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Prevalence of dental caries in children aged 1 to 5 years living in Moscow

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Abstract
INTRODUCTION. Dental health is an integral part of the overall health of children. Dental morbidity in children remains one of the pressing health problems. A feature of dental morbidity in children at the present stage is the high prevalence of dental caries and its complications. Dental caries is a multifactorial disease and is recorded in patients of any age. The prevalence of early childhood caries in children aged 6 months to 6 years is an important social problem for health care worldwide. The study of dental morbidity in children is dictated by the need to obtain information on their prevalence in all age groups.
AIM. To study the prevalence of dental caries in children of early and preschool age (from 1 year to 5 years) based on data from preventive medical examinations of minors.
MATERIALS AND METHODS. An epidemiological survey of the child population was conducted as part of preventive medical examinations of minors aged 1 to 5 years, clinical research methods were used, and all results obtained were processed statistically.
RESULTS. Analysis of the prevalence of early childhood caries showed that this indicator increases as children grow older. Using the Pearson χ^2 criterion for contingency tables, a statistically significant relationship was found between the prevalence of caries and the age group ($\chi^2 = 34.1$, df = 4, $p < 0.0001$). Absolute indicators of the prevalence of dental caries are higher in girls in all age groups and lower in boys. Statistically significant differences in the prevalence of caries in boys and girls were observed only in the age group of 1 year ($\chi^2 = 31.45$, df = 1, $p < 0.0001$) and 5 years ($\chi^2 = 4.61$, df = 1, $p < 0.032$). In the age groups of 2, 3, 4 years, statistically significant differences in the prevalence of dental caries among boys and girls were not found.
CONCLUSIONS. The prevalence rate of dental caries in children aged 1 to 5 years increases as the child grows older and does not tend to decrease. The absolute prevalence rate of dental caries is higher in girls in all age groups and lower in boys. Statistically significant differences in the prevalence of dental caries in boys and girls were observed in the age groups of 1 year and 5 years, this indicator is higher in girls than in boys. In the age groups of 2, 3, 4 years, statistically significant differences in the prevalence of dental caries among boys and girls were not found.

Keywords: prevalence of dental caries, caries, early childhood caries

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Распространенность кариеса зубов у детей в возрасте от 1 года до 5 лет, проживающих в г. Москве

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Резюме
ВВЕДЕНИЕ. Стоматологическое здоровье является неотъемлемой составляющей общего здоровья детей. Стоматологическая заболеваемость детского населения остается одной из актуальных проблем здравоохранения. Особенностью стоматологической заболеваемости детей на современном этапе является высокая распространенность кариеса зубов и его осложнений. Кариес зубов является многофакторным заболеванием и регистрируется у пациентов любого возраста. Распространенность раннего детского кариеса возраста у детей в возрасте от 6 месяцев до 6 лет является важной социальной проблемой для здравоохранения всего мира. Изучение стоматологической заболеваемости у детей диктуется необходимостью получения сведений об их распространенности во всех возрастных группах.
ЦЕЛЬ. Изучить распространенность кариеса зубов у детей раннего и дошкольного возраста (от 1 года до 5 лет) на основе данных профилактических медицинских осмотров несовершеннолетних.

МАТЕРИАЛЫ И МЕТОДЫ. Было проведено эпидемиологическое обследование детского населения в рамках профилактических медицинских осмотров несовершеннолетних в возрасте от 1 года до 5 лет, использованы клинические методы исследования, все полученные результаты обработаны статистически.
РЕЗУЛЬТАТЫ. Анализ распространенности раннего детского кариеса показал, что данный показатель увеличивается по мере взросления детей. С помощью критерия χ^2 Пирсона для таблиц сопряженности признаков была выявлена статистически значимая связь распространенности кариеса и возрастной группы ($\chi^2 = 34{,}1$, df = 4, $p < 0{,}0001$). Абсолютные показатели распространенности кариеса зубов выше у девочек во всех возрастных группах и ниже у мальчиков. Статистически значимые различия распространенности кариеса у мальчиков и девочек наблюдались только в возрастной группе 1 год ($\chi^2 = 31{,}45$, df = 1, $p < 0{,}0001$) и 5 лет ($\chi^2 = 4{,}61$, df = 1, $p < 0{,}032$). В возрастных группах от 2, 3, 4 лет статистически значимых различий распространенности кариеса зубов среди мальчиков и девочек не выявлено.
ВЫВОДЫ. Показатель распространенности кариеса зубов у детей в возрасте от 1 года до 5 лет увеличивается по мере взросления ребенка и не имеет тенденции к снижению. Абсолютный показатель распространенности кариеса выше у девочек во всех возрастных группах и ниже у мальчиков. Статистически значимые различия распространенности кариеса у мальчиков и девочек наблюдались в возрастных группах 1 года) и 5 лет, данный показатель выше у девочек выше, чем у мальчиков. В возрастных группах от 2, 3, 4 лет статистически значимых различий распространенности кариеса зубов среди мальчиков и девочек не выявлено.

