

Evaluation of Dental Fear and Anxiety in Children Aged Between 6-14 Years

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Abstract

Background: Dental fear and dental anxiety is poorly understood in children and which poses a hindrance in rendering dental care. There also are a wide range of factors that influence pre-treatment and during treatment dental fear and dental anxiety.

Aims and Objectives

1. To assess dental anxiety of children in the age groups of 6-8 years, 9-11 years & 12-14 years.
2. To assess dental fear of children in the age groups 6-8 years, 9-11 years & 12-14 years.
3. The assess dental fear and anxiety in children in the age groups of 6-8 yrs, 9-11yrs and 12-14 yrs during their initial dental treatment procedures.

Materials and Methods: This cross-sectional study was conducted in the Department of Pedodontics and

Preventive Dentistry, Coorg Institute of Dental Sciences. Virajpet, Karnataka, after obtaining the necessary ethical clearance .The children aged between 6-14 yrs were divided into three groups (6-8yrs, 9-11yrs & 12-14 yrs) using stratified random sampling method. The dental anxiety before treatment procedure was assessed using Modified Dental Anxiety Scale (MDAS) with facial images in the waiting room and fear in the dental environment using Direct Interview Questionnaire (DIQ.) The fear and anxiety during treatment procedure was assessed using Doctor’s Observation Sheet (DOS), which comprised of physiological and psychological Observations. The assessment was made by a trained single examiner. The data obtained was tabulated and subjected to statistical analysis. (fisher’s exact test & kruskal-wallis test)

Results: Anxiety and fear measured using modified MDAS and DIQ before showed no significant difference in the age groups. The anxiety and fear measured using physiological and psychological parameters in DOS during treatment procedures also showed no significant difference to the age group studied. However, extraction procedure was found to be statistically significant with the psychological parameter and not significant to physiological parameters.

Discussion: The age was considered a potent delineator of fear in child. Ripa had suggested that the dental visit evokes some degree of apprehension or anxiety in almost all children. In this study there was no difference in fear and anxiety experienced in the children of age group 6-14 years in accordance with Tolendo, Folayn and Castro, whereas Rayen R., Muthu M.S., Chandrashekhar Rao R., Sivakumar in their study concluded that most children (aged 4 to 11 yrs) were anxious and the most anxiety provoking situation in the dental operatory was in the reception area. S.H.Al-Jundi, A.J.Mahmood., suggested that the anxiety was dependent on the age of the child that is younger the child more is the anxiety. The differences in the findings are possibly related to culture, study design, sampling methods and the measuring scale used. Dental anxiety appears to vary by type of treatment. In children higher anxiety levels is reported for invasive treatment type or injection procedure or the period of extraction. Also, in the present study children undergoing extraction exhibited statistically significant psychological observation, which is suggestive of increased anxiety to the extraction.

Interpretations & Conclusion: In conclusion, more than the age of the child, treatment procedure (extraction) initiated a significant level of anxiety in children.

Keywords: Dental Fear, Dental Anxiety, Modified Dental Anxiety Scale, Physiological Parameters, Psychological Parameters

Introduction

Fear is explained as an emotional response to a perceived threat or danger, which is physically expressed. Fear is composed of physiological changes, an inner feeling and an outer behavioral action. Fear is experienced when we can recognize what causes it. Also, fear can develop through conditioning or acquired symbolically through examples of parents and stories they tell or through child's developing perception of the world.^{1,2} The fear is acquired in a child is young and is unable to understand the reason for change and senses a threat to the security of his routine pattern of life by being forced to a new situation.

