Original Article

Assessment of Dental Anxiety during Pulp Therapy, Restorations & Extraction in 6- to 9-year-old children using drawings and questionnaire – A cross sectional study.

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ABSTRACT

Bacground: Childhood dental fear and anxiety are prevalent from an early age through adolescence, posing a significant challenge in pediatric dental care. Understanding children's emotions during dental procedures is crucial for pediatric dentists to anticipate and address behavioral responses in future visits. Utilizing drawings and questionnaires can effectively gauge an individual's self-concept, anxiety, attitude, or conflicts. **Aim**: This study aimed to assess children's drawings and questionnaires as means to measure dental anxiety related to dental treatment. **Methodology**: Forty children aged 6-9 years participated in this study. During the initial therapeutic session, all participants underwent pulp therapy and restorative treatment with local anesthesia administration. Objective assessment of distress during treatment was conducted using the Sound, Eye, Motor (SEM), and Frankl Scales. Subsequently, children were provided with a predetermined set of questions before the treatment, and their responses were recorded. Following the interview, children were asked to draw a picture of their surroundings. Pediatric dentists and psychologists scored the children's drawings using the Child Drawing: Hospital (CD: H) scale. The findings were compared with Frankl and SEM Scores. **Results**: A statistically significant association was observed between Frankl score and SEM Score (p<0.001*). A strong positive correlation was found between CD:H Scores Examiner 1 and CD:H Scores Examiner 2 (p<0.001*; r=0.760). **Conclusion**: Assessing dental anxiety through children's drawings, which reflect their inner feelings, offers an alternative to self-report techniques for pediatric dentists. Drawing, being both easier and enjoyable, emerges as a valuable tool for measuring children's levels of dental anxiety. **Keywords:** Children, Dental Anxiety, Drawings, Pain Perception, Behaviour Management

I. Introduction–

Dental fear and anxiety among children are prevalent from early childhood through adolescence. The initial dental encounter significantly influences a child's perception of dentistry. Anxiety experienced during dental visits or procedures can lead to adverse outcomes such as uncooperative behaviour and psychological distress. Thus, it is crucial to evaluate the behaviour of children undergoing dental treatments to help Pediatric dentists understand their responses. Various methods exist to assess dental anxiety, including clinical observation, self-report scales completed by children, and questionnaires completed by parents.[1]

Anxious children typically exhibit negative behaviour in the dental setting, although some may not outwardly express their anxiety. Previous studies indicate that relying solely on clinical observations may not accurately gauge children's dental anxiety.[2] Questionnaires, completed by either children or parents, offer another assessment method, although parental ratings may not always align with children's actual anxiety levels, particularly in younger children. Additionally, children under eight years old may have difficulty reliably responding to questionnaire items due to their developmental stage.[3] Drawing assessments have been recognized as a valuable tool for evaluating children's psychological states, with research focusing on spontaneous drawings as indicators of cognitive development and emotional expression.[4]

Drawing tests, such as Child Drawing: Hospital (CD: H), offer a non-verbal method to assess subjective feelings, including fear and anxiety, in a Pediatric dental clinic setting.[5] These tests are easy to administer, cost-effective, and enjoyable for children, making them a valuable addition to the evaluation of dental anxiety in children undergoing treatment. This study aims to evaluate both children's drawings and questionnaires as means of measuring dental anxiety during dental procedures.

II. Material and methods–

Ethical approval

The protocol of this clinical study was approved by the Ethics Committee of Dr. HSRSM Dental College & Hospital, Hingoli. Ethical Approval number - HDCH/Ethics/2023/77. Before enrolment, written informed consent was obtainedfrom the parents/guardians of eligible children participating in this study.

Study Population

The number of patients required was calculated based on a micro-sample at an accepted level of significance(P < .05) and a maximum permissible error α < 0.05 and β < 0.2.A total of 40 children were enrolled in this study. The participants of this study included children referred to the Department of Pediatric and Preventive Dentistry for their dental treatment. 40 subjects who matched the inclusion criteria

were randomly selected from children who were appointed for their first dental treatment session.

