

Comparative Evaluation of an Audiovisual Distraction Aid and Print Format Entertainment on Pain Perception, Anxiety and Children Behavior in the Dental Setting

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ABSTRACT

Aim: The aim of this study was to evaluate the effect of using audio-visual entertainment aids and print format entertainment aid (comics) on children's pain and anxiety.

Materials and methods: This randomized parallel trial was performed on 60 patients aged 5 and 9 years, who required pulp therapy. The study consisted of three study groups, Group 1- treatment along with PlayStation, Group-2 treatment along with comic group, and Group 3- control group (treatment without any entertainment).

Results: Mean age was 7.1 ± 0.29 years. There was a significant improvement in the patients who were given treatment along with PlayStation. ($p < 0.001$) Statistically significant differences were found ($p < 0.001$) in terms of parental perception of the patient's anxiety during the visits.

Conclusion: It was concluded from the study that use of distraction method techniques is effective in reducing situational anxiety and parental perception of pain distress in younger children.

Clinical relevance: Entertainment while treating pediatric patient can help in improving the comfort level of patient in a clinical setup.

Keywords: Audio-visual, Behavior assessment, Dental anxiety.

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INTRODUCTION

Fear is described as a person's response to a potentially life-threatening event or scenario to safeguard one's life. This could lead to a fight-or-flight situation.¹ Previous studies reveal that a child's level of fear before or during dental treatment is related to not just disruptive behavior, but also an increase in pain perception, which can lead to uneasiness, nervousness, anxiety, and sensitization for future treatments.^{2,3}

Dental anxiety is a term used to describe a patient's reaction to stress linked with dental treatment where in the stimulus is unknown, ambiguous, or not present at that time.⁴ Phobia is a dread of certain stimuli that is irrational, severe, and persistent, resulting in full avoidance of the perceived danger.⁵ According to the Diagnostic and Statistical Manual of Mental Disorders and the International Statistical Classification of Diseases and Related Health Problems (DSM)—IV (ICD)—10, the term "odontophobia" is defined as an overwhelming and irrational fear of dentistry associated with dreadful sentiments of phobias.⁶

Dentistry exposes patients to an atmosphere and certain experiences that many individuals find frightening. This might make it harder to persuade them to accept certain kind of treatment, which would need some form of distraction.⁷

Distraction, a nonaversive strategy used to alter a child's discomfort by diverting his or her attention away from the main task to achieve effective and high-quality treatment, is one of the psycho-behavioral approaches used in medical and dental treatment settings.⁸

A short break during a stressful procedure can be an effective use of distraction before moving on to more advanced behavior-guidance techniques. According to McCaul and Mallot's notion, when a patient is distracted from an unpleasant stimulus that causes pain, his or her perception of pain lessens.⁹

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Audiovisual Aids¹⁰

Audio-visual aids can be defined as those sensory images or objects that promote, stimulate, and reinforce learning, based on John Burton in 1955. According to Kinder S. James, audio-visual aids may be utilized to make the learning process more precise, realistic, and dynamic. The purposes of using audio-visual aids:

- To make teaching-learning more explicit
- To function as an instructional role by itself
- To ignite interest among the group

- To make teaching more efficient
- To provide best motivations and clear images.

Various authors have classified audio-visual aids based on the sort of projection they use. Audio-visual aids can be classified into:

Audio aids

- The term "audio materials" refers to materials that can be heard.
- Radio, cassette player, walkman, and headphones.

Visual aids

- Aid in visualising things. It has two types:
 - Not requiring projection: print material, exhibits, poster, etc.
 - Requiring projector: slides, film strips, OHP, etc.

Audio-visual aids

- Can be heard and seen at the same time.
- Projected aids, television, and films are just a few examples.

Audio-visual aids can also be classified into projected aids which can be Films or Films strips.

