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RESEARCH ARTICLE

VALIDATION OF NEW ANIMATED SCALE WITH PICTORIAL SCALE AND FACIAL IMAGE SCALE IN CHILDREN DURING THEIR FIRST DENTAL VISIT BEFORE AND AFTER DENTAL TREATMENT

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ABSTRACT

Introduction*:* A potential problem in inpatient management in pediatric dentistry is dental anxiety (DA) among children. It is of paramount importance for pediatric dentists to identify an anxious child and review potential management options specific to every child. ***Aim****:* This study aims to validate a newly devised Chota-Bheem-Chutki (CBC) animated scale and to compare this with Raghavendra, Madhuri, Sujata Pictorial Scale (RMS-PS) and Facial Image Scale (FIS) to measure dental anxiety in young children during their first dental visit before and after treatment. ***Materials and Methods:*** One hundred children aged 6–15 years were randomly selected who visited our department. The child's anxiety levels were measured using three different scales, the FIS, RMS-PS, and the CBC animated scale. To check the validity of the CBC scale it was compared with the other two scales. The scores were recorded by asking the children to choose the figure they identified with at that instant. Spearman's correlation test will be used to obtain a correlation among the scales. Wilcoxon Signed Rank Test is used to compare the mean anxiety scores between different scales before treatment and after treatment. ***Results:*** A statistically significant correlation was found among FIS, RMS-PS, and CBC Scale however CBS scale when compared with other scales the results obtained were found to have a higher correlation which was statistically significant. **Conclusion:** The findings of this study suggest that the CBC scale can be used as a new tool for dental anxiety assessment in children among younger age groups as they are more fascinated by cartoon characters.

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INTRODUCTION

Despite the evolving trends in dentistry, anxiety, and feeling of fear still persists for dental treatment in the general population, especially in children and adolescents. Previous research has shown a prevalence of approximately 6–20% irrespective of culture and country. Several terminologies have been used by various schools of psychological thought to unfold the concept of dental anxiety and fear in children.[1,2] Anxiety is a state of uneasiness or distress regarding something with a feeling of uncertain outcome.[3] There are various views over the origin of this trait; it is not only concerned with the fear of pain or other incursive procedures but is also linked to the fear of separation from the parents and communicating with unknown people.[4]Dental anxiety is defined as "an abnormal fear or dread of visiting the dentist for preventive care or therapy and unwarranted anxiety over dental procedures."[5]

Dental anxiety in children is a matter of concern for pedodontists as the first dental visit leaves an impact and influences future behavior toward dental treatment.[6]Moreover, the effects of dental anxiety can last until adulthood, which can lead to dental neglect.[7]Thus, it is of prime importance for a pediatric dentist not only to recognize dental anxiety but also to adopt techniques to manage the child in such a manner that it incorporates a positive attitude in the child for future dental visits.[8] Various methods have been used in literature for the assessment of dental anxiety. Physiological methods such as measuring pulse rate, muscle tension, and blood pressure require experience in interpreting results from special equipment; projective techniques such as Corah's dental anxiety survey and modified Corah's dental anxiety survey require dexterity for carrying out interviews and scoring.[9]Other easier methods to record anxiety include self-reporting questionnaires. The ideal measure to record anxiety should require less skill and should be easy to record.

It should allow for limited cognitive and linguistic skills.[10]To meet the above-mentioned criteria, picture tests like FIS, RMS-PS is the appropriate choice, where facial index scale (FIS) has been used in numerous studies to assess dental anxiety before dental treatment. Hence, taking into account the aforementioned limitations, the present study was conducted to validate a newly devised animated scale Chota Bheem–Chutki scale (CBC scale) with cartoon characters that are familiar for the children and compare it with the RMS and FIS for the assessment an of child's dental anxiety during their first dental visit.

MATERIALS AND METHODS

Institutional review board approval was obtained. A hundred children aged 6–15 years visiting the Department of Pediatric and Preventive Dentistry were considered for the study and duration of the study is 6 months from December 2020 to April 2021. The study group comprised of 58 males and 42 females among which 46 were 6-8 years, 35 were 9-11years, 19 were 12-15years. Children and their parents/guardians visiting the outpatient department (OPD) were approached in the waiting area and those visiting for the first dental treatment were selected randomly based on the inclusion and exclusion criteria.

