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Research Article

Choosing a Method for Correcting Anxiety in Children Aged 4 - 12 Years Before Dental Treatment

IA Nikolskaya[1], EN Anisimova[2], IS Kopetsky[1], N Yu Anisimova[2] and VA Katyukhina[1]*

[1]Pirogov Russian National Research Medical University, Ministry of Health of the Russian Federation, Russia

[2]Federal State Budgetary Educational Institution of Higher Education " Russian Biotechnological University (ROSBIOTECH), Russia

***Corresponding Author:** VA Katyukhina, Department of Therapeutic Dentistry, Pirogov Russian National Research Medical University, Ministry of Health of the Russian Federation, Russia.

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Abstract

Relevance: Many children have anxiety and fear at the very thought of visiting a dentist. Children do not make contact with a doctor, refuse to perform dental manipulations, express their emotions vividly, or withdraw into themselves. In addition, in a state of anxiety, the work of many organ systems changes, and an increase in heart rate is the most common indicator. As a result, such patients refuse to visit-the dentist, which worsens the state of oral health. Alternatively, dental procedures for unadapted patients are performed under anesthesia or sedation. But doctors do not have a proven algorithm for diagnosing a child's anxiety level and how to correct this condition for safe and effective dental treatment.

Aim: Clinical-and functional justification of the choice of a method for correcting anxiety in children aged 4 - 12 years in an outpatient dental appointment.

Materials and Methods: From 2019 - 2024 years, a study was conducted, in which 986 children aged 4 - 12 years participated. Before the start of the examination, general somatic and psychological anamnesis of patients was collected. The level of anxiety of children from 4 to 6 years of age was determined using the" test of child anxiety "by R.Temml, M.Dorka, V.Amen; from 7 to 12 years of age-the" Scale of explicit anxiety CMAS" in the adaptation of A.M.. Parishioners. Hemodynamic parameters (HR and SpO_2) were measured Choice MMed using a Choice MMed 300C5 pediatric pulse oximeter. All patients underwent a dental examination of the oral cavity and the degree of caries activity was determined by T.F. Vinogradova. Based on the results of the examination methods, a decision was made on the further strategy of working with the patient (treatment with the support-of an anesthesiologist or the use of art-therapy as a method of psycho-emotional correction).

Results: According to the results of psychological testing, all patients were divided into three groups: low-level (19.2%), medium-level (52.4%) and high-level anxiety (28.4%). Almost all children with low levels of anxiety had their heart rate within the age norm (86.9%). This group also showed the highest percentage of patients with compensated caries activity (51.9%). Children with a high level of anxiety showed moderate and severe tachycardia (38.8% and 61.2%, respectively), and 62.2% of the subjects in this group showed a decompensated degree of caries activity. Patients with low levels of anxiety required less psychological correction, than children with medium and high levels. Based on the results of our study, a computerized program "Determining the method of correcting anxiety in children before dental treatment" was developed, which will help dentists determine the tactics of working with children's patients before dental manipulations.

Conclusion: Thus, to improve the quality and safety of dental care for children, on the basis of a comprehensive psychological and functional examination, a digital program "Determining the method of correcting anxiety in children before dental treatment" was developed.

Keywords: *Anxiety; Adaptation; Heart Rate; Art Therapy; Degree of Caries Activity*

Introduction

Fear and anxiety before dental treatment are experienced by many people around the world. This is a normal reaction of the body to threatening or unknown influences, which helps the body to mobilize psychological reserves. But for children, going to the dentist's office is very stressful, which they can't cope with on their own. Many studies show that the prevalence of dental anxiety among children varies from 5 to 20% [1-4].

The etiology of anxiety is multi-factorial and consists of personal and indirect experience, psychological characteristics, susceptibility to stressful situations, etc. [5]. The clinical manifestation of anxiety consists of emotional, motor neurohumoral, and vegetative-somatic components [6]. Emotional includes strong subjective experiences, which some children vividly demonstrate by crying and shouting, others- by isolation and detachment. Increased muscle tone, motor arousal, or, conversely, blockage of muscle activity are motor manifestations. Hormonal changes in anxiety are characterized by increased levels of ACTH, cortisol, and other hormones [7]. The autonomic-somatic component is expressed in changes in the functioning of organ systems that are controlled by the sympathetic and parasympathetic nervous systems. An increase in the heart rate is the most common indicator of anxiety and fear [8]. In a study by Shindova MP., *et al*. we found a correlation indicating that the degree of self-reported anxiety as a subjective method of assessing psychological state is comparable to the heart rate as an indicator of stress [9]. In the study of Alghareeb Z., *et al*. significant increases in heart rate were also noted in patients with high dental anxiety [10].

