Comparative Evaluation of Visual and Taste Distraction Techniques using RMS Pictorial Scale in making of Periapical Radiographs

Parimala Tyagi¹, Shikha Mali², Saumya V Rathi³, Nikita Agrawal⁴, Anup Kumar⁵, Jinu M Abraham⁶

A B S T R A C T

Anxiety is often experienced by children. Various methods of reducing anxiety have been used in dentistry. Amongst this distraction is commonly used.

 Aim: The aim of the study was to compare visual and taste distraction techniques during intraoral periapical radiography in children.

 Materials and methods: This study was an experimental study. The sample size was 60 and they were randomly allocated into group A- No Distraction (n = 20), group B- Taste Distraction with the help of the Lollipop method (n = 20), and group C- Visual Distraction Method with the help of Projector method (n = 20). The child’s anxiety was checked with the help of the RMS Pictorial Scale. The anxiety was assessed before and after taking radiographs in respective groups.

 Result: Student t-test and one-way ANOVA was used to find the significance of study parameters. The highest anxiety reduction (mean difference) was seen in the visual distraction technique followed by taste distraction and no distraction technique.

 Conclusion: Environmental distractions such as visual and taste distraction techniques provide a positive environment and thereby help to reduce the anxiety in the child.

 Keywords: Dental anxiety, Intraoral periapical radiography, Taste distraction, Visual distraction.

J South Asian Assoc Pediatr Dent (2022): 10.5005/p-journals-10077-3219

I N T R O D U C T I O N

The most common routine investigation in the field of dentistry is intraoral periapical radiography. It helps the dentist to establish a diagnosis and thereby provide proper dental care. Poor radiographic results can have an impact on the diagnosis as well as on the treatment protocol which needs to be followed. Therefore, this facilitates the need for optimal interpretation of radiographs.¹

Stress, fear, anxiety, and hopelessness are often experienced by pediatric patients in healthcare settings and even in radiology settings. The child is intimidated by the typical sterile-looking environment and large radiology machines. Distress behavior (e.g., flailing, crying, and moving,) and other stress responses (e.g., talking) is often seen in pediatric patients when they are under stress. This distracts and prevents the operator to make a radiograph.² Moreover operators need to know ways to influence patient cooperation during radiographic procedures, especially in pediatric patients.

A study was conducted and explained that 44% of the radiographs had failed while taking periapical radiography in children. Out of this, 32% of the radiographs could not be interpreted and the rest could still be interpreted.³

Dental anxiety is a state of apprehension in relation to dental treatment. In dentistry, various methods of reducing patient anxiety have been used and distraction is one of them.⁴ Mc Caul and Mallet developed the distraction theory by placing importance on the fact that the attention capacity of humans is narrow. Therefore, awareness of pain decreases when a person’s attention is diverted away from the stimulus.⁵

Getting children to cooperate can be a challenge. Therefore, one may need to use age-appropriate distraction techniques.⁶ There are various distraction techniques such as audio-visual distractions, visual distractions, and taste distractions.⁶ Visual distraction includes creating a new image which causes the mind to divert away and focus less on pain and anxiety thereby reducing it. Similarly, taste distraction provides a way for new stimulus and the mind gets distracted and focuses on the new stimuli leading to lesser pain and anxiety. With this background, the present study had incorporated visual distraction by means of projecting a cartoon and taste distraction by means of the lollipop. Moreover, above mentioned two distraction techniques were compared for anxiety reduction with conventional radiography.
**MATERIAL AND METHODS**

**Study Design**
This study was an in vivo, double-blinded experimental study that was conducted on a convenience sample size of 60 children aged between 5 and 10 years. This experiment was conducted in the Department of Pediatric and Preventive Dentistry, People's College of Dental Science and Research Center, Bhopal. Ethical approval was obtained by the Institutional Research Board (PCDS/ACAD/2021–22/616). Written parental consent and informed consent were taken for every participant.

**Inclusion Criteria**
- Children between the ages 5–10 years who were not ready to take radiographs under normal dental setup
- No previous dental treatment experience
- Those who gave consent for the study.

**Exclusion Criteria**
- Any medically and physically compromised children
- Children who do not require X-ray as a diagnostic aid
- Those who had not given consent for the study.

