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THE PREVALENCE OF DENTAL CARIES IN CHILDREN WITH IRON DEFICIENCY ANEMIA IN THE KARAGANDA REGION

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Aim of the study. To assess the prevalence of caries in children with iron deficiency anemia.

Materials and methods. A study was conducted on 1500 children and adolescents in 3 areas of the Karaganda region, of which 54% suffer from IDA. Study examined children and adolescents aged 3 to 17 years, who were classified into three age categories: preschool children (3-6 years), primary school age (7-11 years), and high school age (12-17 years). The analysis was aimed at identifying the connection between iron deficiency anemia and the prevalence of caries among children and adolescents in the Karaganda region. To achieve this goal, statistical methods were applied, including correlation analysis and analysis of variance, considering age groups and regional characteristics.

Results and discussion. All study participants examined showed a direct connection between the degree of iron deficiency anemia (IDA) and the prevalence of caries, amounting to 67.98%, which is a significant correlation. This effect is especially noticeable among children aged 7 to 11 years. It was also found that with an increase in the severity of iron deficiency anemia, an increase in the number of cases of decompensated caries is observed.

Conclusions. Children and adolescents with iron deficiency anemia (IDA) exhibit higher rates of caries activity. In severe iron deficiency anemia, there is a high prevalence of caries, which indicates a significant impact of iron deficiency on dental health. Such figures indicate the importance of timely diagnosis and treatment of iron deficiency anemia to improve overall health and prevent possible complications in the form of oral diseases, including caries.

Key words: children's population; iron deficiency anemia; caries prevalence; age groups; rural areas

INTRODUCTION

The high dental morbidity among children remains one of the urgent problems of national health care, especially among children with various somatic diseases. One of these problems is iron deficiency anaemia (IDA), a polyetiological chronic disease caused by depletion of iron stores in the body, characterised by hypochromia and a decrease in the number of red blood cells in the blood. Iron is a crucial nutrient for human growth at every stage of life. It is particularly vital for children due to its significant impact on their development [8]. According to the World Health Organization (WHO), every person on the planet suffers from this disease, especially children (6 to 59 months) 40% and women (15 to 49 years) 30% of whom, according to WHO, suffer from iron deficiency anaemia [1, 9]. There is data on changes in teeth and periodontal tissues in patients with iron deficiency anaemia [3], but information on the frequency of dental diseases in individuals with iron deficiency anaemia is scarce and sketchy, and it is often noted that this requires further research [2, 4, 5, 6, 7]. In the Republic of Kazakhstan, regional programmes for the prevention of major dental diseases in children and adults have been developed, but these works pay insufficient attention to the development of therapeutic and preventive measures for children with iron deficiency anaemia. There have been no systematic studies in this direction concerning the prevalence and intensity of major dental diseases in children with iron deficiency. Therefore, the study of these issues would make it possible to improve the effectiveness of preventive and therapeutic measures in this population.

Aim of the study – to assess the prevalence of caries in children with iron deficiency anemia.

To achieve this goal, the following tasks have been identified:

1. Determine the prevalence of dental caries in children with iron deficiency anemia.

2. To study the structure and intensity of dental caries in children with iron deficiency anemia.

MATERIALS AND METHODS

In this study examined 1,500 children and adolescents in rural areas of the Karaganda region, of which 428 children and adolescents were from the Bukhar-Zhyrau district, 644 from the Nura district, 428 from the Osakarovsky district. The age of the children was from 3 to 17 years of them 765 (51%) were boys and 735 (49%) girls. In total, there are 812 (54%) children with IDA: 205 (25.25%) of them are from the Bukhar-Zhyrau district, 406 (50%) from the Nura district, 201 (24.75%) from the Osakarovsky district.

Criteria for inclusion were:

- children and adolescents aged 3 to 17 years with IDA and dental diseases.
- children and adolescents whose parents consented to participate in research.

Criteria for exclusion were:

- children and adolescents aged 3 to 17 years who do not have IDA or dental diseases.
- children and adolescents whose parents refused to participate in the study.

Dental examination. To assess the dental status, children and adolescents were divided into three groups: preschool age (3 – 6 years), junior school age (7 – 11 years) and senior school age (12 – 17 years). The structure of dental morbidity was determined by indicators of the condition of hard dental tissues. Dental examination was carried out by questioning and examination using a standard set of dental instruments under artificial light. The obtained data were entered into a card, which included information about age, place of residence, past and concomitant diseases, subjective and objective data on the condition of the teeth, periodontium, and oral mucosa.

