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ABSTRACT

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CLINICAL AND EPIDEMIOLOGIC FEATURES OF CARIOUS LESIONS OF PERMANENT TEETH IN CHILDREN WHO WERE INTERNALLY DISPLACED AS A RESULT OF WAR IN UKRAINE

The aim of the study: To assess the prevalence and intensity of dental caries in permanent teeth and to determine the characteristics of its course in children who have undergone forced displacement due to military conflict.

Materials and methods. The study was conducted on the basis of the Department of Pediatric Dentistry, I. Horbachevsky Ternopil National Medical University of the Ministry of Health of Ukraine. The study included 160 children aged between 7 and 12 years (the period of the alternating occlusion), divided into two groups: the main group – 80 children who had been displaced to the territory of the Ternopil region as a result of the war in Ukraine; and the comparison group – 80 children who had lived in the Ternopil region since birth. To assess the dental status of the study participants, international standards for the diagnosis of caries were used, namely: the prevalence of caries (determined as a percentage) and the intensity of caries, which was assessed using the DMFT+dft index. The level of activity of the caries process was determined according to the methodology proposed by N.I. Smolyar and N.L. Chuchray (2015).

Results. As a result of the study, a critically high prevalence of caries in permanent teeth was objectified in children aged 7–12 years in both study groups: 88,75±5,36 % in the main group and 86.25±5.53% in the comparison group, which corresponds to a mass defeat of caries according to the WHO classification. The intensity of the caries process in the main group (children forced to move) was higher – DMFT+dft = 5.1±0.4, compared to the comparison group – DMFT+dft = 4.2±0.5, indicating the negative impact of stress factors, lifestyle changes and limited access to dental care. It was found that the children in the main

group had a subcompensated form of dental caries ($46.48 \pm 5.92\%$), whereas the children in the comparison group had a compensated course of the carious process ($47.83 \pm 6.01\%$), which could be due to the different mineralisation potential of the oral fluid. In the children of the main group, the decompensated form of this pathology was diagnosed most frequently ($53.85 \pm 9.78\%$) in the initial caries of permanent teeth, which may indicate the exhaustion of the adaptive mechanisms of remineralisation of hard dental tissues. The analysis of the localisation of the carious lesions showed the highest prevalence of initial caries on the vestibular surfaces of the maxillary incisors ($43.75 \pm 5.55\%$ of cases in the main group and $38.75 \pm 5.45\%$ of cases in the comparison group), which is consistent with peculiarities of washing the tooth surface with oral fluid.

Conclusions. Thus, the study found that the dental status of children forcibly relocated due to military action was characterized by a higher prevalence and intensity of caries, a subcompensated form of caries accompanied by a predominance of affected maxillary incisors, and a greater need for caries treatment compared to children living in relatively stable regions.

Keywords: children, permanent teeth, caries, prevalence, intensity, activity.

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КЛІНІКО-ЕПІДЕМІОЛОГІЧНІ ОСОБЛИВОСТІ КАРІОЗНОГО УРАЖЕННЯ ПОСТІЙНИХ ЗУБІВ У ДІТЕЙ, ЯКІ БУЛИ ВИМУШЕНО ПЕРЕМІЩЕНІ ВНАСЛІДОК ВІЙНИ В УКРАЇНІ

Мета дослідження: оцінити поширеність та інтенсивність карієсу постійних зубів та охарактеризувати особливості його перебігу у дітей, які зазнали вимушеної релокації внаслідок воєнних дій.