Ключевые слова: распространенность кариеса, кариес, ранний детский кариес, кариес раннего детского возраста

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INTRODUCTION

Oral health is an integral part of children's overall health. Dental morbidity in the pediatric population remains one of the pressing issues in healthcare. Over the past decades, the study of the prevalence of dental diseases in children has been a subject of scientific and practical interest for healthcare administrators, pediatricians, and pediatric dentists. Despite significant advancements in the diagnosis and treatment of dental diseases, these pathologies are still registered in children of all ages [1–3].

A distinctive feature of pediatric dental morbidity at the present stage is the high prevalence of dental caries and its complications.

Despite improvements in the quality and expansion of preventive and therapeutic measures, the prevalence, intensity, and severity of dental caries remain high and show no tendency to decrease [4].

Dental caries is a multifactorial disease and is observed in patients of all ages. According to the World Health Organization, caries of both primary and permanent teeth in children is a major global health issue [5].

Early childhood caries (ECC) is considered one of the most challenging problems in pediatric dentistry.

The term "early childhood caries" refers to carious lesions and their complications in children aged 6 months to 6 years (6–71 months). At this age, caries is characterized by rapid, aggressive progression and multiple lesions, often requiring restoration of teeth with artificial crowns and early tooth extraction due to complications [6–8].

The prevalence of early childhood caries in children aged 6 months to 6 years is a significant social problem for global healthcare [9; 10].

The treatment of dental caries and its complications in young children is technically challenging due to their negative attitude toward dental procedures. Therefore, according to Clause 19 of the Russian Ministry of Health Order No. 910n dated 13.11.2012 (as amended on 21.02.2020) "On the Approval of the Procedure for Providing Medical Care to Children with Dental Diseases", the treatment of multiple caries complications in children under 3 years of age, as well as other dental conditions for children of any age based on medical indications, is performed under general anesthesia[1].

Early childhood caries and its impact on the quality of life of children increase the burden on the healthcare system, including its financial costs. Due to the significant prevalence of dental caries in all age groups, prevention remains a highly relevant and crucial issue in dentistry, with substantial medical and social importance, especially for the pediatric population.

The study of dental morbidity in children is essential for obtaining data on its prevalence across all age groups.

AIM

To investigate the prevalence of dental caries in young and preschool-aged children (from 1 to 5 years old) based on data from preventive medical examinations of minors.

[1] Order of the Ministry of Health of the Russian Federation of 13.11.2012 No. 910n (as amended on 21.02.2020) "On approval of the Procedure for providing medical care to children with dental diseases". (In Russ.) Available at: https://normativ.kontur.ru/document?moduleId=1&documentId=217427 (accessed: 14.02.2025).

MATERIALS AND METHODS

To achieve the stated objective, an epidemiological survey of the pediatric population was conducted as part of preventive medical examinations of minors aged 1 to 5 years. Clinical research methods were employed, and all obtained results were statistically analyzed.

Categorical variables are presented as absolute and relative frequencies.

The prevalence of dental caries by age was analyzed using Pearson's χ^2 test for contingency tables. To analyze the relationship between the prevalence of caries among boys and girls, Pearson's χ^2 test with Yates' continuity correction was applied.

RESULTS

The study included 1,440 children aged 1 to 5 years residing in Moscow. The epidemiological survey was conducted as part of preventive medical examinations aimed at studying dental morbidity in children aged 1 to 5 years.