Statistical data processing. Statistical processing of the research results was carried out using standard programs Microsoft Excel and STATISTICA v 8.0 for Windows, developed by StatSoft, Inc. (2012). Descriptive statistics were performed for all analyzed indicators depending on the type of variable. Qualitative characteristics were described as mean values and standard deviations. When assessing the significance of differences, the chi-square test was used.

RESULTS AND DISCUSSION

During the investigation, 428 children were examined in the Bukhar-Zhyrau district, 644 in the Nura district, and 428 in the Oskarovsky district.

The minimum age of children in all areas is 3 years, the maximum age is 17 years. The average age of children in the Bukhar-Zhyrau district was 9.74 years, in the Nura district – 11.12 years, in the Osakarovsky district – 8.52 years. The total age was 9.79 years. There were 765 boys (51%) and 735 girls (49%). The total number of children with IDA is 812 (54%): from the Bukhar-Zhyrau district – 205 (25.25%), from the Nura district – 406 (50%), from the Osakarovsky district – 201 (24.75%) (Table 1).

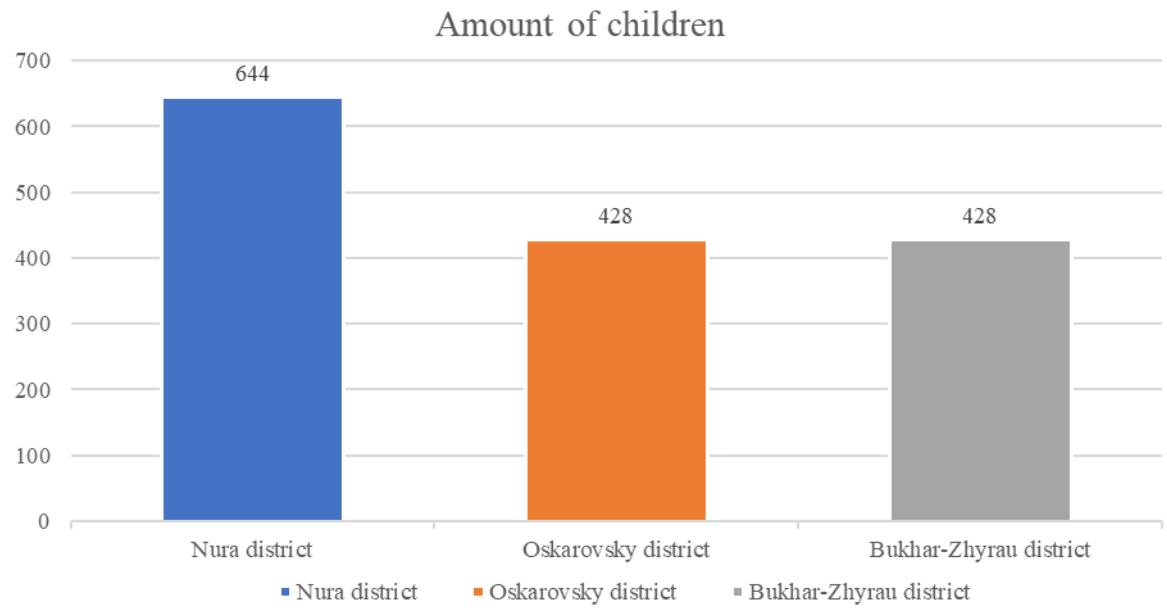

Figure 1 – Amount of examined children

During the investigation, a high prevalence of IDA was observed in all districts: in the Nura district of the Karaganda region – 63.0%, in the Bukhar-Zhyrau district – 47.9%, in the Osakarovsky district – 47.0% (Fig. 1).

A high prevalence of dental diseases is observed in the Osakarovsky and Bukhar-Zhyrau districts (Fig. 2). When the exploration was conducted, according to WHO recommendations, a high prevalence of caries was noted in the Oskaravsky district, reaching 80.8%; in the Nura and Bukhara-Zhyrau districts, average figures of 65.9% and 61.7% were noted, respectively.

