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## Comparative evaluation of effectiveness of mobile app and dental videos in management of dental anxiety in paediatric patients

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### Abstract

**Background:** Dental fear and anxiety are one of the major challenges in pediatric dentistry. Dental fear and Anxiety are a common reason for avoiding dental treatment which over time, may result in deteriorated oral health.

**Aim:** To evaluate the effectiveness of a mobile app (Little lovely Dentist) compared to dental videos in the management of dental anxiety in pediatric patients during their first dental visit.

**Materials and Methodology:** A total of 45 children of age 4-8 age who were in the need of class I GIC restoration were assigned into 3 groups: Group 1: Dental application; Group 2: Dental video; and Group 3: Tell- show- do and each group comprised of 15 children each. Anxiety of the children were assessed before and after the procedure. Two physiological parameters (Pulse rate and oxygen saturation level) and two behavioral parameters (Facial Image Scale and Chotta Bheem Chutki scale) were recorded.

**Result:** The result showed lower mean pulse rate, significant reduction in oxygen saturation, Facial Image scale and Chotta Bheem Chutki scale post intervention in all 3 groups with high statistical significance in Dental video and Dental application group

**Conclusion:** Dental application and Dental Video are effective alternate to Tell Show Do technique in reducing dental anxiety in young children.

**Keywords:** Dental anxiety, paediatric patients, dental videos

### Introduction

Dental anxiety is defined as "an abnormal fear or dreadful feeling of going to the dentist for preventive care or therapy and unjustified anxiety over dental procedures."

The child's attitude toward dentistry must be established, from the initial dental visit to be successful [1].

A stressful circumstance like a dental appointment causes kids to become more avoidant and anxious. Dental anxiety plays a major role for those who provide, dental care because it may stop kids from seeking treatment and make it difficult for them to cooperate during treatment. The noises of drilling, cleaning, the aroma of various cements, freshly cut dentine and various other dental procedures increase their anxiety.

Hence, it is challenging to perform necessary dental treatment for an anxious child as their behaviour in during procedure is hindered. Improving the behavior of the child would improve productivity and make the experience of the youngster receiving treatment more enjoyable. In order to implement a precocious during behavioral therapy, it's critical to identify children's anxiety before initiating the procedure. Several approaches are available for assessing anxiety like self-report assessment, parental proxy assessment, observation-based assessment, and physiological assessment [2].

In this current study self-report assessment tools like the Chotta Bheem Chutki scale, Facial image scale, and physiological assessment tools like oxygen saturation and pulse rate is used. [3, 4].

The management of anxious children and uncooperative behavior has resulted in the development of more sophisticated, linguistic, and pharmacological treatments.

The Tell-Show-Do and Modelling are one such behaviour management techniques commonly used by pediatric dentist in routine dental practice.

Tell Show Do is according to learning theory, suggests that a child must have a good education.

Modeling is an observation-based learning through live and filming of models. The behavior of the child in these days is based on characters and emotions they come across the social networks. Mobile phones and other electronic devices have paved the way for this. Several videos of children undergoing dental treatment with positive attitudes are readily available on social media.

Today, kids of all ages spend numerous hours on the phone viewing videos, playing games, or even internet surfing. Various apps are available for cellular phones today that may be used to teach kids about the steps involved in receiving dental care, which can help reduce their anxiety. To reduce fear and anxiety during treatment, dental videos available on social media demonstrate primary tooth extraction and restoration.

Various studies have proved dental application usage is effective in reducing anxiety when compared to tell show do. Very few pieces of literature are available to show the effectiveness of dental demonstration video in reducing anxiety when compared with standard Tell Show Do.

This current study aims to evaluate the effectiveness of a mobile application compared to dental videos in the management of dental anxiety in pediatric patients.

## Materials and Methods

After obtaining ethical clearance from the institutional review board and written consent from parents was obtained. 45 children aged between 4 years to 8 years were enrolled in the study based on inclusion and exclusion criteria.

