

# Factors influencing anxiety levels in children undergoing dental treatment in an undergraduate clinic

Shreya Kothari<sup>1</sup>, Deepa Gurunathan<sup>1</sup>

<sup>1</sup>Department of Paediatric and Preventive Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India

## ABSTRACT

**Introduction:** Dental anxiety is a kind of fear exerted due to threatening stimuli. Assessing a child's dental anxiety level is very important to perform a particular treatment. The aim of this study is to examine the various factors that determine the anxiety levels in children and evaluate their anxiety levels. **Materials and Methods:** A total of 50 children participated in the survey conducted. Each participant had fulfilled the inclusion and exclusion criteria to answer the questionnaire. It included questions regarding their habits, fears, and dental visit experience. Evaluation of their anxiety levels was done using the facial image scale (FIS) and the modified dental anxiety scale and was correlated with various factors using the Statistical Package for Social Science Software. **Results:** Female children are more anxious than male children toward dental treatment. About 38% were anxious and 16% refused while undergoing radiographic examination and showed significant anxiety levels ( $P = 0.012$ ). About 16% of the population were highly uncooperative and were necessary to implement behavioral shaping techniques on them. It influences the FIS anxiety score before initiation of the treatment ( $P = 0.003$ ). About 48% of children had maintained a good rapport with the dentist and showed strong significance with the child's anxiety ( $P = 0.025$ ). **Conclusion:** Gender and behavior of the child while diagnosis and radiographic examination, implementation of behavioral shaping techniques, and rapport developed between child and dentist are all influencing factors of dental anxiety. The number of visits to the dental clinic, socioeconomic status, kind of amount of consumption of sugars, and type of treatment being done do not contribute to a child's anxiety level.

**Keywords:** Behavioral shaping techniques, dental anxiety, facial image scale, modified dental anxiety scale, threatening stimuli

## Introduction

Dental anxiety is one of the primary emotions when entering the clinic and arises due to threatening stimuli, which aggravates the individual to respond in certain ways. This has been a potential problem in patient management. It leads to various psychological, cognitive, and behavioral consequences.<sup>[1]</sup> There are physiological symptoms like sweating, increase in pulse rate, blood pressure, and psychological symptoms like confusion, panic, and inability to concentrate.<sup>[2,3]</sup> There are many patients who avoid or

neglect treatment because of their fear to dental procedures. According to a survey conducted among 6000 people, 58% of the respondents delayed their dental treatment because of their fear. It is found that 80% of the Americans have some anxiety towards dental treatment while 5-14% of them experience intense dental anxiety. This makes their oral hygiene worsen leading to complications later.<sup>[4]</sup>

Apart from the adults, dealing with the anxiety levels of child is even more complicated. The dentists' appearance, environment of the clinic, and instrument make the child more anxious. The behavioral manifestations in the form of crying, screaming, and avoiding dental treatment decrease the efficiency of dental health service.<sup>[2]</sup> Various behavior shaping techniques including tell-show-do (TSD), positive reinforcement, effective

**Address for correspondence:** Dr. Deepa Gurunathan, Department of Paediatric and Preventive Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, 162, Poonamallee High Road, Chennai - 600 077, Tamil Nadu, India. E-mail: drgdeepa@yahoo.co.in