Матеріали і методи. Дослідження було проведено на базі кафедри дитячої стоматології Тернопільського національного медичного університету імені І.Я. Горбачевського МОЗ України. У дослідження були включені 160 дітей віком від 7 до 12 років (період змінного прикусу), які були розподілені на дві групи: основна група – 80 дітей, які зазнали вимушеної релокації на терени Тернопільської області внаслідок військових дій; та порівняльна група – 80 дітей, які з народження проживають на території Тернопільської області. Для оцінки стоматологічного статусу учасників дослідження використовували міжнародні стандарти діагностики каріозного процесу, а саме: поширеність карієсу (визначали у відсотковому співвідношенні), та інтенсивність карієсу яку оцінювали за допомогою індексу КПП+кп. Рівень активності каріозного процесу відповідно до методики, запропонованої Н. І. Смоляр та Н. Л. Чухрай (2015).

Результати та їх обговорення. У результаті проведеного дослідження встановлено, що у дітей віком 7–12 років, об'єктивізували критично високу поширеність карієсу постійних зубів в обох групах дослідження: $88,75 \pm 5,36\%$ – в основній групі, та $86,25 \pm 5,53\%$ – в порівняльній групі, що згідно класифікації ВООЗ відповідає масовому ураженню карієсом. Інтенсивність

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каріозного процесу в основній групі (вимушено релоковані діти) була вищою – КПП+кп = $5,1 \pm 0,4$, порівняно з порівняльною групою – КПП+кп = $4,2 \pm 0,5$, що свідчить про негативний вплив стресових факторів, змін у способі життя та обмеженого доступу до стоматологічної допомоги. Встановлено, що серед дітей основної групи превалює субкомпенсована форма карієсу зубів ($46,48 \pm 5,92$ %), тоді як у порівняльній групі переважає компенсований перебіг каріозного процесу ($47,83 \pm 6,01$ %), що може бути пов'язано з різним рівнем мінералізаційного потенціалу ротової рідини. У дітей основної групи при початковому карієсі постійних зубів найчастіше діагностувалася декомпенсована форма даної патології ($53,85 \pm 9,78$ %), що може свідчити про виснаження адаптаційних механізмів ремінералізації твердих тканин зуба. Аналіз локалізації каріозних уражень виявив найбільшу поширеність початкового карієсу на вестибулярних поверхнях різців верхньої щелепи ($43,75 \pm 5,55$ % в основній групі, та $38,75 \pm 5,45$ % випадків в порівняльній групі), що узгоджується з особливостями омивання поверхні зубів ротовою рідиною.

Висновки. Отже, в результаті проведених досліджень встановлено, що стоматологічний статус дітей, які зазнали вимушеної релокації внаслідок воєнних дій, характеризуються вищим рівнем поширеності та інтенсивності карієсу, у них превалює субкомпенсована форма каріозного процесу, що супроводжується переважним ураженням різців верхньої щелепи, крім того, вони мають вищу потребу в санації каріозних уражень, порівняно з дітьми, які проживають у відносно стабільних регіонах.

Ключові слова: діти, постійні зуби, карієс, поширеність, інтенсивність, активність.

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INTRODUCTION

The state of children's dental health is an important indicator of the overall level of medical and social well-being of a society, reflecting the availability of preventive measures, the quality of medical care, and the impact of environmental and socioeconomic factors [1]. One of the most common oral pathologies in childhood is dental caries, which remains a global medical and social problem regardless of the level of development of the health care system [2, 3].

Since the outbreak of full-scale war in Ukraine caused by the military aggression of the Russian Federation, millions of citizens, including a significant number of children, have been forced to leave their homes and move to relatively safe regions. Forced relocation is accompanied by dramatic changes in lifestyle, disruption of eating habits, limited access to dental care, and increased levels of psycho-emotional stress, which can lead to a decrease in the body's

adaptive capacity and contribute to the development of dental diseases, including dental caries [4, 5].

According to the World Health Organization, there is a clear correlation between the level of social maladjustment, stress and dental health indicators in children [6]. Changes in living conditions, poor diet, irregular access to oral hygiene products and reduced health care are significant risk factors that can lead to the progression of dental caries, especially during the variable occlusion period [7, 8].