**Methods**
Initially, 76 children had come to the dental operatory while the study was going on. But out of those 76, 16 children were excluded as they did not meet the inclusion criteria. Then 60 children were randomly allocated into three groups by simple random sampling through the lottery method by the investigator. Group A is the conventional radiography group (n = 20), group B is the taste distraction group via the lollipop method (n = 20) and group C is the visual distraction group via the Projector Method (n = 20). (Flowchart 1)

**Evaluation Method**
The anxiety of the child was assessed through Raghavendra, Madhuri, Sujata (RMS) Pictorial Scale (RMS-PS). It comprises a row of five faces ranging from very happy to very unhappy. Two separate sets of photographs were used for boys and girls. The children were asked to choose the face that relate to their feeling most at that moment. The coinvestigator was unaware of the allocations and hence the anxiety was evaluated by the coinvestigator.

Group A (Fig. 3) that is the conventional group, the child was made seated and was explained about the procedure with the help of the Tell show do technique. Then pre radiographic anxiety was recorded using the RMS Pictorial scale (Figs 1 and 2) followed by an intraoral periapical radiograph was taken via the conventional method. Then postradiographic anxiety was again assessed with the help of the RMS Pictorial Scale. (Figs 1 and 2)

In group B (Fig. 4) the taste distraction was done using the lollipop method. In this, the child’s pre radiographic anxiety was recorded using the RMS Pictorial scale (Figs 1 and 2). This was followed by attaching lollipop to the X-ray film on the lingual side and given to the child to lick. The size of the lollipop for all the age groups was the same. After the child was acquainted with the taste of the lollipop, the investigator took the lollipop and then made an intraoral periapical radiograph. After taking the radiograph, post radiographic anxiety was assessed with the help of the RMS Pictorial Scale (Figs 1 and 2). After the assessment of anxiety, the child was asked to rinse their mouth with fluoride mouth rinse (230 ppm of Sodium Fluoride).

In group C (Fig. 5), the visual distraction was done using the projector method. This pre radiographic anxiety assessment was

---

**Flowchart 1**: CONSORT flow diagram showing the allocation of participants and the research protocol
done using RMS Pictorial Scale (Figs 1 and 2). Then the child was asked about their favorite cartoon. Then that cartoon was projected as a movie clip with the help of a projector as a distraction technique. As the child got acquainted with the environment, then the intraoral periapical radiograph was made. The cartoon was projected prior and while taking radiographs and it was projected in such a way that the cartoon was visible within their sight. Post radiographic anxiety was measured using the same scale (Figs 1 and 2).

There was a minimum waiting period and the appointment was kept as short as possible. While taking radiographs, the parents were asked to sit outside the operatory room. Size 0 intraoral film was used for all the children.

Statistical Analysis
Data were analyzed using SPSS 23.0 version (IBM; Chicago). Variables were expressed as mean, standard deviation, number, and percentages. Paired t-test was applied within each group to find significant differences between the pre and post radiographic phases. One-way ANOVA was run to find intergroup significance. p-value lesser than 0.05 was considered statistically significant.

Results
This study was conducted as an in-vivo experimental study with a total sample size of 60. No significant age difference was noted between the groups in age (p = 0.711). Mean age of conventional, taste Distraction, visual distraction was 6.950 ± 1.669, 7.400 ± 1.818,
Use of Distraction Techniques in making of Periapical Radiographs

Journal of South Asian Association of Pediatric Dentistry, Volume 5 Issue 1 (January–April 2022)

35

Dental radiography is an aid used to assist dentists to conduct examinations, establishing a diagnosis, and arranging appropriate care management. The indication of dental radiographs includes various diseased conditions like caries, periapical abscesses, and periodontal bone loss. However, the placement of intraoral film during periapical radiographic procedures cannot be tolerated by many people, especially children. This can cause dental anxiety in children.

Table 1: Intergroup comparison for pre-anxiety levels amongst the study population

| Groups               | Mean ± S.D | Anova Statistic | df    | Significance value |
|----------------------|------------|-----------------|-------|--------------------|
| Visual distraction   | 3.800 ± 0.833 | 3.675           | 3     | 0.062 (NS)         |
| Taste distraction    | 3.500 ± 0.759 |                |       |                    |
| Conventional distraction | 4.200 ± 0.695 |                |       |                    |

Table 2: Comparison of pre- and post-radiographic anxiety in group A, B and C

| Group  | Pre radiographic mean ± S.D | Post radiographic mean ± S.D | Mean difference | p-value  |
|--------|-----------------------------|-------------------------------|-----------------|----------|
| Group A| 4.200 ± 0.695               | 3.450 ± 0.510                 | 0.750 ± 0.550   | 0.02*    |
| Group B| 3.500 ± 0.759               | 1.700 ± 0.571                 | 1.850 ± 0.587   | 0.000    |
| Group C| 3.800 ± 0.833               | 1.350 ± 0.489                 | 2.450 ± 0.825   | 0.000    |

* p < 0.05, significant; **p < 0.001, highly significant

Discussion

Dental radiography is an aid used to assist dentists to conduct examinations, establishing a diagnosis, and arranging appropriate care management. The indication of dental radiographs includes various diseased conditions like caries, periapical abscesses, and periodontal bone loss. However, the placement of intraoral film during periapical radiographic procedures cannot be tolerated by many people, especially children. This can cause dental anxiety in children.

