



Risk Factors for the Formation of Inflammatory Diseases of the Upper Digestive Tract in Children in the Republic of North Ossetia-Alania

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

In recent years, cases of diseases of the digestive tract among preschool and school-age children have become significantly more frequent. This article analyzes the influence of various factors (heredity, living conditions, age, gender, lifestyle) on the likelihood of morbidity. Chronic pathology of the upper digestive tract in the vast majority of children begins at preschool age with further significant growth from the moment they attend school. Close attention is required by children whose parents and immediate relatives suffer from gastroenterological diseases. Modern diagnosis of the disease will reduce the risk of development and progression of the most common pathology of the digestive organs of childhood and avoid the development of severe complications.

Keywords: Pathologies of the upper digestive tract; helicobacter infection; diseases of the digestive system; promotion of breastfeeding; preschool and school-age children.

1. INTRODUCTION

One of the main reasons for the current trends in the deterioration of public health in Russia is still the health problems of children and adolescents [1]. The greatest increase in morbidity is observed among schoolchildren, who make up 70% of the child population [2-4]. Of particular concern are the health indicators of children living in ecologically unfavorable territories. The theoretical justification of the directions of primary prevention of any diseases is the identification of risk factors [5-7]. Risk in the medical sense means a combination of conditions that significantly increase the likelihood of loss of health, the occurrence and progression of diseases. The concept of disease risk aims to analyze all the conditions that determine the threat to a child's health, to establish the maximum number of factors that increase the likelihood of disease [5]. Taking into account the social significance and relevance of the problems of negative trends in children's health, as well as due to the fact that morbidity is one of the most important informative indicators of the health of the child population, we conducted a detailed analysis of the morbidity of children in the class of diseases of the digestive system, including pathology of the upper digestive tract (UDT).

2. MATERIALS AND METHODS

With the help of multivariate regression analysis, the morbidity of the child population in the Republic of North Ossetia–Alania was studied by the class of digestive organs according to social research data. On the basis of questionnaires, interviews and analysis of medical documentation, we have studied the socio-hygienic, economic, medical and biological factors contributing to the formation of the disease in children. 1288 cases (children aged 4 to 18 years) in children's educational institutions of Vladikavkaz and districts of the Republic of North Ossetia-Alania, characterized by various indicators of the environmental situation, water supply sources, socio-economic status of the population, the volume of medical care, were considered. The questionnaire, along with the passport part, provided data on heredity, obstetric history of mothers, child development, past illnesses and socio-hygienic living conditions. Information was also requested

characterizing the features of the course of diseases of the upper digestive tract, general clinical examination and diagnosis of helicobacter infection (HP infection) using a non-invasive respiratory test. All the children surveyed were taken under observation based on information about previously identified diseases of the upper digestive tract, the presence of burdened heredity, existing gastroenterological complaints and the results of HP infection. The conducted studies have shown that over the period from 2014 to 2020, the total incidence of diseases of the digestive system increased from 3371 to 4871 cases per 100 thousand population, that is, by 1.44 times. The growth rate of the general morbidity of the children's population with diseases of the digestive system was 30.8%. During the same period, the primary incidence of digestive diseases increased from 1583 to 2195 cases per 100 thousand population and moved from the 8th to the 5th rank in the structure of all newly identified pathology in children. The growth rate of the newly detected morbidity was 27.9%. Along with the growth of the entire pathology of the digestive organs, there is an increase in the pathology of the upper digestive tract in children in the Republic of North Ossetia-Alania [5]. Over the period 2014-2020, the cumulative prevalence (total morbidity) of diseases of the upper digestive tract increased almost 2 times (from 336 in 2014 to 565 in 2020), and the newly detected incidence increased 1.25 times (from 197 to 247 per 100 thousand population) (Table 1).

