

## Correlating General Anxiety, Dental Anxiety and Emotions using Tom & Jerry Emotional scale- An Exploratory Study

### Abstract:

**Background:** Measures to record anxiety should be simple to use. Therefore, picture tests are considered an appropriate choice.

**Aim-** To develop an emotion scale using pictures of famous cartoon characters 'Tom and Jerry' and correlate the association between general anxiety, dental anxiety and emotions of a child.

**Materials & Methods:** 126 Pediatric dental patients visiting the Department of Pediatric and Preventive Dentistry for the first time were selected for the study. For general anxiety parents of selected patients filled the PAS questionnaires. Before the initiation of the study, the Tom and Jerry scale was developed and assessed for reliability and validity. This validated scale was used for the assessment of emotions and dental anxiety measured using Venham's anxiety scale.

**Statistical Analysis:** Descriptive statistics were performed and the association between parameters was evaluated using the Chi-square test. (Significance level- P-value < 0.05).

**Results:** There was a significant association between the findings of the Tom and Jerry emotional scale with preschool anxiety scale ( $p=0.041^*$ ) and dental anxiety scale ( $p<0.001^*$ ) respectively.

**Conclusion:** The Tom and Jerry emotional scale can be used for the assessment of emotions among children and it also associates well with the general and dental anxiety.

**Key-words:** Anxiety, Pediatric Dentistry, Dental fear, Psychosocial factors, Practice management.

### Introduction:

Dental anxiety (DA) is a condition of apprehension that originates from the belief that something horrible would happen about dental care, which eventually ends in a sense of losing control. Low to moderate DA is experienced by nearly half of children visiting dental clinics and nearly 10% to 20% of children report high levels of dental anxiety.[1] DA can have severe implications for the child, dental team, and dental services.[2] Therefore, it becomes crucial to have an accurate assessment of dental anxiety among children, so that appropriate measures can be taken. To date, various methods of assessment of dental anxiety including physiological methods[3], and many different self-report measures[2], are available. Ideally, anxiety measurement tools should be relatively easy to use, and picture tests are considered as an excellent choice. Commonly used are Venham's pictorial test

(VPT) and facial index scale (FIS), however, these scales present with few drawbacks. Figures on the VPT scale are all male which might pose difficulties when a young patient is a girl, the ambiguous nature of some figures on the scale is confusing for the child to choose. Moreover, the figures used in these scales are unfamiliar to the children.[3]


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In this study, an effort has been made to develop a scale using pictures of famous cartoon characters 'Tom and Jerry'. The various pictures of Tom and Jerry used in this scale are relatable to the thoughts, feelings, behaviours, and physical symptoms of a child.

Hence, this study was an attempt in assessing the dental anxiety, general anxiety and emotions using the validated scales.

### Methodology:

#### Study design, study population, sample size, and sampling technique

This study was conducted among pediatric dental patients visiting the Department of Pediatric and Preventive Dentistry in Institute of Dental Sciences, Bareilly for the first time. The study included 126 children between 3- 5 years of age. The sample size was estimated using G\*power version 3.19.7 software to find an association between the dental anxiety scale and the Tom and Jerry scale, such as to achieve a power of 95% at a 5% level of significance assuming a large effect size at the degree of freedom of 12 (7 categories in Tom and Jerry scale and 3 Categories in Dental Anxiety Scale). The minimum required sample size was 104. Thus, 126 (more than the minimum required) samples were included in the study.

#### Inclusion criteria:

No previous dental experience & hospitalization, no learning disability, absence of any systemic disease and accompanied by either parent.

#### Exclusion criteria:

Children with any physical or mental disability, children having with any past dental experience and parents who do not give consent.

#### Data collection

#### Ethical considerations

The study was initiated after obtaining approval from the institutional ethics committee [Registration number-EC/NEW/INST/2021/2230].

#### Development of Tom and Jerry scale:

The Tom and Jerry scale was administered with the help of a card consisting of a series of seven figures depicting various emotions by the cartoon character Tom and Jerry. (Figure 1)



#### Validity:

To assess the face and content validity of the scale, a response sheet was prepared to elicit experts' responses. (4 Pedodontist and 4 General dentist) All the response sheets were checked for completeness and were found to be complete. The percentage agreement for each item was assessed [(number of agreed raters per picture/total number of raters response) x100].

