International Journal Dental and Medical Sciences Research
Volume 5, Issue 4, July-Aug 2023 pp 466-471 www.ijdmsrjournal.com ISSN: 2582-6018

Evaluation of Children's Anxiety AfterUsing Different Behavior Management Techniques

Azza Kamal Mohamed ELMubarak[1], Hossam El-Sherbiny Hammouda and Abeer Mostafa Abdellatif[3]

[1]*MSc student, Department of Pediatric Dentistry, Faculty of Dentistry, Mansoura University, Egypt.*
[2]*Lecturer of Pediatric Dentistry, Faculty of Dentistry, Mansoura University, Egypt.*
[3]*Professor of Pediatric Dentistry, Faculty of Dentistry, Mansoura University, Egypt.*

Date of Submission: 15-08-2023 Date of Acceptance: 25-08-2023

ABSTRACT: Dental anxiety and pain in children are characterized by unease and unpleasant thoughts about dental treatment. This study aimed to evaluate behavior management techniques (BMT), including virtual reality (VR), mobile dental games (MG), and film modelling (FM), to reduce child anxiety. This study is a randomized controlled trial involved 100 children (3–7 years) are indicated for molarpulpotomies. The experimental BMTs were applied during treatment and compared to the traditional tell-show-do technique (TSD). The measurements were taken before and after the procedure. While Virtual reality notably reduced anxiety, other techniques showed no significant effect. Virtual reality consideredas the most effective method for anxiety reduction in children.

KEYWORDS: Anxiety, Pain, Virtual Reality, Mobile Games, Modelling.

I. INTRODUCTION

Dental anxiety is frequent in patients undergoing dental procedures, particularly in children. Controlling the amount of patient anxiety in clinical settings is critical to the success of dental treatments and patient comfort.**[1, 2]** Uncooperative conduct in children might impair the efficient administration of dental treatment. As a result, despite the abundance of available behaviour management techniques, there is a need to look for a psychologicalbehaviour management technique that effectively reduces fear and anxiety during dental treatment, induces a change in thechild's attitude toward the treatment, and is also acceptable to the parents.**[3, 4]**

In children, there is a strong association between anxiety caused by dental procedures and a favourable prognosis in dentistry; hence, anxiety management is critical as a crucial aspect that contributes to the effectiveness of dental therapies. The first visit to the dentist is critical in developing the child's behaviour, attitude, and achieving treatment effectiveness. To control a child's anxiety during the examination phase before to the treatment appointment, paediatric dentists frequently use the Tell-Show-Do (TSD) approach.**[5]**

Pain management can be grouped into traditional and behavioural /alternative methods that are used to address the patient's fears and/or needs in the dental office. Different strategies for dental pain relief, such as music therapy, behavioural modelling, and deep breathing, are used in behavioural/alternative therapies. Furthermore, several behavioural tactics such as soap bubbles, counting, discussion, television, toys, and video games are employed as distractions at the dentist office. Recently, technical advancements have resulted in the adoption of 2D or 3D video spectacles for watching movies. These methods are known as audio-visual systems (A/V) or eyeglass systems.**[6]**

For many children, drawing is a natural activity that they engage in spontaneously and regularly, generally with genuine excitement. As a result, it is expected that when used in clinical dental settings, it will minimize the child's anxiety about the environment and the nature of the therapy. In 1999, Child Drawing: Hospital (CD:H) scale was developed as a means of measuring the anxiety of hospitalized school-age children. In the field of dentistry, Pond (1968) found stories concerned with pain, blood and other signs of aggression in a series of children's drawings collected by a dentist. Sheskin et al. (1982) utilized drawings of children in a dental setting as an assessment tool for their anxiety.**[7]**

The greater outcomes with audiovisual assistance can be explained by the fact that youngsters get more involved and concentrate when listening to stories, music, or viewing cartoons, diverting their attention away from the anxiety-inducing oral stimulation. Because they frequently close their eyes to focus, the images and

