

## PEDIATRIC DENTISTRY

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*S. Ey. Leshchuk, Ph.D., N. L. Chukray, M.D.,  
U.O. Stadnyk, Ph.D., \*D. V. Popovych, M.D.*

Lviv National Medical University named  
after Danilo Halitskiy

\*Ternopil National Medical University named  
after I. Gorbachevsky

### THE EVALUATION OF THE EFFECTIVENESS OF CARIES PREVENTION IN CHILDREN WITH ASTHMA (PART 2)

#### ABSTRACT

**Actuality.** Analysis of dental morbidity of children in different regions of Ukraine shows a significant increase in recent years in the prevalence primary and permanent teeth as well, which is 65-98 % at an intensity of 1.2 to 7.1 tooth.

Somatic pathology is one of the important risk factors for the development of caries in children. Asthma is one of the most common allergic diseases of the respiratory system, its frequency in children of Ukraine ranges from 3 % to 15 %.

However, the impact of the course and treatment of asthma on the oral ecosystem, including tooth enamel, has been insufficiently studied, which necessitated a detailed study of risk factors for dental caries in children with asthma and the development of differentiated preventive measures.

**Purpose of the study.** To evaluate the effectiveness of preventive measures in children with asthma.

**Material and methods of the researches.** There were 144 12-year-old children suffering from asthma under our observation during 2 years who were treated in the pulmonary-allergic department of children's regional hospital. It was developed a set of measures for the prevention of dental caries for children with I-II and III-IV degree of severity of asthma. Assessment of the effectiveness of preventive measures complex was carried out after 6, 12, 24 months according to the following criteria: caries intensity (DMF), reduction of the increase in the intensity of caries, the level of hygiene of the oral cavity (according to Green-Vermillion index), mineralizing potential of saliva (MPS).

**Results.** The improvement of the following indicators was found for 2 years of our observation: decrease in the increase of caries intensity in children with III-IV compared with I-II degree of severity of asthma; improvement of oral hygiene and in mineralizing potential of saliva. The reduction in the increase of caries intensity in children with asthma amount 46.94 % in children with I-II and 51.02 % with III-IV severity of asthma.

**Conclusions.** The analysis of the results of the examination of children during the two years of application of the developed set of caries prevention measures shows that

*the implemented measures are effective for application in children depending on the severity of asthma.*

**Key words:** caries, children, asthma, prevention.

*C. E. Leshchuk, k. med. n., N. L. Chukray, d. med. n.,  
U.O. Stadnyk, k. med. n.,  
\*D.V. Popovych, d. med. n.*

Львівський національний медичний університет імені  
Данила Галицького

\*Тернопільський національний медичний університет  
ім. І. Горбачевського

### ОЦІНКА ЕФЕКТИВНОСТІ ПРОФІЛАКТИКИ КАРІЄСУ ЗУБІВ У ДІТЕЙ З БРОНХІАЛЬНОЮ АСТМОЮ (ЧАСТИНА 2)

#### АНОТАЦІЯ.

При аналізі стоматологічної захворюваності дітей у різних регіонах України встановлено значне зростання поширеності карієсу як тимчасових, так і постійних зубів за останні роки, що складає 65-98 %. Високий рівень ураженості карієсом зубів серед дітей зумовлений рядом місцевих та загальних чинників ризику, при взаємодії яких знижується резистентність твердих тканин зубів та збільшується ризик розвитку карієсу зубів. Одним із вагомих чинників ризику розвитку уражень твердих тканин зубів у дітей є соматична патологія. Бронхіальна астма є одним із найбільш поширених алергічних захворювань дихальної системи, її частота у дітей в Україні коливається у межах від 3 % до 15 %. Доведено значний вплив на органи та тканини порожнини рота як соматичної патології (bronхіальної астми), так і препаратів, які використовують для її лікування. Однак недостатньо вивчено безпосередній вплив клінічного перебігу бронхіальної астми на стан твердих тканин та на емаль зубів зокрема з подальшим розпрацюванням диференційованих профілактичних заходів і оцінки їхньої ефективності. Під нашим спостереженням протягом двох років знаходились 144 дитини з бронхіальною астмою віком 12 років, які перебували на лікуванні в пульмо-алергологічному відділення дитячої обласної лікарні. Для дітей був розпрацьований комплекс диференційованих карієс профілактичних заходів (для дітей з I-II та III-IV ступенями тяжкості бронхіальної астми). Ефективність розпрацьованого комплексу оцінювали через 6, 12 та 24 місяці за наступними критеріями: приріст інтенсивності карієсу, редукція приросту інтенсивності карієсу, рівень гігієни порожнини рота, мінералізувальний потенціал ротової рідини (МІПРР). Аналіз результатів спостереження довів ефективність впроваджених карієс профілактичних заходів залежно від ступеня тяжкості та тривалості БА, про що свідчить зменшення приросту інтенсивності карієсу зі збільшенням терміну застосування профілактичних заходів та показники

редукції приросту інтенсивності карієсу, покращення стану гігієни і підвищення рівня резистентності емалі у різні періоди спостереження.

