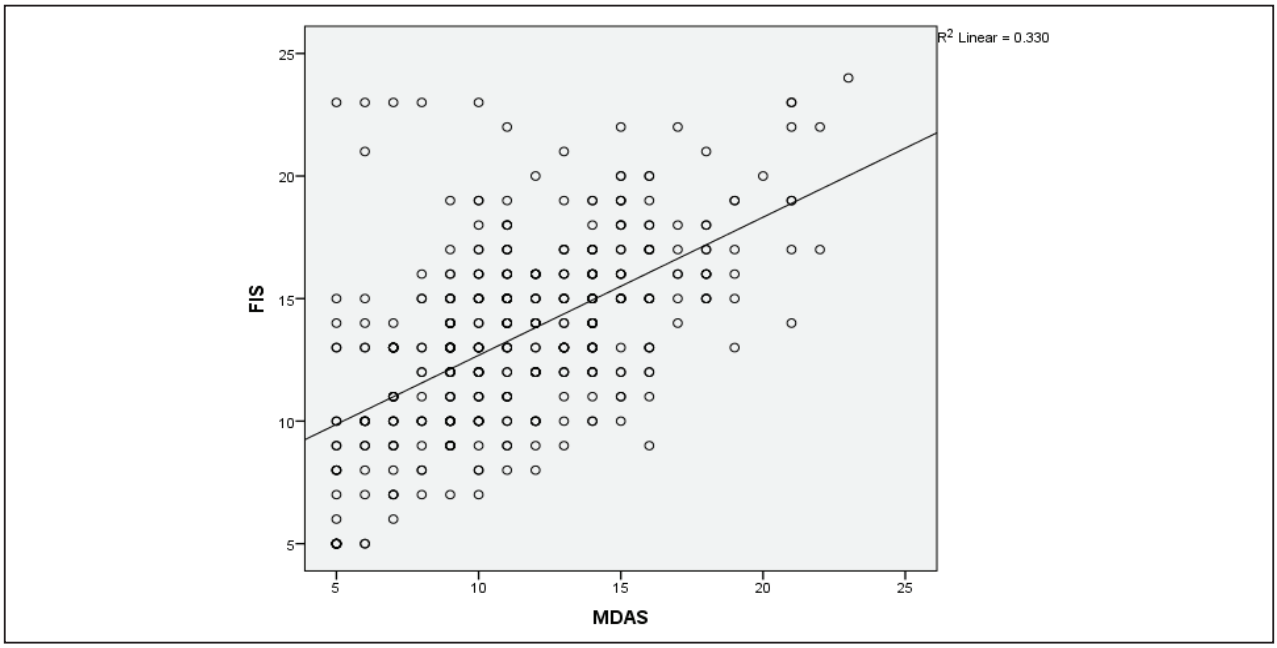

Figure 1: Scatter plot showing correlation between MDAS-N and FIS in study participants
(R^2 Linear = 0.330; r = 0.574; p-value <0.001)

DISCUSSION

Anxiety in patients still poses a significant problem in the practice of dentistry. Dental anxiety, especially for the children, is one of the hurdles to seek dental treatment. People may adopt a "cycle of avoidance" in which they consciously avoid visits to the dentist until they face a dental emergency, which can further strengthen their fear of dentistry[18] which can lead to "vicious cycle" of dental fear/anxiety.[5,19]

Therefore, detecting and assessing dental anxiety among child patients with some valid method of measurement is necessary in order to alleviate the dental anxiety.[20] Even though there are various self-administered questionnaires to assess the anxiety,[13] it is still considered a difficult measurement as it is a subjective issue that may vary among individuals.[21]

This study was conducted to assess the dental anxiety in school children using Modified Dental Anxiety Scale translated into Nepali language.[16] Few authors have suggested the use of pictures with emotions so that the children can understand and comprehend better.[13] Facial version of the dental anxiety scale has been developed to facilitate the questionnaire for the children owing to their cognitive functions.[22] The FIS is considered as one of the simplest tools to assess the anxiety where the child can just point the image that best represents himself/herself.[23] Facial Image Scale has also been combined with Dental Anxiety Scale (DAS) to assess the anxiety level.[10,13] Therefore in adjunct to MDAS-N, the FIS was used.

In the studied population, very less children (26, 6.48%) reported that they were not anxious with score 5.00 ± 0.0 (mean ± SD) which shows that 375 (93.52%) of children were anxious in the dental setup with mean ± SD score of 11.83 ± 3.59. Which was higher than the anxiety level reported by Fayad et al.[15] (51.6%) and Wu et al.[24] (17.8%) in different populations but almost similar prevalence (93.8%) has been reported in Russian children.[4] This variation may be related to different sample sizes, methodology, or geographical change.[15]

Even though most of the children were in the anxious category, among these children most of them were categorised as low anxious (153, 38.15%) followed by moderate anxiety (140, 34.92%) and there were less children who had extreme anxiety (17, 4.24%). Extreme dental anxiety (MDAS-N score ≥19) was prevalent among four percent participants in present study while 20.67% of the sample reported high dental anxiety in the study conducted by Giri et al.[16] in Nepali adult population. It has been reported that children who observe dental anxiety in their parents or guardians are more likely to develop a similar attitude and ultimately face stressful experiences during dental visits in their youth[18] as mother's anxiety and child's anxiety are closely related.[12] In a hospital-based study done in Nepali population, 37.6% parents accompanying their children to the dentist showed moderate to severe anxiety levels.[8] The children with extreme anxiety in current study were less when compared to children of Saudi Arabia as reported in literature.[15,25]