As can be seen from the table, over the period 2014-2020, there has been an increase in intensive indicators of general and newly detected morbidity in the class of digestive organs, including UDT, in Vladikavkaz and the regions of the Republic of North Ossetia-Alania. Thus, the growth rate of the total incidence of children with UDT diseases in the republic amounted to 68.3%, and the newly identified - 25.1%. The method of multivariate regression analysis was used to study the interdependent influence of demographic and medical factors on the dynamics of the incidence of UDT diseases. Their cumulative effect on the dynamics of both primary (95.29%) and general morbidity (88.81%) and, to a lesser extent, on the dynamics of medical examination (74.6%) was shown. In recent years, the provision of district

pediatricians in the republic has increased from 19.2 to 22.2 per 10 thousand children, and the coverage of endoscopic examinations per 1000 children - from 11.9 to 16.2%. Together, these two indicators primarily affect the detection of digestive diseases, including UDT pathology ($r=0.81$). The incidence of digestive organs in children, including UDT, in the Republic of North Ossetia-Alania has increased over the past 7 years, as evidenced by both the rate of increase in total morbidity (30.8%) and the newly identified (27.9%). At the same time, according to the results of multivariate regression analysis, there is a tendency to increase gastroduodenal

pathology, which by 2030 may increase its level by 1.5-2 times. The most significant influence on the formation of this process is provided by pediatricians, coverage by instrumental methods of examination ($r= 0.61-0.95$). The high level of morbidity established by us in the class of digestive organs, including UDT, in children and adolescents in the Republic of North Ossetia-Alania determines the relevance of early detection of this pathology and risk factors contributing to its formation. We calculated the informative value of risk factors in points (see Table 2).

Table 1. Dynamics of indicators of general and primary morbidity of children with digestive pathology (per 100 thousand children)

Indicator	Period							Dynamics of indicators
	2014	2015	2016	2017	2018	2019	2020	
General morbidity	3371	3779	4358	4884	6984	6110	4871	30,8%
Newly detected morbidity	1583	1977	2526	2804	4562	3562	2195	27,9%

Table 2. Biological risk factors for diseases of the digestive system in children

Factors	Points
Hereditary predisposition (the presence of diseases of the gastroduodenal system in the family)	3,0
Unfavorable environmental situation	4,0
Neuropsychic, emotional overload, stress, conflicts at school and at home, incomplete family, violation of the daily routine	6,0
Physical inactivity	2,5
Hypoxic-ischemic encephalopathy (birth trauma, threat of miscarriage, PPTSNS, toxicosis, pathology in childbirth, cord entanglement, etc.)	6,0
Early mixed and artificial feeding, milk mixtures that do not contain taurine	2,0
Eating disorders	3,0
Alimentary errors (abuse of acute indigestible food, food in dry water)	4,0
<i>N. pylori</i>	5,0
Chronic foci of infection (chronic tonsillitis, rhinosinusitis, caries)	5,0
Frequent acute respiratory infections	2,5
Acute intestinal infections	3,5
Intestinal and gallbladder dyskinesia	2,0
Intestinal dysbiosis	2,0
Helminthic invasion	2,0
Giardiasis of the intestine	2,0
Manifestation of allergy	3,5
Viral hepatitis in the anamnesis	3,0
The use of long-term and frequent courses of antimicrobial drugs	3,0
Anomalies of the Constitution	2,0
Operations on abdominal organs	2,0
Pylorostenosis, pylorospasm (copious regurgitation, vomiting up to 3 months)	2,5
Other somatic diseases	3,0

Taking into account the total number of points scored, we identified 3 risk groups: low-risk group - up to 6 points, medium - 7-11 points and high - 12 points and above. The analysis made it possible to establish that the majority of examined children (1123 – 87.2%) belong to the group of high risk of developing UDT diseases. Of these, children of senior school age accounted for more than half of the examined children (57.4%) and only 10.4% were preschool children. A comparative assessment of a number of socio-hygienic and biological factors in the surveyed children allowed us to identify their certain significance in the formation of pathology of the digestive organs in children and adolescents both in general and in certain age periods, to determine the risk of diseases when exposed to adverse factors.