All of the above reactions can be observed even before entering the dentist's office. Patients don't make contact with the doctor, and in the case of compulsory treatment, they form a negative experience, thereby increasing dental anxiety. As a result, children often refuse to attend preventive dental appointments, which leads to poor oral health [11].

Alternatively, these patients are treated under anesthesia or sedation. But, do not forget that the anesthetic risk exceeds the risk from dental intervention. The goal of every dentist should be to treat patients safely and effectively. The problem is that there is no verified algorithm for dentists to determine the level of anxiety of a child, and in which case it is necessary to prescribe dental treatment under general anesthesia.

It is customary to use psychological testing to diagnose children's anxiety. There are many different questionnaires and scales available in the literature. For a quick and accurate diagnosis, you should choose tests that are suitable for the child's age, simple and understandable in performing and analyzing the result, as well as those that have passed standardization in Russia. Psychological methods should be supported by objective indicators (for example, heart rate data). Only on the basis of a comprehensive diagnosis of the patient will we be able to choose further tactics for working with them [12].

Purpose of the Study

Clinical and functional justification of the choice of a method for correcting anxiety in children aged 4 - 12 years in an outpatient dental appointment

Materials and Methods

From 2019 - 2024 years were examined 986 children (482 boys and 504 girls) aged 4 - 12 years, including 472 children aged 4 to 6 years and 514 children aged 7 to 12 years. The inclusion criterion for the study was children aged 4 - 12 years with varying degrees of anxiety before dental treatment. Non-inclusion criteria include the presence of bronchial asthma, diabetes mellitus, mental retardation, children with physical disabilities and an established psychiatric diagnosis. The exclusion criterion is unwillingness to continue participating in the study.

Before starting the examination, the general somatic and psychological history of patients was collected using developed questionnaires for parents, consisting of key questions about the child's condition and behavior when visiting a dentist.

The next step was to determine the patient's level of anxiety. For children from 4 to 6 years of age, the "Child Anxiety Test" was chosen by R. Temml, M. Dorka, and V. Amen. Children aged from 7 to 12 years were assessed for their level of anxiety using the "Explicit Anxiety Scale CMAS" adapted by A. M. Prikhozhan. According to the results of psychological testing, all patients were divided into three groups: those with a low level of anxiety, medium and high.

The heart rate and blood oxygen saturation level were determined using ChoiceMMeda ChoiceMMed 300C5 pediatric pulse oximeter. The correspondence of the obtained parameters with the age norm, moderate or severe tachycardia was checked according to the protocol of the CSSSA of the FMBA of Russia.

All patients underwent a dental examination of the oral cavity, the CPI index was calculated, and the degree of caries activity was determined by T. F. Vinogradova.

After analyzing the results of all methods of examination, a decision was made on the further algorithm of actions for safe and effective correction of anxiety and rehabilitation of the oral cavity of patients. As a method of psychological correction, was chosen art therapy, using neurographics-a method of organizing thinking and transforming the psycho-emotional state. Using markers, colored markers, and pencils, the child spent 15 - 20 minutes drawing neurographic lines and coloring the resulting fragments, thereby forming new neural connections.

The Wilcoxon test was used to determine statistical differences. Differences between independent samples were compared using nonparametric Mann-Whitney criteria and two-sample Kolmogorov-Smirnov criteria.

Results and their Discussion

According to the results of R. Temml's "Child Anxiety Test" and the "CMAS Scale of explicit anxiety CMAS", a low level of anxiety was detected in 19.2% of the subjects, an average level was observed in 52.4% and a high level in 28.4%, respectively (Diagram 1).

