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DYNAMICS OF ORAL HYGIENE INDICATORS AND SALIVITY RATE IN CHILDREN WHO FREQUENTLY HAVE ACUTE RESPIRATORY AND VIRAL INFECTIONS

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Before preventive interventions, the hygienic state in children, often ill, was unsatisfactory and ranged from 2.28 ± 0.23 – 2.29 ± 0.12 points. A month after the appointment of preventive measures, this indicator improved to satisfactory in children of group 3 and to good in group 4 (who were assigned professional hygiene twice a year, individual hygiene using calcium paste, the use of calcium supplements and those that increase the body's protective properties and amounted to 1.68 ± 0.06 points and 1.5 ± 0.05 points, respectively. 6 months after the first survey, oral hygiene worsened in all children relative to the second survey, but it was better than to take preventive measures. The same picture was observed when determining the hygiene index according to the Green–Vermilion. There is a tendency to improve the rate of salivation after preventive measures.

Key words: caries, acute respiratory viral infections, hygiene index, salivation rate, children.

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ДИНАМІКА ПОКАЗНИКІВ ГІГІЄНИ ПОРОЖНИНИ РОТА І ШВИДКОСТІ СЛИНОВИДІЛЕННЯ В ДІТЕЙ, ЯКІ ЧАСТО ХВОРІЮТЬ НА ГОСТРІ РЕСПІРАТОРНО–ВІРУСНІ ІНФЕКЦІЇ

До профілактичних втручань гігієнічний стан порожнини рота в дітей, які часто хворіють на гострі респіраторні вірусні інфекції, відповідав незадовільному і коливався в межах $2,28 \pm 0,23$ – $2,29 \pm 0,12$ бала. Через місяць після призначення профілактичних заходів цей показник покращився до задовільного в дітей 3-ї групи і до доброго в 4-й групі (яким призначали проведення професійної гігієни два рази за рік, індивідуальної гігієни з використанням кальційумісної пасти, застосування препаратів Са і тих, які підвищують захисні властивості організму і становив $1,68 \pm 0,06$ бала і $1,52 \pm 0,05$ бала відповідно. Через 6 місяців після першого обстеження гігієна порожнини рота погіршилась у всіх дітей відносно другого обстеження, але була кращою, ніж до проведення профілактичних заходів. Таку ж картину спостерігали під час визначення індексу гігієни за Грін–Верміліоном. Помітна тенденція до покращення швидкості слиновиділення після проведення профілактичних заходів.

Ключові слова: карієс, гострі респіраторно–вірусні інфекції, індекс гігієни, швидкість слиновиділення, діти.

The study is a fragment of the research project "Improve methods of prevention and treatment of diseases of hard tissues of teeth and periodontal tissues on the background of somatic pathology in children taking into account socio-economic factors and psycho-emotional state 2017-2021", state registration No. 0119U102852.

Currently, the most common dental disease in children is dental caries, both deciduous and permanent [9, 12]. In childhood, this disease ranks first among chronic nosological units and occurs 5-8 times more often than the second most common disease of childhood – bronchial asthma. According to authors from different countries, from 80 to 90 % of children with a milk bite, about 80 % of adolescents at the end of school have carious cavities, and almost 100 % of adults have at least one filled tooth [7]. Statistics show that in developing countries there is a higher prevalence of caries, due to lack of knowledge, lack of health education and financial capacity to use all modern hygiene items.

Due to the activity of microorganisms that accumulate in plaque, there is a progressive demineralization of the hard tissues of the teeth under the action of organic acids [4, 6]. Improving oral hygiene helps to increase the mineralizing properties of oral fluid and the resistance of hard tissues of the teeth, which reduces caries [5, 6, 7].

Based on scientific theories and data provided by scientists around the world, it is now proven that the carious process is caused by countless causes, including not only local factors but also general etiological ones, such as physical health, chronic diseases and incidence on them [10, 12].