In the study, children were divided into the following age groups: preschool age (3 – 6 years) – 35.3%, junior school age (7 – 11 years) – 39.3% and senior school age (12 – 17 years) – 39.3%. A high prevalence of caries was noted in children of preschool (73.9) and junior school age (77.2%) (Fig. 3). This may be due to the structural features of primary teeth, insufficient oral hygiene, and malnutrition with a predominance of carbohydrate foods. Dental disease was most often observed at 7 – 11 years of age, then its number decreased. This is probably due to the replacement of temporary teeth with permanent ones, normalization of the bite and elimination of imbalances in jaw growth, development of healthy eating habits, and improvement of oral hygiene.

With the participation of IDA, the prevalence rates in children with IDA are higher than in healthy children: the prevalence of caries in 3 – 6-year-old children with IDA was 75.6% and without IDA – 71.3%, in 7 – 11 year old children – 79.2% and 74.9%, respectively (Fig. 4). At the age of 12 – 17 years, no differences in the prevalence of caries were identified and amounted to 52.6% and 52.6%, respectively.

The total number of children with mild IDA was 31.5% (473), moderate – 18.1% (271) and severe – 4.5% (68). The study noted that the prevalence

Table 1 – Characteristics of children by districts of the Karaganda region

Indicator	Bukhar-Zhyrau district	Nurinsky district	Osakarovsky district	Total
Average age	9,74	11,12	8,52	9,79
Gender: girls	201	312	222	735
Gender: boys	227	332	206	765
Total patients with IDA	205	406	201	812
Total	428	644	428	1500