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<b>Saveetha Dental College and Hospitals</b> <b>Department of Pedodontics</b> <b>Dental Anxiety in children</b>		<b>5. Socioeconomic status:</b> <b>Family income –</b> A. 1,000-5,000 B. 5,000-20,000 C. 20,000-50,000 D. 50,000- 1,00,000 E. 1,00,000 or more
1. Name :	Age/Sex:	
2. Address (urban/rural):		6. Is it the first dental visit of the child? A. Child's first dental visit B. Second dental visit C. Has visited many times
<b>Tick the following choices (single/multiple) wherever necessary.</b>		
3. Brushing, dietary and oral hygiene practices:  <b>Brushing habit -</b> A. Brushes once a day B. Brushes twice a day C. Brushes sometimes only  <b>Dietary intake-</b> A. Vegetarian diet only B. Non-Vegetarian diet also consumed C. Child consumes lots of sweets and chocolates		7. If not the first dental visit, how was the child's first experience to the dental clinic and what treatment was performed? A. Child was cooperative and had a good experience B. Average experience and treatment C. Uncooperative and bad experience
4. Number of siblings of the child: A. 1 B. 2 C. 3 or more		8. Type of treatment done previously- A. Scaling(cleaning) B. Restoration(filling) C. Pulpotomy(RCT) D. Extraction
9. Does the child tend to get more anxious while seeing the dental instruments and while taking an x-ray? A. Child refuses to let the dentist check with instruments B. Child is anxious but cooperates with the dentist C. Child was calm and comfortable		C. No good rapport and didn't respond to the dentist talking.
10. Type of treatment being done? A. Scaling(cleaning) B. Restoration(filling) C. Pulpotomy(RCT) D.Extraction E. Fixed Appliance (Alignment)		14. Was there a necessity to implement behavioural shaping and modelling techniques to make the child cooperative? A. Child was uncooperative and behavioural management was very much necessary. B. Behavioural shaping techniques were implemented on the child to comfort the patient. C. No behavioural shaping techniques required since the child was very cooperative.
11. Was the child sad and still anxious post treatment? A. No, child was happy and satisfied B. Child was inexpressive after the treatment C. Child left crying with incomplete treatment		
12. Was the child cooperative or became cranky while undergoing treatment? A. Child was more cranky and refused to get treatment done B. Child became anxious and required parent assistance. C. Child was well behaved		
13. How was the relation between the dentist and the child? A. Good rapport developed and friendly nature of child with dentist B. Average rapport and communication		

**Figure 1:** Questionnaire

communication, modeling and distraction are used to tackle children who are anxious and seem too uncooperative.<sup>[5]</sup> Studies have proved that fear of dental treatment in children may result in treatment management difficulties.<sup>[6]</sup> The behavioral management problems are also related to dental factors like earlier negative

treatment experiences, injection, and drilling, which show negative emotional loads.<sup>[7,8]</sup>

Physiological measures such as blood pressure, pulse rate, and psychological measures like modified child dental anxiety

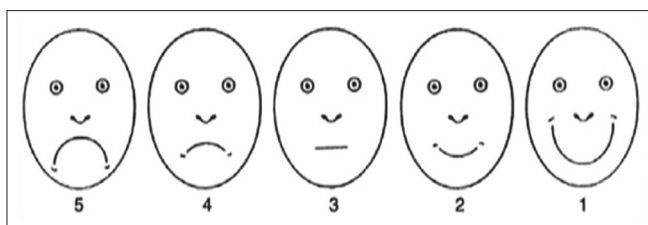


Figure 2: Facial image scale interpretation

scale (MCDAS), Venham's picture test (VPT), and facial image scale (FIS) are used to assess the anxiety levels in children.<sup>[9]</sup> Various patterns to evaluate the anxiety in children are studied and factors such as age of the child, gender, number of dental visits, oral hygiene habits, and socioeconomic status contribute to this. The attitude of the dentist toward the patient is a major factor in deciding one's anxiety level and behavior.<sup>[10]</sup> For a good treatment, a good rapport between the two should be present creating positive impact.

This study aims to assess the various factors influencing the dental anxiety levels in children.

## Materials and Methods

Before the commencement of the study approval was obtained from the Saveetha Dental College institutional review board. The patients along with their guardians were invited to take up the survey. An informed consent was taken from the parent followed by distribution of the questionnaire. The questionnaire was developed and pretested among 10 other pair of children and parents. Modifications in questionnaire were done according to the requirements. A total of 50 children had been chosen for the study comprising 30 girls and 20 boys.

The inclusion criteria are as follows:

1. Children of 6 to 10 age group
2. Parents who are willing to take up the surgery
3. Children who are in need of oral prophylaxis.

The exclusion criteria are as follows:

1. Highly uncooperative patient
2. Child having any kind of systemic diseases
3. Children who are on regular medications
4. Parents who deny taking up the survey.