During clinical examinations, the dental status of each patient was recorded. Informed voluntary consent for all examinations and the use of the collected data for scientific purposes was signed by the parents or legal guardians, in accordance with Article 20 "Informed Voluntary Consent to Medical Intervention and Refusal of Medical Intervention" of Federal Law No. 323-FZ of November 21, 2011, "On the Fundamentals of Health Protection of Citizens in the Russian Federation" (with amendments and additions effective from January 11, 2023)[2].

The prevalence of dental caries was determined as the ratio of the number of patients with carious teeth to the total number of examined individuals, expressed as a percentage (%). Table 1 presents data on the prevalence of dental caries among children aged 1 to 5 years.

Data analysis revealed that teeth are affected by carious processes across all age groups. Using Pearson's χ^2 test for contingency tables, a statistically significant association was identified between caries prevalence and age group ($\chi^2 = 34.1$, df = 4, $p < 0.0001$). The prevalence of caries increases as children grow older. Figure 1 presents a graph of the prevalence of dental caries among children aged 1 to 5 years.

At the age of 1 year, dental caries was recorded in 31.3% of patients; at 2 years – in 32.9%; at 3 years – in 36.6%; at 4 years – in 38.4%; and at 5 years – in 52.4%. Thus, the prevalence of dental caries increases with age.

Figure 2 graphically presents the analysis of dental caries prevalence by age and gender.

[2] Federal Law of November 21, 2011 No. 323-FL (as amended on July 24, 2023) "On the fundamentals of protecting the health of citizens in the Russian Federation" (as amended and supplemented, entered into force on July 13, 2022). (In Russ.) Available at: https://www.consultant.ru/document/cons_doc_LAW_121895/ (accessed: 14.02.2025).

Table 1. Prevalence of dental caries among children aged 1 to 5 years

Таблица 1. Распространенность кариеса зубов среди детей в возрасте от 1 года до 5 лет

Age Group	Number of Children	Presence of Caries				χ^2	df	*p*
		No		Yes				
		n	%	*n*	%			
1	284	195	68.7	89	31.3	34.1	4	<0.0001
2	289	194	67.1	95	32.9			
3	290	184	63.5	106	36.6			
4	289	178	61.6	111	38.4			
5	288	137	47.6	151	52.4			

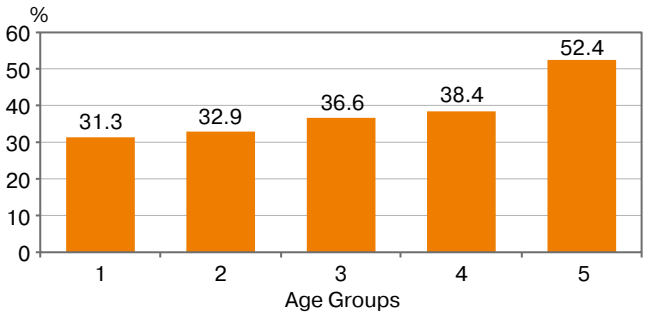

Fig. 1. Prevalence of dental caries depending on age

Рис. 1. Распространенность кариеса зубов в зависимости от возраста

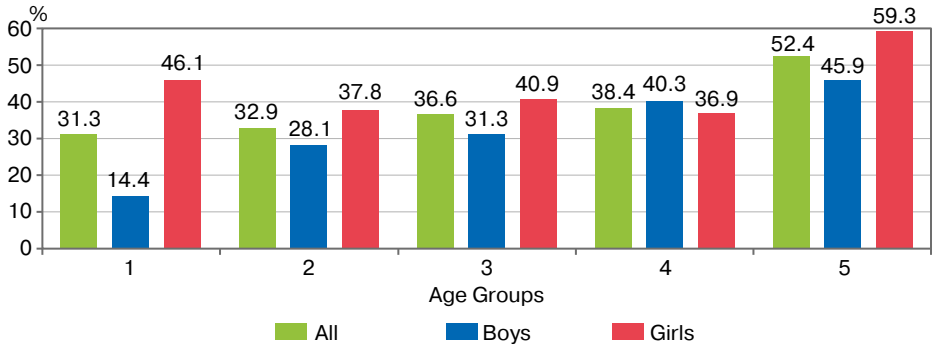

Fig. 2. Prevalence of dental caries depending on age and gender

Рис. 2. Распространенность кариеса зубов в зависимости от возраста и пола

Table 2. Pearson's χ^2 test with Yates' correction. Analysis of the relationship between the prevalence of dental caries in boys and girls