Inclusion criteria

1. Children between 6-9 years of age.
2. Children with carious primary teeth which required pulp therapy and restorative treatment.
3. Children who are not considered medically compromised.
4. Obtained verbal informed consent from the child and parent for their participation in the study where procedures are explained in an age-appropriate attitude.
5. Children who accept to draw a picture.

Exclusion criteria

1. Children with a compromised physical and mental health history.
2. Children who reject to draw a picture.

Study Design

During the initial therapeutic session, all participants received pulp therapy and restorative treatment accompanied by local anesthesia administration. Objective assessment of distress during the treatment was conducted using the Sound, Eye, Motor (SEM), and Frankl Scale to assess the construct validity of the CD:H scale. These scales rely on visual observation of the child's behavioural reactions in the dental clinic. A single Pediatric dentist, unaware of the drawing scores, evaluated the Frankl and SEM scales. Composite scores were calculated by summing the scores obtained across all treatment stages. Subsequently, each child was presented with a standardized set of questions before the treatment, adapted from Klein's study in 1967.[6]

The questions were as follows:

1. Have you visited a dentist?
2. Why did you visit a dentist?
3. Could you tell me something about the dentist?
4. Were you afraid to go to the dentist?
5. Do you remember the treatment you received?
6. Did it hurt?
7. Do you like the dentist?

The child was allowed to explain in 'yes' or 'no' andthe answers were recorded.

Following the interview, the children were instructed to create a drawing depicting their environment. Each child was provided with a plain white A4 sheet of paper along with a box of 12 coloured crayons, a pencil, eraser, and a ruler. They were given the instruction, "Draw anything you see in the clinic," and were allowed ample time to complete their drawings, during which they could write their name and age on the paper. It was made clear that the sheets would be collected once the drawing was finished. All participants were given the option to draw, and those who declined were excluded from the study. There was no imposed time limit for the drawing activity. If any questions arose from the child, they were answered in a neutral manner that did not influence the child's drawing, or the original instructions were reiterated. Once the child completed their drawing, the sheet was collected (see Figure 1) and the required treatment was performed. Two impartial examiners, a seasoned Pediatric dentist and a psychologist, who were not present during the treatment session and were unaware of the SEM and Frankl scale scores, evaluated and scored the drawings. The results were then compared with the Frankl and SEM scores.

Figure 1

Scoring of the drawings:

The CD: H Scoring Guide, Rating Scale, and CD: H score sheet were utilized to assess the drawings. Clatworthy's study has established the internal validity of the drawing test, and a manual has been developed to assist in scoring, providing specific instructions and examples. Raters were instructed to carefully review and understand the CD: H manual. The detailed rating scale for CD: H is outlined in Figure 2, while the scoring process, depicted in Figure 3, comprises three sections. Part A involves rating 14 items on a scale from 1 to 10, with 1 indicating the lowest anxiety level and 10 the highest. Part B involves assigning additional scores for the presence of any of eight items identified as pathological signs. Part C utilizes a gestalt scoring method, where the

scorer assigns an overall rating on a 1 to 10 scale based on specific indicators of the child's anxiety depicted in the picture. A score of 11 indicates low anxiety, while a score of 10 signifies high anxiety. The total score is calculated by summing the scores from Parts A, B, and C. An overall rating is then obtained by combining the scores from all three sections, resulting in a possible total score ranging from 15 to 290. The CD: H score sheet categorizes anxiety levels as follows: <43 for very low stress, 44-83 for low stress, 84-129 for average stress, 130-167 for above-average stress, and 168 and above for very high stress.[5]

Figure 2

Figure.3

Statistical Analysis

Data in this study were inputted into Microsoft Excel 2010. Age stats were presented as mean ± standard deviation. Frequency distribution and percentage described questionnaire responses. A comparison between Group 1 and Group 2 used unpaired t-tests for parametric parameters. Fisher's Exact Test assessed the association between SEM score and Frankl score. Pearson's correlation coefficient examined

CD:H scores correlation. Kendall Tau correlation analyzed SEM score vs. Mean CD: H score and Frankl Score vs. Mean CD: H score. Linear regression investigated SEM score, Frankl score, and Mean CD: H score relationship. Graphical representation used bar graphs and scatter plots. Significance was set at p < 0.05. Analysis done with SPSS version 19.