As the child grows older and his ability to reason develops, acquired fears disappears, threats of other kinds becomes reasons for fear and the situations that produce fear change with age. What frightens a 2 year old child may not frighten him at 6 years of age.^{3,4} Whereas, anxiety is a vague fear experience without knowing the cause and is most prevalent of all human emotions.¹ The major difference between anxiety and fear is immediacy of the etiological agent.²

The cause of anxiety can be an unconscious memory of a fear stimulus or through stimulus generalization. Stimulus generalization is "when we learn a response to a particular situation, we have learned a response to all situations that are similar to the original one. Stimulus generalizations can and frequently occur without our knowledge".²

For example: a child who learns to fear a strict father may later feel uneasy or anxious in the presence of other men, the child sees them as being like the father and has a vague fear that transfers to them through the process of stimulus generalization. Children behaviour in any situation depends on inheritance pattern of physical and

mental endowment and as they develop by the conditioning received through environment.¹

The inheritance pattern cannot be altered as the environmental conditioning for the child will grow to have a well adjusted personality suited to the situation. The emotional conditioning of children towards dentistry as towards other experiences is formed primarily in the home with parental guidance. The un co-operative behavior due to dental fear and anxiety is frequently given reason by the children not to seek dental treatment.⁴

Mild fear and anxiety are expected experiences, consistent with normal development, but they become a concern and potentially in need of treatment when the fear or anxiety is disproportionate to the actual threat and daily functioning become impaired. While anxiety is a multidimensional construct that consists of somatic, cognitive, and emotional elements.⁴

Dental anxiety is a state of apprehension that suggests something dreadful is going to happen in relation to dental treatment, and is clubbed with a sense of losing control. Dental fear is a emotional reaction to one or more specific threatening stimuli in the dental situation.⁵ To identify and manage the dental fear, it is important for the dentist to understand the variations of dental fear and anxiety with the age, as the expression of fear and anxiety differs in different age groups and manifests differently in individual children.⁴

Also the individual emotional response depends on factors such as age, socioeconomic status, parental attitude, family background, patient awareness and previous dental experiences.^{5,6,7} The frequent use of self-reporting questionnaires can yield much information and aid in predicting a patient's levels of sensitivity to treatment, as well other anxiety causing related events that might affect dental visit.²

In children it is limited, as it requires some cognitive ability to understand the questions, also the lack of studies to verify the ability of developed schedules to distinguish between dental fear and anxiety⁸, Hence in this study to assess and compare the dental fear and anxiety in different age groups, 6-8yrs, 9-11 yrs and 12-14 yrs, Modified Dental Anxiety Scale (MDAS) and Direct Interview Questionnaire (DIQ) and Doctor's Observation Sheet (DOS) was used.

Materials and methods

This study was conducted in the department of pediatric and preventive dentistry, Coorg institute of dental sciences. Virajpet, Karnataka, after obtaining the necessary ethical clearance and informed consent from the parents to assess the dental fear and dental anxiety of their children.

The 90 children aged 6-14 years visiting for the first time to the department were selected in this cross sectional study using stratified random sampling method. Children in the age group of 6-14 yrs were included in the study, as children in this age group are in periods of Concrete Operation and Formal Operation of Cognitive Development.

The Children excluded in the study were below the age of 6 yrs, still in pre-operational stage of cognitive development and also the Children above the age of 14 yrs as they were beyond the referral age to the department. The Children with special health care needs were not included as there could have been chance of increased levels of anxiety in these children.

For the assessment of dental fear and anxiety the selected study sample were divided into Group1 - aged 6-8 yrs Group2 - aged 9-11 yrs Group3 - aged 12-14 yrs I. Assessment of Dental Anxiety Using Modified Dental Anxiety Scale (MDAS) MDAS this is a brief five item questionnaire with fixed alternative. We incorporated

pictorial representations to this scale for better understanding and identification of the emotions corresponding to their uneasiness.

With an fixed alternative answers ranging from not anxious to extremely anxious on a likert- type scale starting from 1(not anxious) to 5(extremely anxious) with the score ranging from 5 to 25 as a possible total score range. The children and their parents were explained about the questions in MDAS in the waiting room with the language that was to the level of the respondent.