Acute respiratory viral infections (ARVI), despite the high level of modern medicine, remain the most common disease among all age groups and have a negative impact on the body as a whole, especially now in a pandemic [1, 11].

Therefore, it is still important to study the state of oral hygiene and the possibilities of its improvement in children who often suffer from ARVI.

The purpose of the study was to clarify the dynamics of oral hygiene and salivation rate in children who often suffer from ARVI in the process of preventive measures.

Materials and methods. During our study, we examined 80 children aged 6 to 8 years (whose parents were familiar with the conditions of the examination, methods of examination, prevention scheme

and signed an informed consent to participate), which was divided into 4 groups of 20 people: group 1 – almost healthy children, who carried out professional oral hygiene and was prescribed the use of calcium-containing toothpaste; group 2 – children who often suffer from acute respiratory viral infections, who underwent professional oral hygiene and were prescribed the use of calcium-containing toothpaste; group 3 – children who often suffer from acute respiratory viral infections, who were prescribed occupational hygiene twice a year and the use of the already known treatment and prevention complex, including: personal hygiene with the use of toothpaste “Drakosha”, the use of the drug “Osteovit” (Odesa Biotechnology, NPA, Ukraine) rinsing with Sanodent elixir (Odesa Biotechnology, NPA, Ukraine) and use of “Kinder Biovital Gel” (Bayer Consumer Care AG, Germany); group 4 – children who often suffer from acute respiratory viral infections, who were prescribed occupational hygiene twice a year and the use of our proposed treatment and prevention complex, including: personal hygiene with calcium paste, the use of calcium-containing drugs and those that increase protective properties of the organism (“Biotrit C” (Odesa Biotechnology, NPA, Ukraine), “Lecithin D3” (Odesa Biotechnology, NPA, Ukraine), vitamin complex “Supervit” (JSC “Kyiv Vitamin Plant”, Ukraine).

Since the children were of different age groups – hygiene indices were evaluated according to the methods of Fedorova-Volodkinoy (evaluation of the index results is determined by staining the vestibular surfaces of the lower 6 front teeth with solutions containing iodine) and Green-Vermilion (paint the vestibular surfaces 11, 16, 26, 31 tongue surfaces 36, 46 iodine-containing solutions) [5, 7].

Quantitative indicators were statistically processed according to the Student-Fisher method, the results were considered reliable at a value of $p < 0.05$ [8].

To determine the rate of salivation in the morning on an empty stomach collected unstimulated oral fluid in centrifuge tubes for 10 min [2, 3].

The incidence of acute respiratory viral infections was assessed by studying the medical records of the examined children from their birth to the first examination by us and by questioning the parents. The effectiveness of treatment and prevention measures was evaluated 1 and 6 months after the first visit of children.

Results of the study and their discussion. The study of oral hygiene indicators in children 6-7 years old during the first visit showed their unsatisfactory condition in all groups of the survey (tab. 1).

Table 1

The state of oral hygiene in children before and after preventive measures according to the Fedorov-Volodkina index ($M \pm m$)

Groups	Quantity children	Hygienic index according to Fedorova-Volodkinoy, points		
		I examination	II examination	III examination
1	20	1.89±0.06	1.45±0.05 $p_{I-II} (<0.05)$	1.62±0.06 $p_{I-III} (<0.05)$ $p_{II-III} (<0.05)$
2	20	2.29±0.19 $p_{1-2} (<0.05)$	1.88±0.08 $p_{1-2} (<0.05)$ $p_{I-II} (<0.05)$	1.92±0.09 $p_{1-2} (<0.05)$ $p_{I-III} (>0.05)$ $p_{II-III} (>0.05)$
3	20	2.28±0.19 $p_{1-3} (<0.05)$ $p_{2-3} (>0.05)$	1.68±0.06 $p_{1-3} (<0.05)$ $p_{2-3} (<0.05)$ $p_{I-II} (<0.05)$	1.75±0.06 $p_{1-3} (>0.05)$ $p_{2-3} (<0.05)$ $p_{I-III} (<0.05)$ $p_{II-III} (>0.05)$
4	20	2.29±0.19 $p_{1-4} (<0.05)$ $p_{2-4} (>0.05)$ $p_{3-4} (>0.05)$	1.52±0.05 $p_{I-II} (<0.05)$ $p_{1-4} (<0.05)$ $p_{2-4} (<0.05)$ $p_{3-4} (<0.05)$	1.58±0.06 $p_{1-4} (>0.05)$ $p_{2-4} (<0.05)$ $p_{3-4} (<0.05)$ $p_{I-III} (<0.05)$ $p_{II-III} (>0.05)$