Inclusion criteria included i) First dental treatment accompanied by the parent or guardian, ii) Children willing to participate in the study with parental consent, iii) Children with no history of major illness.

Exclusion criteriai) Physically and mentally challenged children, ii) Children with a history of previous dental treatment visit. Parents/guardians were informed regarding the study and consents were obtained from them. Three different scales were used to determine the anxiety level of children during their first dental visit before and after treatment. The child's anxiety levels were measured using three different scales; the FIS, RMS-PS, and the animated CBC pictorial scale, To validate the specificity of the CBC scale it was compared with FIS and RMS-PS. The scores were recorded by asking the children to choose the figure they identified at that instant.

FACIAL IMAGE SCALE

This scale comprises a series of five pictures showing very happy to very unhappy faces. For the study, the scale was shown to children and they were asked to choose the image they identified with at that instant. The scores were recorded by assigning a value of one to the very happy face and five to the very unhappy face (Figure 1).

Table 1. Showing age and gender wise distribution among study subjects

Age and Gender distribution among study subjects			
Variables	Category	n	%
Age	6-8 yrs	46%	46%
	9-11 yrs	35%	35%
	12-15 yrs	19%	19%
Sex	Males	58%	58%
	Females	42%	42%

Figure 1. Showing Facial Image Scale

RAGHAVENDRA, MADHURI, SUJATA PICTORIAL SCALE

The RMS-PS consists of original photographs of both boy and a girl child. Their photographs were taken with the permission of their parents. Parents were informed regarding the picture scale and their consent was taken for the utilization of photographs of their child in the study.

RMS-PS comprises a row of five faces ranging from very happy to very unhappy. Two separate sets of photographs were used for boys and girls. The children were asked to choose the face they feel about themselves at that moment. The scale was scored by giving a value of one to the very happy face and five to the very unhappy face for boys and girls (Figure 2, Figure 3)

Table 2. Showing spearman's correlation coefficients between different anxiety scales before treatment among study subjects

Spearman's correlation coefficients between different Anxiety measuring scales before Rx among study subjects			
Values	FIS	RMS	CBC
rho	1	0.71	0.83
P-Value	.	<0.001*	<0.001*
rho	0.71	1	0.79
P-Value	<0.001*	.	<0.001*
rho	0.83	0.79	1
P-Value	<0.001*	<0.001*	.

* - Statistically Significant

Table 3. Showing spearman's correlation coefficients between different anxiety scales after treatment among study subjects.

Spearman's correlation coefficients between different Anxiety measuring scales After Rx among study subjects				
Variables	Values	FIS	RMS	CBC
FIS	rho	1	0.83	0.90
	P-Value	.	<0.001*	<0.001*
RMS	rho	0.83	1	0.89
	P-Value	<0.001*	.	<0.001*
CBC	rho	0.90	0.89	1
	P-Value	<0.001*	<0.001*	.

* - Statistically Significant

CHOTTA BHEEM–CHUTKI SCALE

This scale comprises two separate cards; one for boys and the other for girls. For boys, the Chota Bheem cartoon character was chosen to depict various emotions, and for girls, Chutki cartoon character was chosen to depict various emotions. Each card consists of a series of six figures depicting happy to unhappy and running emotion by the cartoon character. Children were asked to choose the face they identified with at that instant. To record on the scale, a score of one was assigned to a happy face and six to an unhappy face and running (Figure 4).

Table 4. Showing comparison of mean anxiety scores between before and after treatment measured among different scales using Wilcoxon signed rank test

Comparison of mean Anxiety scores between Before and After Rx measured using different scales using Wilcoxon Signed Rank Test						
Scales	Time	N	Mean	SD	Mean Diff	P-Value
FIS	Before Rx	100	1.91	1.82	-0.12	0.39
	After Rx	100	2.03	2.57		
RMS	Before Rx	100	2.40	0.77	-0.06	0.35
	After Rx	100	2.46	1.02		
CBC	Before Rx	100	1.54	0.63	-0.16	0.04*
	After Rx	100	1.70	0.96		

* - Statistically Significant

Statistical Analysis: The scores obtained from all three scales were compared using the student's t-test. Spearman's correlation test will be used to obtain a correlation between the scales used in the study. Comparingthe mean anxiety scores between different scales before treatment and after treatment will be measured using the Wilcoxon Signed Rank Test. Age and gender-wise comparison of liking for a particular Anxiety measuring scale among study subjects will be done using Chi-square Test.

