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Effectiveness of mobile dental app versus tell-play-do in management of child behaviour before and after dental treatment

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Abstract
Background: Dental anxiety is an abnormal feeling or a dreadful feeling that keeps the child away from visiting a dentist. Dental anxiety can lead to dental neglect in children compromising their oral health and impacting their quality of life.
Aim: The aim of the study was to assess the effectiveness of dental app versus tell-play-do in management of child behaviour before and after dental treatment.
Materials and methods: Sixty children in the age group of 4-12 years were divided into two groups. Group I achieved intervention through the use of mobile dental app "Little Lovely Dentist" available on Google play store on the android platform of smart phones whereas Group II was explained about the procedure through tell-play-do. Heart rate was recorded with the use of pulse oximeter and the anxiety levels were estimated using Facial Image Scale before, during and after oral prophylaxis and OHI-S. The subjects were called for follow up after 7, 14 and 21 days to evaluate if the intervention procedure was able to positively influence the child's aptitude. Statistical analysis was done using independent t test.
Results: The average heart rate, facial image scale and OHI-S scores reduced after interventions.
Conclusion: Tell play do and mobile dental app are effective in reducing dental fear and anxiety amongst children. Mobile dental app can be used as an adjunct with tell play do to instill a positive attitude towards future dental appointments.

Keywords: Mobile dental app, child behavior, dental treatment

Introduction

A child's first visit to a dental clinic is a pivotal moment that moulds the child for either acceptance or rejection of dental treatment. Dental anxiety amongst kids is a cause of concern for it may lead to dental neglect even in adulthood. Treating a child, however, usually relies on a one-to-two relationship among the dentist, the patient, and parents or caregivers [1].

According to American Academy of Pediatric Dentistry non pharmacological and pharmacological approaches can be used by a pediatric dentist for managing a child's behaviour. Basic behavior guidance includes communication guidance, positive pre-visit imagery, modelling, tell-show-do, ask-tell-ask, voice control, non-verbal communication, positive reinforcement and descriptive praise, distraction, and desensitization [2]. Most commonly used behavior management techniques by pediatric dentists are tell-show-do (TSD) and modelling [3, 4, 5]. In modelling children were prepared for dental treatment by observing either a live model, which can be a cooperative child or a film modelling. Children may reproduce behaviour shown by the model. However, just by modeling and tell-show-do we may not provide a more explanatory concept and make them ready for dental treatment. Therefore, tell-show-do has been modified into tell-play-do where the child is allowed to play with the customized dental imitating toys and verbal explanations.

In today's technologically driven world, mobile phones have become the unnamed companions of human lives. It is seen that these days children of all age groups readily use mobile phones to play countless games or talking to their friends and browsing internet. Nowadays we have many dental apps to educate the children about dental procedures with the joy of gaming which can help them to alleviate dental fear and anxiety. We can really educate them about dental procedures, carious process and a lot of other things pertaining to dentistry. Among various dental education apps "Little Lovely Dentist" is an application developed by Leaf cottage software and Shanghai Edaysoft Co., Ltd. available on the Google Play Store and App Store, respectively. It can be used for playfully educating children about treatment procedures such as prophylactic cleanings, pit and fissure sealants, restorations, and extractions, while also explaining the importance of oral hygiene maintenance through brushing, especially the interdental areas.

It was found that a very small number of studies have been done on the management of pediatric patients using various dental apps and tell-play-do technique.

The aim of this study was to assess the effectiveness of a dental app [Little lovely dentist] versus tell-play-do in management of child behaviour before and after dental treatment.

Materials and methods

After obtaining the ethical clearance from the institutional review board and written consent from parents, 60 children aged between 4 -12 years were selected for the study.

Inclusion criteria

Children in the age group of 4- 12 years with the first dental visit were included the study.
Mentally and physically healthy children.

Exclusion criteria

Children with previous dental experience

Children with any underlying physical or learning disability were excluded from the study.

Children undergoing any medical treatment that might affect heart rate.