Таблица 2. Критерий χ^2 Пирсона с поправкой Йейтса. Анализ взаимосвязи распространенности кариеса зубов у мальчиков и девочек

Factor		Number of Children	Presence of Caries				χ^2	df	*p*
			No		Yes				
			n	%	*n*	%			
1 year	boys	132	113	85.6	19	14.4	31.45	1	<0.0001
	girls	152	82	53.9	70	46.1			
2 years	boys	146	105	71.9	41	28.1	2.64	1	0.103
	girls	143	89	62.2	54	37.8			
3 years	boys	131	90	68.7	41	31.3	2.45	1	0.118
	girls	159	94	59.1	65	40.9			
4 years	boys	129	77	59.7	52	40.3	0.23	1	0.635
	girls	160	101	63.1	59	36.9			
5 years	boys	148	80	54.1	68	45.9	4.61	1	0.032
	girls	140	57	40.7	83	59.3			

The analysis of dental caries prevalence among boys and girls revealed that in all age groups, the absolute prevalence was higher in girls and lower in boys: at 1 year – 19 boys (14.4%) and 70 girls (46.1%); at 2 years – 41 boys (28.1%) and 54 girls (37.8%); at 3 years – 41 boys (31.3%) and 65 girls (40.9%); at 4 years – 52 boys (40.3%) and 59 girls (36.9%); at 5 years – 68 boys (45.9%) and 83 girls (59.3%). The relative prevalence of dental caries in children was higher in girls across all age groups, except for the 4-year age group.

Table 2 presents the results of Pearson's χ^2 test with Yates' continuity correction for analyzing the relationship between the prevalence of dental caries in boys and girls.

The analysis of dental caries prevalence by gender revealed that the absolute prevalence was higher in girls across all age groups. Statistically significant differences in dental caries prevalence between boys and girls were observed in the 1-year age group ($\chi^2 = 31.45$, df = 1, $p < 0.0001$) and the 5-year age group ($\chi^2 = 4.61$, df = 1, $p < 0.032$).

In the age groups from 2 to 4 years, no statistically significant differences in dental caries prevalence between boys and girls were identified.

DISCUSSION

The analysis of data obtained from the epidemiological study of the pediatric population in Moscow aged 1 to 5 years, conducted as part of preventive medical examinations of minors, demonstrated that the prevalence of dental caries increases as children grow older.

Using Pearson's χ^2 test for contingency tables, a statistically significant association was identified between caries prevalence and age group ($\chi^2 = 34.1$, df = 4, $p < 0.0001$).

The absolute prevalence of dental caries was higher in girls across all age groups and lower in boys.

Statistically significant differences in caries prevalence between boys and girls were observed only in the 1-year age group ($\chi^2 = 31.45$, df = 1, $p < 0.0001$) and the 5-year age group ($\chi^2 = 4.61$, df = 1, $p < 0.032$).

In the age groups of 2, 3, and 4 years, no statistically significant differences in dental caries prevalence between boys and girls were identified, despite categorical (absolute) variables indicating a higher prevalence in girls compared to boys (except for the 4-year age group).

CONCLUSION

1. The prevalence of dental caries in children aged 1 to 5 years increases as they grow older and shows no tendency to decrease. A statistically significant association between caries prevalence and age group was identified ($\chi^2 = 34.1$, df = 4, $p < 0.0001$).

2. The absolute prevalence of dental caries was higher in girls across all age groups and lower in boys:
   – 1 year: 19 boys (14.4%) and 70 girls (46.1%);
   – 2 years: 41 boys (28.1%) and 54 girls (37.8%);
   – 3 years: 41 boys (31.3%) and 65 girls (40.9%);
   – 4 years: 52 boys (40.3%) and 59 girls (36.9%);
   – 5 years: 68 boys (45.9%) and 83 girls (59.3%).

3. Statistically significant differences in caries prevalence between boys and girls were observed in the 1-year age group ($\chi^2 = 31.45$, df = 1, $p < 0.0001$) and the 5-year age group ($\chi^2 = 4.61$, df = 1, $p < 0.032$), with girls showing higher prevalence than boys.

4. In the age groups of 2, 3, and 4 years, no statistically significant differences in dental caries prevalence between boys and girls were identified.

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