RESEARCH ARTICLE

Effect of Digitalized Previsit Imagery on Behavior of Children in the Dental Operatory

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Abstract

Aim and objective: The present study was aimed to determine the impact of exposure to digitalized previsit imagery technique on the anticipatory dental anxiety levels of children.

Design: 40 children, aged 4–8 years requiring noninvasive dental treatment were included in the study. Preintervention anxiety levels were assessed using Venham picture test (VPT) in the waiting room and randomly divided into two groups. The study group was exposed to the digitalized previsit imagery technique which included a customized cartoon video of dental operatory and the concerned pediatric dentist in his/her own voice through WhatsApp messenger. The other group was dealt with the conventional approach using verbal and nonverbal communication. Postintervention anxiety was assessed in both the groups and the difference was compared.

Result: A significant difference in anticipatory dental anxiety was found between the two groups ($p<0.001$) using SPSS software. There was no marked relation of age and sex with the reduction of anxiety levels after exposure to digitalized previsit imagery.

Conclusion: The idea of digitalizing previsit imagery can be a time saving approach which is helpful in managing anxious children before entering the dental operatory.

Keywords: Cartoon, Dental anxiety, Dentist voice, Digitalized previsit imagery, WhatsApp.

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Introduction

Emotion is a complex psychological state that involves three distinct components: a subjective experience, a physiological response, and a behavioral or expressive response[1]. When exposed to a new environment, the child experiences various emotions like anxiety, fear, worry, and shyness. Hospital environment is intimidating for most of the children which could be attributed to multiple factors such as maternal anxiety, peer influence, dental office environment, doctor's attire, and attitude, which may lead to undesirable behavior in the dental clinics. A pediatric dentist understands child's psychology and shapes or modifies their unacceptable behavior by instilling a positive attitude towards the dental treatment.

Behavior modification is an attempt to alter human behavior and emotion in a beneficial manner according to the laws of modern learning theory[2]. It is aimed at preparing the child for the dental visit, so that the child becomes comfortable and relaxed in the dental clinic. It may begin before the patient enters the dental operatory and can engage written information as well as exchange of ideas, voice tone, body language, facial expression, and touch. Most commonly used techniques include communication, tell-show-do, desensitization, modeling, etc. One such technique is positive previsit imagery where patients are shown positive images or photographs of dentistry and dental treatment in the waiting area before the dental appointment.[3]

In today's digitalized world, smartphones are commonly used and children are into E-learning. Up-gradation of modifying a child's behavior through digital means becomes easy, convenient, and economical. This could be done by incorporating dental simulating videos in the smartphones for a pre-exposure of the child to dental practice which helps in anxiety reduction. Dental anxiety levels can be measured by using various anxiety scales such as dental anxiety scale, facial image scale, smiley face programs, etc., of which Venham's picture scale/test (VPT) is more commonly used.[4] The present study was designed to assess the effect of a digitalized previsit imagery on the behavior of the child requiring noninvasive dental treatment with the help of Venham's picture scale.

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Materials and Methods

This study was carried out in the Department of Pedodontics and Preventive Dentistry at Kamineni Institute of Dental Sciences, Narketpally, Nalgonda, India and was approved by the Institutional Ethical Committee.

Participants

Participants were consecutive series of new and current out-patients attending Kamineni Institute of Dental Sciences, over a period of 2 months.

Inclusion Criteria

- Children under the age range of 4–8 years.
- Children who never visited a dental operatory.
- Children requiring dental treatment which did not include any invasive procedures under local anesthesia at the initial appointment.
- Children whose parents commonly use "WhatsApp" messenger as the means of communication.

Exclusion Criteria

- Children who have already visited the dental operatory.
- Children who require extensive dental procedures.
- Children with learning difficulties who were judged unable to understand instructions.
- Visual and hearing impairment.
- Children whose parents did not use "WhatsApp" messenger.