III.Results

According to CD:H Scores, 92% of children exhibited an average level of anxiety, while 5% displayed above-average anxiety levels, and 2.5% showed low anxiety levels (refer to Table 1).

A **statistically significant** strong positive correlation was observed between CD:H Scores Examiner 1 and CD:H Scores Examiner 2 (p < 0.001*; r = 0.760) (refer to Table 2).

Furthermore, a **statistically significant** difference in CD:H scores between Examiner 1 and Examiner 2 was noted (p < 0.001*) (refer to Table 3).

There was a statistically insignificant correlation observed between SEM/Frankl scores and Mean CD:H Score (refer to Table 4).

In total, 40 children aged 6 to 9 years, with a mean age of 7.18 ± 0.3, participated in the study, comprising 29 girls and 11 boys. Their perceptions of dental treatment were categorized as YES or NO based on responses to questions 1, 4, 5, 6, and 7 (refer to Table 5).

Question no. 2 - **"Why did you visit a dentist?"** revealed that 42.5% of children reported visiting the department due to pain, 37.5% due to caries, and 20% due to tooth mobility (refer to Graph 1).

Question no. 3 - **"Could you tell me something about the dentist?"** showed that 55% of children had a positive perception, 40% had a neutral perception, and only 5% had a negative perception (refer to Graph 2).

Positive: The dentist and / or the dental situation liked by the subject.

Neutral: No opinion was given for good or bad.

Negative: The situation or the dentist described as definitely bad.

Furthermore, out of a total of 9 subjects who received a Frankl score of 1 'Definitely negative', 88.9% reflected a SEM score of 'Painful'. Similarly, all 3 subjects who received a Frankl score of 1 'Definitely positive' showed a SEM score of 'comfort'. A statistically significant association was found between Frankl score and SEM Score (p < 0.001*) (refer to Table 6).

		CD:H SCORE			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	1	2.5	2.5	2.5
	Average	37	92.5	92.5	95.0
	Above average	2	5.0	5.0	100.0
	Total	40	100.0	100.0	

Table 1-CD H-Scores

Correlations			CD:H Scores Examiner 1	CD:H Scores Examiner 2
CD:H Scores Examiner 1	Pearson Correlation		1	.760**
	Sig. (2-tailed) p value			<0.001*
	N		40	40
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 2-Correlation between CD-H Scores of Examiner 1 and CD-H Scores of Examiner-2

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Deviation
CD:H Scores Examiner 1	40	46	121	106.50	11.802
CD:H Scores Examiner 2	40	47	152	129.88	17.742
Unpaired 't' test	Mean Difference=-23.375;		t=-12.678		p<0.001*
Mean CD:H Scores	40	46.50	134.00	118.1875	13.89368

Table 3-Descriptive-statistics-CD-H-Score-and-Comparison-between-two-CD-H-score-by-Unpaired-'t'-test

Coefficients		Unstandardized Coefficients		Standardized Coefficients	t	Sig. p value	95.0% Confidence Interval for B	
Model		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	113.276	13.689		8.275	.000	85.539	141.013
	SEM Score	.565	3.004	.051	.188	.852	-5.522	6.653
	Frankl Score	1.828	4.283	.116	.427	.672	-6.850	10.505
a. Dependent Variable: Mean CD:H Scores								

Table 4 - Linear Regression analysis for Frankl score SEM score and Mean CDH Scores.

