**REPUBLIC OF AZERBAIJAN**

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# ABSTRACT

of the dissertation for the degree of Doctor of Sciences

# EPIDEMIOLOGY, CLINICAL AND MICROBIOLOGICAL CHARACTERISTICS OF THE COURSE OF INTESTINAL NEMATODOSES IN THE TERRITORY OF AZERBAIJAN


Speciality: 3202.01 – Epidemiology

Field of science: Medicine

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## URGENCY OF THE PROBLEM AND DEGREE OF DEVELOPMENT

The WHO 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)[1,2]. Intestinal parasitosis ranks 4th among the causes of all diseases and traumas due to the damage they cause to the health of the population[3]. Helminthosis is a widespread group of diseases and to some extent determines the health status of the population. 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. Against the background of helminthiasis, children are 2-4 times more ill with acute intestinal and respiratory diseases. 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[4,5]. Entering the

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[2] Mk Wendt, S. Diagnosis and Treatment of Pinworm Infection / S.Wendt, H.Trawinski, S.Schubert [et al.] // Dtsch Arztebl Int., - 2019, Mar 29, 116(13), p.213-219.

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[4] Tssema Alemnesh, Yitayew Berhanu, Kebede Taddese. Intestinal parasitic infections at Tikur Anbessa University Hospital, Ethiopia: a 5-year retrospective study // Int J Infect Dis Ther., - 2016, 1(1), - p.22–26.

[5] Lokhmatova, I.A. Vliyanie askaridoza na kachestvo zhizni detey shkolnogo vozrasta // - Moskva: Infektsyonnıe bolezni. Novosti. Mneniya. Obuchenie,- 2018. № 2, s.149-154

human body, helminths are capable of disrupting the microecological balance in the intestinal cavity and causing an imbalance of microflora. 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. Therefore, intestinal dysbacteriosis is often accompanied by worm infestations and aggravates the clinical picture of these conditions with functional disorders in the gastrointestinal tract. Microecological disturbances, in turn, are sometimes involved as a mechanism for initiating and then maintaining pathological processes. In this regard, the relevance of the examination of intestinal microbiocenosis in persons infected with helminthosis is not in doubt [6,7]. However, there is very little information on intestinal microbiocenosis during helminthosis in domestic and foreign literature. In this aspect, the negative impact of some parasites on the immune status of infected persons and the development of immunodepression are of special relevance, which promotes carcinogenesis and the emergence of associations with HIV-infection, tuberculosis and a number of other pathological conditions. In childhood, helminths are considered a factor that promotes the development of chronic food disorders, gastrointestinal tract dysfunction, intoxication, sensitization of the body, weakening of immunity[8,9]. Until now, the clinical signs of helminthiasis have been studied in sufficient detail, but the global environmental changes that have occurred in the last decade, the

[6] Ermakova, L.A., Tverdokhlebova, T.I. Analiz zabolevaemosti cheloveka larvalnımi gelmintozami (ekhinokokkoz, toksokaroz, dirofilyaryoz) v Rossiyskoy Federatsii // - Moskva: Epidemyologiya i Vaktsinoprofilaktika, -2017.№1, s.43-46.

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[8] Sokolova, T.S. Vzaimodeystvie gelmintov i mikrobyotı kishechnika: znachenie v razvitii i profilaktike khronicheskikh neinfektsyonnıkh zabolevaniy. / T.S.Sokolova, O.S. Fedorova, I.V. Saltıkova [s soavt.] // Byulleten sibirskoy meditsinı, - 2019. № 18(3), s.214-225.

[9] Daryani, A. Intestinal parasitic infections in Iranian preschool and school children: a systematic review and meta-analysis. / A.Daryani, S. Hosseini-Teshnizi, S.A.Hosseini [et al.] // Acta trop.- 2017;169, - p.69–83.

widespread use of antibacterial, immunotropic and other drugs and a number of other factors have changed the clinical picture of helminthiasis, which requires further research. Entering the human body, helminths are able to disrupt the microecological balance in the intestinal cavity and create an imbalance of microflora[10],[11]. 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[12]. 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[13],[14]. The methods of immunological diagnosis of helminths have not been practically developed in our republic, and these methods belong to the range of less suitable and expensive methods. In this regard, the search for methods of early verification of nematodes for the purpose of timely deworming does not lose its relevance. From this point of view, it is necessary to develop an action algorithm and to constantly improve the sanitary-epidemiological control system

[10] Chai, I., Reese, A.T., Dunn, R.R. Drivers of microbiome biodiversity: a review of general rules, feces, and ignorance // MBio., - 2018, 9, - p.1294- 1296.