Sample Size

Forty subjects were included in the present study. The study sample was based on data on the mean and SD (Standard Deviation) of scores from the original development of the Venham scale. Estimating that a clinically significant difference between the two groups would be 1 SD, a sample size of 34 would give 80% power to detect this difference at significance level of 0.05 and hence 40 subjects were actually recruited.

The null hypothesis was stated thus

In the population of children aged 4–8 years attending the Department of Pedodontics and Preventive Dentistry, there is no difference in the mean dental anxiety score of children (as measured by the VPT) exposed to the modified previsit imagery technique prior to treatment and the children exposed to conventional behavior modification techniques such as verbal communication.

Study design

The study included 40 children in the age-group of 4–8 years. Pre-intervention anxiety level was assessed in all the 40 children and randomly divided into two groups (Fig.1).

***Intervention group:** children were exposed to the modified previsit imagery technique*

Nonintervention group: Children were dealt with conventional approach using verbal and nonverbal communication.

The anxiety assessment of the children was conducted by a dentist (principal researcher) who was blind to the patient's group allocation using Venham's Picture Scale. Both the child's group code and anxiety score were sealed for the analysis at the end of the study.

After recording the anxiety level, children were recalled after a week for the respective treatment procedures. The parents of the intervention group were asked to show a video sent through "WhatsApp" to their child were as the parents of the nonintervention group were not given any specific instructions.

Intervention

The modified approach of previsit imagery used in the present study was a type of audio visual modeling through the most commonly used mode of communication, i.e., WhatsApp, before the patient entered the dental operatory. The video consisted of an animated series of customized sketchs resembling the concerned dentist in English as well as the regional languages in the dentist's own voice. This video was made to familiarize the child to the dental operatory environment. Treatment procedures like oral prophylaxis and restorations were explained with the use of euphemisms such as a special brush for scalar, tooth bug for caries and noisy brush for airotor, etc., along with proper oral hygiene maintenance instructions. The parents were asked to show the video to their children (Fig. 2).

Verbal and nonverbal communication with the child and parent was done in the other group where the parent was asked to get the child after a week for the respective treatment procedure.

After a week, the anxiety levels were re-assessed before starting the treatment and tagged with the code allotted to the subjects. The children then proceeded to the operatory for their dental treatment. The difference between pre-intervention and postintervention anxiety levels of the subjects was assessed and compared.

Scale Used for Measuring Anxiety

Dental anxiety was assessed by Venham Picture Scale. It consists of a series of eight paired drawings of a child, each pair including a fearful (1) and a nonfearful (0) pose. The respondent is asked to indicate which picture more accurately reflects his/her feelings at the time. Scores are determined by summing the number of instances in which the child selects the high fear stimulus. Scores range from 0 to 8 with higher scores indicating higher levels of dental anxiety (Flowchart 1).

Masking

The researcher assessing the level of anxiety was masked to the children's membership of the group. The children and the parents were not informed which arm of the trial they were in. Data analysis was conducted by an independent analyst masked to the coding used to indicate group membership.

Statistical Methods

Data analysis consisted of two parts: the description of the demographic characteristics of the participants, including the comparison of the sex and age of the participants in the two groups of the trial, and an analysis of the dental anxiety scores. Since the data were not normally distributed, the Mann–Whitney U test was used to compare the anxiety scores of the two groups. The data were analyzed using SPSS software.

Results

Baseline anxiety levels and the anxiety level before starting restorative procedure were compared and the mean reduction of anxiety was noted.

In the intervention group, it was observed that maximum reduction of anxiety means was in the age group of 7–8 years with mean difference of 3.66 and 3.14, respectively and the least reduction was observed in the age group of 4–5 years with the mean difference of 1.25 and 2.5, respectively (Table 1).

In the nonintervention group, it was observed that maximum reduction of anxiety means was in 5 and 8 years group with the mean difference of 2 in both the age groups and least reduction in anxiety means was seen in age group of 4 and 7 years with the mean difference of 0.5 and 0.4, respectively (Table 2).

Nonsignificant results were obtained when the difference between the anxiety levels were compared based on age and sex (Table 3).