The questionnaire was answered by the parents or guardians of the children. The children were also asked to grade anxiety level before and after the treatment using MDAS and FIS.

### Facial image scale

The FIS involved the assessment of anxiety levels by making the child choose a particular facial expression before and after the treatment. The facial expressions range from a score of 1 to 5 with the following interpretations:

- 1- Very happy

**Modified Dental Anxiety Scale**

CAN YOU TELL US HOW ANXIOUS YOU GET, IF AT ALL, WITH YOUR DENTAL VISIT?

PLEASE INDICATE BY INSERTING 'X' IN THE APPROPRIATE BOX

1. If you went to your Dentist for TREATMENT TOMORROW, how would you feel?

Not Anxious ☐ Slightly Anxious ☐ Fairly Anxious ☐ Very Anxious ☐ Extremely Anxious ☐

1. If you were sitting in the WAITING ROOM (waiting for treatment), how would you feel?

Not Anxious ☐ Slightly Anxious ☐ Fairly Anxious ☐ Very Anxious ☐ Extremely Anxious ☐

1. If you were about to have a TOOTH DRILLED, how would you feel?

Not Anxious ☐ Slightly Anxious ☐ Fairly Anxious ☐ Very Anxious ☐ Extremely Anxious ☐

1. If you were about to have your TEETH SCALED AND POLISHED, how would you feel?

Not Anxious ☐ Slightly Anxious ☐ Fairly Anxious ☐ Very Anxious ☐ Extremely Anxious ☐

1. If you were about to have a LOCAL ANAESTHETIC INJECTION in your gum, above an upper back tooth, how would you feel?

Not Anxious ☐ Slightly Anxious ☐ Fairly Anxious ☐ Very Anxious ☐ Extremely Anxious ☐

**Instructions for scoring (remove this section below before copying for use with patients)**

The Modified Dental Anxiety Scale. Each item scored as follows:

Not anxious	=	1
Slightly anxious	=	2
Fairly anxious	=	3
Very anxious	=	4
Extremely anxious	=	5

Total score is a sum of all five items, range 5 to 25: Cut off is 19 or above which indicates a highly dentally anxious patient, possibly dentally phobic

Figure 3: Modified dental anxiety scale

- 2- Happy
- 3- Moderate
- 4- Unhappy
- 5- Very unhappy.

The FIS scores were correlated with the mean scores of:

1. Rapport between child and dentist
2. Implementation of behavioral shaping techniques.

### Modified dental anxiety scale

The MDAS comprises a set of five standard questions to assess the anxiety levels of children ranging from not anxious to extremely anxious. This is one of the most reliable methods to measure dental anxiety. The following are the list of questions and interpretation of the scores:

The scores of all the five set of questions were added to obtain the total MDAS score. This total score was used to correlate the anxiety levels of children with the mean of the following factors:

1. Gender
2. Brushing habits
3. Dietary habits
4. Consumption of sugars
5. Socioeconomic status
6. Number of dental visits
7. Child behavior while diagnosing and x-ray
8. Type of treatment.

The data were tabulated and analyzed using the Statistical Package for Social Science Version 11.5. The independent sample *t*-test

and Mann-Whitney test were performed for assessing the mean score differences along with the  $P$  value.

## Results

The number of participants obtained through the survey was 50. These participants were from the age group 6 to 10 years. The following are tables depicting the frequency of responses for every parameter and their correlation with the anxiety levels score. Gender has a significant value of  $P = 0.018$ . From Tables 1 and 2, it is seen that 38% of children

were anxious and 16% of them refused while undergoing radiographic examination and show significance with anxiety levels ( $P = 0.012$ ). Other parameters such as brushing habits ( $P = 0.518$ ), dietary habits ( $P = 0.119$ ), consumption of sugars ( $P = 0.776$ ), socioeconomic status ( $P = 0.351$ ), number of dental visits ( $P = 0.497$ ), treatment performed ( $P = 0.659$ ) show no significance. From Tables 1 and 3, we observe 16% of the population were highly uncooperative and were necessary to implement behavioral shaping techniques on them. It influences the FIS anxiety score before initiation of the treatment ( $P = 0.003$ ). About 48% of the children had maintained a good rapport with the dentist and showed strong significance with the child's anxiety ( $P = 0.025$ ).