[11] Brosschot, T.P., Reynolds, L.A. The impact of a helminth-modified microbiome on host immunity // Mucosal Immunol., 2018, Jul, 11(4), - p.1039-1046.

[12] Bronchteyn, A.M., Maksimova, M.S., Fedyanina, L.V. Kishechnıe nematodozı: algoritm dyagnostiki i lecheniya. analiz sobstvennıkh nablyudeniy i obzor literaturı // - Moskva: Epidemyologiya i infektsyonnıe bolezni, - 2018. № 3, s.149-152.

[13] Jourdan, P.M., Lamberton, P.H., Fenwick, A. Soil-transmitted helminth infections // Lancet., 2018, 391(10117), - p.252–265.

[14] Nyundo, A.A., Munisi, D.Z., Gesase, A.P. Prevalence and correlates of intestinal parasites among patients admitted to Mirembe National Mental Health Hospital, Dodoma. Tanzania. // J Parasitol Res. 2017; № 3, - p.565- 569.

(taking into account the local natural climate, as well as social life conditions and the activity of the population) [15],[16],[17]. Until now, there are unsolved problems in the tactics of treating people infected with parasitosis[18]. The above-mentioned problems not only confirm that the study of intestinal parasitosis is extremely relevant in modern conditions, but also require the search for new approaches to their diagnosis, treatment and prevention - they are appropriate and accessible in the daily work of all circles of practical health care. The serious ecological and parasitological situation of the 21st century requires a change in the strategy and tactics of the prevention of mass and socially important pathologies (first of all, due to the reduction of new infection risks). The analysis of measures for the prevention of parasitic diseases shows that the level of sanitary-educational work among both children and adults is qualitatively low. All of these determine the relevance of the current research work.

**The object and subject of the research.**

In order to study the ways of carrying out a sanitary campaign on the application of measures to prevent intestinal parasitosis, explanatory work and parasitological examination were conducted among 2800 people. Laboratory examinations were carried out in dynamics before and after deworming in 168 people with helminthiasis. The main group - 168 people aged from 1 to 65 years, 112 women and 56 men, with helminthiasis. The comparison (control)

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[15] Pengyang, Li, Pamela, E Rios Coronado B. Wang Nanomedicine Approaches Against Parasitic Worm Infections // Adv Healthc Mater , - 2018, 7 (13), - p.94-96.

[16] Pickering, A.J., Djebbari, H., Lopez, C. Effect of a community-led sanitation intervention on child diarrhoea and child growth in rural Mali: a cluster-randomised controlled trial. // Lancet Glob Health., - 2015;3(11), p.58-64

[17] Bittirov, A.M. Parazitarnıe zoonozı kak problema sanitarii i gigienı v mire i v rossiyskoy federatsii // - Moskva: Gigiena i sanitariya, - 2018. № 3, - s.208-212

[18] Kuznetsova, K.Yu. Optimizatsiya metodov gosudarstvennogo monitoringa vodnıkh obektov po parazitologicheskim pokazatelyam // - Moskva: Gigiena i sanitariya, - 2017. №5, s.437-442

group consisted of 65 uninfected healthy individuals (36 women and 29 men).

**The purpose of the study**

As a result of the study of the epidemiological, clinical and microbiological features of intestinal nematodes in the territory of the Republic of Azerbaijan, anti-epidemic measures were developed and epidemiological control was streamlined to reduce the level of infection of the population with these invasions in Azerbaijan.

**Tasks of research**

1. Prospective and clinical-laboratory examination of patients with intestinal nematodes;
2. Assessment of the dynamics and level of disease of the population with intestinal nematodes in the territory of Azerbaijan;
3. Detection of the main risk factors of the spread of intestinal nematodes;
4. Development of algorithms for early diagnosis of intestinal nematodes in the territory of Azerbaijan;
5. Studying the characteristics of clinical symptoms in patients with intestinal nematodes;
6. Studying the dynamics of the main indicators of cellular and humoral immunity in infected patients;
7. Implementation of seroepidemiological examinations and assessment of the role of variable social factors in the activity of the epidemic process in nematodes;
8. Assessment of intestinal microbiocenosis in persons infected with nematodes;
9. Evaluation of the effectiveness and quality of primary and secondary prevention measures on the basis of the second generation of epidemiological control, development of the population health strategy and streamlining of epidemiological control.