Table 1 shows that no significant difference was noted between the groups in the preanxiety phase at p = 0.062. There was an insignificant difference in anxiety reduction among girls and boys in different groups.

Table 2 Chart 1 shows pre and postradiographic anxiety in groups A, B, and C. It was seen that in all three groups the postradiographic anxiety was lower as compared to the pre radiographic anxiety. Also, the reduction in anxiety in groups B and C was highly significant (p = 0.000) while in group A it was significant (p = 0.002).

Chart 2 shows an intergroup comparison of mean anxiety levels in groups A, B, and C. It is seen that the mean reduction in anxiety is 0.75 times in group A, 1.85 times in group B, and 2.45 times in group C. Hence, it can be inferred the highest anxiety reduction (mean difference) was seen in the Visual technique (group C) followed by taste distraction (group B) and conventional method (group A).
Use of Distraction Techniques in making of Periapical Radiographs

Usually, it is seen that dental anxiety is a common problem in children. There are two types of anxiety seen in children, one which is to specify dental stimuli (e.g., needle, drill, radiograph machine) and the other one is overall generalized anxiety.4

Ivana Meyer Prado et al. had done a systematic review on various distraction techniques (audio, audio-visual, instruments camouflage, biofeedback, dental operating microscope, toys) concluded that distraction techniques can be effective in managing children’s and adolescent’s dental anxiety and fear during dental treatment.5

In the current study, the age group 5–10 was chosen because, in a study conducted by Chhabra N et al., the prevalence of dental anxiety was 6.3% in the 5–10 years age group, hence this age group was chosen.6 Studies have shown that children over the age of three respond better to dental treatment when parents are not present in the dental operatory.7 As white and pharaoh states that the size of the intraoral periapical radiograph to be used in children is size 0, hence we have used size 0 radiographs.8 Also, in this study RMS pictorial scale had been used because it is colorful, easily understood and the child can relate more to this scale as compared to black and white cartoon figures.9

Distraction techniques can be used to achieve patient’s cooperation and their proper use can be very effective. To gain confidence, a child should be exposed slowly to a new stimulus. This technique can be accurately described by “Lollipop radiography” and Visual Distraction Radiography by “Projector method.”10

In a study done by Rahul Mishra et al., the author had compared anxiety levels between audio-visual distraction with the help of chair-mounted monitors playing the clip and audio distraction with the help of earphones. It was seen that both groups had decreased the anxiety but the audio-visual distraction group was better. Similarly, in the current study, it was seen that both the distraction groups had reduced anxiety as compared with the conventional group.11

The results revealed that the taste distraction group was better when compared with the conventional radiography and these results were in accordance with a study done by APW Monika et al. in which the authors have compared the lollipop method of radiography with the conventional method of radiography and have also checked for the quality of radiographs. So the authors have found that the lollipop method of radiography is better than the conventional one and also the quality of radiographs is better when lollipop was used as a helping aid.12

Anxiety reduction (mean difference) in group A, B, and C.

In the presented study, distractions were beneficial in reducing anxiety and also projector method was found to be superior when compared with others. These results were in accordance with the study done by Xiabo Quan et al. the author had compared no distraction, minimal distraction with the help of light, and distraction with the help of light and animation. The animation was done with the help of the Projector method where cartoon or positive photograph was displayed. It was seen that there was a reduction in anxiety of children due to distraction and more reduction was with the help of light and animation. Due to this, it was seen that parents were willing to return with their children and to recommend others to them.13

The result revealed that the visual distraction group had higher mean anxiety reduction and these results were consistent with the study done by S. Ghadimi et al., where the author had compared the visual distraction technique with the conventional tell show do technique and it was seen that there was more anxiety reduction in the visual distraction group than in the tell show do technique.14

The advantage of visual and taste distraction is that it diverts the child’s mind from anxious stimuli thereby allowing to do the procedure easily. While if we use the distraction technique in the first visit, then we must continue it in every visit otherwise the child won’t allow continuing with the procedure.15

There is no literature available comparing the visual distraction and taste distraction technique while making an intraoral periapical radiograph in children. Hence we have done this study and we found that both the distraction techniques were found to be very effective in relation to handling patients with visual distraction being better than taste distraction technique.

