

EVALUATION OF THE RESULTS OF THE IMPLEMENTATION OF DENTAL CARIES PREVENTION PROGRAMS IN PRESCHOOL CHILDREN

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ABSTRACT

At the world level, the most convenient form of service for preschool children is the provision of dental preventive and curative care directly in preschool organizations. One of the global problems of public health in general and pediatric dentistry in particular, special attention is paid to the continuation of the study of the etiology, prevention and treatment of caries, both from the point of view of the theoretical justification of the main provisions of the modern paradigm of caries, and in relation to the practical application of scientific achievements.

Key words: preschoolers, tooth surface damage, caries growth, prevention, dental program.

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ОЦЕНКА РЕЗУЛЬТАТОВ РЕАЛИЗАЦИИ ПРОГРАММ ПРОФИЛАКТИКИ КАРИЕСА ЗУБОВ У ДЕТЕЙ ДОШКОЛЬНОГО ВОЗРАСТА

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АННОТАЦИЯ

На мировом уровне для детей дошкольного возраста наиболее удобной формой обслуживания является оказание стоматологической профилактической и лечебной помощи непосредственно в детских дошкольных организациях. Одной из глобальных проблем здравоохранения в целом и детской стоматологии в частности, уделяется особое внимание продолжению изучения вопросов этиологии, профилактики и лечения кариеса, как с точки зрения теоретического обоснования основных положений современной парадигмы кариеса, так и в отношении практического применения научных достижений.

Ключевые слова: дошкольники, поражение поверхностей зубов, прирост кариеса, профилактика, стоматологическая программа.

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INTRODUCTION

There is a global increase in the world's population and, accordingly, the number of people with caries and periodontal diseases is increasing, which increases the burden on the healthcare system. About 37% of carious lesions and up to 67% of severe forms of periodontitis remain untreated [23]. In this regard, the problem of prevention of major dental diseases is an urgent problem of modern medicine. Already at an early age, carious lesions of the teeth are detected in many children, therefore it is important to identify the initial carious lesions in a timely manner [4, 18]. Early childhood caries (EC) is characterized by the presence of one or more carious lesions, with or without the formation of a carious cavity, in children under the age of 6 years [18, 20]. Data on the prevalence and intensity of dental caries in children vary significantly in different countries and regions [8, 13, 16, 24].

C According to an analysis of studies published over the past 5 years, Chen et al., 2019, determined that the prevalence of caries of temporary teeth in five-year-olds can be from 23% to 90%, and the intensity, according to the cfr (caries filling removal), from 0.9 to 7.5. In most countries of the world, the prevalence of caries of temporary teeth exceeds 50% and is at a high level [17].

Identification of risk factors for the development of caries in a child is necessary to assess the individual risk of further development of caries [7]. Various methods and indices have been developed to assess the risk of developing caries, but none of them has a high degree of reliability in predicting the formation of new carious lesions [7, 21, 25]. At the same time, caries management based on risk assessment reduces the growth of caries [19].

Most researchers offer comprehensive programs for the prevention of dental caries in children. An important method of caries prevention is oral hygiene, which eliminates the etiological bacterial factor that causes the development of dental caries [22]. It is recommended to start hygienic dental care from the moment of eruption of the first tooth [13, 15]. There is a wide range of oral hygiene items and products for children [9]. A barrier to the introduction of this direction is the lack of

awareness of children and parents about the rules of oral hygiene [12, 13]. Many mothers start brushing their children's teeth more than a year after teething, use an adult toothbrush and toothpaste for this, use too much toothpaste for each tooth brushing and do not understand the importance of fluorides contained in toothpaste [14].

Within the framework of evidence-based medicine, fluorides have the highest level of confirmation of safety and effectiveness in the prevention of caries [6, 10, 17]. The use of systemic and local fluorides is approved by international, American and European dental associations, and is also justified in the WHO recommendations [24]. Fluoride-containing toothpastes are currently recognized as the main means of individual prevention of dental caries [11]. Fluoride varnish and other local fluoride preparations for professional use are highly effective [10]. However, the level of practical use of fluorides for the prevention of caries remains insufficient (Naumova, 2014) [21].

In the prevention of dental diseases, it is important to conduct sanitary and educational work in children's educational institutions about risk factors and ways to eliminate them, instilling habits of hygienic care and proper nutrition in children from an early age [19]. A controlled brushing of teeth using fluoride toothpaste has a positive effect on the state of oral hygiene of preschoolers [12]. The introduction of special programs of hygienic education and upbringing of preschoolers contributed to the reduction of the increase in caries of temporary teeth by 46.5% [24].