Notes: 1. $p_{1-2} - p_{1-4}$ – the probability of differences in the rate between groups of children during each examination; 2. $p_{I-II} - p_{I-III}$ – the probability of differences between the indicators of one group during different examinations.

Full compliance with the recommendations for preventive measures contributed to a significant improvement in oral hygiene in children of all study groups, after 1 month of using the scheme. During the first examination, the hygienic condition of the oral cavity of frequently ill children corresponded to unsatisfactory and ranged from 2.28±0.23 to 2.29±0.12 points. After a re-examination, which was conducted 1 month after the first visit, the hygiene index according to the Fedorov-Volodkina index became satisfactory in children of group 3 and good in group 4 and amounted to 1.68±0.06 points and 1.52±0.05 points, respectively. Six months after the appointment of treatment and prevention measures, the state of

oral hygiene deteriorated in all children relative to the second examination, but was better than during the 1st examination. This may be because the treatment and prevention course was passed 5 months ago and its effect is almost not preserved, in this regard, the prevention scheme should be repeated once every 6 months or in case of recurrence of acute respiratory disease viral infections.

Similar results were observed when determining the Green-Vermilion hygiene index (tab. 2). In all observation groups there was an improvement in oral hygiene, due to full compliance with the recommendations and prevention scheme. Prior to preventive interventions, the hygienic condition in almost healthy children was 1.26 ± 0.11 points (satisfactory), during the third examination, it almost did not change – 1.24 ± 0.12 . Children who often suffer from ARVI health study index corresponded bad. One month after the appointment of preventive measures, this figure improved to the average in children of groups 3 and 4 groups (which carried out the already known set of preventive measures and our caries prevention scheme) and amounted to 1.48 ± 0.10 points and 1.15 ± 0.12 points respectively. In the examined children of the 2nd group, who were prescribed only oral hygiene, the indicators during the 1st and 3rd visits did not differ much (unsatisfactory). Six months after the first examination, the Green-Vermilion hygiene index deteriorated in all children relative to the second examination, but remained better than at the first visit.

Table 2

The state of oral hygiene in children before and after preventive measures according to the Green-Vermilion index ($M \pm m$)

Groups	Quantity children	Hygienic index according to Green Vermilion, points		
		Examination I	Examination II	Examination III
1	20	1.26 ± 0.11	1.18 ± 0.11 $p_{I-II} (>0.05)$	1.24 ± 0.12 $p_{I-III} (>0.05)$ $p_{II-III} (>0.05)$
2	20	1.79 ± 0.17 $p_{1-2} (<0.05)$	1.77 ± 0.10 $p_{1-2} (<0.05)$ $p_{I-II} (>0.05)$	1.75 ± 0.14 $p_{1-2} (<0.05)$ $p_{I-III} (>0.05)$ $p_{II-III} (>0.05)$
3	20	1.80 ± 0.16 $p_{1-3} (<0.05)$ $p_{2-3} (>0.05)$	1.48 ± 0.10 $p_{1-3} (<0.05)$ $p_{2-3} (<0.05)$ $p_{I-II} (>0.05)$	1.62 ± 0.12 $p_{1-3} (<0.05)$ $p_{2-3} (>0.05)$ $p_{I-III} (>0.05)$ $p_{II-III} (>0.05)$
4	20	1.78 ± 0.18 $p_{1-4} (<0.05)$ $p_{2-4} (>0.05)$	1.15 ± 0.12 $p_{I-II} (<0.05)$ $p_{1-4} (>0.05)$	1.26 ± 0.13 $p_{1-4} (>0.05)$ $p_{2-4} (<0.05)$