### Inclusion criteria

1. First dental visit.
2. Children with Frankl behavior rating positive and negative.
4. Children requiring Class 1 Glass-Ionomer restoration.

### Exclusion criteria

1. Children who are mentally challenged and medically compromised.
2. Children falling under ASA 3, 4 and 5.

### Randomization and Blinding

Clearance for the trial was approved by the Institutional Human Ethical Committee (EC/NEW/INST/2020/1397 Ref: 247/IRB-IBSEC/SIST) Sathyabama Dental College and Hospital. The study was conducted between March and May 2023 in the Department of Pediatric and Preventive Dentistry. 45 children were randomly selected and allocated into 3 groups using a random sampling method with 15 children in each group. The children and the dentist performing the restoration were not aware of the type of educational intervention they were going to receive.

### Study Group

**Group I:** Children who were receiving restoration by using a mobile dental application called "LITTLE LOVELY DENTIST" developed by Leaf Cottage software and Shanghai Edaysoft Co. Ltd. available on the Google Play Store and App Store, respectively on smartphones.

**Group II:** Children who were receiving restoration by showing a dental video depicting class I GIC restoration in a pediatric patient.

**Group III:** Children who were receiving restoration by the Tell-Show-Do technique.

Before treatment irrespective of the group and pulse rate, oxygen saturation level, Chotta Bheem Chutki scale and facial image scale rating were noted

In group I, after recording the anxiety levels, the child is made to play with the mobile application 'LITTLE LOVELY DENTIST' where they were educated about basic dental procedures like prophylactic cleaning, restorations, and extractions. The child was encouraged to act as a dentist and perform the dental treatment virtually. The duration of this was standardized to 15 minutes.

In group II, after measuring the anxiety levels, the child is made to watch a dental video depicting the basic class I GIC restoration performed on a 6-year-old cooperative child for 5 minutes from YouTube.

In group III, after measuring the anxiety levels, the child was made to receive information about the basic class I GIC restoration procedure Tell Show Do technique.

After conditioning the children in every group, the child received treatment by the same trained dentist. After receiving the treatment, pulse rate, oxygen saturation level and anxiety levels were again measured and recorded.

### Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) 23.0 software package (Chicago, IL, USA) is used for data analysis. The descriptive statistics will be reported in the form of mean and standard deviation. The normality of the data will be evaluated using Kolmogorov-Smirnov Test. Depending on the distribution of data, the ANOVA test or Kruskal Wallis test will be employed will be employed to compare the continuous data between groups. Similarly, Paired t-test/ Wilcoxon test will be employed for within-group comparison. A *P* value of  $\leq 0.05$  will be considered statistically significant

### Results

At baseline, none of the four variables showed a statistically significant difference between the groups.

After the intervention, the pulse rate was almost similar (102) in the Dental application and Dental Video groups. The pulse rate was relatively less in the Tell-Show-Do group (99.20). However, the difference in pulse rate among all three groups was statistically non-significant ( $p=0.56$ ). Similarly, the oxygen saturation also showed a statistically nonsignificant ( $p=0.4$ ) difference in comparison between the groups. Oxygen saturation among all three groups was relatively the same with approx. score of 97. Both the Chotta Bheem scale and the Facial Image scale showed statistically significant differences ( $p=0.001^*$ ) in the mean scores among the three groups. Using the Chotta Bheem scale, the greatest anxiety scores were recorded in the Tell-Show-Do group (2.67) followed by the dental video group (1.6). Likewise, the Facial image scale also showed the greatest anxiety scores among the Tell-Show-Do group (5.4) followed by the dental video group (2.07).