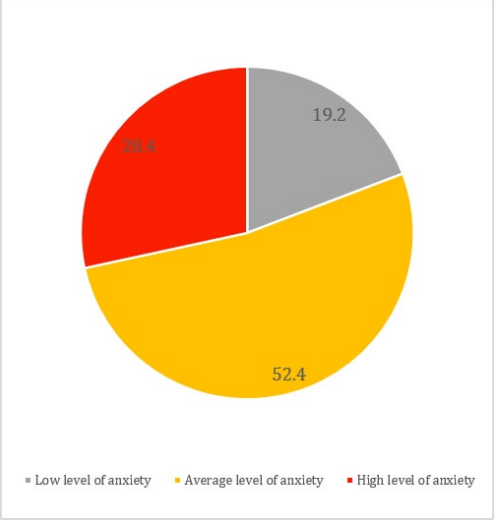

Diagram 1: *Distribution of children according to the results of psychological testing.*

In the group of children with a low level of anxiety, only 13.1% had moderate tachycardia, while the remaining 86.9% had heart rate indicators within the age norm. In this group, the compensated degree of caries activity was found in 51.9%, subcompensated in 33.3% and decompensated was the lowest percentage - 14.8%.

Among children with an average level of anxiety, the heart rate was within the normal range in 10.1%. 56.8% showed moderate tachycardia, and 33.1% - severe. The compensated degree of caries activity was determined in 14.1%, subcompensated in 54.4%, and decompensated in 31.5%.

The group with a high level of anxiety had the highest percentage of patients with severe tachycardia - 61.2%, the remaining 38.8% had moderate tachycardia. Also in this group, the largest percentage of children with a decompensated degree of caries activity was identified - 62.2%. 28.9% had a subcompensated degree of caries activity and only 8.9% had a compensated one. Diagram 2 and 3 graphically represent the results obtained in groups with low, medium, and high levels of anxiety.

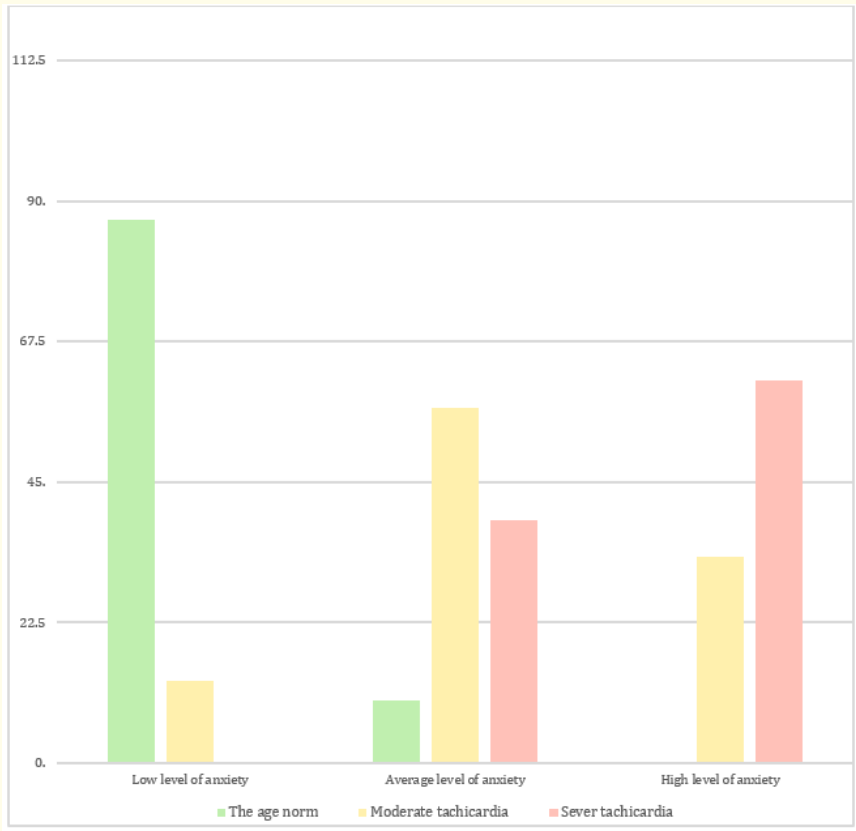

Diagram 2: *Comparison of heart rate indicators in children with different levels of anxiety.*

