

# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## Development of a Program for Individualized Prevention of Dental Diseases in Children with Down Syndrome.

Alexey N. Morozov<sup>1</sup>, Natalia V. Chirkova<sup>2\*</sup>, Zhanna V. Vecherkina<sup>3</sup>, Elena A. Lescheva<sup>4</sup>, Olga I. Oleinik<sup>5</sup>, and Alina A. Smolina<sup>6</sup>.

<sup>1</sup>M.D., the head of Propaedeutic Dentistry Department, Voronezh N. N. Burdenko State Medical University, 309400, Voronezh, Revolutsii Avenue, 14

<sup>2</sup>M.D., professor of Propaedeutic Dentistry Department, Voronezh N. N. Burdenko State Medical University, 309400, Voronezh, Revolutsii Avenue, 14

<sup>3</sup>PhD., lecturer of Propaedeutic Dentistry Department, Voronezh N. N. Burdenko State Medical University, 309400, Voronezh, Revolutsii Avenue, 14

<sup>4</sup>M.D., professor of Faculty Dentistry Department, Voronezh N. N. Burdenko State Medical University, 309400, Voronezh, Revolutsii Avenue, 14

<sup>5</sup>M.D., professor of Hospital Dentistry Department, Voronezh N. N. Burdenko State Medical University, 309400, Voronezh, Revolutsii Avenue, 14

<sup>6</sup>Assistant of Faculty Dentistry Department, Voronezh N. N. Burdenko State Medical University, 309400, Voronezh, Revolutsii Avenue, 14

### ABSTRACT

It is known that Down syndrome is not a rare pathology as on the average there is one case for 700 births in the world. The need to study the dental status of children with Down syndrome identifying the risk factors for the development of dental diseases, namely periodontitis and tooth decay, as well as the development of a program for individualized prevention of dental diseases is of the utmost importance. 102 children aged from 8 to 12 were examined for the dental status analysis and the study of risk factors for the development of major dental diseases. More detailed information on the socio-economic level of the families in which the children live was obtained through a questionnaire. The clinical examination of the patient's oral cavity included external examination of the child, examination of the oral mucosa, labial and lingual frenula, tooth hard tissues and dental bite. The oral hygiene effectiveness was determined using the PHP (Podshadley-Haley) method. The program of individualized prevention of dental caries in children with genetic pathology was developed. It was found that the factors that reduce the prevention program effectiveness include a child's mental development disorder, features of the somatic status of children with Down syndrome, socio-economic factors, the parents' attitude to their own health and the health of their children.

Keywords: prevention of dental diseases, Down syndrome, prevention program, health education.

<https://doi.org/10.33887/rjpbcs/2019.10.3.16>

*\*Corresponding author*

## RELEVANCE OF THE PROBLEM

In recent years, in the structure of childhood morbidity and mortality, congenital malformations have been ranked first in assessing the health status of the population. It is known that Down syndrome is not a rare pathology as on the average there is one case for 700 births in the world. However, in Russia, the problem of practical rehabilitation of children with Down syndrome has many unresolved issues [1, 6]. The dental status of children with Down syndrome living in Russia has not been sufficiently studied but such children are in particular need of dental sanitation on the background of unsatisfactory oral hygiene [3,8]. Performing oral hygiene in children with Down syndrome is rather difficult and causes a lot of problems for parents due to disturbed occlusions or non-contact behaviors of children [2,4]. There is a high prevalence of periodontitis, carious lesions and an increased prevalence of malocclusions which are still poorly known [5,7].

Thus, the need to study the dental status of children with Down syndrome identifying the risk factors for the development of periodontitis and tooth decay as well as the development of a program for individualized prevention of dental diseases is of the utmost importance.

**The purpose of the study** is to develop a program for individualized prevention of tooth decay and periodontal diseases and to identify factors that reduce the effectiveness of the program.

## MATERIALS AND METHODS

102 children aged from 8 to 12 were examined for the dental status analysis and the study of risk factors for the development of major dental diseases. All the examined children were divided into 2 main groups:

- the first group – 38 children with Down syndrome;
- the second group – 64 practically healthy children without any genetic disorders.

The children with Down syndrome were observed in the «Hope Sail» Rehabilitation Center from the moment of their first visit. The children's clinical examination was carried out by the specialists from the «Hope Sail» Rehabilitation Center in accordance with the established procedure. 64 practically healthy children were examined at the clinical site of the Dental Clinic of Voronezh State Medical University named after N.N. Burdenko.