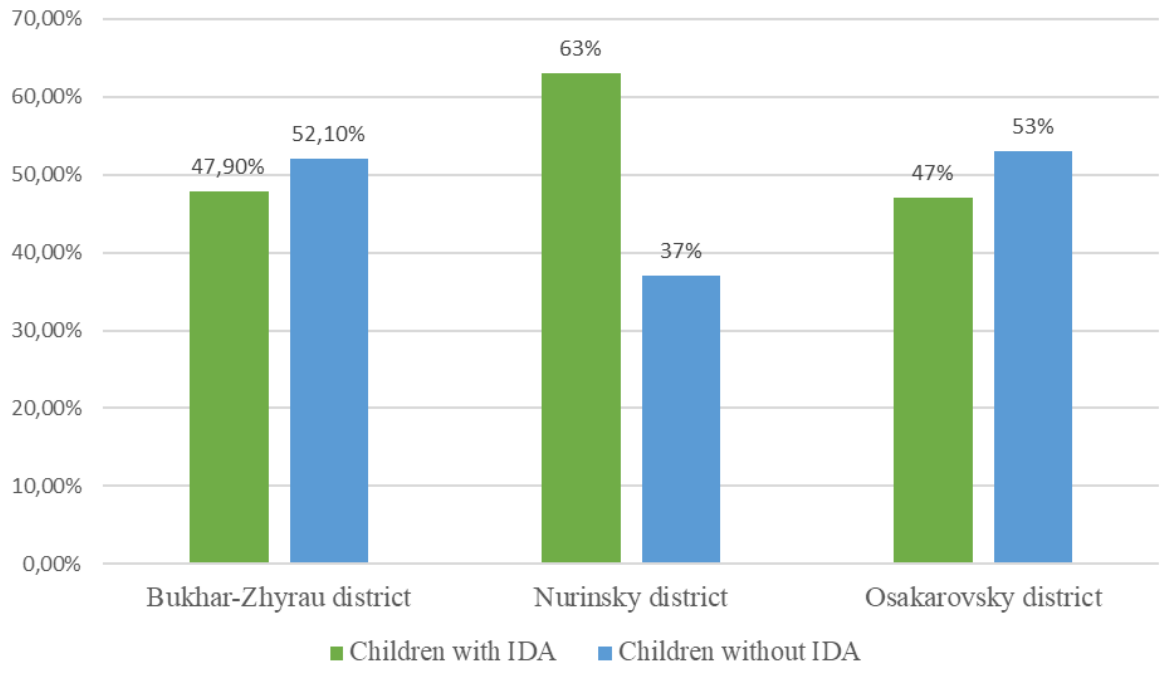

Figure 2 – Prevalence of IDA by district

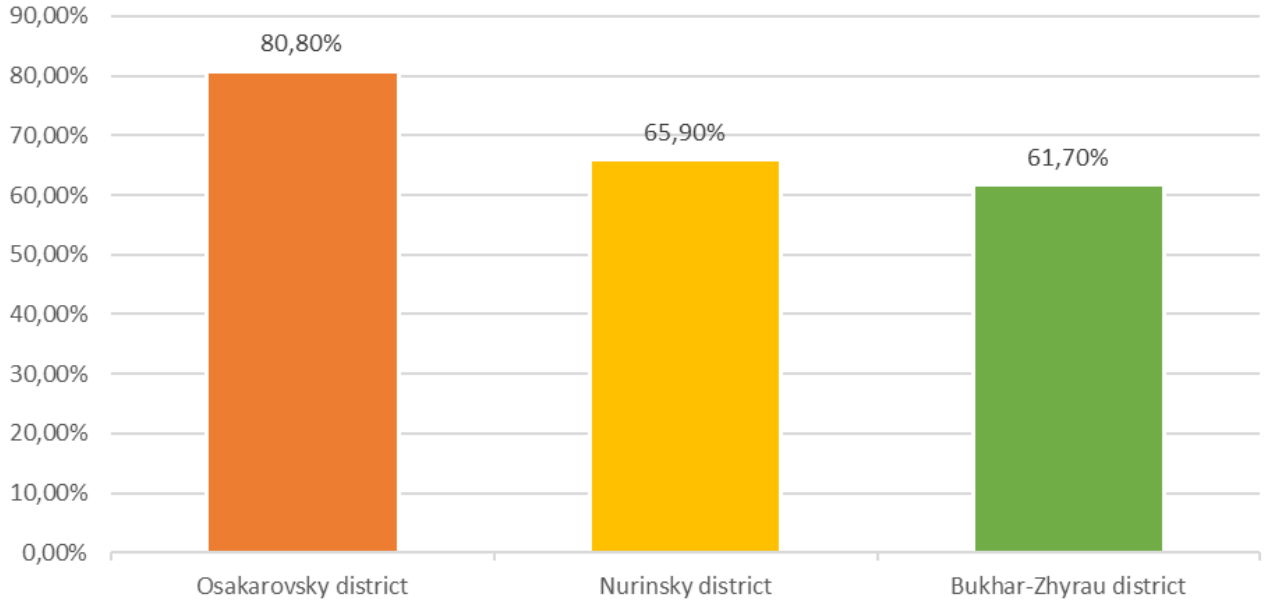

Figure 3 – Prevalence of caries in districts of the Karaganda region

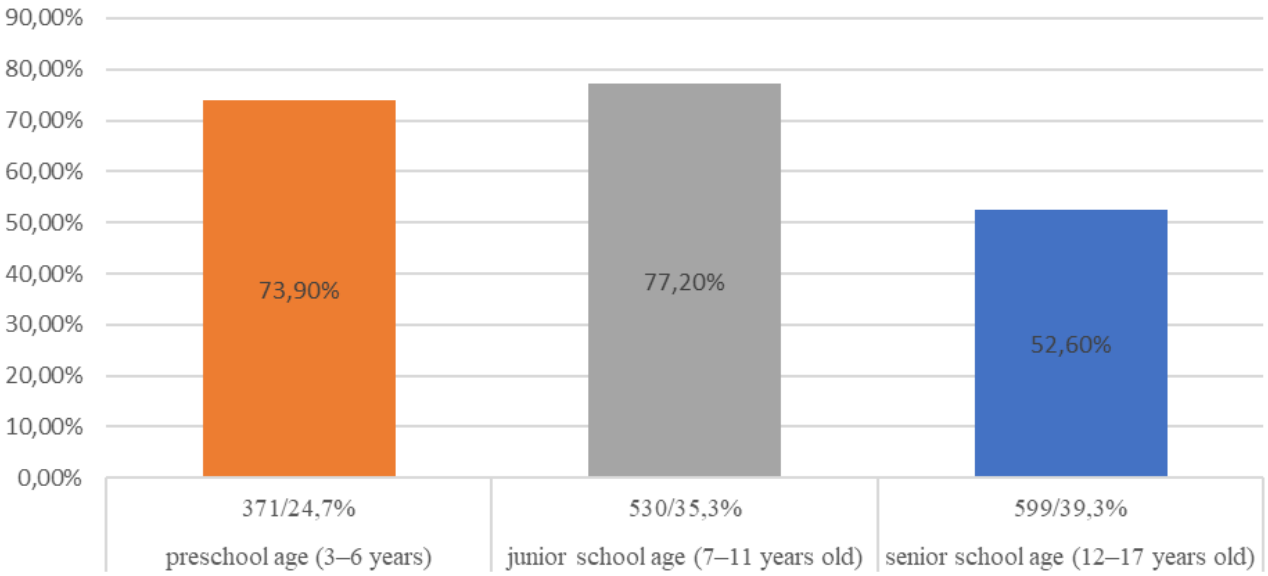

Figure 4 – Prevalence of caries by age groups

of IDA in boys was only 27.9% (419): of these, a mild degree was noted in 16.1% (241), a moderate degree – 9.7% (146) and a severe degree – 2.1% (32), the prevalence of IDA in girls was 26.2% (393). Accordingly, mild, moderate, and severe degrees were distributed as follows: 15.5% (232), 8.3% (125) and 2.4% (36), respectively (Table 2). Most often, mild, and moderate IDA is recorded in boys, while severe IDA is more often recorded in girls.

Children and adolescents with IDA have high rates of caries extensiveness. In severe iron deficiency anemia, there is a high prevalence of caries – 92.7% (Fig. 5). With a moderate degree - 83.4%, with a mild degree of IDA – 64.7%. There is a direct correlation between the severity of IDA and caries prevalence rates.

The relationship between the severity of IDA and the degree of caries activity is presented in Table 3.

