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VIRTUAL REALITY DISTRACTION: A NEW INSIGHT IN FEAR FREE DENTISTRY

Dental Science

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ABSTRACT

OBJECTIVES: The aim of this study was to evaluate and compare the effectiveness of video-eyeglass distraction versus cognitive behavioural therapy in the management of anxious pediatric patients during dental extraction.

Study design: The present study was conducted on two age groups i.e. 6-9 and 10-12 years comprising of 80 children with 40 in each age group who required extraction of at-least one mandibular primary molar under local anesthesia. The children of both the age groups were randomly divided into two sub-groups that is-audiovisual distraction group and cognitive behavioural therapy group with 20 children in each sub-group. The physiological assessment of anxiety was done by recording heart rate using fingertip pulse oximeter at the start of extraction, three minutes after giving local anesthesia and at the completion of extraction. The psychological assessment was done by recording base line anxiety prior to the treatment and post treatment anxiety at the completion of extraction using Venham's anxiety scale.

Results: Independent t test at 0.05% level of significance revealed a statistically significant difference in the mean scores of pulse rate ($p<0.01$) and clinical anxiety ($P=0.034$ and 0.039) between the video-eyeglass distraction and cognitive behavioral therapy in both the age groups.

Conclusion: Video-eyeglass distraction was found to be more effective in managing anxious children during dental extraction in comparison to cognitive behavioural therapy.

KEYWORDS

Behavior management, Cognitive behavior, Dental anxiety, Dental extraction, Video-eyeglass

INTRODUCTION:

The pediatric patients with his/her first visit to dentist are mostly found anxious and apprehensive because of dental equipment and the newness of the experience.[1] The presence of disruptive behavior, whether the result of anxiety or simple non-compliance, is of particular concern, given that it can limit children's access to quality oral health care as well as pose an increased risk to injury. Therefore, managing a child's distress during a dental appointment may improve access to dental care and also contribute to successful treatment.[2,3] To assist in the management of such children, a wide range of pharmacological and non-pharmacological methods are available to dentists.[4] Among the non- pharmacological techniques cognitive behavioural therapy and distraction techniques seem very promising in managing anxious children.[5]

Cognitive Behavioural Therapy (CBT) is an effective treatment for anxiety disorders of children and can be effective in reducing dental anxiety. These behavioural and/or cognitive interventions can be used ahead of, during or after finishing the dental treatment.[6] Cognitive behavioural therapy encourages the child to talk about the way he feels and the aim is to change his attitude, belief and opinion from the negative to the positive state.[5] Based on the theory by McCaul and Mallot, the perception of pain is decreased when a patient is distracted from an unpleasant stimulus.[7] Techniques for distraction include music, brief relaxation, storytelling, audio presentation through headphones or audiovisual story presentation on television.[8,9] But according to Cassidy et-al watching cartoons on television did not distract children during needle injection. The possible reason may be that children concentrated on the surrounding environment and not on the television.[10]

One approach that may enhance the salience of distraction is through the use of audiovisual (AV) eyeglasses which refers to a lightweight, goggle-like, portable set of glasses that connects to a variety of media (e.g., TV, videogame consoles, smart-phone and DVD players). Clinically, the use of video eyewear provides a method of distraction that combines visual and auditory distraction, eliminates visual interference, and reduces auditory interference.[3]

As there is lack of studies comparing the effect of distraction and cognitive behavioural therapy in managing anxious children and till date there is no study comparing these two methods during the pediatric dental extraction. Hence, the aim of this study was to evaluate and compare the effectiveness of video eye-glass distraction and cognitive behavioural therapy in the management of anxious pediatric patients during dental extraction.

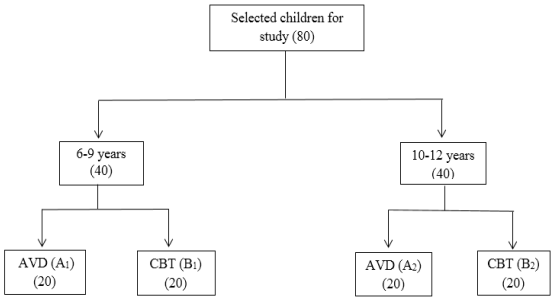
MATERIALS AND METHODS:

This study was approved by the Research Development and Sustenance Committee: Bapuji Dental College and Hospital, Davangere Karnataka India (Ref. No BDC/Exam/283/2016-17). It was deemed essential that the child was happy to take part in the study and only then was parental consent for both inclusion and treatment in the study obtained. Sample size was calculated using formula given by Chow et-al.[11] Calculated sample size was 40 in each group.

