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The Role of the Educational Program in Reducing the Child's Anxiety at the Dentist

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Abstract

The objective of the study was to create and implement an educational program with the aim of reducing children's anxiety at the dentist. The study began with the hypothesis that the implementation of an educational program can lead to a decrease in the level of dental anxiety among children. The sample included 196 children (experimental group of 95 children and control group of 101 children), primary school pupils. The educational program was structured in the form of twelve PowerPoint presentations, focusing on three essential themes. These were: the importance of oral hygiene, methods and techniques used for good oral hygiene and the role of nutrition in maintaining healthy teeth. The methods used were the questionnaire, PowerPoint presentations, semi-structured interviews, demonstrations and exercises. A questionnaire was applied and saliva was taken to determine immunoglobulin A, both at the beginning and at the end of the study. In the experimental group,

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there were statistically significant differences between the initial and final results of both the questionnaire and immunoglobulin A testing ($p<0.05$). There were no statistically significant differences in the control group ($p>0.05$). Following the interpretation of the results, the hypothesis was confirmed according to which the implementation of an educational program can lead to a decrease in the level of dental anxiety in children.

Keywords: School children, dental anxiety, immunoglobulin A, educational program

Introduction

Dental anxiety and fear-related behaviors are challenging aspects of pediatric dentistry (Majstorovic & Veerkamp, 2004). The association of dental anxiety with poor oral health makes the intervention of the dentist necessary in the identification and treatment of children's dental problems from an early stage. Although there are a number of methods available to the dentist, successfully managing the dental procedure for a child with dental anxiety takes time, effort and experience (Ashkenazi et al., 2002).

Dental anxiety sometimes leads to a range of uncooperative or disruptive behaviors before or during dental procedures, called dental behavior management problems. These lead to stressful and unpleasant experiences for both the child and the dentist (Buchanan & Niven, 2002). Additionally, dental anxiety has been shown to have a consistent impact on pain throughout dental treatment, and this type of anxiety, respectively dental behavior management problems are associated with children's dental caries, resulting in a vicious cycle (Lin et al., 2017, Alsadat et al., 2018).

Dental anxiety ranges from very low to high and interacts with the urgency of dental treatment. Therefore, different approaches to reducing anxiety should be correlated with the level of anxiety (Armfield & Heaton, 2013, Newton et al., 2012). Although pharmacological interventions may be used to manage high anxiety, such as anesthesia or sedation, dentists generally use communication, behavioral and psychological techniques to manage high or moderate dental anxiety in children and to achieve a high quality of dental treatment. These include methods and techniques such as *Tell-Show-Do*, voice control, distraction, music, educational programs, modeling and restraint (Goettems et al., 2017). Of these methods, some require specialist training, others cause psychological trauma to children and most are initiated only before or during dental treatment.

Experiential learning is an innovative learning technique by which knowledge or skills are acquired through the experience of participating in real or simulated practical activities. This is based on the theory that one can generalize an experience through reflective observation and then move on to

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action. Active and personalized learning are components of experiential learning (Kolb, 2014).

Experiential learning has been used effectively in improving knowledge, attitude and behavior change in health education and has recently been introduced to promote children's oral health, resulting in better oral hygiene (Matthews et al., 2014, Angelopoulou et al., 2015).

Material and Methods

This experimental study was conducted between September 2019 and February 2020 in a group of 196 children (experimental group of 95 children and control group of 101 children). The children are pupils of the "Nicolae Balcescu" Secondary School in Târgu Mureș. Inclusion criteria were age between 6 and 11 years, urban environment and similar socio-economic status. Non-cooperative children, those undergoing drug treatment and children whose parents did not agree to participate in the study were excluded from the study.

The PowerPoint presentations on the importance of oral hygiene covered topics related to: the morphology of the teeth, the appearance of caries and the reasons behind this process, as well as the importance of periodic control and the consequences of postponing dental treatment.

To maintain good oral health, the correct brushing technique and the use of dental floss were presented. It was explained to the children the need to brush their teeth regularly and the consequences of not following oral hygiene rules. With the help of dental models, the correct brushing was exemplified, after which the children demonstrated that they understood the technique. There have been discussions about the need to floss to clean the interdental areas. These activities sought to enhance children's understanding of the importance of oral hygiene to eliminate the risk of tooth decay.

The PowerPoint presentations were followed by the virtual tour of the dental office, with the aim of familiarizing the children with the instrumentation and how it works. Following the activities carried out, "doctor-patient" role playing games were organized in which the children imitated the use of dental instruments and discussions were held about the benefits of visiting the dental office.

