Evaluation of the Effect of a Dental Simulation App on Anxiety in Pediatric Dental Patients Undergoing Restorative Treatment: A Randomized Controlled Trial

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ABSTRACT

Aim: This study aimed to explore the impact of a dental treatment simulation app on anxiety levels in pediatric dental patients.

Materials and Methods: A total of thirty children, aged 4 to 8 years old and without previous dental experiences, were randomly divided into two groups: the control group (Group I) and the dental app group (Group II). Anxiety levels were assessed before and after restorative dental treatment using the RMS pictorial scale (RMS-PS).

Results: Both groups displayed similar initial anxiety levels. However, post-treatment analysis revealed that the dental app group experienced a significant reduction in anxiety compared to the control group. This finding indicates that the simulation app effectively alleviates dental anxiety in children.

Conclusion: The dental treatment simulation app proves to be effective in reducing both pre- and postoperative anxiety in pediatric patients, potentially improving their overall dental experience.

INTRODUCTION

Dental anxiety is a prevalent concern among children, often complicating the provision of effective dental care.[1] Children who experience significant dental anxiety might sidestep visits to the dentist, which can lead to negative impacts on their oral health. While traditional methods to alleviate anxiety, like behavioral strategies and medications, have had varying results, they also come with drawbacks and potential side effects.[2] However, recent advancements in digital technology have opened up new ways to tackle this challenge. One such development involves mobile applications designed to prepare children for dental visits through engaging simulations. These apps can visually walk kids through various dental procedures, helping them grasp what to expect and ultimately easing their fear of the unfamiliar.[3-5]

The dental treatment simulation app is crafted to alleviate dental anxiety in young patients by providing them with a friendly introduction to common dental procedures. With its vibrant illustrations, easy-to-understand language, and interactive elements, the app is both engaging and accessible for little ones. This study aimed to assess how effectively this app reduces anxiety in pediatric patients undergoing restorative dental treatments.[6-8]

Material and Method

Participants: A total of thirty children, aged 4 to 8 years, with no prior dental experiences, were recruited for the study. They were randomly assigned to two groups: the control group (Group I) and the dental app group (Group II).

Study Design: This study utilized a randomized controlled trial framework to evaluate the impact of a dental treatment

simulation app on anxiety levels in pediatric patients undergoing restorative dental procedures.

Interventions:

- **Control Group (Group I):** This group received standard dental care without the use of the dental simulation app.
- **Dental Simulation Group (Group II):** Participants in this group interacted with the dental treatment simulation app (Doctor Dentist: Animal Clinic) prior to their dental treatment which included introductions to common dental procedures through colorful illustrations and engaging interactive features.

Procedure: Before any treatment or interaction with the app, initial anxiety levels for each child were measured using the pictorial scale. In the control group, participants received a standard verbal briefing about the dental procedure through the tell-show-do technique. In contrast, the dental app group interacted with the dental treatment simulation app for 15 minutes prior to their dental procedure. Regardless of the group, all children underwent the same restorative dental treatment.

Anxiety Assessment: The children's anxiety levels were measured before and after the restorative dental treatment using the Raghavendra, Madhuri, Sujata (RMS) Pictorial Scale (RMS-PS). The RMS-PS features original photographs of both a boy and a girl, taken with parental permission. Parents were informed about the pictorial scale, and consent was obtained for using images of their children in the study. The RMS-PS consists of a series of five faces, ranging from very happy to very unhappy. Separate sets of photographs were prepared for boys **(Fig 1)** and girls **(Fig 2)**. Children were asked to select the face that best represented how they felt at that moment. The scale was scored by assigning a value of one to the very happy face and five to the very unhappy face.[9,10]

Data Analysis: Anxiety levels were compared between groups by analyzing the pre- and post-treatment RMS scores. Statistical methods were employed to determine significant differences in anxiety levels between the two groups after treatment.

Ethical Considerations: Ethical approval for the study was obtained, and informed consent was secured from the parents or guardians of all participants prior to their inclusion in the study.
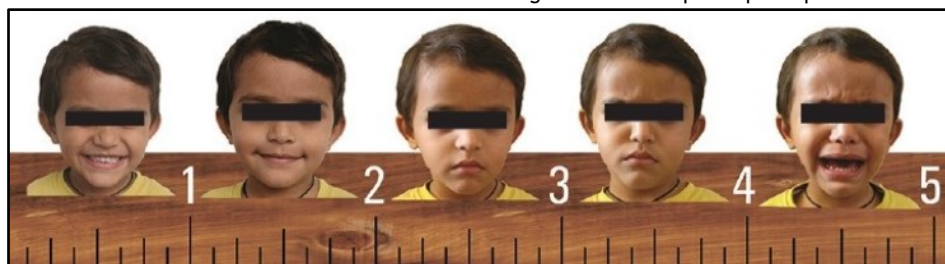

Figure 1: RMS Pictorial Scale for Boys

Figure 2: RMS Pictorial Scale for Girls

1. Result:

The initial assessment revealed no substantial difference (P > 0.05) in anxiety levels between the two groups, suggesting they started out similarly. However, the group using the dental app experienced a notable reduction in anxiety post-treatment when compared to the control group (P < 0.05). Moreover, significant differences were observed within group II during the intragroup analysis **(Table 1).**

Table 1: Inter Group Comparison of Mean Anxiety Level				
Groups	N	Pre-treatment anxiety	Post-treatment anxiety	P value
Control Group	15	3.2 ± 0.15	3.5 ± 0.20	> 0.05
Dental Simulation Group	15	3.4 ± 0.10	1.6 ± 0.10	< 0.001*
P value		p > 0.05	p < 0.05*	

* Significant

DISCUSSION

Dental pain and anxiety go hand in hand, often leading to negative oral health outcomes since individuals might shy away from essential treatments and display heightened stress during procedures.[11,12] For pediatric patients, restoring decayed teeth is a standard practice, yet the process can be filled with distressing steps, sometimes resulting in longer treatments and increased anxiety.[13] A dental simulation app offers a solution by helping children familiarize themselves with various dental procedures and tools, thereby easing their fears about the unknown. Consequently, this study aimed to evaluate how exposure to the Dental Simulation affects anxiety levels in comparison to traditional methods during restorative treatment for children aged 4 to 8 years.

The findings of this study highlight the significant role of technology, specifically a dental treatment simulation app, in reducing anxiety among pediatric dental patients. Dental anxiety is a common issue among children, often leading to avoidance of dental care and poor oral health outcomes. By integrating the simulation app into the dental experience, practitioners can help young patients confront their fears in a controlled, engaging manner.

The results indicated that children who used the simulation app exhibited a notable decrease in anxiety levels following treatment, contrasting with the control group that did not benefit from such preparation. This suggests that familiarizing children with dental procedures before they undergo actual treatment can lessen their anxiety. The visual and interactive features of the app likely made dental scenarios less intimidating, providing children with a sense of control and understanding.

Moreover, the application aligns well with the developmental needs of children aged 4 to 8 years, as it employs imagery and interaction that appeal to this age group. This approach can not

only alleviate immediate anxiety but may also contribute to a more positive perception of dental visits in the long term, encouraging regular dental attendance and improving overall oral health.

Further studies could investigate the specific features of the app that are most effective in reducing anxiety. It might also be beneficial to explore how this technology could be adapted for different age ranges, or even for patients with special needs, to ensure accessibility to all children.

CONCLUSION

In conclusion, the dental treatment simulation app serves as a promising tool in pediatric dentistry, fostering a more supportive environment for young patients. Continued innovation and research in this area may lead to even greater advancements in managing dental anxiety and enhancing the overall dental experience for children.

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