STUDY DESIGN:

The inclusion criteria were the absence of mental retardation, ASA physical status I and II, Frankel behavior rating of 2 or 3 and presence of at least one primary mandibular molar needing extraction under local anesthesia. The children with vision or hearing problem were excluded from the study. The present study was conducted on two age groups i.e. 6-9 and 10-12 years and comprised of 80 children with 40 in each age group. The children of both the age groups were randomly divided into two sub-groups that is-audiovisual distraction group and cognitive behavioural therapy group with 20 children in each sub-group. After selecting the children baseline anxiety was recorded by an independent observer using Venham's anxiety rating scale.

Randomisation of children:



AVD: Audiovisual distraction; CBT: Cognitive behavioral therapy

Interventions to reduce dental fear and anxiety:
In the audio-visual distraction video-eyeglass was introduced to the children and once they were adapted to it they were given an option to select their choice of the movie from a varied list and the extraction was carried out. In the cognitive behavioural therapy, the children were left in the play room for five minutes where the dentist tried to establish a rapport with him/her. After this a film of a happy cooperative child undergoing dental treatment was shown to the child to draw his/her attention towards the happiness of the child being treated and answer the child's questions about the dental procedure shown in the film.

Anxiety measuring parameters
Heart rate was recorded using fingertip pulse oximeter at the start of treatment, three minutes after giving local anesthesia and at the completion of extraction. The psychological assessment was done by recording anxiety at the completion of extraction using Venham's anxiety scale.9 The recordings of Venham's anxiety rating scale and pulse oximeter were recorded by an independent observer who assessed the child throughout the dental extraction. Collected data was entered in excel and analysed using R software version 3.23. Independent t-test was used to compare means of two groups and $P < 0.05$ was considered as statistically significant.

RESULTS:
In the present study there was no significant difference regarding sex in the age group of 6-9 and 10-12 years between video-eyeglass distraction and cognitive behavioural therapy table (1)

Table 1: Distribution of children according to gender

Age	Sex	Group				Total	
		Video-eyeglass		Cognitive behavioural therapy			
		Count	%	Count	%	Count	%
6-9 years	F	9	45.0	9	45.0	18	45.0
	M	11	55.0	11	55.0	22	55.0
	Total	20	100.0	20	100.0	40	100.0
10-12 years	F	9	45.0	10	50.0	19	47.5
	M	11	55.0	10	50.0	21	52.5
	Total	20	100.0	20	100.0	40	100.0

Intragroup comparison: There was a statistically significant difference in the mean scores of pulse rate (P<0.001) and clinical anxiety (P=0.034) between video-eyeglass distraction and cognitive behavioural therapy in the age group 6-9 years table (2). Similarly a statistically significant difference in the mean scores of pulse rate (P<0.001) and clinical anxiety (P=0.039) was also seen between video-eyeglass distraction and cognitive behavioural therapy in the age group 10-12 years-table (3). In both intragroup and intergroup comparison, the mean of baseline anxiety and initial pulse rate did not show any significant differences between the treatment groups.

Table 2: Mean changes in anxiety and pulse rate in the age group 6-9 years

	Group						P value
	A1			B1			
	N	Mean	S D (±)	N	Mean	S D (±)	
Anxiety Baseline	20	1.9	0.67	20	2.0	0.69	0.644
Anxiety Clinical	20	0.9	0.64	20	1.3	0.66	0.034
Pulse rate Initial	20	92.9	4.84	20	95.2	6.97	0.233
Pulse rate-3Min	20	92.6	6.29	20	106.4	7.88	<0.001
Pulse rate at end	20	92.1	5.06	20	104.6	8.23	<0.001

Table 3: Mean changes in anxiety and pulse rate in the age group 10-12 years

	Group						P value
	A1			B1			
	N	Mean	S D (±)	N	Mean	S D (±)	
Anxiety Baseline	20	1.9	0.72	20	2.0	0.69	0.823
Anxiety Clinical	20	0.9	0.67	20	1.2	0.62	0.039
Pulse rate Initial	20	93.9	6.40	20	92.8	7.65	0.625
Pulse rate-3Min	20	94.1	7.00	20	103.4	7.62	<0.001
Pulse rate at end	20	92.4	5.99	20	101.9	8.23	<0.001

Intergroup comparison: There was statistically no significant difference in the mean scores of pulse rate (after giving local anesthesia P=0.495 and at the completion of extraction P=0.865) and clinical anxiety (P=0.811) between the age group 6-9 and 10-12 years in video-eyeglass distraction-table (4). Similarly, statistically no significant difference in the mean scores of pulse rate (after giving local anesthesia P=0.221 and at the completion of extraction P=0.315) and clinical anxiety (P=0.622) was seen between the age group 6-9 and 10-12 years in cognitive behavioural therapy- table (5). This revealed that video-eyeglass had equal level of distraction effect on 6-9 and 10-12 years pediatric patients and cognitive behavioural therapy also had same level of effect on both the age groups i.e. 6-9 and 10-12 years during dental extraction.