Regarding the importance of nutrition for healthy teeth, the foods that form the basis of a balanced diet and provide an optimal intake of nutrients have been presented. Children were explained the consequences of excessive consumption of sweets, as well as the importance of eating fruits and vegetables.

A questionnaire was applied to the children at the beginning and at the end of the educational program. It included 10 questions (nine closed questions and one open question) that looked at the children's perception of

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the dental act. At the same time, both at the beginning of the educational program and at the end of it, saliva was collected in order to determine immunoglobulin A. Saliva samples were taken from a number of 150 children (experimental group of 75 children and control group of 75 children), because 46 of the parents did not give their consent for this.

The saliva samples were collected between 10 A.M. and 11 A.M., approximately two hours after the children had eaten and consisted of approximately 2 ml saliva stored at -20˚C until evaluation. Special sterile containers (Sali-Tubes) were used for collection, and the oral cavity was rinsed with water 5 minutes before sampling.

The measurements were conducted using the Salivary IgA ELISA Assay Kit (DRG Instruments GmbH, Marburg, Germany) according to the manufacturer's instructions and took place at the Advanced Center for Medical and Pharmaceutical Research in Târgu Mureș. The range of detection varied between 22.20 and 94.95 µg/mL for the experimental group, and for the control group between 22.54 and 95.07 µg/mL.

The results were evaluated using the GraphPad Prism 8 for Windows (GraphPad Software, San Diego, CA, USA). The collected data was analyzed using the non-parametric qualitative chi-square test and the Student's t-test. The level of statistical significance was set to 0.05 ($p<0.05$).

Results

In the experimental group, the number of children who went to the dentist for control or treatment of simple caries increased from 26.32%, before the program, to 45.26%, after the program ($p=0.01$) *(Figure 1)*.

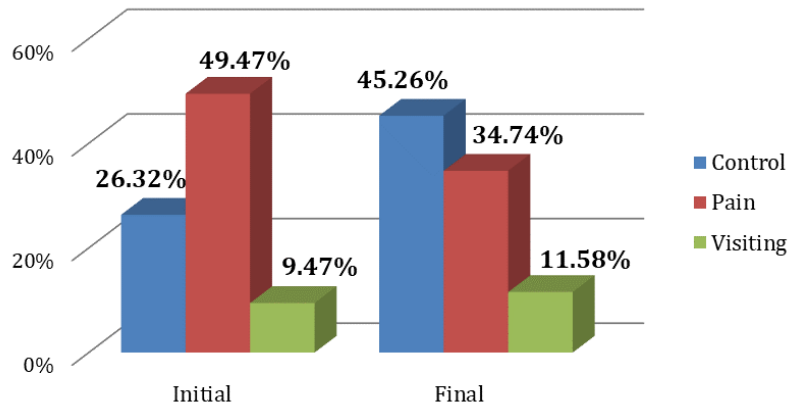

Figure 1. Distribution of answers regarding the purpose of the first visit to the dentist *(Experimental Group)*

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In the case of fear of medical equipment, the percentage of children who fear it has decreased (64.21% compared to 23.16%, *p*=0.0001). Also, when asked about the fear of injection, the percentage of children who show fear decreased (70.53% compared to 21.05%, *p*=0.0001) *(Figure 2 and 3).*

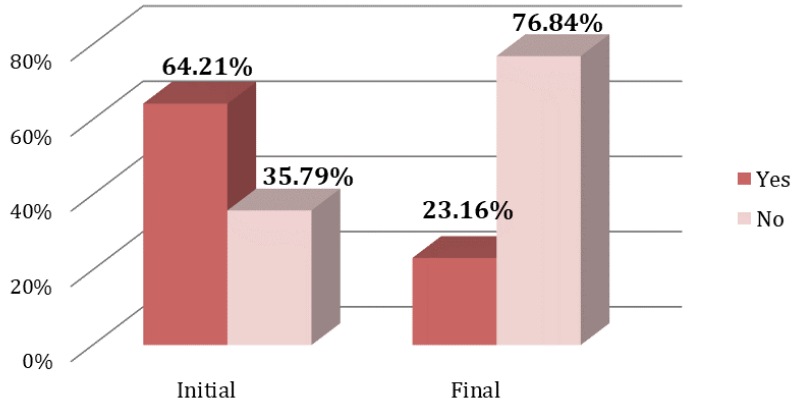

Figure 2. Distribution of responses regarding fear of medical equipment *(Experimental Group)*