The effectiveness of dental training programs for preschoolers is determined by indicators of improving children's dental knowledge [11]. However, the ultimate goal of prevention is to reduce morbidity, so the results of educational programs should be determined by indicators of reducing the prevalence and intensity of caries and gingivitis [4, 15]. To assess the results of dental caries prevention, indicators of intensity reduction and reduction of dental caries growth and surface caries are used, comparing the results of control and experimental groups or data from epidemiological studies in the dynamics of long-term observations [13].

When choosing a specific technology, method

and means of treating caries in children, it is necessary to follow the basic recommendations and algorithms, take into account the data of clinical and X-ray examination [3, 23, 25]. However, the advantage of any one method of caries treatment over others has not yet been proven [1]. In the last decade, minimally invasive approaches have been preferred in pediatric dentistry [9]. For noninvasive treatment of initial caries of temporary teeth in young children, the use of fluorides is recommended [15]. For the treatment of preschool children with a high risk of developing and high activity of caries, a combination of conservative and minimally invasive methods of caries treatment, the use of prevention courses, the use of thin-walled metal crowns after the treatment of pulpitis is proposed [10]. The method of atraumatic restoration therapy (ART) has found wide application in childhood [11]. When using ART, good behavior was noted in children, whereas with the traditional preparation of carious cavities using a drill, most children showed negative behavior [6]. The use of SRC with the addition of silver fluoride improved the results of filling of carious cavities, compared with conventional SRC [5].

The results of treatment of caries of temporary teeth in children may depend on the quality of filling materials and many other factors: the localization of the carious cavity, the hygienic condition of the mouth and the general health of the child, the frequency of intake of sweet and sour foods and beverages, the use of fluoride toothpaste and the frequency of brushing teeth [2, 11].

A special algorithm for the treatment and prevention of caries of early caries of temporary teeth, taking into account a specific clinical situation, allows you to plan and effectively implement the appropriate amount of therapeutic and preventive measures [1].

Thus, various methods and means can be used for the prevention and treatment of dental caries in preschool children. However, there is no information in the available literature on the comparative effectiveness of various dental caries prevention programs for preschoolers that can be conducted in preschool institutions.

THE PURPOSE OF THE STUDY

Substantiation of a comprehensive program

for the prevention and treatment of dental caries in preschool children by medical, sociological and clinical and economic analysis.

METHODS AND MATERIALS OF THE STUDY.

In total, 959 children participated in the study, including 320 children living in the city of Bukhara (pupils of 4 kindergartens), 319 children living in the Alat district of Bukhara region (pupils of 4 kindergartens) and 320 children living in the Karakul district of Bukhara region (pupils of 4 kindergartens). 4 programs for the prevention of dental caries in kindergarten students were carried out. Program No. 1 included a screening dental examination of children. Other programs, in addition to screening examination of children, additionally included various activities. Program No. 2 was aimed at involving parents in the prevention and timely treatment of dental caries in children. Program No. 3 assumed the formation of health-saving behavior in children. In Program No. 4, dentists carried out complex primary (application of fluoride varnish and sealing of fissures) and secondary prevention of caries (non-invasive and minimally invasive methods of caries treatment).

Methods and materials of the study. In total, in the study, to determine the clinical effectiveness of prevention programs, a repeated dental examination of preschoolers was carried out after 7 months, which included determining the condition of temporary and erupted permanent teeth.

THE RESULTS OF THE STUDY.

The screening program (Program No. 1) included a dental examination of children and the transfer of directions to parents for the rehabilitation of children in a dental clinic. Repeated examination of the children revealed that an increase in carious lesions was observed in all age groups. The indicators of dental caries growth, according to the cfr (caries filling removal) index, were for 3-year-olds - 0.20 ± 0.01 , 4-year-olds - 0.35 ± 0.01 , 5-year-olds - 0.33 ± 0.01 , 6-year-olds - 0.35 ± 0.01 , per 1 examined. The differences in the growth rates of dental caries (according to CP) in children aged 4, 5 and 6 years, in relation to 3-year-olds, were statistically significant ($p < 0.001$).

The study of the structure of the cfr index in

the dynamics of observation showed that most parents did not follow the recommendations of a dentist and did not take their children to a dental clinic for oral sanitation.