Table 4: Mean changes in anxiety and pulse rate between the age group 6-9 and 10-12 years in video-eyeglass distraction

	Video-eyeglass						P value
	6 – 9 years (A1)			10 12years (A2)			
	N	Mean	S D (±)	N	Mean	S D (±)	
Anxiety Baseline	20	1.9	0.67	20	1.9	0.72	0.821
Anxiety Clinical	20	0.9	0.64	20	0.9	0.67	0.811
Pulse rate Initial	20	92.9	4.84	20	93.9	6.40	0.562
Pulse rate-3Min	20	92.6	6.29	20	94.1	7.00	0.495
Pulse rate at end	20	92.1	5.06	20	92.4	5.99	0.865

Table 5: Mean changes in anxiety and pulse rate between the age group 6-9 and 10-12 Years in cognitive behavioural therapy

	Cognitive behavioural therapy						P value
	6 – 9 years (B1)			10 – 12 years (B2)			
	N	Mean	S D (±)	N	Mean	S D (±)	
Anxiety Baseline	20	2.0	0.69	20	2.0	0.69	1.000
Anxiety Clinical	20	1.3	0.66	20	1.2	0.62	0.622
Pulse rate Initial	20	95.2	6.97	20	92.8	7.65	0.316
Pulse rate-3Min	20	106.4	7.88	20	103.4	7.62	0.221
Pulse rate at end	20	104.6	8.23	20	101.9	8.23	0.315

DISCUSSION:
The rate of prevalence of dental fear is 5-20% in most of the population and is seen more in children. A variety of behavioural interventions designed to reduce anxiety and disruptive behaviours include modeling, relaxation, deep breathing, hypnosis, distraction, behavioural rehersal and conscious sedation.[9] The present study investigated the outcome of two different methods for the treatment of dental anxiety i.e. video-eyeglass distraction and cognitively oriented therapy.

As anxiety significantly correlates to age and gender[12], homogeneity of groups in this regard is an essential aspect to be considered. In this study no statistically significant differences were seen between age and gender. The presence of anxiety and uncooperative behaviour before the treatment can affect the validity of the results and should not be overlooked.[13] In this study the mean baseline anxiety did not show any significant difference between the treatment groups. Furthermore, all children were chosen with no past dental history as negative dental experiences may lead to dental anxiety and fear. Wright et al and Freeman pointed to the importance of the child's initial dental experience, and concluded that aversive procedures resulted in less positive behavior.[13, 14] Preschool age groups have shown to have a higher level of fear and anxiety than school going children and the use of distraction required a low level of dental fear and anxiety.[7] For this reason school going children (6-12 years) were chosen for the current study The selected age group was further divided into two age groups i.e. (6-9) and (10 -12) years old. This division was done keeping in mind that psychology and mental status of a six year old child is different from that of a twelve-year-old child.

The physiological changes were measured by using pulse oximeter which is considered to be an excellent means of monitoring pulse rate.[15,16] Pulse rate has been used as an outcome measure in numerous medical, paramedical and dental studies of fear and anxiety.[17,18] The overall results revealed by both physiological and psychological parameters indicated that children were more relaxed in video-eyeglass distraction than cognitive behavioural therapy. This might be due to the reason that video-eyeglass being effective in distracting the attention of the child by eliminating the sight and sound of the anxiety provoking stimuli. In contrast the cognitive behavioural therapy aims to facilitate new understanding and uses both behaviour modification technique and cognitive restructuring procedures to change maladaptive beliefs and behaviours before the dental procedure.

In the recent studies conducted by Asvanund et al[19] and Hoge et al,[20] the

results are corresponding to the current study where a significant reduction in anxiety and positive behaviour was instilled via the audiovisual eyeglass during local anesthetic injections and dental restorative procedures in pediatric dental patients.

The results of our study are in accordance with the meta-analysis done by Melissa et al, the findings of which suggest that virtual reality distraction ranks among the most effective of psychological interventions for reducing both psychological and experimental pain, especially those who do not respond to other psychological treatments.[21]

The positive effects of video-eyeglass distraction on the dental anxiety in children in the present study are attributed to the complete blockage of children's visual fields, and as a result to a successful distraction technique. While the video- eyeglass distraction technique is not meant to replace the trust building communication that is inherent to good patient clinician relationship, the present study recommends introducing video-eyeglass at dental appointments after trust is established to enhance the positive patient attitude towards the dental experience.

CONCLUSION:

Video-eyeglass offers an effective method of distraction that diminishes the unpleasantness associated with dental extraction and offers a relaxed state in children. It almost requires no effort to employ and is well liked by the children.

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