RESULTS

The present study was conducted among the 100 children aged 6–15 years who visited our department during their first dental treatment visit were randomly selected for this study. Among 100 children, 58 were boys and 42 were girls. 46% were aged from 6-8 years, 35% from 9-11 years and 19% from 12-15% (Table 1).

Table 5. Showing age wise comparison of liking for a particular anxiety measuring scale among subjects

Age wise comparison of liking for a particular Anxiety measuring scale among study subjects using Chi square Test										
	6-8 yrs		9-11 yrs		12-15 yrs		Total			
Scales	n	%	n	%	n	%	n	%	χ^2 Value	P-Value
FIS	4	8.7%	0	0.0%	0	0.0%	4	4.0%	59.548	<0.001*
RMS	0	0.0%	6	17.1%	16	84.2%	22	22.0%		
CBC	42	91.3%	29	82.9%	3	15.8%	74	74.0%		

* - Statistically Significant

Table 6. Showing gender wise comparison of liking for a particular anxiety measuring scale among subjects

Gender wise comparison of liking for a particular Anxiety measuring scale among study subjects using Chi square Test								
	Males		Females		Total			
Scales	n	%	n	%	n	%	χ^2 Value	P-Value
FIS	3	5.2%	1	2.4%	4	4.0%	59.548	<0.001*
RMS	15	25.9%	7	16.7%	22	22.0%		
CBC	40	69.0%	34	81.0%	74	74.0%		

* - Statistically Significant

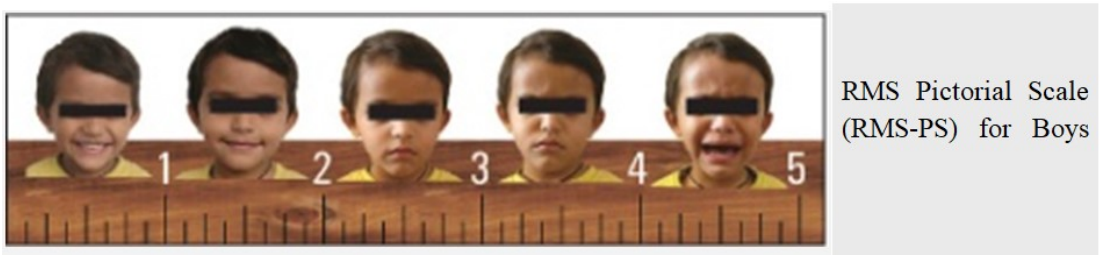

Figure 2. Showing Raghavendra-Madhuri- Sujata Pictorial Scale for Boys (RMS-PS)

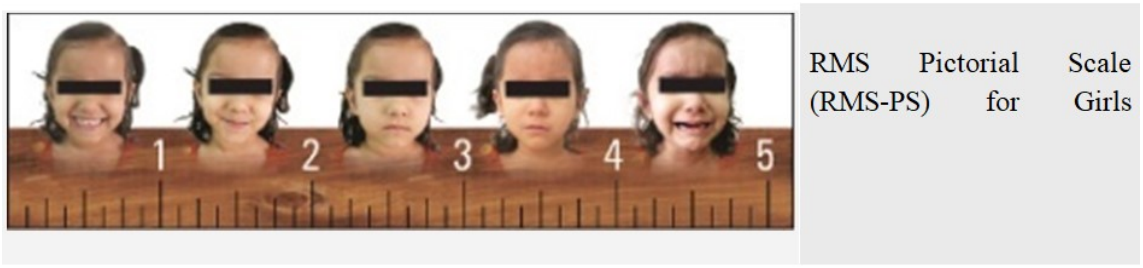

Figure 3. Showing Raghavendra-Madhuri- Sujata Pictorial Scale for Girls (RMS-PS)