**Table 1:** Pre-intervention and post-intervention Comparison of Pulse rate, O2 saturation CBC scale, and FIS scale

| Group comparison |                    | Pre-Intervention |      |         | Post Intervention |       |         |
|------------------|--------------------|------------------|------|---------|-------------------|-------|---------|
|                  |                    | Mean             | SD   | P value | Mean              | SD    | P value |
| Pulse rate       | Dental application | 106.0            | 7.04 | 0.055   | 102.40            | 10.21 | 0.56    |
|                  | Dental Video       | 102.86           | 5.39 |         | 102.07            | 5.40  |         |
|                  | Tell-Show-Do       | 98.83            | 8.17 |         | 99.20             | 6.76  |         |
| O2 saturation    | Dental application | 97.73            | 3.93 | 0.4     | 98.47             | 3.42  | 0.989   |
|                  | Dental Video       | 97.27            | 3.61 |         | 99.87             | 3.35  |         |
|                  | Tell-Show-Do       | 97.87            | 2.66 |         | 98.80             | 2.11  |         |
| Chotta Bheem     | Dental application | 3.47             | 1.3  | 0.989   | 1.27              | 0.45  | 0.001*  |
|                  | Dental Video       | 3.47             | 1.3  |         | 1.60              | 0.82  |         |
|                  | Tell-Show-Do       | 3.53             | 1.8  |         | 2.67              | 0.81  |         |
| Facial Image     | Dental application | 5.73             | 2.84 | 0.978   | 0.40              | 0.82  | 0.001*  |
|                  | Dental Video       | 5.53             | 2.20 |         | 2.07              | 1.62  |         |
|                  | Tell-Show-Do       | 5.73             | 2.98 |         | 5.40              | 1.59  |         |

Kruskal Wallis test, \*Statistical significance at  $p \leq 0.05$

**Within Group Comparison**

Among the within-group (before vs after) comparisons in the dental application group, only the anxiety scores measured using the Chotta Bheem Chuki scale and facial Image scale revealed a statistically significant difference ( $p=0.001^*$ ). Both scales showed a reduction in anxiety scores after introduction to dental application. The pulse rate and Oxygen saturation didn't show any statistically significant difference after the intervention of dental application.

All the variables except the Pulse rate showed statistically significant differences during within-group comparison in the Dental Video group. The pulse rate was relatively the same before and after the intervention. The oxygen saturation reduced from 99.87 to 97.27 after the intervention. Both the

dental anxiety scales (Chotta Bheem Chutki and Facial Image) showed a reduction in the anxiety scores after introduction to dental Video.

Only Oxygen saturation and dental anxiety scores measured using the Chotta Bheem scale showed statistically significant differences in the Tell-show-Do group. The oxygen saturation was reduced from 99.8 to 97.87 after the intervention. The dental anxiety score measured using the Chotta Bheem Chutki scale reduced from 3.53 to 2.67 after the intervention of Tell-show-Do. Similarly, the dental anxiety score measured using the facial image scale marginally reduced from 5.73 to 5.4 after the intervention of Tell-show-Do and this difference was statistically non-significant ( $p=0.63$ ).

**Table 2:** Within group comparison between dental application, Dental Video, Tell Show Do

| Within Group comparison |        | Dental application |      |         | Dental Video |      |         | Tell-Show-Do |      |         |
|-------------------------|--------|--------------------|------|---------|--------------|------|---------|--------------|------|---------|
|                         |        | Mean               | SD   | P value | Mean         | SD   | P value | Mean         | SD   | P value |
| Pulse rate              | Before | 106.0              | 7.04 | .083    | 102.86       | 5.39 | .124    | 98.83        | 8.17 | .931    |
|                         | After  | 102.40             | 10.2 |         | 102.07       | 5.4  |         | 99.20        | 6.76 |         |
| O2 saturation           | Before | 98.47              | 3.42 | 0.404   | 99.87        | 3.3  | 0.001*  | 98.80        | 2.1  | 0.07*   |
|                         | After  | 97.73              | 3.93 |         | 97.27        | 3.61 |         | 97.87        | 2.6  |         |
| Chotta Bheem            | Before | 3.47               | 1.30 | 0.001*  | 3.47         | 1.30 | 0.001*  | 3.53         | 1.80 | 0.06*   |
|                         | After  | 1.27               | 0.45 |         | 1.60         | .82  |         | 2.67         | .81  |         |
| Facial Image Scale      | Before | 5.73               | 2.84 | 0.001*  | 5.53         | 2.20 | 0.001*  | 5.73         | 2.98 | 0.63    |
|                         | After  | 0.40               | 0.82 |         | 2.07         | 1.62 |         | 5.40         | 1.59 |         |