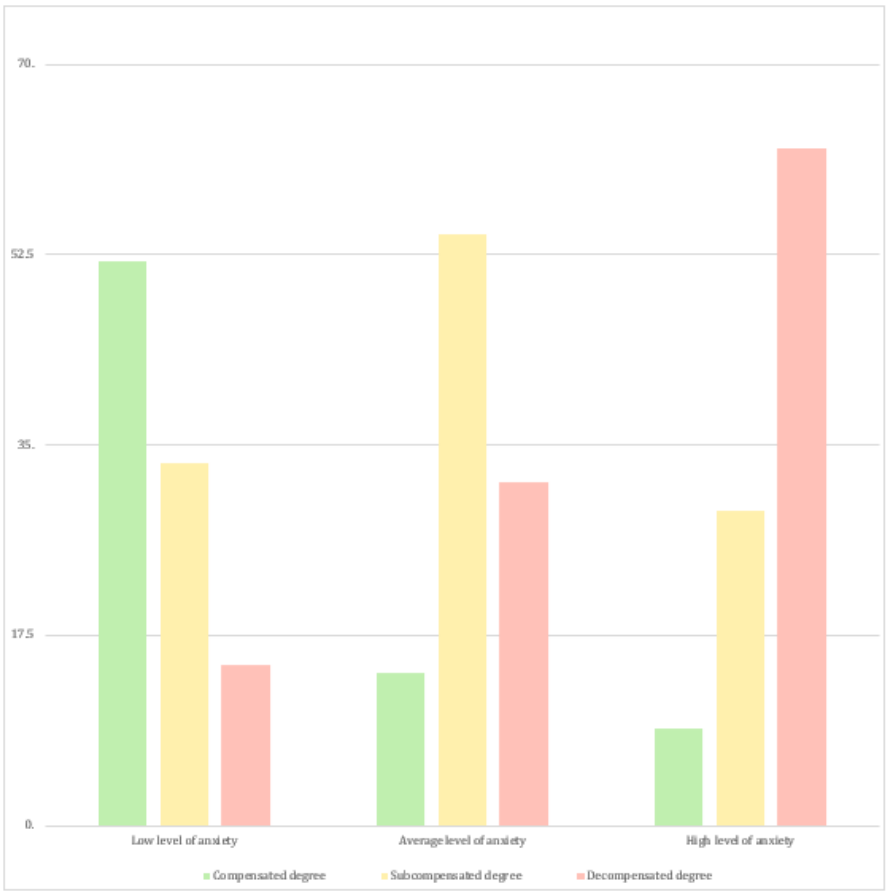

Diagram 3: *Comparison of the degree of caries activity in children with different levels of anxiety.*

After performing all diagnostic manipulations, analyzing the results and distributing patients into groups, a decision was made on the further tactics of anxiety correction. Children with a high level of anxiety, pronounced tachycardia and decompensated degree of caries activity were referred for further treatment accompanied by an anesthesiologist. The remaining groups of patients underwent correction of their psycho-emotional state by neurography. Children with low levels of anxiety needed less adaptation techniques than those with medium and high levels. But, as a result of psychological work, full cooperation of patients and parents with a dentist was achieved, anxiety levels were reduced, and hemodynamic parameters were normalized.

Based on our study, to standardize the protocol for choosing a method for correcting anxiety in children of different age groups, a computerized program "Determining the method for correcting anxiety in children before dental treatment" was developed [13]. The main task of the program is to determine the future strategy of working with the patient based on the collection of anamnesis and the results of objective examination methods (how many adaptation techniques should be carried out, what methods should be used, and in what case the patient should be referred for general anesthesia). For each patient in the program, an electronic card is created, which indicates the main contact information about the child and his parents. A questionnaire for collecting general somatic and psychological medical history is built into the program, and parents can fill it out directly in it. The doctor enters the results of determining the level of

anxiety, hemodynamic parameters and the CPI index independently in the corresponding columns. After these simple manipulations, the program automatically converts the data according to its internal score system and displays the result on the screen. Also, depending on the answers, when filling out the patient's general medical history questionnaire, the program can generate a comment about the need to consult with a pediatrician or anesthesiologist to safely choose the method of anesthesia in dental treatment.

Conclusion

Thus, on the basis of a comprehensive psychological and functional examination of children before dental treatment, it became possible to create a digital program: "Determining the method of correcting anxiety in children before dental treatment", which allows improving the quality and safety of dental care provided to children. The advantage of the developed program is its ease of use, reduced time costs, and increased efficiency in providing dental care to the children's population.

Conflict of Interest

The authors declare no conflict of interest.

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