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Epidemiology Characteristics of the Course of Intestinal Nematodoses in the Territory of Azerbaijan

Abstract

In the article, brief information on the epidemiology characteristics of the course of intestinal nematodoses in the territory of Azerbaijan, and the successes and experience gained in the study of these diseases in recent years were shared. On the basis of the epidemiological analysis, it was determined that the specific weight of the level of infestation among the examined persons in the territory of Azerbaijan varied between 7,7 % and 26,5 % The etiological structure of helminthosis was represented as follows: in the general structure of helminthosis, the incidence rate of ascariasis – 41,7 ± 2,9 %, enterobiosis – 36,9 ± 2,8 %, trichocephalosis – 2,9 %, hymenolepidosis – 4,7 %, with taeniidoses – 3,7 %, with other helminthoses – 10,1 %. Among the examined persons, the number of infected children was highest in girls aged 12-15 years (36,6 ± 4,6 %) and boys aged 8-11 years (28,6 ± 6,1 %; $p<0,001$). The highest proportion of infected adults was among men aged 16 to 30 (16,1 ± 4,9 %) and women aged 31-50 (13,4 ± 3,3 %; $p<0,001$). Screening examinations carried out in different regions of the republic showed a high level of infection of children with parasitic infections, which confirms the active transmission of the infection and the stability of foci.

Keywords: *helminthosis, epidemiology, prevention, diagnostics, infectious diseases, epidemiological aspects, epidemiological control*

Introduction

The World Health Organization expert assessment shows that diseases caused by helminths are the third most important infectious and parasitic diseases in the world, and diseases caused by plasmodials are the fourth (1,4 billion and 600 million cases, respectively) (WHO, 2012, p. 88). Helminthosis is a widespread group of diseases and to some extent determines the health status of the population (Khalafli, 2014, p. 154). Helminths have various pathological effects on the health of the population (primarily children). They cause acute allergy, which is accompanied by a weakening of the immune system, promotes the development of secondary infectious and non-infectious diseases (Buaro, 2019, p. 56; Ermakova, 2017, p. 43). Against the background of helminthiasis, children are 2-4 times more ill with acute intestinal and respiratory diseases (Taghiyeva, 2024, p. 128). It should also be noted that the course of parasitic diseases is sometimes accompanied by the chronicity of the infectious process and irreversible complications, which increases their role as a factor that potentially lowers the quality of life and general health of the population. It is known that intestinal helminths change their chemical composition in the cavity of the gastrointestinal tract, which can lead to a change in the composition of the normal intestinal microflora) (Supryaga, 2018, p. 12; Raimkulov, 2019, p. 50). Therefore, intestinal dysbacteriosis is often accompanied by worm infestations and aggravates the clinical picture of these conditions with functional disorders in the gastrointestinal tract (Ajtmurzayeva, 2019, p. 44; Aslanova, 2019, p. 19). Microecological disturbances, in turn, are sometimes involved as a mechanism for initiating and then maintaining pathological processes (Siviero, 2024, p. 460). In this regard, the relevance of the examination of intestinal microbiocenosis in persons infected with helminthosis is not in doubt) (Rokaitė, 2024, p. 916).

In recent years, reviews summarizing a large number of sources of literature on helminthology and microbiology either contain information about the possible effect of helminths on the intestinal

microflora, or there is no information at all about the effect of helminths on the microbial landscape of the intestine. In modern times, the final verification of ascariasis and enterobiosis is based on the detection of either helminth eggs or the parasites themselves in the cofiltrate of the patient (Saini, 2024, p. 288). However, the infestation can be detected by this method only when the helminths have reached the adult stage − when there are a sufficiently large number of female and male (or only female) individuals in the patient's body, or before the parasite dies naturally.

Research

Grading of the inspected areas according to the level of morbidity made it possible to distinguish more typical zones for the regions of the Republic and to distribute the settlements according to these zones, which was carried out for the purpose of analyzing the indicators of morbidity of the population with parasitic diseases. We used the cartographic method to assess the ecologically unsatisfactory situation in the territory of the republic. In accordance with the goals and tasks of the inspection, a program for the improvement of epidemiological and hygienic control by stages was developed in the context of the reconstruction of the State Sanitary Epidemiological Service of the Republic, which consists of 3 stages.

In the first stage, a complex sanitary-epidemiological characterization of environmental objects was given, indicators of changes in the sanitary-hygienic situation were found, and the ecological-hygienic effect of various factors (water, soil, food products) on the level of morbidity with parasitic diseases was scientifically substantiated. In the conditions of human anthropogenic activity, the assessment of the quality of environmental objects was carried out on the basis of sanitary-hygienic, microbiological, parasitological and other indicators found through complex examination and calculation methods.

In the II phase of the research, a comparative analysis of parasitic disease in the territory of Azerbaijan was carried out and a ranking by regions was carried out. The structure of registered infectious diseases consists of many nosological forms and is characterized by the specificity of the clinical course of the disease and the main indicators of the epidemic process. The analysis of the epidemiological situation for more priority parasitic diseases in the republic was performed during 2007-2017. The main laws of the epidemic process were revealed: the dynamics and level of the disease, its nature (hotness, outbreaks, periodicity), high risk groups, economic parameters of the importance of infections were determined. In order to assess the state of the disease, statistical reports of the dynamics of parasitic disease were analyzed based on the data of the state and internal statistical reports. Calculation of average annual intensive indicators of parasitic diseases, which are more important for the regions of the republic, was carried out.