Despite some improvement in the situation at the second examination, compared with the data of the first examination, carious untreated teeth prevailed in all age groups of preschoolers. The share of untreated teeth in the structure of the cfr was, at the second examination, 83.39% in 3-year-olds, 77.62% in 4-year-olds, 70.48% in 5-year-olds, 59.63% in 6-year-olds, differences in indicators in 4, 5 and 6-year-olds, in relation to 3-year-olds, were statistically significant ($p < 0.05-0.001$).

The number of cured filled teeth detected in preschoolers during the second examination, compared with the data of the first examination, increased slightly and amounted, in the structure of the CFR, in 3-year-olds only 12.70%, 4-year-olds - 18.70%, 5-year-olds - 23.11%, 6-year-olds - 27.16%. The differences between the age groups, in relation to 3-year-old children, were statistically significant ($p < 0.05-0.01$). With age, from 3 to 6 years, the proportion of filled teeth in children increased by 2.1 times. However, the number of filled teeth in all age groups remained significantly less than carious teeth: in 3-year-olds - 6.6 times, 4-year-olds - 4.1 times, 5-year-olds - 3.1 times, 6-year-olds - 2.2 times.

The share of prematurely removed temporary teeth in children aged 3 and 4 years in the structure of cfr was 3.91% and 3.68%, in 5-year-olds it reached 6.41%, 6-year-olds - 13.20%.

The data obtained indicate that children often turned to a dentist in the presence of acute pain, when significant destruction of teeth was noted and it was impossible to preserve temporary teeth until their physiological change.

Thus, the application of Program No. 1 only slightly improved the dental status of preschoolers. The majority of children retained the growth of new carious lesions, most carious teeth remained untreated. The situation was especially unfavorable in children aged 3-4 years, in whom the proportion of untreated carious teeth, at the second examination, was about 80%.

Program No. 2 provided, in addition to screening the dental health of children, sanitary and educational work among parents

of preschoolers on the prevention of dental diseases.

Dynamic observation of children revealed an increase in dental caries (according to the cfr index, per 1 examined) in all age groups: in 3-year-olds 0.43 ± 0.02 , 4-year-olds -0.10 ± 0.01 , 5-year-olds -0.12 ± 0.01 , 6-year-olds -0.49 ± 0.03 . Significant differences in relation to 3-year-old children, the growth of dental caries was determined in children aged 4 and 5 years ($p < 0.01$).

The increase in carious lesions of tooth surfaces, according to the cfr index, was significantly higher than according to the cfr index (in 3-year-olds by 1.3 times, 4-year-olds by 7.6 times, 5-year-olds by 6.9 times, 6-year-olds by 4.4 times), and was, respectively, 0.55 ± 0.03 , 0.76 ± 0.04 , 0.83 ± 0.04 and 2.17 ± 0.11 . In children aged 4, 5 and 6 years, the differences in the value of caries growth, according to the cfrs index, in relation to 3-year-old children, were statistically significant ($p < 0.001$).

There was an increase with age in the growth of carious lesions of the surfaces of teeth, according to the cfrs index, the values of which increased 3.9 times from 3 to 6 years, from 0.55 ± 0.03 to 2.17 ± 0.11 , $p < 0.001$. In the structure of the cfr, during repeated examination, some improvements were noted in children, compared with the data of the first examination. In all age groups in the structure of the cfr index, the proportion of carious untreated teeth decreased significantly ($p < 0.001$): in 3-year-olds - from 86.41% to 72.94%, in 4-year-olds - from 92.81% to 62.16%, 5-year-olds - from 83.03% to 52.64%, 6-year-olds - from 76.66% to 50.93%. The differences between the "k" indicators at the second examination, in relation to 3-year-old children, had statistical significance ($p < 0.01$).

It should be noted that, despite the decrease in the "c" indicators in the structure of the cfr index, in children aged 3-4 years, most teeth still required treatment, and in children 5-6 years old, every second tooth affected by caries needed treatment.

According to the data of the second examination, compared with the first, the proportion of sealed teeth in the structure of preschool children of all age groups increased in the structure of the CPU: in 3-year-olds - 3.3 times, 4-year-olds - 2.2 times, 5-year-olds - 2.6

times, 6-year-olds - 2.3 times ($p < 0.001$). The values of the indicator "p" in the structure of the cfr index were 17.30%, 34.23%, 42.07% and 39.66%, respectively, the differences in relation to 3-year-olds were statistically significant ($p < 0.01$).

The share of removed teeth in the structure of the cfr index, compared with the first examination, increased in 3-year-olds from 8.24% to 9.76%, in 4-year-olds - from 0.62% to 3.60%, in 5-year-olds - from 0.92% to 5.29%, in 6-year-olds - from 6.19% to 9.41%. High indicators of "y" reflect the untimely appeal of children for help. As a result, irreversible changes develop in the milk teeth, requiring their removal.