The questions were translated from the original language into the local language (Kannada or Malayalam or Coorgi) and was again translated back to English, by the examiner to ensure that the scale was assessed accurately that which they purport to measure Parents filled the questionnaire for evaluation of dental anxiety level in the age group of 6-8 yrs as children in this age group would be unable to comprehend the content of the questionnaire and parents ability to predict their Child's anxiety levels with some degree of accuracy.

Whereas the children in the older age group 9-11 yrs and 12-14 yrs filled the questionnaire for self evaluation of dental anxiety on their own with or without their parental guidance under the supervision of the examiner. The total score of MDAS in each child was calculated and inferred based on the interpretation of the clinical psychologist as 0-10 - good 11-15 - fair 16-20 - bad 21 -25 - poor Assessment of Dental Fear Using Direct Interview Questionnaire (DIQ) After the assessment of dental anxiety the children were subjected to assessment of dental fear using DIQ. DIQ for fear consisted of ten questions related to dental environment with a simple yes or no answer.

These questions were asked in a language that the children could comprehend by the examiner, so as to integrate the questions to its complete clarity and concise. The

respondent replied to these questions either yes or no and the same was recorded by the assistant of the examiner appropriately. The score for each question was either 0 or 1 ie.'0' for no and '1' for yes.

Then the total score ranged from '0' to 10 The scores for fear in each child was calculated and inferred based on the clinical psychologists interpretation as, 0-3 - good 4-6 - fair 7-8 - bad 9-10 - poor. III. THE ASSESSMENT OF DENTAL FEAR AND ANXIETY USING DOCTORS OBSERVATION SHEETS (DOS) DURING INITIAL DENTAL TREATMENT PROCEDURE. DOS consisted of physiological and psychological parameters The physiological parameters were eye closure, facial expression, presence or absence of vocal signs, presence or absence of noticeably increased respiratory changes, presence or absence of tremble and any others.

In eyes it was observed for partial or complete closure and normal eye opening. In facial expression it was further examined for either smile or stoic or grimaice. The psychological parameters comprised the feelings of relaxed or little uneasy or so uneasy that break out in to sweat and physically sick. After assessment of fear and anxiety the DOS was used to observe the fear and anxiety of the child to the first dental treatment initiated depending on the comprehensive treatment plan, the treatment option being either a extraction or oral prophylaxis or restoration.

The observation for physiological and the psychological parameters was made by the same examiner who had assessed the fear and anxiety earlier so as to have fare amount of precision in the observation . The observations were scored for physiological and psychological parameters. In physiological parameters For the eye closure it was scored as follows 1- Normal eye closure 2- Partial eye closure 3- Complete eye closure For the facial expression as 1- Smile 2- Stoic 3- Grimaice For vocal

signs 1- Absent 2- Present Similarly for respiration rate 1- Normal respiratory rate 2- Increased respiratory rate . The rest of the physiological observations, ie tremble or any other was not seen in any of the children during the treatment.

Thus the total score in physiological observations ranged from 4 to 10 The scoring for psychological observation were scored as 1- Relaxed 2- Little uneasy 3- So anxious that they broke into sweat and physically feel sick. The score for psychological parameters ranged from 1 to 3 The score from the physiological parameters for each child was calculated and inferred based on clinical psychologist interpretation as 4-5 - Good 6-7 - Fair 8 - bad 9-10 - Poor The score from psychological parameters for each child

Results

Statistical analysis of the data

To assess the anxiety of children across different age groups

	Anxiety			
	Non anxious	Anxious	Highly anxious	total
Age group 6-8 Count	14	11	5	30
9-11 Count	11	15	4	30
12-14 Count	16	11	3	30
Total Count	41	37	12	90

test	X ² value	df	p-value
Kruskal Wallis	2.3062	2	0.3157

was calculated and inferred based on clinical psychologist interpretation as 1- Good 2- Fair 3- Poor

The data's obtained from the assessment of dental anxiety, dental fear and fear and anxiety during treatment procedures in different age groups of 6-8 yrs, 9-11 yrs and 12-14 yrs were tabulated and subjected to statistical analysis.