On the basis of socio-epidemiological examinations carried out in the III phase of the research, a comprehensive action plan was developed for the prevention of intestinal nematodes in urban families, for lowering their general level of morbidity and increasing health indicators.On the basis of the epidemiological analysis, it was determined that the specific weight of the level of infestation among the examined persons in the territory of Azerbaijan varied between 7,7 % and 26,5 % The etiological structure of helminthosis was represented as follows: in the general structure of helminthosis, the incidence rate of ascariasis – 41,7 ± 2,9 %, enterobiosis – 36,9 ± 2,8 %, trichocephalosis – 2,9 %, hymenolepidosis – 4,7 %, with taeniidoses – 3,7 %, with other helminthoses – 10,1 %. Among the examined persons, the number of infected children was highest in girls aged 12-15 years (36,6 ± 4,6 %) and boys aged 8-11 years (28,6 ± 6,1 %; $p<0,001$). The highest proportion of infected adults was among men aged 16 to 30 (16,1 ± 4,9 %) and women aged 31-50 (13,4 ± 3,3 %; $p<0,001$).

The highest level of morbidity with helminthosis (26,5 %) was found in Baku city and Absheron peninsula. Yevlax-Ismailli zone (18,0 %), then Sheki-Zagatala zone (13,1 %), Ganja-Gazakh zone (12,4 %), Lankaran zone (11,7 %), Guba-Khachmaz zone are in second place (10,6 %) and other zones (7,7 %).

Parasitic diseases are closely related to the population's household and behavioral infrastructure, sanitary-hygienic and natural conditions, the level of organization, quality and efficiency of epidemiological control. The analysis carried out during the years 2007-2017 gave reason to say

that the level of infection of children (0-14 years old) during intestinal helminthiasis and primary infections reached 85 %. The high level of enterobiosis (71,2 %) is considered as an indicator of population, especially children's helminthosis.

For the purpose of early diagnosis of intestinal nematodes, the 2 most promising methods are proposed in modern times, which are used for the purpose of individual examination of patients or persons suspected of any other infestation within immunodiagnostic studies, as well as mass examination of the population of endemic regions: PCR (polymerase chain reaction) and EIA (enzyme immunoassay). Both reactions have high sensitivity and specificity, can be used on a large scale, PCR differs from many other diagnostic methods in its high efficiency. The PCR method was highly effective in all clinical forms of invasion (from 92,3 ± 3,4 % to 95,6 ± 2,6 %). The EIA method was also highly effective – 82,6 ± 5,0 % - 89,5 ± 4,2 %, respectively.

Helminthoses were divided according to severity as follows: mild degree – 42,3 ± 3,8 %, moderate degree – 37,5 ± 3,7 %, severe degree – 20,2 ± 3,1 %. The following symptoms and syndromes were noted in the patients we observed: the complex of symptoms of dysfunction of the gastrointestinal tract (constipation, hard stools, loss of appetite, nausea, abdominal pain) – 83,3 ± 3,4 %, weakness (80,0 ± 5,9 %), dry cough (24,4 ± 6,4 %), headache (15,5 ± 5,5 %), skin rashes – 46,6 ± 7,4 %, decrease in hemoglobin index – 31,0 ± 6,8 %, broken nails – 26,7 ± 6,6 %, subfebrile temperature (13,3 ± 5,2 %), thinning hair and shedding – 8,89 ± 4,1 %.

The high level of cytokines in the blood serum of patients with intestinal nematodes confirms the presence of a chronic inflammatory process that occurs mainly in the gastrointestinal tract, so cytokines are considered markers of any inflammatory process. Their high amount can cause a number of clinical symptoms typical for the intestinal stage of the disease: intoxication syndrome (weakness, headache, subfebrile temperature); allergic syndrome (itching of the skin, rashes on the skin); syndrome of damage to the gastrointestinal tract (dysfunction of the gastrointestinal tract, abdominal pain). The data obtained on the amount of interleukin − IL-1, IL-6 and tumor necrosis factor − TNF-a indicate the participation of cytokines in the body's defense reactions in the intestinal stage of helminthiasis, as well as in the increase in the severity of the pathological inflammatory reaction in organs.

Under the influence of deworming, the number of patients with grade III-IV dysbacteriosis decreases, the number of patients with poorly noticeable grade I-II dysbacteriosis, and the number of patients without dysbacteriosis increases. The dynamic determination of the severity of dysbacteriosis gives reason to consider a new diagnostic criterion of the effectiveness of the treatment of helminthiasis.

Conclusion

Screening examinations carried out in different regions of the republic showed a high level of infection of children with parasitic infections, which confirms the active transmission of the infection and the stability of foci. The measures taken to get rid of parasites and increase the level of sanitary culture have been effective. In order to successfully solve the problem of reducing the level of infestation of the population, it is important to carry out mass deworming several times throughout the republic and to conduct sanitary and hygienic training of the population.

Exploratory epidemiological control, by using the 2nd generation epidemiological control data, new information was obtained about the factors affecting the development of the epidemic process during intestinal parasitosis, which made it possible to assess the impact of the behavioral factor on the level of morbidity and the development of the epidemic process. The data obtained during the epidemiological examinations made it possible to formulate the main directions of the epidemiological control of current helminthoses, to collect primary information, and to statistically process them during operative and retrospective analysis.

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