**Ключові слова:** карієс, діти, бронхіальна астма, профілактика.

Analysis of dental morbidity of children in different regions of Ukraine shows a significant increase in recent years in the caries prevalence of both temporary and permanent dentition, which is 65-98 % at an intensity of 1.2 to 7.1 [1-6].

The high level of dental caries among children is due to a number of local and general risk factors, the interaction of which reduces the resistance of the hard tissues of the teeth and increases the risk of dental caries [7].

Somatic pathology is one of the important risk factors for the development of hard tissues of the teeth in children [8-11]. Asthma is one of the most common allergic diseases of the respiratory system, its prevalence in children in Ukraine ranges from 3 % to 15 % [12, 13].

In children with asthma, both somatic pathology and its treatment have a significant effect on the organs and tissues of the oral cavity [14, 15].

However, the influence of the course and treatment of asthma on the ecosystem of the oral cavity, including tooth enamel, has been insufficiently studied, which necessitated a detailed study of caries risk factors in children with bronchial asthma and the development of differentiated preventive measures.

**The aim of the study.** Evaluation of the effectiveness of the preventive complex in children with asthma.

**Methods and materials.** During 2 years there were 144 12-year-old children under our observation, who were hospitalized at the Allergic Department of the Lviv City Children's Clinical Hospital

«OHMATDIT». For the prevention of dental caries a set of measures for children with I-II degrees of asthma severity was developed, which included: sanitation of the oral cavity; professional oral hygiene followed by applying of fluoride varnishes; fissures sealing; calcium-containing agents rinsing; use (absorption) of the drug «Echinacea-Lubnifarm»; peppermint solution rinsing; nutrition correction. For children with III-IV degrees of asthma severity, the complex of measures, in addition to the aforementioned applications, included applying of calcium-containing agents; deep fluoridation; use of remineralization gel; oral mineral water baths with Ca<sup>2+</sup> content from 50 to 200 mg/l; complex of vitamins and minerals «Univit».

The effectiveness of the elaborated complex of preventive measures was evaluated after 6, 12 and 24 months according to the following criteria: increase of the DMFT index, reduction of the DMFT index increase, the level of hygiene of the oral cavity, mineralizing potential of saliva (MPS). The children of the control group received care according to the regional dental care program.

**Results of the research.** At the initial examination of children, the DMFT index was, on average, 4.48±0.48 in children of the main and 3.15±0.34 in the control group. It was found that after 6 months the increase of DMFT index was significantly lower in children of the main group in comparison with controls (0.38±0.05 versus 0.54±0.07, p<0.05) (Fig. 1). The increase of the DMFT index was 0.38±0.09 in children with III-IV degrees of asthma severity and 0.36±0.05 in children with I-II degrees (p>0.05). The reduction in the increase of the DMFT index in children with I-II degrees of asthma severity was 33.33 % and in children with III-IV degrees – 29.63 %.

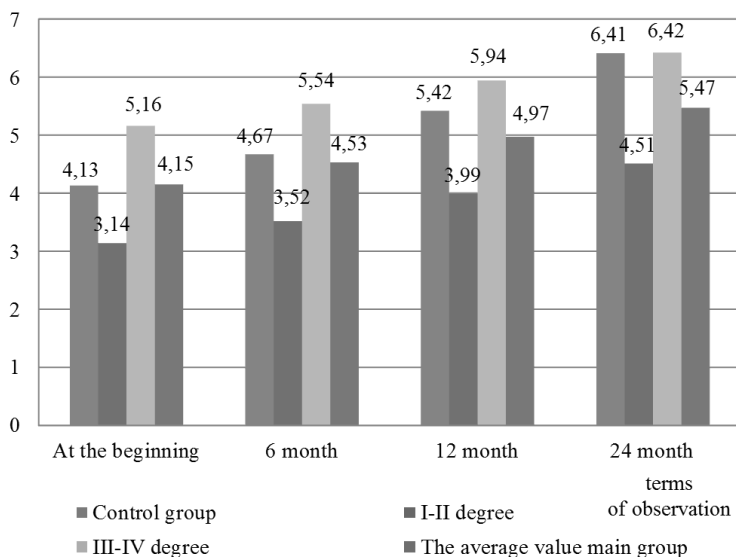


Fig. 1. DMFT index in the examined children at different time of follow-up.