Fisher's Exact Test was done as some cells have the expected count less than 5; chi-square test statistic is not an appropriate measure to assess the anxiety across the age groups. • **KRUSKAL-WALLIS TEST** was used as it is a Non-parametric test for comparing three or more groups or condition.

There is no significant difference between different age group with respect to anxiety

To assess the fear of children across different age groups

		Fear			
		Non Fearful	fearful	Highly fearful	total
Age group	6-8 Count	8	7	15	30
	9-11 Count	10	6	14	30
	12-14 Count	14	8	8	30
Total	Count	32	21	37	90

test	X ² value	df	p-value
Kruskal Wallis	5.7463	2	0.05652

There is no significant difference between different age group with respect to fear

		Physiological			
		Non anxious	Anxious	Highly anxious	total
Age group	6-8 Count	3	26	1	30
	9-11 Count	1	28	1	30
	12-14 Count	4	26	0	30
Total	Count	8	80	2	90

To assess physiological behaviour across different age group

Chi-square tests						
	Value	df	Asymp sig(2-sided)	Exact sig. (2- sided)	Exact sig. (1- sided)	Point probability
Pearson chi- square	2.850 ^a	4	0.583	0.677		
Likelihood ratio	3.710	4	0.447	0.677		
Fisher's exact test	3.111			0.646		
Liner- by- liner	0.618 ^b	1	0.432	0.560	0.280	0.115
Association						
N of valid cases	90					

		Physiological			
		Non anxious	Anxious	Highly anxious	total
Age group 6-8	Count	3	26	1	30
9-11	Count	1	28	1	30
12-14	Count	4	26	0	30
Total	Count	8	80	2	90

From the above table we observe that the Fisher's exact test (p- valve =0.646) is not significant.Hence one may conclude that there is no significant difference between the age group and physiological observations.

To assess psychological behaviour across different age group

		Psychological			
		Non anxious	Anxious	Highly anxious	total
Age group 6-8	Count	12	16	2	30
9-11	Count	8	20	2	30
12-14	Count	13	17	0	30
Total	Count	33	53	4	90

Chi-square tests						
	Value	df	Asymp sig(2-sided)	Exact sig. (2- sided)	Exact sig. (1- sided)	Point probability
Pearson chi- square	3.763 ^a	4	0.439	0.511		
Likelihood ratio	5.063	4	0.281	0.383		
Fisher's exact test	3.848			0.424		
Liner- by- liner	0.882 ^b	1	0.348	0.403	0.201	0.049
Association						
N of valid cases	90					
a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is 1.33 b. The standardized statistic is -.939.						

From the above table we observe that the Fisher's exact test (p- valve = 0.424) is not significant .Hence one may conclude that there is no significant difference between the age group and psychological observations.

***df- degree of freedom**

Discussion

The dental fear is often initiated during childhood. Responsiveness to fear varies in children due to cortical immaturity and emotional conditioning received from parents and contact with environment.⁹ Also, it manifests differently in individual children for instance some are overwhelmed by anxiety whereas others appear calm.

Mild fear and anxiety are expected and is consistent with normal development but they become concern and potentially require treatment when it is disproportionate. Therefore, dental fear in childhood is of great importance and the dental health professional should be understand child's fear and anxiety.¹⁰ The factors that affect child anxiety and behavior in dental situation are age^{3,11} cognitive development¹ and maternal anxiety.^{12,13,14}

The probable explanation for the children to react in various ways is their age dependent psychological and cognitive development and their parenting.⁶ The factors influencing fear and anxiety are important for the clinician to interpret all responses to dental stimuli in the light of these factors.¹² Hence, to understand the knowledge of age

specific response to dental fear and anxiety, in this present study children in 3 age groups, 6-8 yrs, 9-11 yrs and 12-14 yrs was considered. The fear and anxiety is measured by cognitive, psychophysiological and behavioural elements of the individual.