Several studies have suggested that audio-video distraction is routinely utilized in medical practice to minimize patients' discomfort and anxiety during brief invasive procedures and to achieve cooperation of young patients during dental treatment.¹¹⁻¹⁵ On the contrary, the efficiency of distraction during dental treatment operations is still a subject of controversy. According to several research, auditory video distraction is effective in reducing not just anxiety but also pain perception. Other research, on the contrary, revealed that presenting a filmed cartoon during dental treatment did not reduce uncooperative behavior.¹⁴⁻¹⁹ Sullivan et al., on the contrary, found that auditory video distraction significantly lowered pulse but had no effect on anxiety or behavior.¹²

No such study is conducted till date in this region of country, hence the aim of this study was comparative evaluation of the effect of using audio-visual entertainment aids and print format entertainment aid (comics) on children's pain and anxiety in Jammu city, Union Territory of Jammu and Kashmir.

MATERIALS AND METHODS

Participating Subjects

The participants were chosen from consecutive patients visiting the Department of Pedodontics, Indira Gandhi Government Dental College and Hospital, Jammu. The children between 5 and 9 years of age were selected in the study.

The inclusion criteria were:

- Good systemic health
- No previous dental experience for the last 2 years, requiring administration of local anesthesia
- Restorative treatment requires local anesthesia.

The following were used as exclusion criteria:

- Previous negative experience in dental office or known dental phobia as reported in the dental records
- Require pharmacological management to cooperate or medical disability such as the history of seizures or convulsion disorders, nystagmus, vertigo or equilibrium disorders

- Autism and eye problems
- If their parents refused to grant consent.

Study Design

This prospective randomized controlled parallel arm trial was conducted from January 2019 to October 2019. The patients were randomly divided into three groups. The randomization was carried out by a dental assistant who assigned patient to different group by the use of opaque envelopes.

Group 1- Subjects treatment along with PlayStation (PS) Gaming Console

Group 2- Subjects treatment along with Favorite Comic

Group 3- Control (Treatment without any entertainment aid).

Dental Operatory Procedure

The dental clinic used for this study was fully equipped with a dental unit, blood pressure (BP) monitor, and pulse oximeter. A video camera was mounted on an adjustable tripod and set in a position that permitted total observation of the child during the dental treatment, that is, before, during and after the prophylaxis process in visit 2 and the pulp therapy procedure in visit 3. The accompanying parent/guardian was permitted to watch the entire operation, as a passive observer from a chair behind the child and the operator (the child was aware of the parent/guardian's presence). Each visit was 60 minutes or less in duration. The following were the three visits for each patient.

Visit 1: Dental Examination and Inclusion Visit

Before the clinical dental examination (including radiographs), the parent/guardian was questioned about the child's medical and dental history. Following the examination, a treatment plan was made and discussed with the parent/guardian. During this visit, the psychological behavior management technique tell-show-do was used. This method includes; a verbal description by "tell," demonstration by "show" and completion of the show by "do" to familiarize the child with dental settings.

Visit 2: Acclimatization Visit Including Oral Hygiene Information and Prophylaxis

This visit began with an explanation of the procedure utilizing the tell-show-do method. All the subject were made accustomed to the gaming console & comic book reading on the second visit. Following, the acclimatization process, oral hygiene instructions were given, including how to brush one's teeth (toothpaste and toothbrush were used). Then, dental prophylaxis was performed using a slow-speed hand piece with a rubber cup and prophylaxis paste, followed by topical fluoride application using disposable trays.

Visit 3: Pulp Therapy Treatment

Three minutes before the treatment, following behavior management techniques were utilized including verbal communication and positive reinforcement.

Patients were randomly divided into three groups:

Group 1- Subjects treatment along with PS Gaming Console

Group 2- Subjects treatment along with Favorite Comic material

Group 3- Control (Treatment without any entertainment aid).

The following procedures were carried out in both groups:

- intraoral examination,
- injection with local anesthesia,
- application of rubber dam,
- pulp therapy, and
- tooth restoration.