#### Reliability:

The reliability of the questionnaire was assessed by test-retest method. The same scale was administered to 10 children on two occasions spaced at least ½ hours apart those 10 children were not included in the main study. A Cohen's Kappa coefficient value of  $\geq 0.81$  (measured Cohen's kappa coefficient = 0.882) indicated a strong correlation between the two readings indicating 64-81% of data were reliable.[4]

#### Assessment of General anxiety, Dental anxiety and Emotions.

General anxiety was done using a preschool anxiety scale (PAS) developed by Susan H. Spence and Ronald Rapee (1999).[5] This scale consisted of 5 subscales having a total of 28 items assessing a specific aspect of child anxiety. Question 29 is an open-ended, non-scored item relating to the child's experience of a traumatic event. On the basis of total scores, scale was further divided into mild (score 28-52), moderate (53-82) and severe (83-102). Each parent was attended by the investigator. The trained and calibrated investigator explained the items of the questionnaire to the parents and recorded their response.

Dental anxiety was assessed by Venham's anxiety scale. Based on this, children are given rating score from 0 to 5. In this parameter the children were again divided into three rating viz. cooperative (0-1), tense cooperative (2-3) and uncooperative (4-5)[6].

Emotions was assessed using Tom and Jerry Emotional scale by showing picture card and children were asked to select the cartoon face they identified with at that moment.

#### Statistical analysis:

Data were analyzed using the SPSS (Statistical Package for Social Sciences) 25.0 version. Descriptive statistics were performed. The association between categorical variables was assessed using the Chi-square test. P-value  $< 0.05$  was considered statistically significant.

## Results:

The study included 126 children with a mean age of  $4.74 \pm 1.011$  years. The male-to-female ratio was 1.4:1 (58.7% males vs. 41.3% females). The mean preschool anxiety score of the children was  $49.5 \pm 6.031$ . According to preschool anxiety scores, the majority of the children had mild anxiety (69.8%) and none (0.0%) had severe anxiety. According to the dental anxiety scale, the majority of the children were uncooperative (71.4%). On using the Tom and Jerry scale, it was found that overall, the majority of the children were experiencing negative emotions (69.8%), 19.0% expressed happy emotions and 11.1% expressed neutral emotions. Among those experiencing negative emotions, the majority expressed that they felt like crying (19.0%) followed by those feeling sad (15.9%). [Table 1]

On the further analysis, dental anxiety and preschool anxiety were not found to have a significant association [Chi-square value=2.087, df=2, p-value=0.352][Table 2]. The Tom and Jerry emotion scale were found to have a significant association with preschool anxiety ( $p=0.041^*$ ) and dental anxiety ( $p<0.001^*$ ). [Table 3]

Table 1. Distribution of study subjects based on pre-school anxiety score, Dental anxiety score, and Tom and Jerry scale.

Scale	Interpretation	Number of subjects (%)
Preschool anxiety scale	Mild (28-52)	88 (69.8%)
	Moderate (53-82)	38 (30.2%)
	Severe (83-112)	0 (0.0%)
Dental anxiety scale	Cooperative (0-1)	12 (9.5%)
	Tense cooperative (2-3)	24 (19.0%)
	Uncooperative (4-5)	90 (71.4%)
Tom and Jerry scale	Happy	24 (19.0%)
	Neutral	14 (11.1%)
	Sad	20 (15.9%)
	Angry	14 (11.1%)
	Crying	24 (19.0%)
	Shouting	18 (14.3%)
	Running	12 (9.5%)

Table 2. Association between preschool anxiety and dental anxiety.

Dental Anxiety	Preschool anxiety			Total	Chi-square value	df	p-value
	Mild	Moderate	Severe				
Cooperative	8 (9.1%)	4 (10.5%)	0 (0.0%)	12 (9.5%)	2.087	2	352
Tense-cooperative	14 (15.9%)	10 (26.3%)	0 (0.0%)	24 (19.0%)			
Uncooperative	66 (75.0%)	24 (63.2%)	0 (0.0%)	90 (71.4%)			
Total	88 (100.0%)	38 (100.0%)	0 (0.0%)	126 (100.0%)	Chi-square test		

Table 3. Association between Emotions, Preschool anxiety scale and Dental anxiety.