Cognitive measures are largely self-report tests and includes a list of statements or questions to which the patients is require to respond.¹⁵ Two broad types of measurement techniques most frequently used in research are 1) observation of the child's reaction/behavior by dentist or other person during dental treatment 2) Report of the anxiety made by the child him or herself or by the accompanying parent (most often mother).

Psychometric scales of self-reports are most often used while studying adolescents while parental reports are normally used with children under 13 years of age.⁴ A widely used technique to assess dental anxiety and fear is through psychometric testing using self-report measures such as STAIC (a general anxiety scale) and CFSS-DS (dental specific fear scale).

Others have focused upon observation of behavior during treatment, physiological parameters or visual testing (extrafacial image scale).¹⁶ The early self-report or questionnaire tests were derived largely from psychology tests.¹⁷ The dental anxiety scale developed by Corah to measure dental fear and anxiety CDAS is a four-item scale and is frequently used in adults.¹⁸

In children it is limited, as it requires some cognitive ability to understand the questions. The scale omitted questions on procedures that could possibly cause distress for the child, besides the reliability of this instrument¹⁹ The formalized questionnaire used in adults is the Modified Dental Anxiety Scale (MDAS), this is a brief five item questionnaire, which is used to help identify patient anxiety levels.²⁰

It is a modification of The Corah's Dental Anxiety Scale and is better, as it has a additional item of receiving dental injections. For use in children, has not been established and validating measures are found to be low. In children the picture tests such venham picture test (VPT) are used to illustrate their pursued emotion²¹ VPT correlated moderately with other measures of clinical anxiety and indicated the need for some sensitive ways to measure a anxiety in children.²¹ Facial image scale, that uses faces as an indicator of anxiety (five faces comprising very happy to unhappy) in children was found to have high correlation with VPT, it is quick and easy to administer in children.

While it has been demonstrated to have high reliability and validity for measuring dental fear when included with CFSS.¹⁹ The choice of scheduled psychometric scales to use would depend on the objectives of the assessment.¹¹In this study it was to measure dental anxiety in dental situations, MDAS was used. The children examined comprised of different age groups in varying cognitive development and spoke different languages; we incorporated facial images with MDAS for better

understanding by the parent and child to select the correct option for the answer.

Although the difference between the constructs measuring general fear and anxiety are well established, there are no specific studies for verifying the ability of developed schedules to distinguish between dental fear and dental anxiety.¹⁹ CFSS-DS used for children's fear survey measures essentially one dimensional concept of dental fear ,fear of invasive dental procedure, also the questionnaire is filled by the child before the treatment ,this is contradict to design as CFSS-DS is supposed to be filled after the treatment False results may be expected as a child may experience anticipatory anxiety prior to treatment on coming across the anxiety provoking word mentioned in the questionnaire, such as extraction or removal of tooth. Fear survey schedule for children (FSSC) is a self-report questionnaire that measure fear and overall level of fearfulness in children. FSSC-II a revised and updated self report fear scale designed by Australian researchers Gullian and Kliengberg .This scale validity was questioned, as they do not reflect actual childhood fears that children have or experienced on a daily or regular basis.^{19,23} Hence in this study a Direct interviewer Questionnaire (DIQ) for fear was formulated based on the variety of questions ranging from about the dentist, to about the dental clinic, to be seated in the chair, to the various treatments.

Fear of injections, or drill or vibration or cleaning allowing the dentist to exactly know the level of fear in the child.DIQ for fear was closed end questionnaire with 10 questions with answer yes or no. Fear of unknown provokes anxiety in dental clinic, new patients anxiety can be due to the uncertainty they feel about what awaits them after initial appointment checkup.⁴ Fear can be a very powerful and unpleasant emotion; it includes

physiological and psychological response at the same time.