International Journal Dental and Medical Sciences Research
Volume 5, Issue 4, July-Aug 2023 pp 466-471 www.ijdmsrjournal.com ISSN: 2582-6018

noises of the dental procedure are blocked out, resulting in even less anxiety.**[8]** The use of virtual reality goggles and kaleidoscopic technologies during venipuncture reduced children's perceptions of pain and anxiety. The virtual reality goggle is the most effective means of lowering pain and anxiety perception.**[9]**

Despite the fact that there are several strategies for reducing anxiety in children at dental clinics, there is no ideal or definitive tool for all types of children. As a result, the purpose of this research is to evaluate several tolls in order to identify the best tools to utilize.

II. MATERIALS AND METHODS

STUDY DESIGN:

This study was designed as a randomized controlled trial (RCT) to alleviate child dental anxiety by using different behavioral management techniques during pulpotomy in primary mandibular molars. This clinical trial was conducted at the Department of Pediatric Dentistry at Mansoura University from the first of October 2021 till the first of February 2023. This clinical randomized trial was approved by Mansoura Research Ethics Committee (A06030821), Faculty of Dentistry, Mansoura University. A Written informed Arabic consent was obtained from parents of all children before their participation in this study with explanation of the objectives of the study.

SAMPLE SIZE CALCULATION:

Sample size calculation was based on difference in paternal bonding between addict and control groups retrieved from previous research (Amer et al., 2020). Using G power program version 3.1.9.4 to calculate sample size based on effect size of 0.98,using 2-tailed test , α error =0.05 and power = 80.0% , the total calculated sample size will be 25 in each group.

SUBJECT SELECTION:

Total number of 100 children, who were registered for routine dental treatment, were recruited for pulpotomy procedure of one of the carious lower primary molars according to eligibility for inclusion and exclusion criteria. They were categorised into 4 groups according to the BMT used. Each group had 25 child patients: Control (TSD)**[5]**, Virtual reality (VR)[9,55], Mobile Dental Games (MG)**[10, 11]** and Film Modelling group (FM).**[12, 13]**. Enrollment of the child into a specific group was Random. Inclusion criteria were:3-7 years of age, the first dental visit clinic, absence of any systemic or chronic disease.

SUBJECT GROUPING:

Each child eligible for the study was asked to choose a color coded card from 100 cards, which were equally divided into 4 different colors representing the different groups. Each colored card represented the group the child will be included in. As result the groups of the study were as follow: Group 1 (control group): treated as usual with the basic BMT as T.S.D (no otherintervention is used), Group 2 (VR group): children were informed what is the VR and how to use it, then they were asked to choose one of 4 cartoon films (Tom and Jerry, Smurfs, Dora, or Ben Ten) to watch during the dental treatment procedure. Group 3 (MG group): in which 4 different mobile games were explained to each child in the group. Then, they were asked to choose one of them to play with it during the dental procedure, Group 4 (FM group): children were given a tablet and asked to watch a child model with same age and gender entering a pediatric dental clinic for his or her first time and preforming the same dental procedure (pulpotomy).

Children received the Behavior Management Techniques (BMT) as described above according to which group,they are included in. Their anxiety status was assessed before and after treatment by using different anxiety scales; (RMS-PS) pictorial scale**[14, 15]**, Pulse rate (PR)**[16, 17]** and Oxygen saturation levels (SPO2).**[16, 17]**. In addition, at the end of dental appointment, children were given a set of colors and A4 paper and asked to draw a child in a dental clinic, and their drawings were evaluated using the Modified Child Drawing: Hospital (MCD:H) scale(that was modified from old CD:H **[7]**

STATISTICAL ANALYSIS:

Statistical analysis was carried out using SPSS software, version 25 (SPSS Inc., PASW Statistics for Windows version 25, Chicago: SPSS Inc.). Qualitative data were summarized using percentages and counts, while quantitative data were described using the median (with minimum and maximum values) for non-normally distributed data and the mean ± standard deviation for normally distributed data after confirming normality with the Shapiro-Wilk test. The level of significance was set at (≤0.05). The Chi-Square test was employed to compare qualitative data across groups, with the Kruskal-Wallis and Mann-Whitney U tests utilized for comparing two or more non-normally distributed data groups. The Wilcoxon signed-rank test and Friedman test were applied to analyze more than two study periods. For normally distributed data, the Student t-test

International Journal Dental and Medical Sciences Research
Volume 5, Issue 4, July-Aug 2023 pp 466-471 www.ijdmsrjournal.com ISSN: 2582-6018

was used to compare two independent groups, while the one-way ANOVA test was used to compare multiple independent groups, followed by the Post Hoc Tukey test for pairwise comparisons. The Spearman rank-order correlation was employed to assess the strength and direction of linear relationships between two non-normally distributed continuous variables.

III. RESULTS

In **Table (1)**, No significant differences recorded among the RMS-PS scores of the four groups neither pre- nor post-operative (P>0.05). However, the results revealed that in experimental group 2, there was a significant decrease ($p<0.05$) in RMS-PS scores after the dental procedure compared to before the procedure. However, the remaining experimental groups did not exhibit a significant variation in RMS-PS scores compared to the control group.

In terms of pulse rate, **Table (2)** showsno significant differences recorded among the pulse rate scores of the four groups neither pre- nor post-operative. However,only the experimental group 2 revealed a significant decrease in pulse rate after the procedure compared to the initial measurement before the procedure. On the other hand, the remaining experimental groups did not exhibit a significant variation in pulse rate scores compared to the control group.

Table (3) shows no significant differences recorded among the oxygen saturation levels of the four groups neither pre- nor post-operative, while the experimental group 2 had a significant increase in oxygen saturation levels ($p<0.05$) following the procedure when compared to the initial measurement before the procedure. However, the other experimental groups did not show a significant difference in oxygen saturation levels in comparison to the control group ($p>0.05$)

Regarding the analysis of anxiety levels using MCD:H drawings, **Table (4)** showed that there was a significant difference among the various groups. Notably, Group 2 had the highest proportion of non-anxious participants, whereas Group 1 exhibited the highest percentage of individuals classified as very anxious. In comparisons with the control group, statistically significant differences emerged when compared Group 2 and Group 4 to the control group. On the other hand, Group 3 did not show any significant difference with the control group (Group1).

Table (1): Comparison of pre- and postoperative (RMS-PS) scores between the groups and within each group.

RMS-PS	Preoperative Medium (Min- Max)	Postoperative Medium (Min- Max)	Test of significance
Group 1	1 (1-5)	1 (1-4)	P=0.942
Group 2	2 (1-5)	1 (1-3)	P=0.003*
Group 3	2 (1-5)	1 (1-5)	P=0.295
Group 4	1 (1-5)	1 (1-5)	P=0.236
Comparison with control group	p1=0.459 p2=0.291 p3=0.916	p1=0.069 p2=0.482 p3=0.482	

z =Wilcoxon Sign Test *statistically significant
Used test: Kruskal Wallis test
p1: difference between control group and group 2,
p2: difference between control group and group 3,
p3: difference between control group and group 4

Table (2): Comparison of pre- and post-operative pulse rate scoresbetween the groups and within each group.

Pulse rate	Preoperative (Mean ±SD)	Postoperative (Mean ±SD)	P-value
Group 1	103.96±12.51	100.56±12.06	0.093
Group 2	100.96±12.37	96.48±13.66	0.026*
Group 3	101.24 ±15.78	104±17.09	0.370
Group 4	105.60±12.22	100.76±13.16	0.071
Comparison with control g group	P1=0.427 P2=0.471 P3=0.664	P1=0.310 P2=0.391 P3=0.960	

International Journal Dental and Medical Sciences Research
Volume 5, Issue 4, July-Aug 2023 pp 466-471 www.ijdmsrjournal.com ISSN: 2582-6018

*statistically significant. Used test: Paired t test
Used test: One Way ANOVA test p1: difference between control group and group 2, p2: difference between control group and group 3, p3: difference between control group and group 4.