After the treatment the patients were asked to complete the¹ the Modified Venham's clinical ratings of anxiety,² The Wong-Baker Faces Scale.

Parents Assessment

During the third visit, parents were asked to fill in the Modified Corah Dental Anxiety Scale [Corah et al.] (Table 1) to assess their perception of the patients anxiety before the child entered the operating room. A score of 4 indicated lowest possible level of anxiety. A score of 20 the highest possible level of anxiety.²⁰⁻²²

After treatment, the child completed the Venham Picture Test [Venham and Gaulin-Kremer] (Fig. 1) to evaluate their perceived anxiety during treatment. The score ranged from 0 (not anxious) to 8 (extremely anxious).²⁰⁻²³

The Wong-Baker Faces Scale [Wong and Baker] (Fig. 2) was also completed by the child at the end of the treatment. The Wong-Baker Faces Scale is a 6-point scale ranging from 0 (no pain) to 10 (worst pain). For as exact as possible scores, detailed explanations about the significance of each drawing on the scales were given to the child.²⁰⁻²³

Statistical Analysis

The statistical analyses were performed using IBM SPSS Statistics 20 (IBM Corp., Armonk, NY). Shapiro–Wilk test was used to test normality of the data. Descriptive data are reported as frequencies, means, and standard deviation (SD). The statistical differences

Table 1: Modified Corah Anxiety Scale questionnaire was used to assess the anxiety scale of patient

1. If your child has to go to the dentist tomorrow, how would he/she feel about it?
a) He would look forward to it as a reasonably enjoyable experience
b) He wouldn't care one way or the other
c) He would be a little uneasy about it
d) He would be afraid that it would be unpleasant and painful
e) He would be frightened of what the dentist might do
2. While waiting in the dentist's office for his turn, how does he/she feel?
a) Relaxed
b) A little uneasy
c) Tense
d) Anxious
e) So anxious that he sometimes breaks out into a sweat, or almost feels physically sick
3. When he/she is in the dentist's chair waiting while the dentist gets the drill ready to begin working on his teeth, how does he feel?
a) Relaxed
b) A little uneasy
c) Tense
d) Anxious
e) So anxious that he sometimes breaks out into a sweat, or almost feels physically sick
4. When he/she is waiting in the dentist's chair to have his/her teeth cleaned and the dentist is getting the instruments which doctor will use to scrape the teeth around the gums, how does he/she feel?
a) Relaxed
b) A little uneasy
c) Tense
d) Anxious
e) So anxious that he sometimes breaks out into a sweat, or almost feels physically sick

Patient's detail and score

between the three groups were assessed using a one-way ANNOVA test. Further Bonferroni test was done for multiple comparisons. The significance level was set at $p < 0.05$.

RESULTS

A total 60 subjects were included in the study. Among them, were 30 males and 30 females, with the mean age of 7.1 ± 0.29 . Table 2 shows the mean score, standard deviation (SD) and ANNOVA comparison for each variable measured during the control and experimental visit.

Statistical significant differences were found out between the visits with regard to parental perception of the patients' anxiety ($p = 0.00$), as determined by the Modified Corah Dental Anxiety Scale (Table 2). Further when Bonferroni test was applied for multiple comparison, significant differences was observed in all three groups (Table 3).

Self-reported Anxiety Measures

There was significant difference in the measures of anxiety obtained with the Venham Picture Test between the three groups (Table 2). Bonferroni test applied for multiple comparison, showed significant differences all three groups (Table 4).

Self-reported Pain Measures

There were significant differences between the visits in relation to pain ($p = 0.00$) with the Wong–Baker Faces Scale (Table 1). Further when Bonferroni test was applied for multiple comparison, significant differences was observed in all three groups (Table 5).