Sr No	Question	Responses			
		Yes (Frequency /Percentage)		No Frequency /Percentage	
1	Have you visited a dentist	27	70.0	13	30.0
2	Were you afraid to go to the dentist	32	80.0	8	20.0
3	Do you remember the treatment you received	22	55.0	18	45.0
4	Did it hurt	29	72.5	11	27.5
5	Do you like the dentist	26	65.0	14	35.0

Table 5 -Patient's-perception-to-dental-treatment

Frankl Score * SEM Score Crosstabulation			SEM Score				Total
			Comfort	Mild Discomfort	Moderately Painful	Painful	
Frankl Score	Definitely Negative	Count	0	1	0	8	9
		% within Frankl Score	0.0%	11.1%	0.0%	88.9%	100.0%
		% of Total	0.0%	2.5%	0.0%	20.0%	22.5%
	Negative	Count	1	3	7	6	17
		% within Frankl Score	5.9%	17.6%	41.2%	35.3%	100.0%
		% of Total	2.5%	7.5%	17.5%	15.0%	42.5%
	Positive	Count	8	3	0	0	11
		% within Frankl Score	72.7%	27.3%	0.0%	0.0%	100.0%
		% of Total	20.0%	7.5%	0.0%	0.0%	27.5%
	Definitely Positive	Count	3	0	0	0	3
		% within Frankl Score	100.0%	0.0%	0.0%	0.0%	100.0%
		% of Total	7.5%	0.0%	0.0%	0.0%	7.5%
Total		Count	12	7	7	14	40
		% within Frankl Score	30.0%	17.5%	17.5%	35.0%	100.0%
		% of Total	30.0%	17.5%	17.5%	35.0%	100.0%
Fishers' Exact Test p <0.001*							

Table 6 -Association between Frankl and SEM score Fishers' Exact Test

IV. Discussion

Dental anxiety stands as a primary determinant influencing a child's experience in the dental clinic, emphasizing the necessity of early assessment of anxiety levels. Due to their cognitive development, children often struggle to articulate their emotions verbally, underscoring the need for methods that can elucidate their emotions and expectations when verbal expression is limited.[7] Drawing emerges as a potent tool in this regard, offering children an avenue to express themselves effectively. In this study, we employed both drawings and questionnaires to gauge dental anxiety during treatment sessions. Drawing, being a delightful and accessible activity for children, yielded unanimous participation among the subjects.[8] By amalgamating objective and subjective assessment methods, we endeavoured to comprehensively evaluate anxiety and behaviour in the dental context. Objective evaluations, such as those using SEM and Frankl scales, administered and scored by a Pediatric dentist, were juxtaposed with scores from self-projective tools like the CD: H scale.

Previous research by Aminabadi et al. demonstrated a significant correlation between drawing, as assessed by the CD: H Scale, and traditional anxiety scales such as Frankl and SEM.[9] Our findings echoed this correlation, although the association with the Frankl scale was deemed insignificant. Similarly, Mathur et al. linked stress markers in children's drawings with scores on the Frankl behaviour rating scale, further affirming the utility of drawings in assessing dental anxiety.[10]

Torriani et al.'s exploration into children's drawings regarding their perceptions of dental treatment underscored the informative nature of drawings in understanding children's emotions and expectations.[11] In our study, we observed that children adeptly utilized drawing as a means of self-expression, highlighting its utility as a beneficial method for elucidating emotional states.

We specifically targeted children aged 6-9 years, considering their developmental stages and ability to represent human figures in drawings. Notably, the level of detail in drawings exhibited a positive correlation with anxiety levels, with shading and preference for dark colours serving as indicators of anxiety.[12] However, our study's small sample size precluded a nuanced analysis of outcomes across age subgroups or genders. Aminabadi et al. similarly encountered limitations in analysing age subgroups, attributing it to their study's sample size.[9] Moreover, we found no significant gender-based differences, aligning with previous findings.

Moving forward, larger-scale studies could delve deeper into age and gender differentials in anxiety expression. Additionally, future research could explore longitudinal assessments of children's drawings across multiple dental sessions to better discern evolving anxiety levels.

V.Conclusion

Using children's drawings as a means of assessing dental anxiety, which provides insight into their inner feelings, offers an alternative approach for Pediatric dentists compared to traditional self-report techniques. Drawing, being simpler and more enjoyable for children, can be regarded as a valuable tool for measuring children's levels of dental anxiety.

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