**Research methods**

In the conducted complex studies, a number of modern examination methods, including epidemiological, parasitological, sociological, clinical-laboratory, bacteriological, statistical, etc. methods were used.

The main provisions defended:

1. Methodological methods used for the formation of ecological culture in the population of different age groups in order to reduce the risk of infection with causative agents of intestinal nematodes.

2. Measures to protect the environment from the causative agents of intestinal nematodes and reduce the risk of human infection with them.

3. The current epidemiological control system implemented on intestinal nematodes does not allow to assess the true level of infestation of the population of the republic, the degree of contamination of the environment with parasites, to determine the behavioral risk factors that contribute to the infection of the population, and to assess the quality and effectiveness of primary and secondary prevention of parasitic diseases.

4. The epidemiological situation of intestinal nematodes requires the improvement of the epidemiological control system carried out on them in order to reduce the level of infestation of the population and improve the quality of life, which is carried out by optimizing the methods of detecting intestinal helminthiasis, the registration system and approaches to the examination of the population for helminthosis.

**Scientific novelty of the research**

– Based on the results of multi-year complex epidemiological, parasitological, clinical-laboratory, sociological examinations, for the first time in the regions of the republic:

– The actual level of infection with intestinal nematodes of the population of the republic was determined, and the areas with high and medium levels of infection were determined. The specific weight of the level of infestation among the examined persons varied between 7,7% and 26,5%.

– By using exploratory epidemiological control, 2nd generation epidemiological control data, new information was obtained about the factors affecting the development of the epidemic process during intestinal nematodes, which made it possible to assess the impact of

the behavioral factor on the level of morbidity and the development of the epidemic process.

– For the first time, the specific features of the epidemic process during nematodes in modern social conditions were revealed and substantiated.

– New information about the state of intestinal microflora during nematodes was obtained, quantitative changes of lactic acid microbes were evaluated. For the first time, a complex examination of patients with the intestinal stage of ascariasis was developed and applied, which included the analysis of IL-1, IL-6, TNF-a, T3, T4, TTH indicators and examination of the microflora of the large intestine.

– Clinical signs corresponding to the modern course of nematodes were evaluated. Thanks to the conducted examinations, a comparative characterization of the clinical-microbiological characteristics of nematodes was given. Clinical and microbiological criteria of nematodes have been revealed.

– The high efficiency of the action of mass deworming and social mobilization of the population was determined, which was the reduction of the level of infection of the population from 88.4% to 12.7%, the level of knowledge of schoolchildren and the population on the issues of sanitary-hygienic and prevention of infestations - 96% is noticeable by increasing up to

– New methodological approaches were proposed in the ecological-parasitological monitoring system for the formation of ecological thinking among the population belonging to different age groups, which is aimed at reducing the risk of infection with intestinal parasitosis.

– A systematic approach to the tactics of carrying out large-scale sanitization measures during nematodes was developed.

**Practical significance of the study.** The formation of a new scientific direction such as molecular parasitology opens up new opportunities for medical science and healthcare practice and state sanitary-epidemiological control.

The use of molecular biological technologies, which are typical for molecular medicine and are still underutilized in medical parasitology, will allow obtaining new scientific information and significantly expanding scientific knowledge in the etiology and pathogenesis of parasitic diseases. Based on the implementation of this scientific direction, the application of the achievements of molecular parasitology will help improve the quality of life of the population and introduce new methods of diagnosis, prevention and treatment of diseases. The implementation of measures on the application of modern diagnostics, prevention and treatment of the main nematodes using molecular diagnostic methods will increase the efficiency of identification of individuals susceptible to parasitic diseases based on targeted screening.

The need to constantly monitor the level of infestation of the population of the republic by developing a scheme for mass deworming and social mobilization of the population using reconnaissance epidemiological control is scientifically justified. Based on the cartogram drawn up taking into account local conditions and invasion indicators, the level of invasion of the population of the republic by regions, its structure was evaluated. Clinical and microbiological characteristics and markers of nematodes at the modern stage have been revealed thanks to the conducted examinations, which can help in the diagnosis of hidden or difficult to detect helminthosis. Correction of microecological changes occurring during nematodes significantly increases the effectiveness of anthelmintic treatment, which ensures a more durable treatment effect. When worm infestation is suspected, the proposed treatment tactic has made it possible to suggest preventive courses of helminth (taking into account its safety).