EMOTIONS	PRE SCHOOL ANXIETY*			DENTAL ANXIETY**			TOTAL
	Mild	Moderate	Severe	Cooperative	Tense-cooperative	Un-cooperative	
Happy	16 (66.7%)	8 (33.3%)	0 (0.0%)	12 (50.0%)	8 (33.3%)	4 (16.7%)	24 (100.0%)
Neutral	6 (42.9%)	8 (57.1%)	0 (0.0%)	0 (0.0%)	14 (100.0%)	0 (0.0%)	14 (100.0%)
Sad	12 (60.0%)	8 (40.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	20 (100.0%)	20 (100.0%)
Angry	12 (85.7%)	2 (14.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	14 (100.0%)	14 (100.0%)
Crying	22 (91.7)	2 (8.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	24 (100.0%)	24 (100.0%)
Shouting	12 (66.7%)	6 (33.3%)	0 (0.0%)	0 (0.0%)	2 (8.3%)	16 (17.8%)	18 (100.0%)
Running	8 (66.7%)	4 (33.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	12 (100.0%)	12 (100.0%)
Total	88 (69.8%)	38 (30.2%)	0 (0.0%)	12 (9.5%)	24 (19.0%)	90 (73.0%)	126 (100.0%)

## Discussion:

Dental anxiety (also referred to as Dental Fear and Anxiety) is a great challenge in pediatric dentistry. DA is a common reason to avoid dental treatment, ultimately resulting in deteriorated oral health.[7] An anxious child in a dental clinic poses a problem not only for the child himself but also for his family. In addition, outcomes associated with poor oral health may be grave.

H. Buchanan et al, developed a new scale for dental anxiety called the facial image scale, which was based on Venham's picture test.[8] Shetty et al. created and validated the RMS-PS for dental anxiety by comparing it to VPT and FIS scores.[9] Gunmeen Sadana et al. validated the Chota Bheem Emotion Scale by comparing it to VPT and FIS.[3] According to Jyothsna V Shetty et al., employed a newly designed scale, the animated emoji scale (AES), which uses motion emoticons to assess dental anxiety in children during their first dental appointment, and compared it to the Venham picture test (VPT) and facial image scale (FIS).[10]

Anxiety is an extremely prevalent secondary emotion. So, the first step is to determine the true cause of the fear situation through emotion, which allows the dentist to understand the patient's underlying feelings.

As in earlier studies, many scales have been developed for the assessment of anxiety[8,9,10] and the emotions[3], this study was an attempt to develop tom and jerry scale for assessing emotions and correlating the dental anxiety, general anxiety and emotions.

Research done at Michigan University revealed that cartoons help children absorb information better than any other means.[11] In this study cartoon character was used and it was believed that the child would be able to connect to the cartoon character and would freely and easily express his/her feelings. Among various cartoon characters displayed on Television, Tom and Jerry was the preferred choice because Tom and Jerry among the most popular characters, awarded-winning cartoon short films and has been telecasted on TV since 1940s. It has a broad fan base and is liked by children of all age groups.

For the assessment of general anxiety Preschool anxiety scale given by Susan H. Spence and Ronald Rapee (1999) was employed.[5] This scale has a 28-point test, which was filled by the parent depicting the fears and anxiety of the child. The decision to include PAS for the assessment of general anxiety was based on the fact that the reliability and validity of this test are well documented. PAS helps us to know the real anxiety status from parents who answer the questions based on their observation of the child since birth and secondly also helps us correlate different types of anxiety with dental anxiety.[6]

Anant Gopal Nigam et al[6] conducted a study to investigate the links between dental anxiety and general anxiety, and they discovered that there was no statistically significant correlation between the two. In present study there is also no significant correlation seen between general and dental anxiety. ( $p=0.352$ ) according to PAS we found that, the majority of the children had mild anxiety (69.8%), and 71.4% children showed uncooperativeness in terms of dental anxiety. The New Tom and Jerry scale revealed that the participants expressed their emotions very well. [Table 1]

Based on Tom & Jerry emotion scale result of the study revealed that negative emotions such as 60.0%(sad), 85.7%(angry), 91.7%(crying). 66.7%(shouting) 66.7%(running) children have mild anxiety while 40%(sad), 14.3%(angry) 8.3%(crying), 33.3%(shouting), 33.3%(running) participants showed moderate anxiety. [Table-1]

In this study, the Tom and Jerry scale was found to have a significant association with dental anxiety ( $p$ -value  $<0.05$ ), happy children showed cooperative behaviour (50%), neutral children were tense-cooperative(100.0%), and children with negative emotions were uncooperative.