Notes: 1. $p_{1-2} - p_{1-4}$ – the probability of differences in the rate between groups of children during each examination;
2. $p_{I-II} - p_{I-III}$ – the probability of differences between the indicators of one group during different examinations.

The rate of salivation in children of all study groups corresponded to normal at each examination. After preventive measures, there is a noticeable tendency to improve, but we did not find a significant difference between the surveyed groups (tab. 3). In 2 examinations, the best results among children often suffering from acute respiratory viral infections were in group 4 of the study, which was prescribed by our proposed treatment and prevention complex, and in group 3, which was offered a well-known set of preventive measures, and amounted to 0.52 ± 0.02 ml/min and 0.50 ± 0.02 ml/min, respectively. During 3 examinations, after 6 months, the rate of salivation decreased in all groups of the survey, but was normal.

Table 3

The rate of salivation in children before and after preventive measures ($M \pm m$)

Groups	Quantity of children	The rate of salivation (ml/min)		
		Examination I	Examination II	Examination III
1	20	0.55 ± 0.02	0.55 ± 0.02	0.52 ± 0.02
2	20	0.46 ± 0.01	0.48 ± 0.02	0.47 ± 0.03
3	20	0.44 ± 0.01	0.50 ± 0.02	0.48 ± 0.03
4	20	0.45 ± 0.02	0.52 ± 0.02	0.50 ± 0.02

The results indicate the importance of increasing the reactivity of the child's body, even for the prevention of dental caries. Children who often suffer from acute respiratory viral infections are much more likely to be affected by dental caries than others [6, 7, 8]. The main pathogenetic mechanisms of caries in ARVI are: fever, loss of appetite, nasal breathing difficulties (as a consequence - further mouth breathing), poor or no oral hygiene, accumulation of soft plaque [1, 2].

The peculiarity of our proposed complex is that in addition to individual oral hygiene with a properly selected toothbrush and calcium-containing toothpaste, use therapeutic and prophylactic tooth elixir containing lysozyme egg white, cetavlon, riboflavin; use a drug that increases the protective properties of the body and contains biotite and ascorbic acid; use a calcium-containing drug that contains lecithin, calcium and vitamin D3 and a multivitamin complex [13]. All components of the prevention scheme are selected to increase the protective properties of the body as a whole and to locally increase the resistance of the oral mucosa and hard tissues of the teeth.

Prior to preventive interventions, the hygienic condition of the oral cavity in children, who often suffer from acute respiratory viral infections, corresponded to unsatisfactory. One month after the use of the recommended measures, this indicator improved to satisfactory in children of the 3rd group and to good in the 4th group (who were prescribed occupational hygiene twice a year, personal hygiene with calcium-containing paste, the use of Ca and those who Six months after the first examination, oral hygiene deteriorated in all children relative to the second examination, but was better than before preventive measures (according to the Fedorova-Volodkinoy and Green-Vermilion hygiene indices) after preventive measures.

After 6 months of anti-cariou and antiviral therapies, the proposed method of prevention showed a positive effect: reducing the incidence of acute respiratory viral infections, increasing the osteotropic effect, strengthening the immune system, improving general condition and oral hygiene.