It was evident from present study that most of the children were not anxious to visit the dentist (179, 44.64%) or sitting in the waiting area (146, 36.41%) and while polishing the teeth (304, 75.81%). Regarding the procedure the children were slightly anxious while drilling the tooth (104, 25.94%) and very anxious (90, 22.44%) if they were being injected local anaesthesia. Most of the children who were extremely anxious (87, 21.70%) were anxious on administration of needles or injections when compared to other dental procedures like drilling the tooth (31, 7.73%) or scaling and polishing (5, 1.25%). Similar finding has been reported in literature with higher dental anxiety on administration of needles/injections and tooth drilling.[4,7,15,18,25,26]

Considering the response in the Facial Image Scale, there were very less children in the studied population who selected very happy face (Score 1) as the reaction for different situations that were provided. There were 205 (51.12%) of the children who responded to be very happy while cleaning and polishing the teeth. When assessing the children who were extremely worried (children selecting the very unhappy face, score five) in the questionnaire specified, the response was higher in FIS when compared to MDAS-N. This was not only for the question related to the local anaesthesia administration (MDAS-N = 87, 21.70%; FIS = 125, 31.17%) and tooth drilling (MDAS-N = 31, 7.73%; FIS = 57, 14.71%) but for visiting the dentist, waiting in the waiting area and for scaling and polishing also (MDAS-N = 6, 1.50; 6, 1.50%; 5, 1.25% respectively and for FIS = 25, 6.24%; 22, 5.49%; 14, 3.49% respectively) (Table 4). The authors observed that children had preferred more negative reply in FIS than in MDAS-N. Similar to this study Fazilla et al. have reported that children chose more negative facial expressions in FIS.[21]

Even though there were variances in the response between two assessment tools in the study, there was a statistically significant Pearson's positive correlation between MDAS-N and FIS (Figure 1). In a study done in Nepali population[27] good level of internal consistency

between the assessment tools has been reported which was in accordance with other population.[2,12,14] Regardless of the questionnaire used to measure dental anxiety level, the anxiety factors remained constant in different cultures.[4]

The results from this study showed an inverse relationship between the age and dental anxiety score. The mean age of the participants was 11.34 ± 1.85. The older individuals studying in middle school showed lesser anxiety level than younger individuals studying in primary school level with higher mean score in both MDAS-N assessment (Primary school-11.64 ± 4.03, Middle school-11.13 ± 3.68) and FIS assessment. (Primary school-13.90 ± 4.05, Middle school-13.04 ± 3.47) (Table 7) The difference in the mean score of FIS was found to be statistically significant (p-value 0.023). The decrease in the dental anxiety score with increasing age is in agreement with the previous studies done in Nepali[27] as well as other different population.[4,12,15,18,28] In a study carried out in Nepali children the mean score decreased as the age increased where 4 -7 years old children had mean of 20.24 ± 6.37 and 11-14 years old had mean of 16.11 ± 6.95.[27] Higher level of anxiety has been reported in children as young as 2-5 years old compared to older children.[4] The decrease in dental fear with increasing age may be due to development of critical thinking, cognitive abilities and change in expression of fear.[27] Few authors have suggested that if a child gets exposed to dentistry at an early age it may reduce the dental anxiety.[25] Ghimire et al have reported delay in first dental visit in the Nepali population resulted in lack of awareness and knowledge regarding the oral health.[29]

Female had higher mean MDAS-N (Male-10.13 ± 3.56, Female-12.73 ± 3.72) and FIS score (Male-12.68 ± 3.93, Female-14.30 ± 3.46) than male and this difference was found to be statistically significant (Table 6). Most girls were "moderately anxious" (70, 36.08%) and expressed extreme anxiety (12, 6.19%) whereas boys were low anxious (92, 44.44%) and only 5 (2.42%) were extremely anxious, which was similar to the studies done by various authors.[15,18,25,26,28] This relatedness may be due to the fact that females are more prone to higher levels of neuroticism that is positively associated with anxiety[25] and are more willing to admit her fears unlike men who are socially expected to be tough and strong.[5] In contrast to the above report few have found that there were no significant differences in terms of gender regarding the scores that measure dental anxiety levels.[10,12,16,21,27] This variation may be attributed to the difference in the age of the studied population, ethnicity, and cultural differences.[16]

There were very few children who were not anxious in the dental situation in the studied population. As primary school age is the most effective age in receiving knowledge and dental health care,[30] education on oral health care for children at younger ages should be initiated. In addition, dentist's knowledge about the anxiety levels of a child before treatment will help the dentist prepare for reactions that can occur with any given anxiety level and will allow the dentist to take precautions to reduce a child's anxiety level if necessary.[12] Each child can be managed distinctively based on the reasons of the fear, utilizing various behaviour management techniques.[4,5] Administering local anaesthesia by injection is still the most common method used in dentistry for dental procedures that is also linked to the increase in the level of dental anxiety. Thus, there is a need for a more comfortable and pleasant means of achieving local anaesthesia before dental procedures.[4] Exposure to dentistry at an early age[25] may facilitate less complex and minimal invasive dental procedures that may lessen the dental anxiety in children. Fayad et al.,[15] have reported that patients with previous dental visit showed less anxiety than other patients who had not visited a dentist at any time, however, unpleasant past experience led to higher level of anxiety. The association of past dental visit with the anxiety level may be considered as one of the limitations in this study. Another limitation is that the results could be biased as children may overestimate or underestimate their response in the self-administered questionnaire.

CONCLUSION

Despite the limitations, it can be concluded that the dental anxiety is prevalent in Nepali children. It is important for children to visit dental clinic at a very early stage so that dental anxiety can be identified, and monitored for an effective and efficient dental treatment. The expanding knowledge of the oral health in patients and behaviour management skills by the paediatric dentist may prevent the children from developing fear and risking their oral health by avoidance of the dentist, ultimately leading to improved oral health.

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