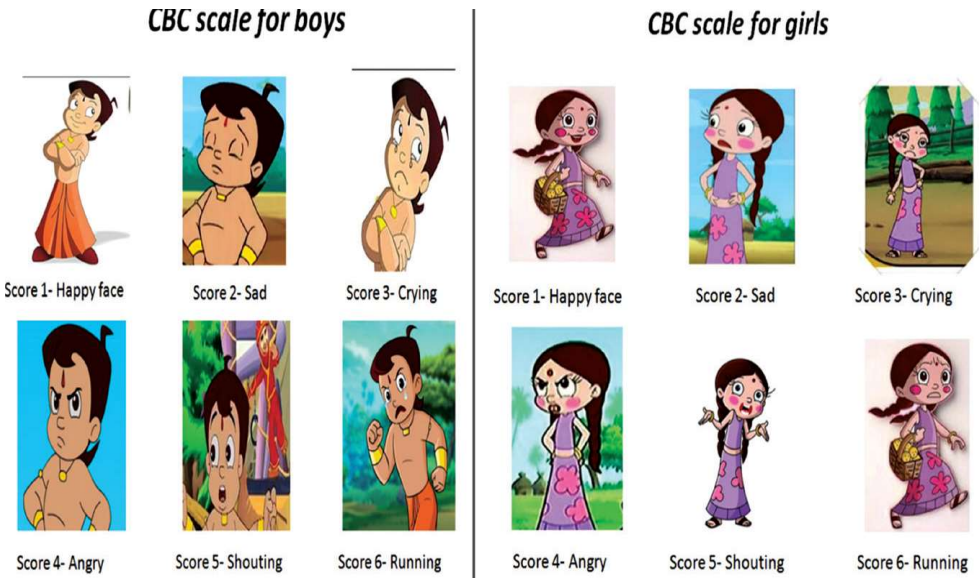

Figure 4. Showing Chota Bheem–Chutki Pictorial Scale (CBC-PS)

When a correlation was done using spearman's method between different scales before treatment, a strong correlation of 0.71 was found between FIS and RMS-PS scale, but a very strong correlation of 0.83 was found between FIS and CBC scale and statistically significant. Similarly, we found a strong correlation between RMS-PS and FIS scale (0.71) however statistically significant higher correlation was seen between RMS-PS and CBC (0.79) (Table /Figure 6). Spearman's correlation was done between different scales after treatment, a very strong correlation of 0.83 was found between FIS and RMS-PS scale, a very strong correlation of 0.90 was found between FIS and CBC scale and statistically significant. Similarly, we found a strong correlation of 0.83 between RMS-PS and FIS, however, a statistically significant higher correlation was seen between RMS-PS and CBC (0.89) (Table 2)

While comparing the mean anxiety scores between different scales before treatment and after treatment measured using the Wilcoxon Signed Rank Test showed FIS had a mean of 1.91 and standard deviation 1.82 before treatment and mean of 2.03 and standard deviation 2.57 after treatment. RMS-PS scale had a mean of 2.40 and a standard deviation of 0.77 before treatment and a mean of 2.46 and a standard deviation of 1.02 after treatment.CBC scale had a mean of 1.54 and a standard deviation of 0.63 before treatment and a mean of 1.70 and a standard deviation of 0.96 after treatment which is statistically significant (Table 3). Age-wise liking for particular anxiety measuring scale among 6-8 years old children is 91.3% towards CBC and 8.7% towards FIS. In 9-11-year-old 82.9% towards CBC and 17.1% towards RMS-PS. In children 12-15 years 84.2% towards the RMS-PSs cale and 15.8% showed liking towards the CBC scale (Table 4). Gender wise comparison of liking for particular anxiety measuring scale among children using Chi-square test showed about 74% of males and females had a liking towards CBC scale and 22% of liking towards RMS-PS scale, 4% towards FIS scale which is statistically significant (Table 5)