Study design

Group I achieved intervention through the use of mobile dental app "Little Lovely Dentist" available on Google play store on the android platform of smart phones whereas Group II was explained about the procedure through tell-play-do using customized dental objects.

"Little Lovely Dentist" is an application developed by Leaf cottage software and Shanghai Edaysoft Co., Ltd. available on the Google Play Store and App Store, respectively. It can be used for playfully educating children about treatment procedures such as prophylactic cleanings, pit and fissure sealants, restorations, and extractions, while also explaining the importance of oral hygiene maintenance through brushing, especially the interdental areas.

For the tell-play-do technique, the 'tell' phase involves a verbal explanation of the procedure appropriate to the developmental level of the child. In the 'play' phase, they become familiar and play with customized dental objects. Finally, in the 'do' phase, the dentist begins the treatment without deviating from the explanation.

Heart rate of the selected children for each group was recorded with the use of pulse oximeter and the anxiety levels were estimated using Facial Image Scale. The children were explained about the procedure of recording simplified oral hygiene index and oral prophylaxis through two different methods of intervention. During the procedure heart rate was measured using pulse oximeter to check the anxiety levels of the child. Evaluation of post treatment anxiety levels was done by recording the heart rate and facial image scale. The subjects were called for follow up after 7, 14 and 21 days to evaluate if the intervention procedure was able to positively influence the child's aptitude for maintainence of oral hygiene and if the children were encouraged to receive further dental treatments.

Results

A total of 33 males and 27 females of average of mean age 8.7 years were randomly recruited and allocated into two groups. Effect of intervention on anxiety was assessed using heart rate before, during and after intervention; using facial image scale before and after intervention and also at interval of 7,14 and 21 days. Independent t test was performed and p value was set to be significant at ≤0.05. The intragroup comparison demonstrated a significant reduction in heart rate for the children recruited to the dental app group and tell play do group. Although there was no significant difference in heart rate measurements between the two groups during the procedure (P value = 0.32) and after the procedure (P value = 0.07) (Table 1 and Graph 1). The comparison of intragroup subjective anxiety using the facial image scores demonstrated a significant reduction in anxiety for all the children in both groups However, there was no significant difference in the intergroup comparison (Table 2 and Graph 2). Intragroup comparison showed reduction in simplified oral hygiene index score was better in tell play do group on 7 and 14 day follow up than mobile dental app group but the intergroup comparison was statistically non significant with p values of 0.07,0.5 and 0.28 at 7,14 and 21 day follow up.(Table 3 and Graph 3)

Table 1: Effect of interventions on heart rate

HEART RATE	INTERVENTION		T	P- VALUE
	MOBILE APP	TELL PLAY DO		
BEFORE INTERVENTION	100.57 ± 8.728	105.47 ± 8.82	- 2.1625	0.017*
DURING INTERVENTION	94.4 ± 8.041	95.57 ± 11.81	-0.4472	0.3282
AFTER INTERVENTION	93.87 ± 9.343	97 ± 10.35	- 1.4533	0.0757

INDEPENDENT T-TEST, p- VALUE ≤0.05 – SIGNIFICANT.