## Discussion

Dental anxiety in children is one of the major challenges faced in the field of dentistry. It poses a problem to the dentist as well as to the parent.<sup>[11]</sup> The early assessment of dental anxiety is very much important to facilitate the diagnosis and a guaranteed pleasant dental visit.<sup>[12]</sup> Avoidance of dental care can lead to more difficulty in behavioral management of the child and poor oral hygiene. According to certain studies, the prevalence of dental anxiety among children in the age of 5 to 10 years in India was found to be 6.3%.<sup>[13]</sup> Improper brushing and dietary habits contribute to the development of poor hygiene. In the study conducted, 80% of the children had brushed only once increasing risk of caries prevalence as shown in Figure 1 and it was found that the brushing habit had no significance with the anxiety of children as shown in Figure 2 ( $P = 0.518$ ). Similarly, excess consumption of sugars by 54% of children Figure 1 contributes to poor oral hygiene but has no significance with dental anxiety of children ( $P = 0.776$ ).

According to certain studies, the age of the child is a factor having an impact on a child's anxiety level and that the cognitive ability of a child develops with increase in age and more understanding.<sup>[14]</sup> As shown in Figure 1 the study comprised of 60% females and 40% males and influenced dental anxiety due to its strong significance with the MDAS score ( $P = 0.018$ ). The children who had no siblings were comparatively more anxious than the ones who had an elder sibling being as role models for them. This is in concordance with a study by Aminabedi NA *et al.*<sup>[15]</sup> When stating about the socioeconomic status of each child, there is no significance with the anxiety levels in children. Another parameter to be considered is the type of treatment and the way it is being performed on the child: 50% underwent restorative treatment and 8% had undergone extraction and oral prophylaxis individually. According to a study, higher anxiety levels were noticed in children while performing an extraction due to the use of needles and while injecting. This being a painful procedure makes the child uncooperative. It was reported that local anesthesia injections increase the dental anxiety scores and the lowest score was linked to oral prophylaxis.<sup>[16,17]</sup> This is not in concordance with result of this study because oral prophylaxis was related to higher anxiety levels. Secondary to injections, x-rays

**Table 1: Frequency of responses for each parameter in percentage**

Parameter	Percentage
Gender	Male 40
	Female 60
Brushing habits	Once 80
	Twice 20
Dietary habits	Vegetarian diet 26
	Non-vegetarian diet 74
Consumption of sugars	Normal 46
	Excess 54
Number of siblings	Nil 14
	One 54
	Two 32
Socioeconomic status	1,000 to 5,000 4
	5,000 to 20,000 38
	20,000 to 50,000 54
	50,000 to 1,00,000 4
Number of visits	First visit 32
	Second visit 44
	Multiple visits 24
Child behavior while diagnosing and x-ray	Calm and comfortable 46
	Anxious 38
	Refusal 16
Type of treatment	Extraction 8
	Scaling 8
	Pulpotomy 26
	Restoration 50
	Fixed appliance 6
	Others 2
Behavior during treatment	Well behaved 54
	Anxious and required parent assistance 28
	Cranky and refused for treatment 18
Behavior posttreatment	Happy and satisfied 36
	Crying and incomplete treatment 16
	Inexpressive 48
Rapport between child and dentist	Good and friendly 48
	Average rapport 40
	No good rapport 12
Behavioral shaping techniques	Implemented to comfort the child 38
	Was necessary 16
	Wasn't required 46