Table (3): Comparison of pre- and post-operative SPO2scores between the groups and within each group.

SPO2	Preoperative Mean ±SD	Postoperative Mean ±SD	P-value
Group 1	96.68±3.06	96.52±5.69	0.909
Group 2	96.84±2.48	97.80±2.27	0.016*
Group 3	94.64±12.12	97.20±2.29	0.309
Group 4	97.08±2.16	97.04±2.19	0.944
Comparison with control group	P1=0.930 P2=0.267 P3=0.827	P1=0.192 P2=0.487 P3=0.595	

*statistically significant. Used test: Paired t test.
Used test: One Way ANOVA test.
p1: difference between control group and group 2, p2: difference between control group and group 3, p3: difference between control group and group 4.

Table (4): Comparison of post-operative CD:Hscores between the groups and within each group.

CD:H	Group 1 (n=25)	Group 2 (n=25)	Group 3 (n=25)	Group 4 (n=25)	Test of significance	Within group significance
Non anxious anxious very anxious	5(20) 8(32) 12(48)	18(72) 6(24) 1(4)	10(40) 6(24) 9(36)	11(44) 8(32) 6(24)	P=0.007*	p1<0.001* p2=0.147 p3=0.03*

Used test: Monte Carlo test
p1: difference between control group and group 2, p2: difference between control group and group 3, p3: difference between control group and group 4

IV. DISCUSSION

Dental anxiety and pain are non-specific psychological states characterized by a lack of ease, nervousness, or unpleasant thoughts about what may occur during a dental treatment, which is commonly associated with previous traumatic experiences in the dental context.**[2]** Employing various behavior management approaches, such as AV aids, may reduce dental anxiety and discomfort by diverting two distinct kinds of sensations: hearing and sight.**[4]**

The greater outcomes with AV assistance can be explained by the fact that youngsters get more involved and concentrate when listening to stories, music, or viewing cartoons, diverting their attention away from the anxiety-inducing oral stimulation. Because they frequently close their eyes to focus, the images and noises of the dental procedure are blocked out, resulting in even less anxiety.**[8]**

Concerning the RMS-PS scores in each group during preoperative and postoperative stages of the current experiment, statistical variations were detected in group 2. Conversely, these outcomes were in agreement with Khandelwal et al.**[18]**, who revealed that RMS-PS gave a statistically significant result when applied on 80 Indian children on 4 dental visits.

Additionally, our study compared the PR change between preoperative and postoperative stages within each of the investigated groups and revealed no significant difference among them except for VR-glasses group. Our results were consistent with Nunna et al.**[19]**, who utilized Pulse Oximeter to affirm that VR distraction was a more useful behavior guidance modality to decrease dental fear and anxiety in children during LA administration. Moreover, Khandelwal et al.**[18]**demonstrated that although there was an

increase in the PR in all studied groups, there was a greater increase in the PR during the subsequent visits in the control group and the audio group as compared to AV groups. In addition, there was a less increase in the PR in both the type of the audio–video group of distraction used in the present study indicating that both the AVD techniques were better in reducing anxiety than the audio distraction.

Besides, our investigation compared the SPO2 change between preoperative and postoperative stages within each of the studied groups and showed that there was no significant difference among them except for VR-glasses group. Similar findings were noticed by Agarwal et al.**[20]**as there was no significant difference found in SPO_2 during all the visits across the groups. Furthermore, Zhang et al.**[21]**in their meta-analysis, concluded that SPO_2levels during the dental treatment in AV distraction group was higher than control.