Carious lesions of the surfaces of teeth also prevailed in the structure of cfrs in preschoolers.

Thus, the application of Program No. 2 did not eliminate the increase in carious lesions in preschoolers. Not all parents followed the recommendations of dentists on oral sanitation in their children, especially at the age of 3-4 years. Most of the carious teeth in children aged 3-4 years remained untreated, and in 5-6-year-old children, half of the carious teeth remained untreated.

Program No. 3 involved the involvement of kindergarten teachers in hygienic education and training of preschoolers on the prevention of caries. In addition, the dentist examined the children and issued a referral for treatment to a dental clinic, conducted classes with the parents of the children (by analogy with the previous program).

The assessment was carried out according to the data of dental examination of children in the dynamics of observation. As a result, it was found that in all age groups of children there was a slight increase in dental caries, according to the cfr index.

According to the cfr index, the increase in dental caries, per 1 examined, was 0.09 ± 0.01 in 3-year-olds, 0.03 ± 0.01 in 4-year-olds, 0.01 ± 0.01 in 5-year-olds, 0.05 ± 0.01 in 6-year-olds. The largest increase in carious teeth was observed in 3-year-olds, the smallest in 5-year-olds. The differences between the rates of dental caries growth in preschoolers aged 4, 5 and 6 years, in relation to 3-year-old children, were statistically significant ($p < 0.05$).

The increase in carious lesions, according to the cfrs index, was significantly higher than

according to the cfr index, and was 0.34 ± 0.04 in 3-year-olds, 0.63 ± 0.05 in 4-year-olds, 0.93 ± 0.06 in 5-year-olds, 1.48 ± 0.09 in 6-year-olds. Differences in the values of cfrs indicators in children aged 4, 5 and 6 years, in relation to 3-year-old children, were statistically significant ($p < 0.001$). The magnitude of the increase in carious lesions of the surfaces of teeth, according to the cfrs index, had a clear age dynamics, and in children from 3 to 6 years significantly increased by 4.3 times (from 0.34 ± 0.04 to 1.48 ± 0.09 , $p < 0.001$).

Significant improvements were noted in the structure of the cfr among preschoolers of all age groups. The proportion of carious untreated teeth decreased in 3-year-olds and 4-year-olds by 1.8 times, in 5-year-olds - by 2.1 times, in 6-year-olds - by 2.3 times ($p < 0.001$). However, in 3-year-old and 4-year-old children, slightly more than half of carious teeth remained untreated (52.58% and 53.52%, respectively), and in 5-year-old and 6-year-old children - about 40% (42.42% and 39.36%, respectively). The number of cured sealed teeth increased significantly ($p < 0.001$) and repeatedly in all age groups, in 3-year-olds - from 3.11% to 46.91%, 4-year-olds - from 4.98% to 46.18%, 5-year-olds - from 9.92% to 49.90%, 6-year-olds - from 10.09% up to 52.82% ($p < 0.001$). However, in 3-5-year-olds, the "p" index in the cfr structure was less than 50%, and only in 6-year-olds it was slightly higher than 50%.

The proportion of prematurely removed temporary teeth did not exceed 1% at the first and second examinations in 3-year-olds and 4-year-olds. However, in 5-year-old and 6-year-old children, the number of premature extractions of temporary teeth detected during the second examination increased significantly ($p < 0.05$) compared to the data of the first examination.

The values of the "r" index in the cfr structure increased in 5-year-olds from 1.01% to 7.68%, in 6-year-olds from 1.09% to 7.81% ($p < 0.001$).

Thus, the application of Program No. 3 improved the dental status of children, but did not completely solve all the problems. The children had new carious lesions, the number of which increased with age. In children aged 3-4 years, about half of the carious lesions remained untreated, at the age of 5-6 years - about 40%.

The implementation of preventive program No. 4, in addition to the measures provided

for in the previous program, included medical measures of primary prevention (sealing of molar fissures, coating of teeth with fluoride varnish) and measures of secondary prevention (non-invasive treatment of carious lesions).

As a result of dynamic observation of children, it was found that the increase in caries of temporary teeth (according to the cfr index) was minimized. In children aged 3 and 4 years, the increase in caries, according to the cfr index, was zero, at the ages of 5 and 6 years, it was the same and insignificant (0.03 ± 0.01 per 1 examined person).