When reduction means of the intervention and nonintervention groups were compared, it was observed that reduction of anxiety

Fig. 1: Study design

was significantly higher in the intervention group when compared to the nonintervention group with $p < 0.05$ (Table 4).

Discussion

Dental anxiety is an unreasonable and excessive negative emotional state, and its physiological manifestations emerge as a response to fear or as a reaction to the unknown. Child's dental anxiety can disrupt the processes of controlling the behavior of children, gaining their cooperation, and creating a positive dental attitude.[5,6] Several stress trigger factors such as unfamiliarity, strange sounds and taste, and the need of constantly lying on dental chair with discomfort and pain makes the child resistant towards a cooperative behavior at the first meeting with the dentist.[7]

Till date, the literature shows various methods of assessing dental anxiety, including indirect methods (physiologic measurements of pulse rate, blood pressure, and muscle tension) or projective techniques (children's dental fear picture test) that require skills in carrying out interviews and administering and scoring tests.[8,9] An ideal scale should be clinically easy to apply, less time consuming, appealing, applicable in younger children with limited cognitive and linguistic skills and should incorporate a scoring system.[10]

Fig. 2: Glimpse of few pictures from the video

VPT is one of the few picture scales available that covers all these criteria and has been used in a number of studies to assess anxiety before treatment, as in the present study.[3,11–13]

There are many communicative, advanced, and pharmacological interventions that have been developed to manage child's anxiety which includes most commonly used techniques such as Tell-Show-Do, modeling, and positive or negative reinforcements. CFox and JTNewton after a controlled trial suggested that viewing positive images of dentistry and dentists prior to dental appointment results in short term reduction in anticipatory anxiety in children.[14] Positive previsit imagery is a type of behavior guidance where patients are shown positive photographs or images of

Flowchart 1: Venham picture scale

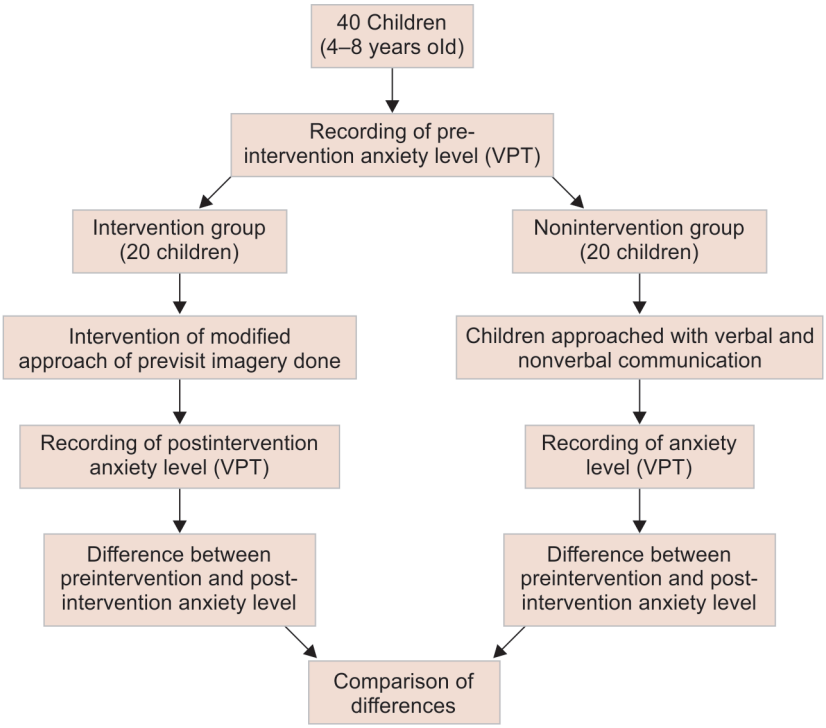

Table 1: Anxiety level comparison in the intervention group

Intervention group						
Age	*No. of children*	*M*	*F*	*Mean of preintervention anxiety using VPT*	*Mean of postintervention anxiety using VPT*	*Difference between pre-and postintervention anxiety means*
4	4	2	2	8.25	7	1.25
5	4	0	4	6.5	4	2.5
6	2	0	2	6.5	3.5	3
7	3	3	0	6.66	3	3.66
8	7	4	3	6.42	3.28	3.14
Total	20	9	11			