The relevance of this study is due to the need to assess the impact of forced migration on children's dental health, particularly the prevalence, intensity and clinical course of permanent dental caries in this category of patients. Another important aspect is to identify the main etiological factors that contribute to the high level of dental caries in children who have been in the war zone and have been forcibly displaced.

Objective: To assess the prevalence and intensity of dental caries in permanent teeth and to determine

the characteristics of its course in children who have been displaced as a result of military conflict.

MATERIALS AND METHODS

The study was conducted on the basis of the Department of Pediatric Dentistry, I. Horbachevsky Ternopil National Medical University of the Ministry of Health of Ukraine, which has been providing free dental care to internally displaced persons, including children, since the first days of the full-scale war in order to maintain and improve the dental health of this group of patients.

The study included 160 children aged between 7 and 12 years (the period of the alternating occlusion), divided into two groups: the main group – 80 children who had been displaced to the territory of the Ternopil region as a result of the war in Ukraine; and the comparison group – 80 children who had lived in the Ternopil region since birth. To assess the dental status of the study participants, international standards for the diagnosis of caries approved by the World Health Organization were used, namely: the prevalence of caries was determined as a percentage (%), and its intensity was assessed using the DMFT+dft index, which characterizes the caries lesions in children in the period of alternating occlusion [9]. The level of activity of the caries process was determined according to the methodology proposed by N.I. Smolyar and N.L. Chuchray [10].

The study was conducted in accordance with the ICH GCP (1996), the 1975 Declaration of Helsinki (revised in 2000), the Council of Europe Convention on Human Rights and Biomedicine (2007), and the

recommendations of the Committee on Bioethics at the Presidium of the National Academy of Medical Sciences of Ukraine (2002). The study was subject to the approval of the bioethics committee of the I. Horbachevsky Ternopil National Medical University, Ministry of Health of Ukraine.

Statistical analysis of the data was performed using STATISTICA 8.0 and SPSS 16.0 software. To assess the reliability of the differences between the groups, Student's t-test was used to determine the statistical significance of the results. The critical level of significance for testing statistical hypotheses in this study was 0,05.

RESULTS AND DISCUSSION

The study of the dental status of the children during the period of alternating occlusion (7-12 years) revealed a high prevalence of caries in both research groups (Fig. 1). Thus, the need to get treated was documented in 46 patients in the main group and in 31 patients in the comparison group. This indicates that the need for get treated in the main group exceeded the corresponding indicator in the comparison group by 1,5 times, $p < 0,05$. The number of children who had previously been treated in the main group was 25, while in the comparison group it was 38, which was 1,5 times higher than in the main group, $p < 0,05$. The assessment of caries resistance demonstrated that the proportion of children without caries lesions in the main group was 9 children, while in the comparison group it was 11 children, which was 1,2 times higher than in the main group, $p > 0,05$.