DISCUSSION

Dental fear is a pervading problem that can lead to intentional avoidance of dental care, negatively impacting patient's orofacial and psychological health.²⁴ Dental fear is specific anxiety that leads to an unpleasant or negative experience during dental procedures. During the treatment, several pharmacological and nonpharmacological approaches are employed to alleviate pain and anxiety. The advantage of nonpharmacological problem is reducing the usage of analgesics and improving the patient's quality of life by alleviating pain. Distraction strategies not only allow interventions to be completed in less time but also reduce the number of interventions needed, in addition to reducing discomfort and anxiety during painful invasive procedures.²⁵

Thus, this prospective randomized controlled parallel arm trial was conducted with the aim to evaluate the comparison of an audio-visual distraction aid and print format on pain perception, anxiety, and child's behavior in the dental setting.

In the present study, two different distraction methods (Reading a comic book and distraction through PS Playing) were used and their effect on children's pain and anxiety levels during pulp therapy were evaluated. These methods were tested because they require no long-term training, and were thus convenient for application in busy hospital units.

PlayStation as a distraction technique is accessible and efficient method since these games are easily understandable and conveniently available on mobile phones, laptops, digital video cameras, portable multimedia players, and tablets.

During the evaluation, it was seen that, pain and anxiety scores were less in comic reading and PS group. In the evaluation, it was observed that while comparing the groups in terms of the pain and anxiety scores obtained according to the statements of the child,



Fig. 1: Venham picture test

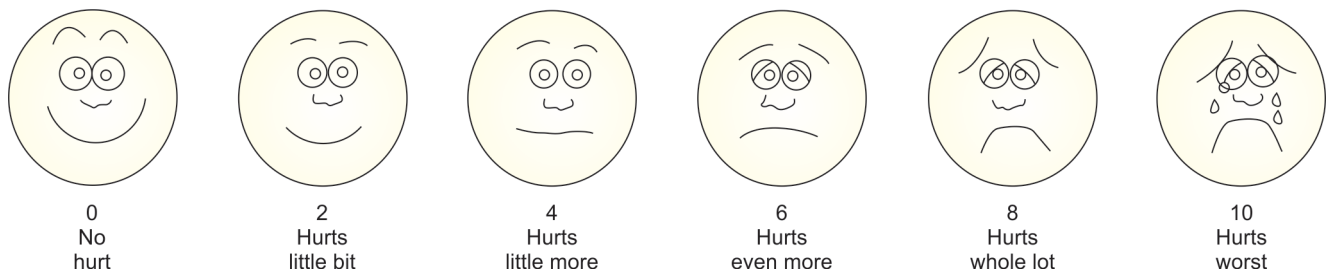


Fig. 2: Wong-baker faces pain rating scale

and the parent, the pain and anxiety scores of the PS group were lower than those of the comic group ($p < 0.05$), and Control groups ($p < 0.05$) (Tables 2 and 3). Similar results were seen in studies done by Inan G et al.²⁴ Study done by Mishra R et al.²⁶ also found out that audio-visual distraction aid reduced level of anxiety and pain, when compare to other aids.

In a study done by A. Al-Khotani et al.²⁷ it was observed that children in audio-visual distraction group (eye-glass system-connected with gaming systems like PS) showed significantly lower MVARS score when compared to control group. In a study done by Patel et al.²⁸ it was observed that children who enjoyed playing hand-held video games had less anxiety during anesthetic

induction when compared to the children who simply had only their parents presence.