More detailed information on the socio-economic level of the families in which the children live was obtained through a questionnaire. The clinical examination of the patient's oral cavity included external examination of the child, examination of the oral mucosa, labial and lingual frenula, tooth hard tissues and dental bite. The oral hygiene effectiveness was determined using the PHP (Podshadley-Haley) method.

## RESULTS OF THE STUDY

One of the significant risk factors for dental caries development is unsatisfactory oral hygiene.

Thus, the average value of the Patient Hygiene Performance (PHP) Index in the children with Down syndrome was  $3.4 \pm 0.87$  points and  $1.6 \pm 0.59$  points in the comparison group. The differences were significant and reliable ( $p < 0.05$ ). Poor oral hygiene in children with Down syndrome is due to the peculiarities of their general somatic state.

When studying the frequency of tooth cleaning, it was found that only 2 children (6%) with Down syndrome brush their teeth twice a day, 18 children (47%) do it irregularly and 18 children (47%) once a day.

All the children with Down syndrome use the wrong technique of tooth cleaning; only 25 (66%) children perform this procedure on their own. In 13 (34%) cases, the procedure is performed by the parents. In the comparison group, only 10 children (16%) brush their teeth irregularly, 12 children (19%) – twice a day, 42 children (65%) – once a day.

According to the frequency of sugar consumption, 3 indicators were distinguished: consumption of sweets in each meal; once a day; once a week. After each meal, cariogenic food was consumed by 16 children (42%) with Down syndrome and 34 children (53%) from the comparison group. About 20 children (53%) with

genetic pathology and 26 children (41%) from the comparison group consumed sweets once a day. 2 (5%) children with Down syndrome consumed them once a week.

More detailed information on the socio-economic level of the families in which the children live was obtained through a questionnaire. 102 questionnaires were reviewed.

The results of the study showed that 29 children (76%) with Down syndrome and only 33 (52%) children from the comparison group live in families with a low and very low standard of living. A decent standard of living was typical for the families of 9 (24%) children with genetic pathology and 20 (31%) children without it. A high standard of living was common only for 11 families from the comparison group (17%).

The social status of the parents of the children with Down syndrome was presented by the following categories: workers - 21 people (55%), employees - 12 people (32%), unemployed - 5 people (13%). The comparison group was represented by employees – 41 people (64%), unemployed and workers – 5 people (8%) and 18 people (28%) respectively.

Comparing the compliance parameter in the two groups, it can be concluded that the doctor's recommendations in the group of children with Down syndrome were followed a bit worse. Only 5 (13%) children and their parents complied with the doctor's orders while in the comparison group the doctor's instructions were followed by 21 (33%) children.

Undoubtedly, the unfavorable situation in the oral cavity of the children with Down syndrome, common risk factors contributed to the high prevalence of tooth decay and periodontal diseases. We developed and tested a program for prevention of dental diseases (tooth decay and periodontal diseases) which is focused on eliminating local risk factors and improving the situation in the oral cavity of children. The prevention program includes the following stages: 1 – the preparatory stage; 2 – the stage of preventive and educative activities; 3 – the stage of execution.

The preparatory stage of the prevention program provided for the child's adaptation to the dental office environment and the doctor's, patient's examination, consultations, preparation of medical documentation, educational and awareness-raising work among the parents. At the same time, common risk factors for the development of major dental diseases were identified. A plan of dental procedures was drawn up and agreed with the parents of the child.

At the second stage, the children and their parents were trained to perform oral hygiene properly. Teachers (tutors), medical workers of child-care facilities and psychologists were explained the purpose and objectives of prevention in dentistry; it was emphasized that the success and effectiveness of the ongoing prevention largely depend on their participation and insistence. All questions of the teaching staff were answered as we tried to make the teachers and educators our helpers in the struggle for children's dental health. The main content of the classes aimed at preventing dental diseases was as follows: proper dental care training; recommendations for a rational nutrition (carbohydrate restriction); prevention of bad habits; arguments to support the need for regular dental check-ups and the formation of conscious attitude to prevention and treatment of teeth; an understanding of the meaning of healthy teeth and health in general. The children's training in dental care was conducted in the form of performances called "Tooth Fairy and Mr. Know Nothing Visiting Children" with giving gifts.