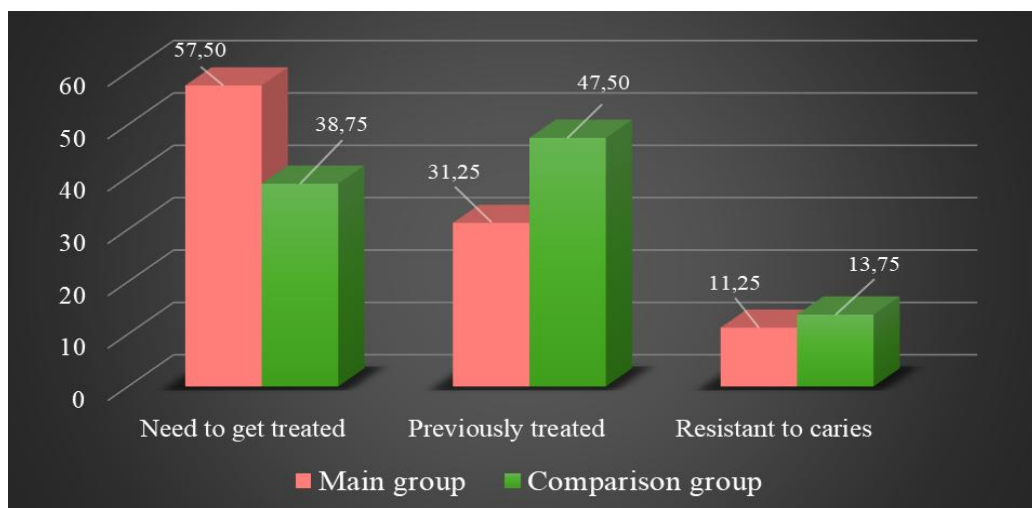


Figure 1 – Structure of dental treatment needs and caries resistance in children in the study groups during the variable occlusion period

The prevalence of caries among the study population was thus found to be $88,75 \pm 5,36$ % in the main group and $86,25 \pm 5,53$ % in the comparison group. According

to the WHO classification system, which defines a caries prevalence rate of 70-90 % as mass caries, the obtained indicators indicate a critically high prevalence

of caries in the study population. The mean value of the DMFT+dft index, which characterises the intensity of the caries process, in the main group was $5,1\pm 0,4$, while in the comparison group this index was 1,2 times lower ($4,2\pm 0,5$). According to the WHO classification, this corresponds to the average level of caries (3,0-6,0).

Analysis of the data shows a more pronounced deterioration in the dental status of children displaced from areas of hostilities compared to their peers living in relatively stable areas. The higher level of need for caries treatment, lower number of previous treatments and high prevalence of caries among children in the main group indicate significant barriers to access to preventive and curative dental care, which may be due to the destruction of medical infrastructure, limited access to qualified specialists, psychological stress and lifestyle changes due to forced migration [11, 12].

The next stage of our study was to determine the prevalence and intensity of dental caries in children during the period of alternating occlusion, depending on the degree of activity of the caries process (compensated, subcompensated, decompensated).

Based on the results obtained, it was found that among the children of the main group, the prevalence and intensity of dental caries varied depending on the form of activity of the pathological process. In particular, in the compensated form of caries, the prevalence was $38,03\pm 5,76\%$, and the average intensity was $4,5\pm 0,2$. For the subcompensated form, the corresponding values were $46,48\pm 5,92\%$ and $7,2\pm 0,2$. In contrast, the decompensated form exhibited the lowest prevalence ($15,49\pm 4,29\%$) and the highest intensity ($12,0\pm 1,3$).

In the comparison group of children with compensated caries, the prevalence of caries was $47,83\pm 6,01\%$, which was 1,3 times higher than in the main group ($p<0,05$), and the average intensity index was $3,4\pm 0,2$ (1,3 times lower, $p<0,05$). In the subcompensated form, these values were $36,23\pm 5,79\%$ and $6,6\pm 0,3$, respectively, i.e. 1,3 times ($p<0,05$) and 1,1 times ($p>0,05$) higher than in the control group. In the decompensated form, the prevalence of caries in children of the comparison group was $15,94\pm 4,41\%$, which did not differ from the main group ($p>0,05$), but the average level of intensity was 1,1 times lower ($p>0,05$).

The analysis of the obtained data indicates the prevalence of a compensated form of dental caries among the children of the Ternopil region (comparison group), and a subcompensated form among the children who were forced to move (main group), which may be due to a complex of etiological factors. One of the main reasons is a violation of a rational diet, which indicates an insufficient ability of the body to fully compensate

for damage to the hard tissues of the tooth. In addition, exposure to stress factors can lead to a disruption in the natural mechanisms of enamel remineralisation, contributing to the accelerated development of the caries process. In addition, social and economic factors, such as limited access to dental care due to forced displacement or unfavourable living conditions (near the front line), can have a negative impact. Changes in hygiene practices, such as irregular access to clean water, oral care products (toothpaste, toothbrushes, etc.) and inadequate sanitation, may further complicate the maintenance of good oral hygiene and contribute to the progression of caries [13].