**Table 2: Correlation of parameters and MDAS (modified dental anxiety scale) score\***

Parameter		Mean value±standard deviation	P
Gender	Male	10.45±2.892	0.018
	Female	12.50±3.138	
Brushing habits	Once	11.85±3.262	0.518
	Twice	11.00±2.867	
Dietary habits	Vegetarian	10.62±2.599	0.119
	Non-Vegetarian	12.05±3.308	
Consumption of sugars	Normal	11.61±2.824	0.776
	Excess	11.74±3.504	
Socioeconomic status	1000-5000	9.50±0.707	0.351
	5,000-20,000	11.79±3.457	
	20,000-50,000	11.96±3.107	
	50,000-1,00,000	9±1.414	
Number of visits	First visit	10.88±2.500	0.497
	Second visit	12.05±3.539	
	Many visits	12.08±3.343	
Child behavior while diagnosing and x-ray	Calm and comfortable	12.09±3.029	0.012
	Anxious	10.11±2.283	
	Refusal	14.25±3.694	
Treatment	Extraction	12.00±4.690	0.659
	Scaling	13.00±3.162	
	Pulpotomy	12.38±3.990	
	Restoration	10.96±2.441	
	Fixed appliance	11.67±4.041	

\*Correlation is significant at the 0.05 level

**Table 3: Correlation of parameters and FIS (facial image scale) pre- and posttreatment score\***

Parameter		FIS (pretreatment) mean±standard deviation	FIS (posttreatment) mean±standard deviation	P – FIS pretreatment	P – FIS posttreatment
Rapport between child and dentist	Good and friendly	3.25±1.018	4.25±1.032	0.025	0.281
	Average rapport	3.55±0.686	3.85±1.089		
	No good rapport	3.50±1.049	3.83±1.169		
Behavioral shaping techniques	Implemented to comfort the child	3.47±0.841	4.00±1.016	0.003	0.259
	Was very necessary	3.25±1.035	3.63±1.061		
	Wasn't required	4.26±0.752	4.22±1.043		

\*Correlation is significant at 0.05 level

are considered to be a negatively rated procedure. Literature suggest that placement of the x-ray film can cause unpleasant sensations such as gagging making the child increase the anxiety levels and refuse treatment.<sup>[18]</sup> About 38% were anxious and 16% refused while radiographic examination. The behavior of the child while diagnosing and radiographic examination is a major factor influencing ones anxiety and the highest level is seen in children who refuse during the stage of diagnosis.

Children often require parent assistance while a treatment is being done. About 28% of the population had their parents by their side. This makes the child obey to the instructions given by the dentist more easily. Various behavioral shaping techniques such as TSD, live, and filmed modeling technique are some coping strategies for the child. About 38% of the children were being managed to make them comfortable and 16% of them were highly uncooperative indicating the necessity to implement various techniques. The implementation of behavioral shaping techniques

is in correlation with evaluation of a child's anxiety before the treatment. Apart from the above-discussed factors that influence anxiety, both FIS and MDAS scores were useful in getting to know each individuals score and the manner in which each child has to be dealt with [Figures 2 and 3].<sup>[19]</sup> MDAS score is a more valid and reliable form of scale. This scale provides accurate information about the anxiety levels of children in the waiting room or while undergoing treatment such as oral prophylaxis, restorations which requires tooth drilling or usage of injections in extractions. Children tend to get more anxious due to the drilling sounds and the noise of other children shouting. It has been reported that the environment in the dental office also influences ones anxiety levels.<sup>[20]</sup> Various instruments which are used, the smell in the clinic, the communication of the dentist with the child and his/her attire plays a major role.<sup>[21,22]</sup> A study indicates that regular outfits are preferred by children under the age of 8 years whereas children above the age of 8 years preferred white coat and surgical scrubs.<sup>[23]</sup> When stating about the kind of rapport

developed between child and dentist, it has to be solely based on trust ensuring the best treatment. This sets up a treatment alliance and it's seen that a child who has developed a good rapport with the dentist has lesser level of anxiety towards dental treatment.<sup>[24]</sup>

## Conclusion

The results indicate that gender, behavior of child while diagnosis and radiographic examination, behavioral shaping techniques before treatment, and rapport developed between child and dentist are influencing factors of dental anxiety. Children are highly anxious during oral prophylaxis and extractions. X-rays contribute to the anxiety levels in children. Other factors like socioeconomic status, number of siblings, type of treatment, amount of sugar consumption, and brushing habits do not influence a child's anxiety level. The environment, smell, and attire of dentist in the dental office are to be considered while dealing with children to create a positive impact.

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## Conflicts of interest

There are no conflicts of interest.

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