Sinha M et al.,²⁹ conducted a study to evaluate nonpharmacologic interventions, such as distraction, as an invaluable adjunct in minimizing pain and anxiety in children facilitating the completion of painful procedures in the pediatric emergency department (ED). Here one of the distraction method used was reading book. It was concluded in the study that using distraction techniques lowers situational anxiety in older children and reduces parental perceptions of pain distress in younger children. Similar results were seen in the present study, pain and anxiety score were less children reading a comic book when compare

Table 2: Descriptive values and ANNOVA comparison

Variable	Control group	Comic group	PlayStation	F-value	p-value
	Mean ± SD	Mean ± SD	Mean ± SD		
Modified Corah Dental Anxiety Scale	18 ± 1.02	13 ± 1.11	7.75 ± 2.14	218.283	0.000*
Wong- Baker Faces Scale	8.5 ± 1.27	6 ± 1.58	2.3 ± 1.6	83.304	0.000*
Venham Picture Test	6.85±.587	5.40±.503	3.15 ± 1.182	100.178	0.000*

*Statistically significant (p < 0.05); NS, Non-significant value (p > 0.05); F- value, ANNOVA test value
Parental perception of patients' anxiety

Table 3: Bonferroni multiple comparisons for MCAS

(I)	(J)	Mean difference (I-J)	Sig.	95% confidence interval	
				Lower bound	Upper bound
Control	Comic	4.697*	0.000	3.49	5.90
	PS	10.197*	0.000	8.99	11.40
Comic	Control	-4.697*	0.000	-5.90	-3.49
	PS	5.500*	0.000	4.31	6.69
PS	Control	-10.197*	0.000	-11.40	-8.99
	Comic	-5.500*	0.000	-6.69	-4.31

*The mean difference is significant at the 0.05 level

Table 4: Multiple comparisons of Venham Picture Test

(I)	(J)	Mean difference (I-J)	Sig.	95% confidence interval	
				Lower bound	Upper bound
Control	Comic	1.442*	0.000	0.79	2.09
	PS	3.692*	0.000	3.04	4.34
Comic	Control	-1.442*	0.000	-2.09	-0.79
	PS	2.250*	0.000	1.61	2.89
PS	Control	-3.692*	0.000	-4.34	-3.04
	Comic	-2.250*	0.000	-2.89	-1.61

*The mean difference is significant at the 0.05 level

Table 5: Bonferroni multiple comparisons for WB scale

(I)	(J)	Mean difference (I-J)	Sig.	95% confidence interval	
				Lower bound	Upper bound
Control	Comic	2.526*	0.000	1.33	3.73
	PS	6.226*	0.000	5.03	7.43
Comic	Control	-2.526*	0.000	-3.73	-1.33
	PS	3.700*	0.000	2.52	4.88
PS	Control	-6.226*	0.000	-7.43	-5.03
	Comic	-3.700*	0.000	-4.88	-2.52

*The mean difference is significant at the 0.05 level

to control group. However, further when multiple comparison was done, it was observed that PS group had less pain and anxiety scores in comparison with Comic Group. (Tables 4 and 5).

The results of the present study differed from previous studies,^{15,30} as significant differences were not found in patients' behavior after the use of audio-visual materials in those studies. Sullivan et al.¹² used a product based on virtual reality. They observed that when children can't see or hear what's going on around them, their anticipation rises. In the present study, patients played with the PS and comic book 3 minutes before the treatment, so at the time

of treatment they could see and hear what was happening around them. This could be one of the reasons of variation in patients behavior in our study. Introducing the intervention 3 minutes prior to treatment was one of the advantages of the study, as children could easily hear or see what was happening around.

A few limitations of our study were that it was conducted at a single center, where dedicated staff and established conditions were very conducive to offer a standardized intervention. The generalizability of the study would have been increased if resident clinicians differing in their levels of training would have performed

the pulp therapy. Self-reported measurement scales of pain intensity and anxiety are also the limiting factors associated with the potential bias.

CONCLUSION

In children using PS gaming procedure the pain and anxiety levels were less when compared to children receiving comic book before the treatment. Use of audio-visual aids distraction with PS during the dental treatment not only minimize distress during the treatment than those without, but also demonstrate a more positive response after local anesthetic injection. This technique helps in improving the quality of management of procedural pain in a pediatric patient. Hence, it was concluded from the study that use of distraction method techniques are very efficient in minimizing situational anxiety and parental perception of pain distress in younger children.

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