Conclusion

The best results were studied indicators in a group of children who were prescribed our proposed set of treatment and prevention measures. Significant improvement in oral hygiene in all study groups, we associate with regular care (double brushing) for oral hygiene. The most significant changes in the indicators were found in children of group 4, who received a set of preventive measures, which included: calcium-containing drug; a drug that increases the protective properties of the body; multivitamin complex; tooth elixir and the use of calcium-containing toothpaste and was 1 month after the first visit on the Fedorova-Volodkinoy index 1.52 ± 0.05 points and 1.15 ± 0.12 points on the Green-Vermilion index. As for the indicators of salivation rate, they corresponded to normal values in all groups of the study), but also slightly improved compared to the first study, especially in children who were offered our method of prevention – 0.52 ± 0.02 ml/min.

A stable and satisfactory state of hygiene requires supervision and reminders to parents by a dentist about the need to care for the oral cavity of their children.

References

1. Andreichyn MA. Udoskonalennia likuvannia khvorykh na hryp ta inshi HRVI. Infektsiini Khvoroby. Ternopil: Ternopilskiy Derzhavnyi Medychnyi Universytet. 2013;2:12–19. [in Ukrainian]
2. Hevkaliuk NO. Pokaznyky funktsionalnykh reaktiv epitelotsytiv porozhnyny rota pry hostrii respiratorno-virusnii infektsii u ditei. Svit medytsyny ta biolohii. 2012;4:7–10. [in Ukrainian]
3. Zeinalova HK, Alyeva RK. Opyt provedenya prohrammy stomatolohycheskykh zabolevaniy u detei shkolnoho vozrasta v Azerbaidzhane. Visnyk problem biolohii i medytsyny. 2012;2(93):244–247. [in Russian]
4. Ivanova AS, Antonova AA. Effektyvnost prymerenya zhevatelnoi rezynky po yzmeneniyu pH pokazatelei sliyny y urovnia hyhyeny polosty rta. Aktualnye problemy stomatolohyy detskoho vozrasta Sb. nauch. statei V Rehyon. Nauch.–prakt. konf. s mezhd. uch. po detskoj stomatolohyy. Khabarovsk; 2015.c. 87–91. [in Russian]
5. Kaskova LF, Levchenko NV, Andriyanova OYu, Amosova LI, Morhun NA, Abramova OE, Leshchenko OS. Epidemiolohichni doslidzhennya – osnova planuvannya zakhodiv profilaktyky stomatolohichnykh zakhvoryuvan u ditey. Ukrayinsky stomatolohichnyi almanakh. 2011; 2:41–43. [in Ukrainian]
6. American Academy of Pediatrics. Enterovirus (nonpoliovirus). In: Red Book: 2012 Report of the Committee on Infectious Diseases, 29th ed, Kimberlin DW, Brady MT, Jackson MA, Long SS (Eds), American Academy of Pediatrics, Itasca, IL 2012. 315–7.
7. Ayoade F, Kumar S. Varicella Zoster (Chickenpox) [Updated 2019 Dec 16]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK448191>
8. Balfour HH Jr, Dunmire SK, Hogquist KA. Infectious mononucleosis. Clin Transl Immunology. 2015;4(2): e33.
9. Orenuga OO, Oluwo, Oluwakuyide RT, Olawuyi AB. Recurrent oral squamous papilloma in a pediatric patient: Case report and review of the literature. Niger J Clin Pract 2018;21:1674–7.
10. Papania MJ, Wallace GS, Rota PA, Icenogle JP, Fiebelkorn AP, Armstrong GL, et al. Elimination of Endemic Measles, Rubella, and Congenital Rubella Syndrome From the Western Hemisphere. JAMA Pediatrics. 2014; 168 (2): 148–55.
11. Pinto A, Hong C. Orofacial manifestations of bacterial and viral infections in children. J Calif Dent Assoc. 2013; 41: 271–9.
12. Tesini BL, Epstein LG, Caserta MT. Clinical impact of primary infection with roseoloviruses. Curr Opin Virol. 2014 Dec;9:91–6. Available at: <https://odessa-biotechnology.all.biz/tabletki-lectin-d3-g2130955>

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