After 12 months of follow-up, in comparison with data obtained after 6 months of observation, the increase of DMFT index in children of the main group was 1.7 times lower than in controls ( $0.44 \pm 0.06$  versus  $0.75 \pm 0.05$ ,  $p < 0.05$ ). The increase of the DMFT index in children with III-IV degrees of asthma severity was  $0.40 \pm 0.03$  and in children with I-II degrees of asthma severity –  $0.47 \pm 0.09$  ( $p > 0.05$ ). During this period the reduction of the increase of DMFT index in the group of children with I-II degrees of asthma was 37.33 % and in children with III-IV degrees of severity – 46.67 %.

Evaluation of the effectiveness of the proposed preventive measures in children with asthma after 24 months of follow-up, in comparison with the data from 6 month follow-up, showed that in children of

the main group the increase in DMFT index was 1.7 times less than in controls ( $1.32 \pm 0.07$  versus  $2.28 \pm 0.09$ ,  $p < 0.05$ ).

The increase of the DMFT index in children with III-IV degrees of asthma severity was  $0.48 \pm 0.05$  and in children with I-II degrees of asthma severity –  $0.52 \pm 0.07$  ( $p > 0.05$ ). Thus, after 2 years of observation the reduction of the DMFT index increase in children with I-II degrees of asthma severity was 46.94 % and in children with III-IV degrees – 51.02 %. In order to assess the effectiveness of the preventive complex, we analyzed the level of oral hygiene in the examined children at different times of the follow-up by means of the Green-Vermilion index (Fig. 2).

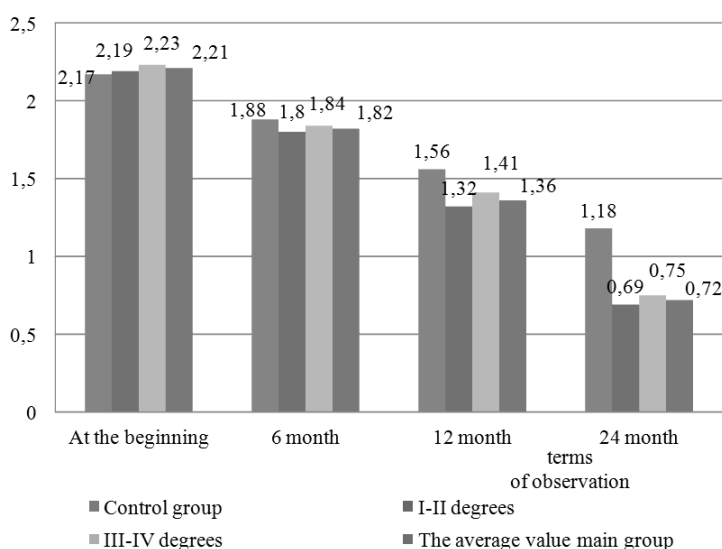


Fig. 2. Green-Vermilion indices in children of the main group and controls at different periods of their follow-up.

At the beginning of the observation the Green-Vermilion index was  $2.21 \pm 0.12$  in children of the main group, and  $2.17 \pm 0.19$  in controls ( $p > 0.05$ ). The highest index of hygiene was found in children with III-IV degrees of asthma severity ( $2.23 \pm 0.08$ ) compared with children with I-II degrees of asthma severity ( $2.19 \pm 0.09$ ,  $p > 0.05$ ) and children of the control group ( $p > 0.05$ ).

After 6 months of preventive measures applications values of the Green-Vermilion indices insignificantly decreased in all groups of examined children but the level of oral hygiene remained unsatisfactory.

The level of oral hygiene at the 12 month of observation in all groups of children changed from unsatisfactory to satisfactory. In comparison with the data at the beginning of the follow-up, significant decrease of the Green-Vermilion index was registered in the main group (from  $2.21 \pm 0.12$  at the beginning to  $1.36 \pm 0.12$ ,  $p < 0.05$ ); in the controls the decrease was insignificant (from  $2.17 \pm 0.19$  to  $1.56 \pm 0.26$ ,  $p < 0.05$ ). The most significant improve-

ment was observed in children with I-II degrees of asthma severity (from  $2.19 \pm 0.09$  to  $1.32 \pm 0.13$ ,  $p < 0.05$ ). At the end of the 24 month of observation the value of the hygiene index in children of the main group was significantly higher than in the controls in opposite to the baseline, when the difference between Green-Vermilion index in both groups was not significant ( $p > 0.05$ ).