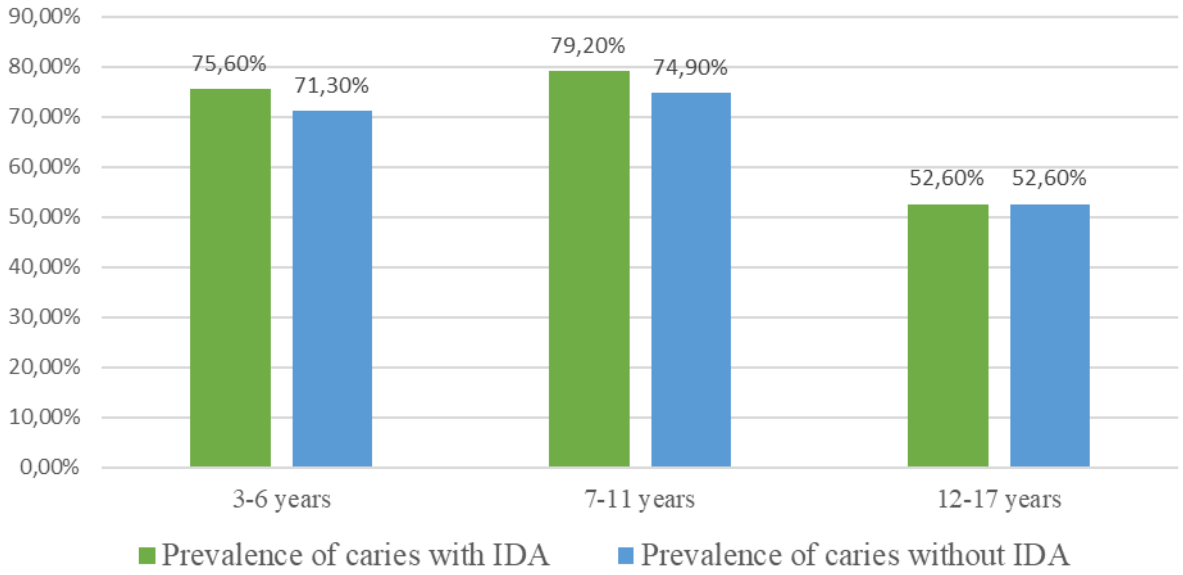

Figure 5 – Prevalence of caries in children with IDA

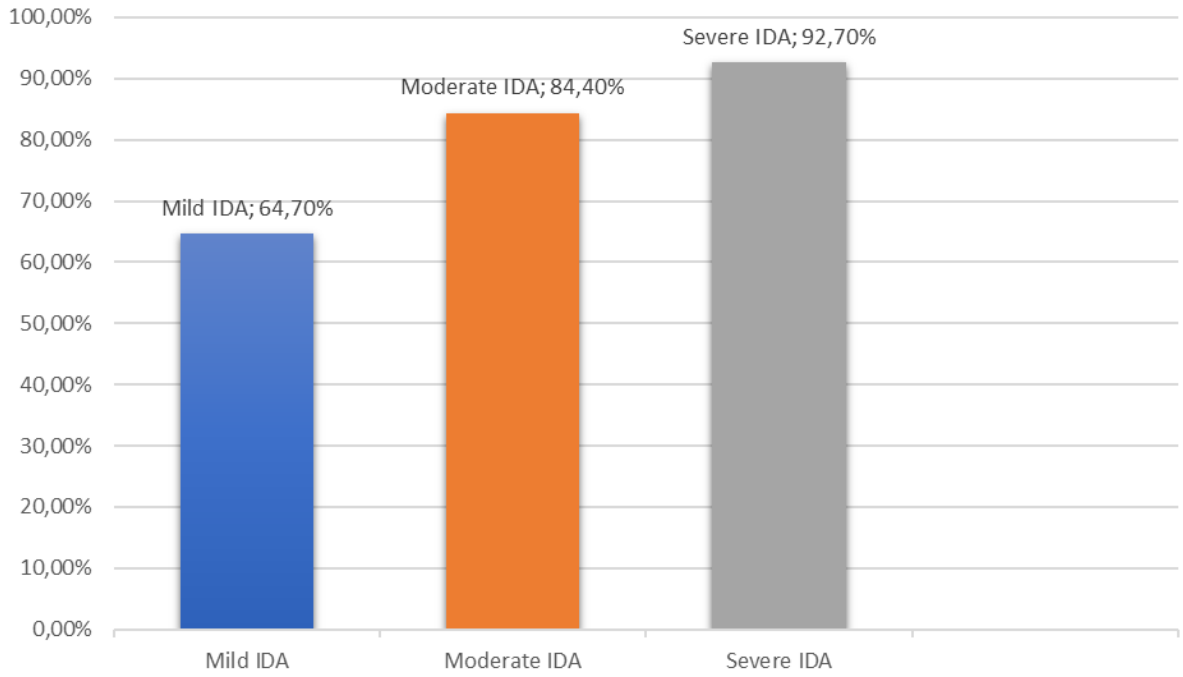

Figure 6 – Prevalence of caries by degree of IDA

A direct correlation was noted between the severity of IDA and the degree of caries activity. In IDA of the first degree, a compensated form of caries occurs in 54.33% of cases, a subcompensated form of caries in 9.51% and a decompensated form of caries in 0.84%, in IDA of the II degree, 39.12%, 14.76%, 12.18%, respectively.; for grade III IDA – 32.35%, 32.35% and 19.11%, respectively. With increasing severity of IDA, an increase in the severity of caries was noted.

CONCLUSION

Thus, our data confirm the influence of IDA on the prevalence of caries and there is no doubt that when planning the treatment and prevention of dental diseases, data on the child's somatic status should be considered. The results of the study allowed us to draw the following findings:

1. Children with iron deficiency anemia have a high prevalence of dental caries – 67.98%

Table 2 – Prevalence of IDA among children in rural areas of the Karaganda region

Index	Girls		Boys		Total	
	abs.	%	abs.	%	abs.	%
Healthy children	342	22,8	346	23,1	688	45,9
Mild IDA	232	15,5	241	16,1	473	31,5
Moderate IDA	125	8,3	146	9,7	271	18,1
Severe IDA (%)	36	2,4	32	2,1	68	4,5
Total (%)	735	49,0	765	51,0	1500	100

Table 3 – Intensity of caries according to the degree of activity in children with IDA

Index	Number of children with IDA I (%)	Number of children with IDA II (%)	Number of children with IDA III (%)
Compensated form	54,33	39,12	32,35
Subcompensated form	9,51	14,76	32,35
Decompensated form	0,84	12,18	19,11

2. As the severity of iron deficiency anemia increases, the number of cases with decompensated caries increases.

Contribution of the authors:

S. T. Tuleutayeva – head of the research, writing, and translation

A. D. Seitzhanova – writing, sending and translation.

K. A. Shauyenova – collection of materials.

D. Zh. Tuleutayev – data processing.

K. S. Mukhtarova – collection of material

A. S. Zhumadilova, N. V. Abdygalieva – data processing.

Conflict of interest. No conflict of interest is declared.

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TRANSLITERATION

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РАСПРОСТРАНЕННОСТЬ КАРИЕСА СРЕДИ ДЕТЕЙ С ЖЕЛЕЗОДЕФИЦИТНОЙ АНЕМИЕЙ В КАРАГАНДИНСКОЙ ОБЛАСТИ

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Цель исследования. Оценить распространенность кариеса у детей с железодефицитной анемией.