The most unfavorable of them, in order of importance, were for preschool children – pathology of the newborn period (asphyxia, perinatal damage to the central nervous system, hypoxic-ischemic encephalopathy), prematurity, unsatisfactory living conditions, foci of chronic infection in the nasopharynx, artificial and early mixed feeding; for younger schoolchildren – chronic foci of infection, helminthiasis, violations of the regime and quality of nutrition; for high school students (12-18 years old) - neuropsychic and emotional overload, violation of the regime moments of nutrition and sleep, alimentary errors, frequent respiratory viral infections, chronic foci of infection. The examined children were distributed almost equally depending on gender (boys - 47.8%, girls - 52.2%), boys prevailed in preschool children, and girls prevailed in school-age children. A special place in the formation of UDT pathology is given to HP infection, which was detected in 63.9% of the surveyed children. Its share in the degree of risk is approximately the same in all regions of the republic [5,8-11].

3. RESULTS AND DISCUSSION

We analyzed the degree of HP infection depending on the age, gender and territory of residence of the examined children. The results of our studies confirm that the frequency of pyloric helicobacteriosis in chronic UDT pathology depends on the age and sex of the child. In preschool children, it was 65.7%, in younger schoolchildren - 76.6%, which is 1.2 times more often than in preschoolers (severe course of chronic UDT pathology with the development of various complications). The

frequency of detected helicobacteriosis in chronic UDT pathology in children living in the city was 67.3%, and in children living in rural areas, it was 1.4 times higher and amounted to 92%.

In order to reduce the risks of UDT disease, a number of organizational measures were proposed: improving the medical literacy of children and parents, promoting breastfeeding, catering in kindergartens and schools, and extensive tempering activities. Of great importance in the prevention of UDT pathology in children is rational feeding in the first year of life, improvement of assistance during childbirth and during the newborn period, identification of chronic foci of infection of the nasopharynx and oral cavity, the presence of helicobacteriosis, as well as other infectious and parasitic diseases, invasion by protozoa. An important role is played by early diagnosis of UDT pathology at the preclinical stage, taking into account the above risk factors. Close attention is required by children whose parents and immediate relatives suffer from gastroenterological diseases. Of course, children with burdened heredity represent the most vulnerable contingent that requires increased attention from parents, teachers and medical professionals. Of particular relevance are measures to improve the quality of planned in-depth preventive examinations in schools and preschool institutions in order to timely and possibly more complete detection of UDT pathology. Younger schoolchildren require the most attention, since the highest incidence of UDT diseases has been identified in this age group. There is also an obvious need to expand the range of recreational activities for children who have suffered acute infectious diseases of the gastrointestinal tract, timely examination of them and long-term dynamic monitoring in terms of preventing the formation of chronic gastroduodenal pathology. In this connection, it is advisable to use more widely at the stage of further treatment of this contingent of patients sanatorium-type children's camps, sanatorium nurseries, gardens, to include more widely in the complex of therapeutic measures local natural factors that positively affect the functional state of UDT. The most important stage in the prevention of UDT pathology is the control over the observance of the daily routine, the rational ratio of the duration of homework and outdoor activities, the conduct of tempering activities, which is especially important in middle school age, when the workload of the educational process increases, and parents' control over children often weakens. It is necessary to protect

the child from family and household conflicts, to prevent his nervous overstrain. A more rigorous approach to prescribing medicines and, first of all, antibiotics is needed, and if long-term antibacterial therapy is necessary, it is advisable to prescribe drugs that correct the microecology of the gastrointestinal tract [12-16].

4. CONCLUSION

Preventive measures with an active influence on controlled risk factors should be carried out among the entire child population. The data obtained indicate that the formation of chronic UDT pathology in the vast majority of children begins at preschool age, and increases significantly from the beginning of school attendance. That is why it is necessary to conduct a complex of diagnostic studies in a timely manner at the first visit of a child to a children's polyclinic in order to detect UDT pathology early. Doctors of preschool institutions and schools should also be targeted at the examination process. All of the above measures can reduce the risk of development and progression of the most common pathology of the digestive organs of childhood at the present stage.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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