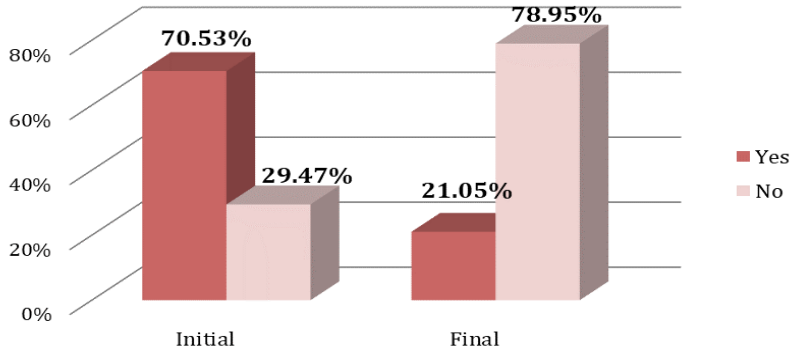

Figure 3. Distribution of responses regarding fear of injection *(Experimental Group)*

When asked about the intention to visit the dentist's office, the number of children who want to go to the dentist weekly increased (from 15.79% to 29.47%, *p*=0.03), same for those who want to visit the dental office monthly (from 18.95% to 48.42%, *p*=0.002) *(Figure 4).*

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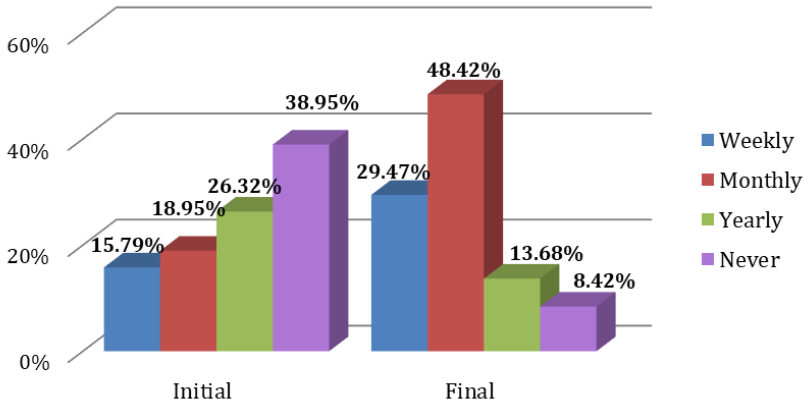

Figure 4. Distribution of answers regarding the intention to visit the dental office *(Experimental Group)*

At the end of the educational program, the number of children who declared that they no longer have dental problems increased by 20% (p=0.007) *(Figure 5).*

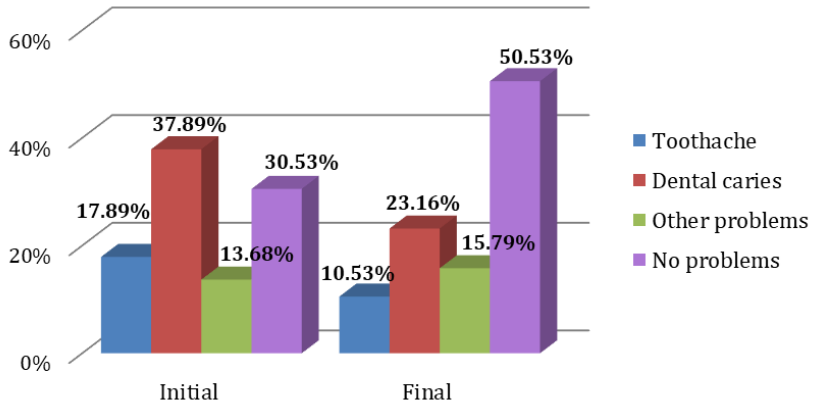

Figure 5. Distribution of responses regarding current dental problems *(Experimental Group)*

There were no statistically significant differences in the control group (p>0.05).

Immunoglobulin A values in the experimental group showed statistically significant differences, following the educational program (p=0.0001) *(Figure 6).*

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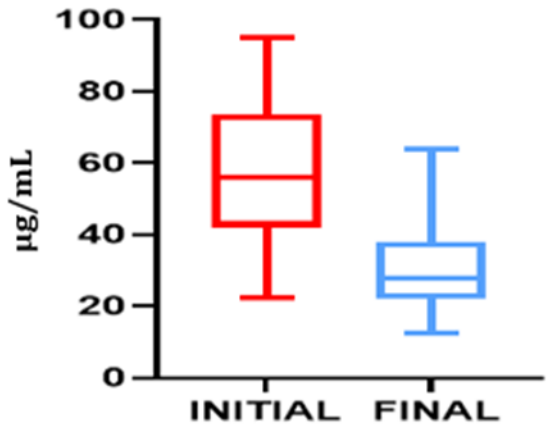

Figure 6. Distribution of immunoglobulin A values *(Experimental Group)*

There were no statistically significant differences in the control group (p=0.11) *(Figure 7).*