Материалы и методы. Проведено исследование 1 500 детей и подростков в 3 регионах Карагандинской области, у 54% из которых диагностирована железодефицитная анемия. Участниками исследования были лица в возрасте от 3 до 17 лет, которые были классифицированы на три возрастные категории: дети дошкольного возраста (3-6 лет), младший школьный возраст (7-11 лет) и старший школьный возраст (12-17 лет). Проведенный анализ направлен на выявление связи между заболеваниями зубов и десен и распространенностью кариеса среди детей в Карагандинской области. Для достижения этой цели были применены статистические методы, включая корреляционный анализ и анализ дисперсии, с учетом возрастных групп и региональных особенностей.

Результаты и обсуждение. У всех рассмотренных участников исследования выявлена прямая зависимость между степенью железодефицитной анемии и распространенностью кариеса, составившая 67,98%, что является значительным показателем корреляции. Этот эффект особенно заметен среди детей в возрасте от 7 до 11 лет. Так же было обнаружено что с увеличением степени тяжести железодефицитной анемии наблюдается рост числа случаев декомпенсированного кариеса.

Выводы. Дети и подростки с железодефицитной анемией демонстрируют более высокие показатели активности кариеса. При тяжелой степени железодефицитной анемии наблюдается высокая распространенность кариеса, что свидетельствует о значительном влиянии состояния железодефицита на здоровье зубов. Такие цифры указывают на важность своевременной диагностики и лечения железодефицитной анемии для улучшения общего состояния здоровья и предотвращения возможных осложнений в виде заболеваний полости рта, включая кариес.

Ключевые слова: детское население; железодефицитная анемия; распространенность кариеса; возрастные группы; сельская местность

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ҚАРАҒАНДЫ ОБЛЫСЫНДА ТЕМІР ТАПШЫЛЫҒЫ АНЕМИЯСЫ БАР БАЛАЛАР АРАСЫНДА КАРИЕС ТАРАЛУЫ ТУРАЛЫ

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Зерттеудің мақсаты. теміртапшылықты анемиясы бар балаларда тісжегінің таралуын бағалау.

Материалдар мен әдістер. Қарағанды облысының 3 аймағындағы 1500 бала мен жасөспірімге зерттеу жүргізілді, олардың 54%-ы теміртапшылықты анемиядан (ТТА) зардап шегеді. Зерттеуге қатысушылар 3 жастан 17 жасқа дейінгі балалар мен жасөспірімдер болды, олар үш жас санатына жіктелген: мектеп жасына дейінгі балалар (3-6 жас), бастауыш мектеп жасы (7-11 жас) және жоғары мектеп жасы (12-17 жас). Талдау Қарағанды облысындағы балалар арасында ТТА мен тісжегінің таралуы арасындағы байланысты анықтауға бағытталған. Осы мақсатқа жету үшін жас топтары мен аймақтық ерекшеліктерді ескере отырып, корреляциялық талдауды және дисперсияны талдауды қамтитын статистикалық әдістер қолданылды.

Нәтижелер және талқылау. Өткізілген зерттеу нәтижесінде қатысушылардың барлығында теміртапшылықты анемиясының дәрежесі мен тісжегінің таралуы арасында 67,98% құрайтын тікелей байланысты дәлелденді. Бұл әсер әсіресе 7 жастан 11 жасқа дейінгі балаларда байқалады. Сондай-ақ, теміртапшылықты анемияның ауырлығының жоғарылауымен декомпенсацияланған тісжегі жағдайларының көбеюі анықталды.

Қорытындылар. Теміртапшылықты анемиясы бар балалар мен жасөспірімдер арасында тісжегінің жоғарғы көрсеткіштері байқалды. Бұл, темір тапшылықты анемияның тістің жағдайына елеулі ықпал бар екенін дәлелдейді. Мұндай сандар жалпы денсаулықты жақсарту және ауыз қуысының аурулары, оның ішінде тісжегі түріндегі ықтимал асқынулардың алдын алу үшін теміртапшылықты анемияны уақытылы диагностикалау мен емдеу маңыздылығын көрсетеді.

Кілт сөздер: балалар популяциясы; теміртапшылықты анемия; тісжегінің таралуы; жас топтар; ауылдық жерлер