Taking into account the fact that more than 50 % of the patients in the study groups were diagnosed with initial caries, our further research will focus exclusively on this stage of carious lesions. We analysed the prevalence of this pathology in relation to the degree of activity of the caries process.

In the course of assessing the prevalence of initial caries among children of the main group, depending on the degree of activity of the caries process, it was found that a compensated form of caries was diagnosed in $7,04\pm 3,04\%$ of cases, subcompensated – in $22,54\pm 4,96\%$, while a decompensated course was observed in $53,52\pm 5,92\%$ of patients. At the same time, in children of the comparison group, the compensated form of dental caries activity was recorded in $4,35\pm 2,46\%$ of cases (1,6 times less frequently, $p<0,05$), subcompensated – in $14,49\pm 4,24\%$ (1,6 times less frequently, $p<0,05$), and decompensated – in $34,78\pm 5,73\%$ (1,5 times less than in the main group, $p<0,05$).

The results obtained indicate a higher prevalence of decompensated initial caries in the relocated children (main group) and suggest that the low prevalence of initial caries in the compensated form of the disease during the period of occlusion change may be due to the high mineralisation potential of the oral fluid and the ability of enamel to remineralise under favourable conditions [14].

In the course of the study of the location of initial caries in permanent teeth in the children of the main and comparison groups, certain peculiarities in the prevalence of carious lesions were found depending on the topographic characteristics of the dentition.

Thus, when evaluating the incidence of lesions of incisors in the maxilla, these indicators were $44,07\pm 6,46\%$ of cases in the main group and $37,84\pm 7,97\%$ of cases in the comparison group, while in the mandible the same values were $11,86\pm 4,21\%$ and $13,51\pm 5,62\%$, respectively. The lesions of the canines of the upper jaw were observed in $15,25\pm 4,68\%$ of the main group and $16,22\pm 6,06\%$ of the comparison group,

and in the lower jaw – in $5,08 \pm 2,86$ % of the subjects and $2,70 \pm 2,67$ % of the subjects, respectively. The incidence of carious lesions in the premolars of the maxilla was $3,39 \pm 2,36$ % in the main group and $2,70 \pm 2,67$ % in the comparison group, while in the mandible these figures were $5,08 \pm 2,86$ % and $2,70 \pm 2,67$ %, respectively. As for the molars, the frequency of their lesions in the upper jaw was $6,78 \pm 3,27$ % of cases in the main group and $8,11 \pm 4,49$ % of cases in the comparison group, while for the molars of the lower jaw – $8,47 \pm 3,63$ % of cases and $13,51 \pm 5,62$ % of cases, respectively.

The results obtained show that there are no statistically significant differences between the groups (main and comparison) in the frequency of carious lesions of different groups of teeth, but the expected

pattern was studied: initial caries is most often diagnosed on the surfaces of teeth that are subject to insufficient natural cleaning by oral fluid, especially on the vestibular surfaces of maxillary incisors. This is consistent with the peculiarities of salivary microcirculation and its hydrodynamic properties in the corresponding areas of the oral cavity [15].

CONCLUSIONS

Thus, the study found that the dental status of children forcibly relocated due to military action was characterized by a higher prevalence and intensity of caries, a subcompensated form of caries accompanied by a predominance of affected maxillary incisors, and a greater need for caries treatment compared to children living in relatively stable regions.

PROSPECTS FOR FUTURE RESEARCH

To develop targeted preventive, therapeutic and rehabilitative measures to reduce dental morbidity among children forcibly displaced as a result of hostilities, taking into account their psycho-emotional state and social conditions.

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A –Work concept and design,
 B –Data collection and analysis,
 C –Responsibility for statistical analysis,
 D –Writing the article,
 E –Critical review,
 F –Final approval of the article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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