Wilcoxon test, \*Statistical significance at  $p \leq 0.05$

**Discussion**

Pediatric patients presenting to the dental operatory first time for their dental treatment exhibit varying degrees of anxiety. The new environment is the main cause of this anxiety along with experiences shared by their caregivers and peer group which can have a negative attitude towards dental procedures. The cornerstone of success in pediatric dentistry is behaviour management. Techniques for behavior modification are used by dental practitioners to establish communication, reduce anxiety and stress in children, and delivery of excellent dental care, gain a relationship and trust between the kid, parent, and dentist, and instill positive attitude towards dental treatment thereby assisting them in coping and willingness to accept dental treatment procedures.

According to the study conducted by Meena *et al.*, Research has shown that 99.7% of children were exposed to screen-based media by 18 a month old [5]. This makes developing mobile applications simple to reach children through parents from their inexperience. There are many useful videos for health education in modern parental philosophies. The new term mobile health has been proposed by WHO, which is a

part of digital healthcare and is described as "medical and public health practices strengthened by mobile devices, such as mobile phones, patient monitoring devices and personal digital assistants [6, 7]. Many applications are designed for dental education and dental healthcare providers are coming up with various methods to provide dental services and education using mobile applications and online sharing websites like YouTube, Instagram etc.

Children today focus mostly on their mobile devices; hence these websites and applications can be used to reduce anxiety towards dental treatment which improves their behaviour at the child's first dental visit.

Age is a critical factor regarding compliance with dental procedures along with dental anxiousness felt. According to Piaget's categorization, kids aged 4-7 years are in the preoperational phase. The development in vocabulary, attention, and attentional skills in this period is a sign of their readiness for social communication which is a comprehensive approach [8]. Eventually, a thorough strategy is constructed which builds trust through alleviating fear and anxiety.

According to study conducted by to Raseena *et al.*,

physiological parameters that is heart rate, and oxygen saturation acted as a reliable indicator of anxiety [9]. According to the current study heart rate decreased post-treatment in all three groups but the values were not statistically significant. Oxygen saturation increased post-intervention in all three groups and the values were statistically significant in the dental video and dental application group. This could be because the patient was actively involved with the usage of mobile phones before the treatment procedure which helped in their anxiety reduction.

The FIS is valid, rapid, reliable, repeatable, and easy to use to evaluate the anxiety level of young children, and the Chota Bheem Chutki scale was used since it is verified, uncomplicated, and suitable for India children because they are familiar with the cartoon characters which are used on this scale. Hence can easily relate to the scale character emotions [10, 11]. In the current study, the mean FIS and CBCS values were reduced in all three groups and were statistically significant. On comparing the values of pre- and post-op, the dental video and dental app group showed high statistical significance compared with TSD. Though in Tell Show Do, children were explained well about the procedure, they were not actively involved when explaining. While playing dental games, their awareness of the sounds from the dental equipment trains them before the actual treatment. This aids in lowering their anxiousness [12, 13, 14, 15].

Modeling plays a crucial role in younger children, where they frequently behave and act like their older siblings or the on-screen characters. Watching a live model happily cooperating for the dental treatment, reduces their fear and anxiety which instills a positive attitude towards the dental treatment in dental video.

The results of this study show that TSD, Dental application, and dental video pave the way in reducing anxiety. However, the high statistical result is seen in dental application and dental video group compared to TSD which could be due to less sample size. Hence, they can be used as an effective alternative to TSD. That is going along with the recent trends.

#### Conflict of Interest

Not available.

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Not available.

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