The children of the second group, without genetic pathology, were given classes on the topic of dental diseases prevention. The 1st and 2nd grades were given "Health Lessons" on the Role of Proper Nutrition in Dental Caries Prevention. In the 3rd and 4th grades, the "Health Lesson" was dedicated to Prevention of Tooth Decay and its Complications; in the 5th and 6th grades – to the Oral Cavity Hygiene. Such lessons developing the skills of individual oral hygiene and monitoring their maintenance were conducted at least 2 times a year.

The third executive stage covered the proper dental hygiene monitoring; the development of a treatment plan and its approval by parents; professional hygiene; oral cavity sanitation; the implementation of preventive procedures from the program.

After the conducted preventive measures, there was an increase in the oral hygiene effectiveness. If the initial value of the PHP index in Group 1 was  $3.3 \pm 0.98$ , in a year it was  $2.4 \pm 0.14$  ( $p < 0.05$ ). However, the effectiveness of oral hygiene remained unsatisfactory. In the comparison group, the average value of the PHP index before the preventive procedures was  $1.7 \pm 0.63$ , after them –  $1.3 \pm 0.11$  ( $p < 0.05$ ). After the conducted preventive measures, there was an improvement of oral hygiene in children without genetic pathology.

### CONCLUSION

Analyzing the above, it may be concluded that the proposed program of individualized prevention turned out to be the most effective in children without genetic pathology. Unfortunately, the influence of uncontrolled risk factors on the effectiveness of preventive measures in children with Down syndrome was significant. The factors that reduce the effectiveness of the prevention program include children's mental health disorders, features of the somatic status of children with Down syndrome, socioeconomic factors, parents' attitude to their own health and the health of their children. The family's social status and low economic standard of living are common factors which are statistically associated with an increased threat of tooth decay. The physical condition of children with Down syndrome is highly dependent on environmental factors. Thus, the low level of economic well-being of the family increases the likelihood of malnutrition, overcrowded accommodation often combined with mothers' excessive employment, their ignorance and, as a consequence, the lack of good child care. It should be noted that the effectiveness of the proposed program of dental diseases prevention could be significantly higher if 87% of the parents of children with genetic pathology showed greater personal responsibility for their children's dental health. The preventive measures consist of simple procedures; most of them can be performed by patients and their parents. The most difficult thing is to convince them that they are a must. Creating conditions for harmonious growth and development of children and, in particular, their dentofacial systems, can be ensured only through the joint efforts of parents, dentists and hygienists.

### REFERENCES

- [1] E.G. Denisova. Determination of Risk Factors for Dental Caries Development in Children with Down Syndrome /E.G. Denisova, E.A. Oleynik//Scientific Journal of Belgorod State University. «Medicine. Pharmacy» Section. - 2011. - #16 (111).—Edition 15/1.—pp. 69-77.
- [2] E.M. Kuzmina. Preventive Dentistry: Manual / E.M. Kuzmina, O.O. Yanushevich. – Moscow: Preventive Medicine, 2016. – p. 544.
- [3] A.V. Lapatina. Clinical Laboratory Evaluation of the Effectiveness of Major Dental Diseases Prevention with regard to Children and Adolescents' Age-Related Physical-Psychological Peculiarities: Thesis Work / Moscow: Moscow State University of Medicine and Dentistry, 2001.
- [4] P.A. Leus. Preventive Community Dentistry. – Moscow: «Medical Book ». – 2008. – p. 444.
- [5] R. McDonald, D. Avery. Dentistry for Children and Adolescents. - Moscow, 2003. – pp. 363-364, 369, 370.
- [6] A.N. Morozov. The Use of Psychological and Educational Methods as Therapeutic Measures in PT Classes at Schools / A.N.Morozov, I.V. Koretskaya, N.V. Chirkova, S.G. Shelkovnikova // Scientific and Medical Bulletin of the Central Black Earth Region. - 2015, # 62, pp. 16-22.
- [7] L.S. Persin. Children's Dentistry: Manual / L.S. Persin, V.M. Elizarova, S.V. Dyakova. –Moscow, 2003.
- [8] N.S. Moiseeva, Y.A. Ippolitov, D.A. Kunin, A.N. Morozov, N.V. Chirkova. The Use of LED Radiation in Prevention of Dental Diseases// EPMA Journal. - 2016. - V.8., #1. –p. 50.