DISCUSSION

Dental anxiety in children is a very common problem developing mostly in childhood and adolescence and is often distressing to the child, parents, and dental practitioners.[11,12] Approximately half of the children report low to moderate dental anxiety, while 10%–20% report high levels.[13,14] During the visit to a dental clinic, the child faces unfamiliar people, representing potentially threatening and invasive situations for children. Those who are more vulnerable may find it difficult to cope with these new experiences and hence become anxious. Unsurprisingly, anxiety-related behaviors have been recognized as the most difficult part of child guidance in dental operatory therefore, it is necessary to identify and quantify anxiety.[15,16]Anxiety is usually the most likely response to dental stimuli and is most commonly seen in children during their first dental visit. Therefore, the dentists need to identify the severity of anxiety in children using an acceptable technique to measure it. An anxious child in a dental clinic poses a problem not only for the child himself but also for his family. In our study, a total of 100 children were selected and the age group was from 6-15 years among them 58% were males and 42% were females. Hence primary, middle, and high school children pre-adolescents and adolescents were included in the study regarding dental anxiety scales. However other studies reported that females generally demonstrate higher levels of DA than their male counterparts.[17]Similarly our study appears to have greater anxiety in anticipation of dental treatment. This could be attributed to the truth that females usually admit their fears readily than males and possess lower tolerance for pain. The results from this study showed that the mean anxiety score reduced with increasing age which is in agreement with the studies of McGrath and Bedi *et al*[18]Ng and Leung*et al*[19]. Appukuttan et al.[20] and Settineri et al.[21] Younger patients were more anxious compared to their elder counterparts. However, several other studies contradicted this trend occurring widely among younger patients. Locker and Liddell correlated this reduction in anxiety with age to age-dependent cerebral deterioration, extinction or habituation, increased ability to cope with experience and more exposure to systemic diseases and treatment.[22] Anxiety measurement was done by subjective means. The subjective measures used were the FIS, RMS-PS, and CBC scale. Spearman's correlation coefficients between different anxiety measuring scales before and after treatment were statistically significant in the CBC scale with a stronger correlation in our study. A previous unpleasant experience with the dentist or the dental procedure seems to play an important factor in instilling early seeds of anxiety within the patient's mind, with the fear of pain cited as the most important reason for fear in the patients with increased anxiety levels. The procedure of extraction has been cited as the most traumatic or anxiety-increasing procedure in this study which is similar to results got by Rodríguez Vázquez et al[23]which was well depicted by using the CBC scale both before and after treatment. This study pointed out that the CBC scale yielded comparable results to the RMS-PS and FIS. Its simplicity and familiar figures put into limelight its establishment as a benchmark to assess the level of dental anxiety faced by young children. A strong correlation of CBC with FIS and RMS-PS scales validates as CBC measured anxiety better which is likely because in FIS and RMS-PS figures on the cards are very similar to each other and are very confusing to children according to Kaur*et al* in his study.[24]

Showing comparison of mean anxiety scores between before and after treatment measured among different scales was only statistically significant in the CBC scale only in our study. Agarwal *et al* used CBC to measure dental anxiety in children and stated that there was no significant difference in the mean VPT anxiety scores between 8- and 10-year-old children with or without previous dental exposure.[4]This result was in contradiction to our study result, where a significant difference was found in the mean anxiety scores of CBC before, and after the procedures. Khatri *et al* assessed dental anxiety using CBC and visual analog scale (VAS) in children aged 3 to 4 years and concluded that CBC was more sensitive compared to VAS similar to our study.[25] Showing age-wise comparison of liking for particular anxiety measuring scale among subjects was statistically seen in the age group of 6-8 years who are interested in cartoon characters in our study. In FIS, young children often face difficulties interpreting the drawings of facial expressions, and hence, most of the subjects in our study preferred CBC over the other two scales used. In younger children with limited linguistic and cognitive abilities, CBC offers many advantages. It is very attractive, easy for children to relate with feelings, less time consuming, offers immediate scoring of dental anxiety, thus helping the dental team to use appropriate behavior management modalities for efficient and effective dental treatment. Unpleasant dental experiences occur more frequently in anxious and recalcitrant children as opposed to nonanxious pediatric patients. Dental anxiety is found in 5–20% of the population. It is exhibited more in children, with increasing age, this dental anxiety shows a downward trend. Chhabra *et al* in their study found the prevalence of dental anxiety in Indian children aged 5–10 years to be 6.3%.[26] Showing gender-wise comparison of liking for particular anxiety measuring scale among subjects. Girls take up the upper hand because they are into a more fantasies world with dolls and cartoons than boys. In contrast ina study by Grisolia *et al* no significant differences were seen between boys and girls.[27]

LIMITATIONS:

Cartoon characters used are not universally acceptable. Further studies involving older participants and the use of cartoon characters that are universally known and familiar with children are required for more favorable results. However, these scales cannot be used in especially a bled children.

CONCLUSION

This study pointed out that the CBC scale yielded comparable results to the RMS-PS and FIS. Its simplicity and familiar figures put into limelight its establishment as a benchmark to assess the level of dental anxiety faced by young children. The main advantages of the CBC scale are it is colorful and attractive, characters from ongoing famous

cartoon series, separate cards for boys and girls, take a very short time. Hence, the CBC scale can be used as a new alternative for dental anxiety assessment in young children. Further studies are required on a larger scale using CBC among the different populations to its validity.

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