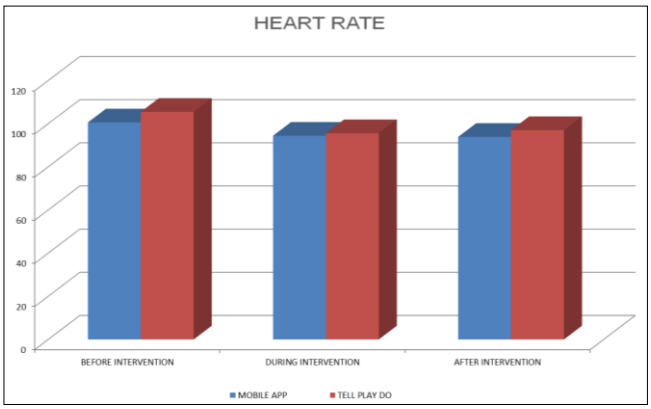

Fig 1

Table 2: effect of interventions on facial image scale

FACIAL IMAGE SCALE	INTERVENTION		T	P- VALUE
	MOBILE APP	TELL PLAY DO		
BEFORE INTERVENTION	3 ± 0.87	3 ± 1.39	0	0.5
AFTER INTERVENTION	1.63 ± .76	1.6 ± 0.72	0.173	0.43
AFTER 7 DAYS	1.93± 0.45	2 ± 0.52	-0.528	0.29
AFTER 14 DAYS	1.73 ± 0.52	1.83± 0.53	-0.736	0.23
AFTER 21 DAYS	1.5 ± 0.51	1.53± 0.51	-0.254	0.4

INDEPENDENT T-TEST, p- VALUE ≤0.05 – SIGNIFICANT.

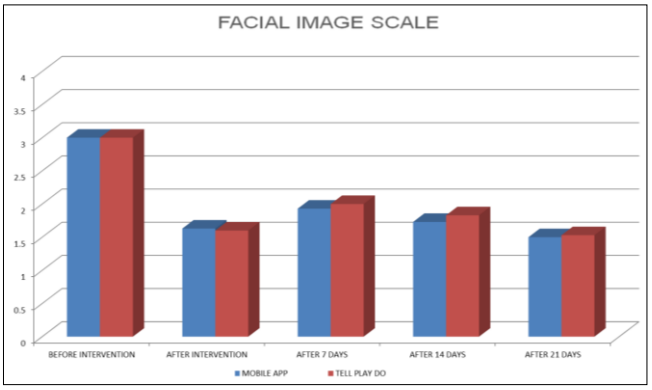

Fig 2

Table 3: Effect of interventions on OHI

OHI	INTERVENTION		T	P- VALUE
	MOBILE APP	TELL PLAY DO		
DURING INTERVENTION	1.37 ± 0.49	1.33 ± 0.66	.2218	0.412
AFTER 7 DAYS	1.33 ± 0.48	1.17 ± 0.38	1.493	0.07
AFTER 14 DAYS	1.1 ± 0.31	1.1 ± 0.31	0	0.5
AFTER 21 DAYS	1.03 ± 0.18	1.07 ± 0.25	-0.5841	0.28

INDEPENDENT T-TEST, p- VALUE ≤0.05 – SIGNIFICANT.

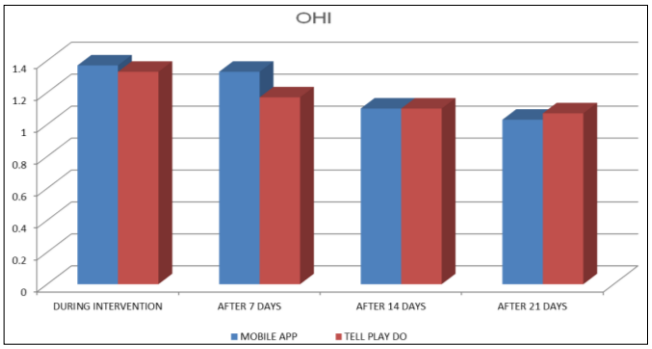

Fig 3

Discussion

Behavior management techniques are aimed at enhancing a child's cooperation, establish proper communication, decrease fear and anxiety, render successful and good quality dental care, build a trusting relationship between the dentist, child, and parent, and promote the child's positive dental attitude.