Psychophysiological activity, such as increased heart rate, sweating and elevated blood pressure occurs when anxious. Psychological events include feeling emotionally overwhelmed, having high levels of anxiety and even feeling terrified and physiological response to fear include a faster heart rate, shallow breathing and similar effects.³

Physiological parameter test requires special equipments and this itself could affect results because the equipment could provoke anxiety.¹⁹ and also time consuming method .Also these physiological parameters change in the body at such time ,do not make the patient a dentally anxious patient .Hence in our study in physiological parameter ,physical and behavioral pattern were observed.

The psycho physiological measures may be subjected to misinterpretation unless they are utilized by individuals who are skilled and knowledgeable in their usage .In our study to measure the fear and anxiety during treatment procedure the Doctor Observation Sheet (DOS) used comprised of physiological and psychological parameters, In physiologic parameter it consisted of physical and behavioral patterns . The age was considered a potent delineator of fear in child.^{1,3}

The prevalence of dental fear and anxiety was higher among pre-schoolers of low-income families. Ripa suggests that the dental visit evokes some degree of apprehension or anxiety in almost all children. In this study there was no difference in fear and anxiety experienced in the children of age group 6-14 years.²⁵

That was in accordance with Tolendo, Fodayn and Castro^{24, 25, 26}, whereas. Rayen R., Muthu M.S., Chandrashekhar Rao R., Sivakumar in their study concluded that most children (aged between 4 to 11) were anxious and the most anxiety provoking situation in the dental operatory was in the reception area.²⁷ S.H.Al-Jundi,

A.J.Mahmood. Suggested that the anxiety was dependent on the age of the child that is younger the child more is the anxiety.²⁸

Asli topaloglu-ak, ece eden, joe. Frencken²⁵ concluded that level of the dental anxiety amongst the 7 year old children was low. The differences in the findings are possibly related to culture, study design, sampling methods and the measuring scale used, The recent review paper on fear and anxiety was suggestive of that there is a need for more well-designed studies with sufficient numbers of subjects using measures to be valid and reliable for the age groups studied.

In this study to assess fear and anxiety direct interview questionnaire (DIQ) and doctor's observation sheet (DOS) developed by clinical psychologist along with modified dental anxiety scale was used. Dental anxiety appeared to vary to different type of treatment, in periodontic and endodontic patients reporting higher levels of anxiety than patients receiving restorative or prophylactic treatment.

In children higher anxiety levels is reported for invasive treatment type, or injection procedure GA, the period of extraction.^{27, 29} Also, in this study children undergoing extraction exhibited statistically significant psychological observation, suggesting increased anxiety to the extraction. Child's ability to cope with dental treatment depends on their age, competence, maturity, personality, intellectual capacity, temperament and emotions, experience, oral health, family back ground, culture etc.

Some children are tolerant to stressful situations and are not likely to present problem during dental treatment, while others are vulnerable and may need more attention and time in order to cooperate for dental treatment. Dental health professionals should acquire an understanding of the dynamic nature of a child and appreciate their hidden factors and underlying complexities associated with the anxiety for dental treatment.

Conclusion

The interpretations of the results from the study, to assess fear & anxiety in the children aged between 6 to 14 years is as follows;

- 1) The anxiety assessed using modified MDAS with facial images in the waiting area by a child himself or herself with parental guidance showed, no significant anxiety level in the children of 3 age groups (6-8 years or 9-11 or 12-14 years).
- 2) The fear assessed using DIQ in the dental environment by the examiner was found to be, not significant in the children of 3 age groups (6-8 years or 9-11 or 12-14 years).
- 3) The assessment of fear and anxiety during dental treatment procedures using psychological and physiological parameters was found to be not significant in the children of 3 age groups (6-8 years or 9-11 or 12-14 years).
- 4) The physiological parameters observed for various treatment procedures (extraction, restoration & oral-prophylaxis) were not found to be significant.
- 5) The psychological parameters observed during treatment were found to be significant for extraction procedure.

From this it can be concluded that, more than the age of the child, treatment procedure (extraction) initiated a significant level of anxiety in children.

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