The effectiveness of the prophylactic complex application is also evidenced by the results of the study of the MPS of the examined children in different periods of observation (Fig. 3).

It was found that in children who underwent the developed preventive measures, MPS increased more markedly, while in children who did not undergo special preventive measures, the changes were smaller during the entire observation period. Therefore, the MPS in children of the main group averaged  $2.26 \pm 0.23$  points after 6 months of the prophylactic complex application, which is slightly higher than that detected at the beginning of the observation ( $1.95 \pm 0.12$  points, respectively),  $p > 0.05$ ). In children

of the control group, the mineralization potential also changed slightly (from  $1.96 \pm 0.28$  at the beginning of the observation to  $2.19 \pm 0.18$  points,  $p > 0.5$ ).

It were revealed the most noticeable changes in the group of children with III-IV severity of asthma: at the 6th month of observation, the value of MPS in

them increased almost 1.2 times compared with the initial value ( $2.25 \pm 0.12$  and  $1.92 \pm 0.11$  points, respectively,  $p < 0.05$ ) whereas the increase in MPS in children with I-II degrees of severity was less noticeable (from  $1.98 \pm 0.18$  to  $2.27 \pm 0.24$  points  $p > 0.05$ ).

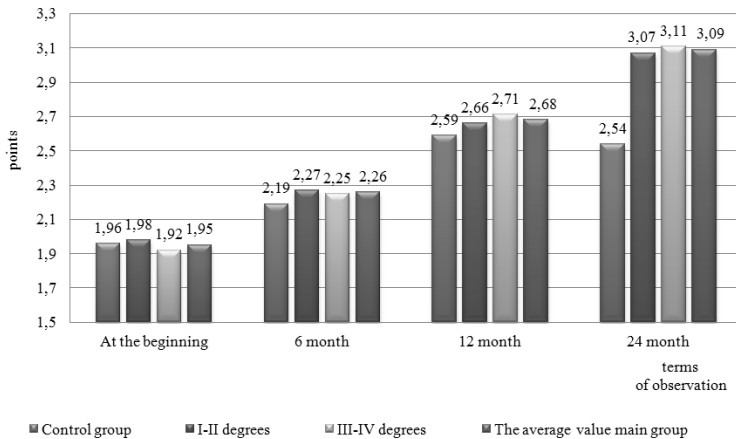


Fig. 3. MPS in children of the main group and controls at different periods of their follow-up.

The MPS in children of the main group increased after 12 months of observation and averaged  $2.68 \pm 0.19$  points. Its value was significantly higher compared with that detected before the application of the prophylactic complex ( $1.95 \pm 0.12$  points, respectively,  $p < 0.05$ ). In children of the control group, the MPS changed less significantly (from  $1.96 \pm 0.28$  to  $2.59 \pm 0.26$ ,  $p > 0.05$ ). In the group of children with III-IV degree of asthma severity MPS increased more significantly (from  $1.92 \pm 0.11$  to  $2.71 \pm 0.28$  points, respectively,  $p < 0.05$ ) than in children with I-II severity of asthma (from  $1.98 \pm 0.18$  to  $2.66 \pm 0.29$  points, respectively,  $p > 0.05$ ).

It was found a significant improvement in MPS in children of the main group after 24 months of the prophylactic complex application, compared to the baseline ( $3.09 \pm 0.11$  vs.  $1.95 \pm 0.12$  points, respectively,  $p < 0.05$ ). In children of the control group, changes in mineralization potential occurred less significantly (from  $1.96 \pm 0.28$  to  $2.52 \pm 0.15$  points, respectively,  $p > 0.05$ ), conversely, there was some decrease in MPS in this group of children compared to with the results obtained on the 12th month of observation ( $p > 0.05$ ). Thus, in children of the main group there was a high MPS, in children of the control group it remained at a satisfactory level. It should be noted that in children with III-IV degrees of asthma severity, the value of mineralization potential in comparison with the initial data increased more markedly ( $3.11 \pm 0.24$  and  $1.92 \pm 0.11$  points, respectively,  $p < 0.05$ ), that is, more than 1.6 times. In contrast, in children with I-II degrees of asthma severity, the MPS increased 1.5 compared to baseline ( $p < 0.05$ ), but was slightly lower than in children with III-IV degrees of asthma ( $p > 0.05$ ). In both groups of chil-

dren, MPS at the end of the observation corresponded to a high level.

It should be noted that the difference in the values of MPS in children with varying degrees of severity of asthma throughout the observation period was insignificant ( $p > 0.05$ ).

There was a steady increase in MPS in children suffering from asthma after two years of prophylactic complex application, its value was significantly higher than in children of the control group ( $p < 0.05$ ).

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