Regarding: CD:H Scale in the current study, we found a statistically significant difference between the surveyed groups as non-anxious represent 72% from total VR-glasses group compared with 44%, 40% and 20% in MG, FM and control groups, respectively. The studies conducted by Aminabadi et al.**[22]**, Guner et al.**[23]** and Ankita et al.**[24]**, have contributed further evidence that supports our findings regarding the use of drawing as a method for assessing anxiety levels in children in easy and more enjoyable way for them.

Al-Halabi et al.**[4]**claimed that videos shown on tablet gave the best result in relieving dental anxiety and pain during IAN block in children. Although the use of AV eyeglasses 'VR box' had no added advantage in a majority of children, but it was more acceptable in patients of 8-10 years.

Also, Ram et al.**[25]**believed that in some cases, the audio-video distraction (AVD) strategy is not advised. A few youngsters who displayed disruptive behavior and resisted therapy rejected the AVD spectacles right away. Furthermore, AVD is not suited for children who are hypervigilant and insist on exerting control over the situation; additionally, the need for maintenance and the lack of spectacles for children with tiny faces limit the use of AVD eyeglasses. Furthermore, AVD eyewear might create a technological barrier that limits their access to the children's teeth. Furthermore, they stated that needing to maintain proper eyeglass placement impeded their job.

V. CONCLUSION

From the current investigations, several points could be declared:

a) Virtual reality was revealed to be the most effective technique for behavior management and reducing anxiety in children.
b) Mobile dental games were observed to be less effective than virtual reality in reducing anxiety in children, with film modeling and tell-show-do techniques following in a descending order.
c) The RMS-Pictorial Scale is a useful measuring tool in pediatric dentistry,for determining the level of anxiety children experience when visiting the dentist.
d) The analysis of children's drawings after dental treatment could be a reliable method for assessing the dental fear and anxiety of young children.

REFERENCES

[1]. Felemban OM, Alshamrani RM, Aljeddawi DH, Bagher SM. Effect of virtual reality distraction on pain and anxiety during infiltration anesthesia in pediatric patients: a randomized clinical trial. BMC Oral Health. 2021;21(1):1-10.
[2]. Garrocho-Rangel A, Ibarra-Gutiérrez E, Rosales-Bérber M, Esquivel-Hernández R, Esparza-Villalpando V, Pozos-Guillén A. A video eyeglasses/earphones system as distracting method during dental treatment in children: A crossover randomised and controlled clinical trial. Eur J Paediatr Dent. 2018;19(1):74-9.
[3]. Jafarimofrad S, Sarlak H, Nourmohammadi S. Is audio a mandatory component of multimedia distraction for reduction of pain and anxiety of pediatric dental patients? A split-mouth crossover randomized controlled clinical trial. Journal of dental research. 2022;19.
[4]. Al-Halabi MN, Bshara N, AlNerabieah Z. Effectiveness of audio visual distraction using virtual reality eyeglasses versus tablet device in child behavioral management during inferior alveolar nerve block. Anaesthesia, Pain & Intensive Care. 2018:55-61.
[5]. Yassin M. Evaluation of Live Modelling and Filmed Modelling Techniques versus No Modelling on Child Anxiety during Dental Treatment: A Randomized Clinical Trial. CU Theses. 2020.
[6]. Appukuttan D. Strategies to manage patients with dental anxiety and dental