Limitations

The scale used is the self-reported anxiety scale whose reliability depends on the patient. Since the sample size which was taken was very small so more studies need to be done with a greater sample size to be conclusive of this study.

Conclusion

Distraction techniques are a win-win situation when used appropriately for children, families, and healthcare professionals. Environmental distractions such as visual and taste distraction techniques provide a positive environment and make the procedures less stressful. The present study suggested that visual
Use of Distraction Techniques in making of Periapical Radiographs

distraction techniques through the projector method can be offered to children as they are easy to implement, portable, and effective methods to reduce anxiety.

Future Directions
This study will enable clinicians to take radiographs in anxious children with minimal intervention. Also, this study is cost-effective and materials are readily available in the market.

References
1. W Monika, AstutiER, Mulyan WM. The quality of the lollipops use in the making of the anterior upper teeth periapical radiography of in paediatric patients. Eurasia J Biosc 2020;14:4049–4053.
2. Quan X, Joseph A, Nanda U, et al. Improving pediatric radiography patient stress, mood, and parental satisfaction through positive environmental distractions: a randomized control trial. J Pediatr Nurs 2016;31(1):e11–22. DOI: 10.1016/j.pedn.2015.08.004
3. Salami A, Halabi MA, Hussein I, et al. An audit on the quality of intra-oral digital radiographs taken in a postgraduate pediatric dentistry setting. OHDM 2017;16(1):13.
4. Allani S, Dr. Setty VJ. Effectiveness of distraction techniques in the management of anxious children in the dental operatory. IOSR-JDMS 2016;15(10):69–73. DOI: 10.9790/0853-1510026973
5. McCaul KD, Malott JM. Distraction and coping with pain. Psychol Bull 1984;95(3):516–533. DOI: 10.1037/0033-2909.95.3.516
6. Martin V. Using distraction techniques with children. Nursing 2013;43(11):68. DOI: 10.1097/01.nurse.0000435210.11271.c1
7. Shetty RM, Khandelwal M, Rath S. RMS pictorial scale (RMS-PS): an innovative scale for the assessment of child’s dental anxiety. J Indian Soc Pedod Prev Dent 2015;33(1):48–52. DOI: 10.4103/0970-4388.149006
8. Chiri R, Awan S, Archibald S, Abbott PV. Parental knowledge and attitudes towards dental radiography for children. Aust Dent J 2013;58(2):163–169. DOI: 10.1111/adj.12041
9. Gupta A, Devi P, Srivastava R, et al. Intra oral periapical radiography - basics yet intriguing: a review. Bangladesh Journal of Dental Research & Education 2017;4(2):83. DOI: 10.3329/bjdre.v4i2.20255
10. Pradol M, Carcavalli L, Abreu LG, et al. Use of distraction techniques for the management of anxiety and fear in pediatric dental practice: a systematic review of randomized controlled trials. Int J Paediatr Dent 2019;29:650–668. DOI: 10.1111/ipd.12499
11. Chhabra N, Chhabra A, Walia G. Prevalence of dental anxiety and fear among five to ten year old children: a behaviour based cross sectional study. Minerva Stomatol 2012;61:83–9.
12. Cox IC, Krikken JB, Veerkamp JS. Influence of parental presence on the child’s perception of, and behaviour, during dental treatment. Eur Arch Paediatr Dent 2011;12:200–204. DOI: 10.1007/BF03262807
13. Sanjay Mallya, Ernest Lam. White and Pharoah Oral Radiology: Principles and Interpretation. 8th edition. 2018.
14. Mishra R, Singh AK, Singh P. A comparison of audio and audio-visual distraction techniques in managing dental anxiety in pediatric patients: a clinical study. Int J Med Res Prof. 2019; 5(3): 88–91. DOI:10.21276/ijmrp.2019.5.3.019
15. Ghadimi S, Estaki Z, Rahbar P, et al. Effect of visual distraction on children’s anxiety during dental treatment: a crossover randomized clinical trial. Eur Arch Paediatr Dent 2018;19(4):239–244. DOI: 10.1007/s40368-018-0352-x
16. Venham LL, Goldstein M, Gaulin-Kremer E, et al. Effectiveness of a distraction technique in managing young dental patients. Pediatr Dent 1981;3(1):7–11.