TSD is the most common technique for the effective management of children's anxiety at their pretreatment visit. It familiarizes them with new procedures, thus reducing their anticipatory anxiety. Vishwakarma *et al*. in 2017 [4] have compared two different behavioral modification techniques; TPD and live modeling among 5- to 7-year-old children and reported that the TPD technique is more efficient than the live modeling technique to reduce children's fear and achieve more cooperative behavior during treatment. They found that mean HR at different intervals was significantly lower among children in the TPD group than among those in the live modeling group during the first visit (after the intervention and during the procedure) and also in the second visit (during the procedure). Hence, the TPD technique may be an alternate method to TSD and live modeling technique [4]. Tell-play-do technique was more successful than the Tellshow-do technique in reducing the children's anxiety. Most of the children in the tell-play-do group were relaxed and comfortable compared to those in the tell-show-do group as stated by Ibrahim *et al.* in 2023 [7]. According to Safar M *et al.* tell-play-do (TPD) technique is more efficient in managing the anxiety of a child with negative behavioral pattern according to Frankl than direct observation (DO) technique and tell-show-do (TSD) technique [8].

Patil *et al*. in 2017 [9] have conducted a study on 60 children who were made to use a mobile dental app called "My Little Dentist" which is developed by Tenlogix Games available on the Google Play Store on smartphones. Their anxiety levels were noted before and after playing the game using the face imaging scale. The results were found to be highly significant; 86.67% of patients turned from a negative to positive behavior, 11.67% from positive to definitely positive, and 1.67% from definitely negative to negative according to Frankl's behavior rating scale and reported that the mobile dental app is useful to alleviate child's fear and anxiety toward dental treatment and it can be used as an adjunct with the conventional behavior management techniques.[9]In this study "Little Lovely Dentist app" was used for explaining the child about dental procedures.

Buchanan H *et al.* in 2003 [10] proposed the Facial Image Scale (FIS) as a suitable measure for assessing children's state dental anxiety.[10]In the present study heart rate and facial image scale were used to assess the anxiety levels. Heart rate was taken as a physiological parameter and facial image scale was a subjective parameter.

Oral hygiene index (OHI) found in 1960 [11] by Greene and Vermillion is a sensitive, simple method for assessing group or individual oral hygiene quantitatively. Simplified OHI (OHI-S) was introduced in 1964 to reduce the number of decisions required on the part of the examiner and the time required for the inspection. OHI-S differs from OHI in the number of tooth surfaces involved (6 rather than 12), method of selecting the surfaces to be scored and the scores which can be obtained [11]. According to Gandhi M *et al.* The need for OHI-S in the primary dentition (OHI-s) is indicated to determine the children's level of oral cleanliness and to determine the appropriate age at which preventive procedures for periodontal disease can be started [12]. Therefore in this study the children below eight years of age whose permanent molars and incisors had not erupted OHI-S was modified as Labial surface of 54 and 64, Labial surface of 61, Lingual surface of 82, Lingual surface of 75 and 85 for debris index. For children aged 8 years and above the index was recorded as recommended for permanent teeth.

In this study follow up was done at 7,14 and 21 days and facial image scale and OHI-S was recorded at the follow up visits and it was found that children in both the groups had reduced anxiety levels while receiving necessary treatments and also they were positively influenced to maintain their oral hygiene.

Elicheria *et al.* in the year 2019 concluded that mobile dental app was better in reducing the anxiety of children in 6-12 years old [13]. According to Pandey V *et al.* 2019, There was no difference between the effect of interactive mobile game and Tell-Show-Do on behavior in 6-12 year old children.[14] Kevadia MV *et al.* in the year 2020 [15],concluded that Tell-play-do technique was more effective in reducing children's fear and anxiety for dental treatment. Tell-play-do can be a functional alternative method to tell-show-do (TSD) and modeling techniques during dental treatment [15].

Conclusion

Mobile dental app and tell – play – do were found to be effective in alleviating the anxiety levels in children aged 4-12 years of age and also aided in the positively influencing the child's aptitude for maintainence of oral hygiene and the children were encouraged to receive further dental treatments. Tell–play–do technique gives a chance to develop a warm connection between the dentist and the child while mobile app though used in supervision, aids in virtually engaging the child to learn about dental procedure. Comingling technology in conventional techniques and modifications can yield fruitful results in management of child behaviour in pediatric dentistry. Therefore, mobile dental apps can be used as an adjunct with interventions like tell- play- do to increase the cooperation levels in children in a dental set up.

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