The increase in tooth surface caries, according to the cfrs index per 1 examined, in children aged 3 and 4 years was small: 0.15 ± 0.01 and 0.16 ± 0.01 ($p > 0.05$). In 5-year-old children, the increase in carious lesions increased to 0.41 ± 0.02 , in 6-year-olds - to 1.91 ± 0.05 . The differences in the growth of caries according to the cfrs index in children aged 5 and 6 years were significantly higher ($p < 0.001$) than in children aged 3 and 4 years.

The study of the structure of the CPU, according to the data of the second examination, showed that positive changes occurred in all age groups, compared with the data of the first examination. In 3-year-olds, the proportion of carious untreated teeth decreased 3.3 times (from 89.02% to 27.27%), in 4-year-olds - 4.8 times (from 91.08% to 18.84%), in 5-year-olds - 6 times (from 90.09% to 14.87%), in 6-year-olds - 8.2 times (from 84.61% to 10.34%). The differences between the values of the "k" index of the first and second examinations were statistically significant ($p < 0.001$).

The number of sealed (cured) teeth in preschoolers has increased in all age groups. In the structure of the CPU, the proportion of filled teeth revealed at the second examination, compared with the first examination, in 3-year-olds increased 6.6 times (from 10.36% to 68.48%). In 4-year-olds - 10 times (from 7.98% to 79.78%), in 5-year-olds - 9.1% (from 8.38% to 76.39%), in 6-year-olds - 5.5 times (from 13.19% to 73.14%).

The differences between the values of the "f" indicators at the first and second examinations were statistically significant ($p < 0.001$) in all age groups.

A significant ($p < 0.05$) increase in the proportion of prematurely removed temporary

teeth was registered in all age groups in the structure of the CPU at the second examination, compared with the first examination: in 3-year-olds - from 0.61% to 4, 24%, 4-year-olds - from 0.94% to 1.38%, 5-year-olds - from 1.52% to 8.74%, 6-year-olds - from 2.20% to 16.52%.

Thus, as a result of the Program No. 4, the increase in carious lesions of teeth in preschool children significantly decreased according to the kpu and kpup indices, the number of untreated carious lesions sharply decreased and the number of filled teeth significantly increased. Применение комплексной программы было эффективным во всех возрастных группах, в отношении как первичной, так и вторичной профилактики кариеса зубов дошкольников.

CONCLUSIONS

Thus, the screening program and its combination with the involvement of parents in caring for the dental health of children gave less results than the additional involvement of kindergarten teachers in the formation of health-preserving behavior in children. On the other hand, a comprehensive program with additional implementation by dentists, directly in kindergartens, preventive procedures, non-invasive and minimally invasive treatment of dental caries allowed to improve the dental status of children much more effectively than all other programs.

CONFLICT OF INTERESTS

The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article.

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AVAILABILITY OF DATA AND MATERIALS

All data generated and analysed during this study are included in this published article.

AUTHORS' CONTRIBUTIONS

All authors contributed to the design and interpretation of the study and to further drafts. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All applicable international, national, and/or institutional guidelines for the care and use of

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CONSENT FOR PUBLICATION

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КОНФЛИКТ ИНТЕРЕСОВ

Авторы заявляют, что данная работа, её тема, предмет и содержание не затрагивают конкурирующих интересов.

ИСТОЧНИКИ ФИНАНСИРОВАНИЯ

Авторы заявляют об отсутствии финансирования при проведении исследования.

ДОСТУПНОСТЬ ДАННЫХ И МАТЕРИАЛОВ

Все данные, полученные или проанализированные в ходе этого исследования, включены в настоящую опубликованную статью.

ВКЛАД ОТДЕЛЬНЫХ АВТОРОВ

Все авторы внесли свой вклад в подготовку исследования и толкование его результатов, а также в подготовку последующих редакций. Все авторы прочитали и одобрили итоговый вариант рукописи.

ЭТИЧЕСКОЕ ОДОБРЕНИЕ И СОГЛАСИЕ НА УЧАСТИЕ

Были соблюдены все применимые международные, национальные и/или институциональные руководящие принципы по уходу за животными и их использованию.

СОГЛАСИЕ НА ПУБЛИКАЦИЮ

Не применимо.

ПРИМЕЧАНИЕ ИЗДАТЕЛЯ

Журнал *"Интегративная стоматология и челюстно-лицевая хирургия"* сохраняет нейтралитет в отношении юрисдикционных претензий по опубликованным картам и заявлениям институциональной принадлежности.

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