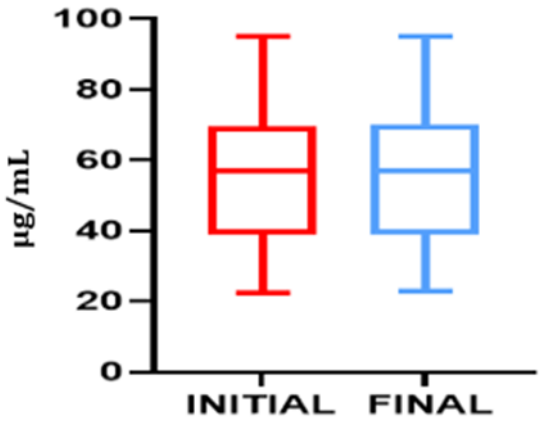

Figure 7. Distribution of immunoglobulin A values *(Control Group)*

Discussion

In order to identify the level of children's anxiety at the dentist, the children's responses to the questionnaire and the values of the salivary biomarker IgA were compared. The efficiency of the educational program was demonstrated by the statistically significant differences recorded in the experimental group, between the initial and final results.

It has been shown that fear of dental instruments can be reduced by introducing them and role playing with them. Thus, the percentage of children who are afraid of dental instruments has decreased. Also, the children's answers showed that at the end of the educational program, the number of those who fear getting an injection decreased. This idea also emerges from the children's answers to the open question of the questionnaire (question number 10 "Write three reasons why you would not want to go to the dentist").

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Initially, the children stated that the reasons why they would not want to go to the dentist are the fear of injections, the smell in the dental office and the noise produced by the dental equipment. After the educational program, many children no longer answered this question. Similar results were also reported by Zhu et al. (2020) who showed that experiential learning at school, prior to the dental visit, is feasible and effective in reducing children's dental anxiety during dental treatment.

The children were introduced to both dental instruments and procedures and were invited to role play in a simulated dental office. They were also allowed to familiarize themselves with dental instruments and simulate dental procedures. Radhakrishna et al. (2019) showed that modifying the *Tell-Show-Do* technique, by adding a learning through play component, led to lower dental anxiety scores.

As a result of the educational program, the number of children who went to the dentist for control or treatment of simple caries increased. Also, the number of children who want to visit the dental office every month has also increased. The results recorded at the end of the educational program showed that following the gradual familiarization with the instruments and the atmosphere in the dental office, the level of dental anxiety among children in the experimental group decreased. A similar idea is found in a study by Alaki et al. (2017). They showed that children who come to the dentist for the first time may show anxiety before the consultation. There are also situations where returning patients may have higher levels of anxiety than new patients if they have had a traumatic dental experience.

Comparing the initial and final results of the questionnaire applied to the control group, it was observed that there were no statistically significant differences. The fidelity of children's answers to the questionnaire is confirmed by the results of immunoglobulin A, which indicated lower values at the end of the experiment in the experimental group. Ohura et al. (2012) showed that the salivary biomarker IgA indicated a significant increase in dental treatment stress compared to alpha-amylase.

It is necessary to create and implement educational programs addressed to children and parents, for them to understand the need to respect oral hygiene and the importance of regular dental check-ups. The progress of dental medicine, both in terms of equipping dental offices with modern equipment and advanced working techniques, combined with a friendly attitude of the dentist, contributes to the increase in the number of those who will trust the dental act. These will help to reduce the fear, and can greatly contribute to its disappearance.

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Conclusion

The final answers of the children in the experimental group showed that following the educational program it increased the desire to go to the dentist more often. The children understood the need to visit the dentist, even just for a check-up, and the importance of treating caries in the early stages. Through the presentations and discussions that followed, the children discovered the importance of following the rules of oral hygiene and a proper diet for good oral health. The children's responses showed that the fear of medical equipment and injections decreased. Results of the salivary biomarker IgA showed the same decreasing trends in the number of children who fear the dental act.

In the control group, the initial results were similar to the initial results of the children in the experimental group. In the absence of the educational program, there were no statistically significant differences between the final and initial results.

The hypothesis was confirmed by the results of the study which showed that educational programs carried out in schools or dental offices can influence children's perception of the dental act, leading to a decrease in anxiety among them.

Human Studies

The study was conducted according to the Declaration of Helsinki and was approved by the Ethics Committee of the George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Târgu Mureș (No. 520/21.11.2019). Written consent was signed by parents or legal representatives, and children were also asked if they agreed to participate in this study.

Conflicts of Interest: The authors declare no conflict of interest.

Funding Statement: The authors did not obtain funding for this study.

Data Availability: All of the data are available in the content of the paper.

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