Table 2: Anxiety level comparison in the nonintervention group

Nonintervention group						
Age	*No. of children*	*M*	*F*	*Mean of preintervention anxiety using VPT*	*Mean second visit anxiety using VPT*	*Difference between first and second visit anxiety levels*
4	4	3	1	7	6.5	0.5
5	3	2	1	6.66	4.66	2
6	6	4	2	6.33	5	1.33
7	5	3	2	6	5.6	0.4
8	2	0	2	6.5	4.5	2
Total	20	12	8			

dentistry and dental treatment in the waiting area before the dental appointment. Its objective is to provide children and parents with visual information on what to expect during the dental visit and provide children with context to be able to ask providers relevant questions before dental procedure is initiated. This may be used with any patient and there is no contraindication for the above procedure[3].Various digitalized behavior modification techniques are present in the form of dental apps and games with music which are mainly used for distraction purpose. In the present study digitalization of positive previsit imagery was done where a customized audiovisual message of dental treatment procedures was explained in the cartoon form of the concerned dentist in his/her own voice which was sent through WhatsApp messenger.

The present study provided evidence to disprove the null hypothesis, demonstrating that the modified approach of previsit imagery before a dental treatment reduces anticipatory dental

Table 3: Difference of means between pre- and postintervention anxiety means according to age and sex

Difference of means between pre- and postintervention anxiety means				
	According to age		*According to sex*	
	Study group	*Conventional group*	*Study group*	*Conventional group*
Mann–Whitney U	25.000	50.000	35.000	50.000
Wilcoxon W	80.000	105.000	90.000	105.000
Z	-2.517	.000	-1.510	0.000
Asymp. Sig. (2-tailed)	0.012	1.000	0.131	1.000
Exact Sig. [2*(1-tailed Sig.)]	0.063	1.000	0.280	1.000

Table 4: Difference of means between first and second visit anxiety levels in the intervention and nonintervention group

	N	*Mean*	*Std. deviation*	*p-value*
Difference of means between pre- and postintervention anxiety means in the intervention group	20	1.7500	0.44426	0.00
Difference of means between first and second visit anxiety levels in the nonintervention group	20	1.0000	0.00000	

anxiety as measured by the VPT. Various studies have reported significant reductions in anxiety by using pre-treatment modeling using films or live settings as well as the tell-show-do method.[15-20] The mechanism by which there was relatively more reduction of anxiety in the group where modified previsit imagery was imposed is probably due to the inclination of the children towards digitalization and imagery of the concerned pediatric dentist in symbolic form with his/her voice and representation of the same in the dental operatory. As this was a preliminary study with a smaller sample size to evaluate customized digitalization of positive previsit imagery on reduction of anticipatory anxiety in children, further studies are needed to see its effect on a larger scale.

Customized digital modification of positive previsit imagery technique could therefore be helpful to reduce anxiety in children between 4 and 8 years before entering the dental operatory with further advanced behavior modification techniques during the procedure and post operative positive reinforcements which would make the child's dental visit a worthwhile experience.

Conclusion

The idea of modified previsit imagery is a successful approach in the behavior management of anxious children based on their cognitive level. This also saves time as these customized videos can be sent by the assistants and even shows the videos to children in the waiting area prior to the child's entry into the operatory.

"By embracing technology, methods like 'modified previsit imagery' can be effectively used for child management."

Why this Paper is Important to Pediatric Dentists

- Social media like WhatsApp is the most convenient mode of pre-appointment communication which can be used as a medium to introduce a child to dental setting and pediatric dentist in a customized way.
- As the child is already familiarized with the operatory, doctor's looks, voice, and various commonly performed procedures, the overall time taken for the pedodontist for treatment is greatly reduced which may inturn increase the efficiency.
- This previsit imagery can instill a positive dental attitude in children.

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