Among 126 children 24 showed happy emotion in which 12 were cooperative, 8 were tense cooperative and 4 were

uncooperative and 14 children with neutral emotion were tense cooperative. However remaining 86 uncooperative children showed sad, angry, crying, shouting and running emotions but 2 children were tense cooperative with shouting emotion. [Table-3]

Hence, it is important to understand the emotions of children and work on them to make their behaviour positive and cooperative in this study we found that Tom and Jerry scale is an effective way to understand the emotions of the children visiting the dental clinic.

### Conclusion;

The Tom and Jerry scale is a reliable tool for the assessment of the emotional status of children visiting the dentist and is significantly associated with the general anxiety and dental anxiety of the children.

### Limitations :

1. Small sample size

### Recommendation:

1. More such studies with large samples and different age group.

### References:

1. Anthonappa RP, Ashley PF, Bonetti DL, Lombardo G, Riley P. 2017. Non-pharmacological interventions for managing dental anxiety in children. The Cochrane Database of Systematic Reviews. Jun;2017(6) CD012676. doi:10.1002/14651858.CD012676
2. Porritt J, Buchanan H, Hall M, Gilchrist F, Marshman Z. Assessing children's dental anxiety: a systematic review of current measures. Community Dent Oral Epidemiol. 2013;41(2):130-142. doi:10.1111/j.1600-0528.2012.00740.x
3. Sadana G, Grover R, Mehra M, Gupta S, Kaur J, Sadana S. A novel Chotta Bheem-Chutki scale for dental anxiety determination in children. J Int Soc Prev Community Dent. 2016;6(3):200-205. doi:10.4103/2231-0762.183108
4. McHugh ML. Interrater reliability: the kappa statistic. *Biochem Med (Zagreb)*. 2012;22(3):276-282. <https://ncbi.nlm.nih.gov/pmc/articles/PMC3900052/>
5. Spence SH, Rapee R, McDonald C, Ingram M. The structure of anxiety symptoms among preschoolers. *Behav Res Ther* 2001;39:1293-1316. doi:10.1016/s0005-7967(00)00098-x
6. Nigam AG, Marwah N, Goenka P, Chaudhry A.



- Correlation of general anxiety and dental anxiety in children aged 3 to 5 years: A clinical survey. *J Int Oral Health*. 2013;5(6):18-24.<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3895713/>
7. Dahlander A, Soares F, Grindeffjord M, Dahllöf G. Factors Associated with Dental Fear and Anxiety in Children Aged 7 to 9 Years. *Dent J (Basel)*. 2019;7(3):68. doi:10.3390/dj7030068
  8. Buchanan H, Niven N. Validation of a Facial Image Scale to assess child dental anxiety. *Int J Paediatr Dent*. 2002 Jan;12(1):47-52. PMID: 11853248.
  9. Shetty RM, Khandelwal M, Rath S. RMS Pictorial Scale (RMS-PS): An innovative scale for the assessment of child's dental anxiety. *Journal of Indian Society of Pedodontics and Preventive Dentistry*. 2015 Jan 1;33(1):48-52. Doi;10.4103/0970-4388.149006
  10. Setty JV, Srinivasan I, Radhakrishna S, Melwani AM, Dr MK. Use of an animated emoji scale as a novel tool for anxiety assessment in children. *J Dent Anesth Pain Med*. 2019 Aug;19(4):227-233. doi: 10.17245/jdapm.2019.19.4.227. Epub 2019 Aug 30. PMID: 31501781; PMCID: PMC6726885.
  11. Habib K, Soliman T. Cartoons' effect in changing children mental response and behavior. *Open Journal of Social Sciences*. 2015;3(09):248. doi:[10.4236/jss.2015.39033](https://doi.org/10.4236/jss.2015.39033)