phobia: literature review. Clinical, cosmetic and investigational dentistry. 2016:35.
[7]. Seligman LD, Hovey JD, Chacon K, Ollendick TH. Dental anxiety: An understudied problem in youth. Clinical psychology review. 2017;55:25-40.
[8]. Gurav KM, Kulkarni N, Shetty V, Vinay V, Borade P, Ghadge S, et al. Effectiveness of Audio and Audio-Visual Distraction Aids for Management of Pain and Anxiety in Children and Adults Undergoing Dental Treatment- A Systematic Review And Meta-Analysis. Int J Clin Pediatr Dent. 2022;46(2):86-106.
[9]. Steimer T. The biology of fear- and anxiety-related behaviors. Dialogues in clinical neuroscience. 2002;4(3):231-49.
[10]. Radhakrishna S, Srinivasan I, Setty JV, D RM, Melwani A, Hegde KM. Comparison of three behavior modification techniques for management of anxious children aged 4-8 years. J Dent Anesth Pain Med. 2019;19(1):29-36.
[11]. Asokan S, Geetha Priya PR, Natchiyar SN, Elamathe M. Effectiveness of distraction techniques in the management of anxious children - A randomized controlled pilot trial. Journal of the Indian Society of Pedodontics and Preventive Dentistry. 2020;38(4):407-12.
[12]. Kevadia MV, Sandhyarani B, Patil AT, Gunda SA. Comparative Evaluation of Effectiveness of Tell-Play-Do, Film Modeling and Use of Smartphone Dental Application in the Management of Child Behavior. Int J Clin Pediatr Dent. 2020;13(6):682.
[13]. Karekar P, Bijle MN, Walimbe H. Effect of Three Behavior Guidance Techniques on Anxiety Indicators of Children Undergoing Diagnosis and Preventive Dental Care. The Journal of clinical pediatric dentistry. 2019;43(3):167-72.
[14]. 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;19(4):227-33.
[15]. Shivashankarappa PG, Kaur J, Adimoulame S. Anxiety Rating Scale for Speech and Hearing-impaired Children. Int J Clin Pediatr Dent. 2022;15(6):704-6.
[16]. Shindova MP, Belcheva-Krivorova A, Taralov Z. Pulse oximetry in paediatric dentistry. Folia Medica. 2022;64(2):202-6.
[17]. Kalra N, Sabherwal P, Tyagi R, Khatri A, Srivastava S. Relationship between subjective and objective measures of anticipatory anxiety prior to extraction procedures in 8- to 12-year-old children. J Dent Anesth Pain Med. 2021;21(2):119.
[18]. Khandelwal M, Shetty RM, Rath S. Effectiveness of Distraction Techniques in Managing Pediatric Dental Patients. Int J Clin Pediatr Dent. 2019;12(1):18-24.
[19]. Nunna M, Dasaraju RK, Kamatham R, Mallineni SK, Nuvvula S. Comparative evaluation of virtual reality distraction and counter-stimulation on dental anxiety and pain perception in children. J Dent Anesth Pain Med. 2019;19(5):277-88.
[20]. Agarwal N. Effectiveness of Two Topical Anaesthetic Agents used along with Audio Visual Aids in Paediatric Dental Patients. J Clin Diagnostic Res 2017.
[21]. Zhang C, Qin D, Shen L, Ji P, Wang J. Does audiovisual distraction reduce dental anxiety in children under local anesthesia? A systematic review and meta-analysis. Oral Dis. 2018;25(2):416-24.
[22]. Aminabadi NA, Ghoreishizadeh A, Ghoreishizadeh M, Oskouei SG. Can drawing be considered a projective measure for children's distress in paediatric dentistry? Int J Clin Pediatr Dent. 2010;21(1):1-12.
[23]. Guner Onur S, Tonguc Altin K, Demetgul Yurtseven B, Haznedaroglu E, Sandalli N. Children's drawing as a measurement of dental anxiety in paediatric dentistry. Int J Paediatr Dent. 2020;30(6):666-75.
[24]. Ankita Y, Shalini G, Ankita S, Anil G, Shikha D, Sakshi J. Child Drawing: A Projective Tool for Dental Anxiety Assessment. Int Healthc Res J. 2020;4(1):19-25.
[25]. Ram D, Shapira J, Holan G, Magora F, Cohen S, Davidovich E. Audiovisual video eyeglass distraction during dental treatment in children. Quintessence Int. 2010;41(8):673-9.