**Dissertation approval and application**

The materials of the dissertation were discussed:

1. International conference "Biore-sources and viruses", (Kyiv, Ukraine, 2007)

2. V International Scientific and Practical Conference "Actual Problems of Diagnosis, Treatment and Prevention of Infectious and Parasitic Diseases" (Tashkent, 2009)

3. "Natural disasters and safety of life activities" International scientific and technical conference (Baku, 2017)

4. "Actual problems of medicine" scientific-practical conference (AMU, Baku, 2017)

5. Scientific-practical conference "Actual problems of medicine" dedicated to the 100th anniversary of the Azerbaijan People's Republic (Baku, 2018)

6. Black Sea 2. International Congress of Applied Sciences. (Turkey, August 23, 2019)

7. International scientific and practical conference "Innovative scientific research in the modern world", (Bashkiria, Ufa, 2021)

8."XII International scientific and practical conference "Global science and innovations 2021: Central Asia" Medical sciences (Kazakhstan, Nur-Sultan, 2021)

9."Current problems of the epidemiology of infectious and non-infectious diseases" Materials of the international scientific and practical conference with the participation of international partner universities (Uzbekistan, Fergana, 2022)

10. International scientific and practical conference "Healthy lifestyle", Tashkent Medical Academy (Uzbekistan, Tashkent, 2023 p.)

11. At the inter-departmental meeting jointly held by profile departments of ATU (Baku, 2022);

12. At the scientific seminar under AMU (Baku, 2023).

Based on the materials of the dissertation, methodical recommendations called "Diagnosis and prevention of helminthiasis" and "Epidemiological control over helminthiasis" were developed. The materials of the dissertation are used in the teaching process at the department of epidemiology of AMU, the proposed practical recommendations are applied in practice.

The institution where the dissertation was carried out. The dissertation work was performed on the basis of the Department of Epidemiology and Biostatistics of the Azerbaijan Medical University and the educational clinical-epidemiological laboratory of the Azerbaijan Medical University.

Printing works. 37 scientific works were published on the subject of the dissertation.

The scope and structure of the dissertation. The dissertation is printed on a computer on 294 pages (423,577 characters) with comments, "Contents", "Introduction" (9 pages, volume: 14,860 characters), "Results" (3 pages, volume: 4783 characters), "Practical recommendations" (1 p., volume: 1379 characters) and "Referenced literature list" (34 p.) sections.

The main content of the dissertation is divided into 8 chapters. Chapter I "Literature review" (61 pages, volume: 122185 marks), Chapter II "Materials and methods of research" (21 pages, volume: 33876 marks), Chapter III "Research results" (24 pages, volume: 24036 marks), Chapter IV (27 pages, volume: 56552 symbols), Chapter V (41 pages, volume: 54498 symbols), Chapter VI (27 pages, volume: 38383 symbols), Chapter VII (19 pages, volume: 24764 mark), Discussion of results (25 pages, volume: 48161 marks).

304 literature sources were used in the writing of the dissertation, of which 25 Azerbaijani, 125 Russian and 154 foreign scientists' works were cited. The dissertation work is visualized with 50 tables and 34 graphs.

## RESEARCH MATERIALS, VOLUME AND METHODS

The work was carried out within the scientific program of the department of epidemiology and biostatistics of AMU in 2007-2017. The research work was carried out using the prospective method at the base of the department of epidemiology and biostatistics of AMU. Laboratory examinations were carried out in the educational clinical-epidemiological laboratory of the department of epidemiology and biostatistics of AMU. Laboratory examinations were carried out in dynamics before and after deworming in 168 people with helminthiasis. These 168 people formed the main group. The comparison (control) group consisted of 65 uninfected healthy individuals (36 women and 29 men). There were 112 women and 56

men among the patients in the main group involved in the examination.

Inclusion criteria for the study: individuals with a diagnosis of intestinal parasites; the possibility of conducting dynamic observation on infected persons, the presence of written consent regarding the participation of parents of infected persons and children in the research.

Exclusion criteria from the study: the age of infected persons is up to 1 year, acute infectious diseases, dementia, mental patients and patients with chronic diseases of internal organs, nervous system, oncological diseases were not included during the observation period, parents of infected persons and children refused to participate in the study.

In order to assess the current epidemiological situation in the country, the official statistical data on the incidence of parasitic diseases for the years 2007-2017, as well as the materials of parasitological and serological examinations of different regions of the republic were used. Statistical reports of the Republican Hygiene and Epidemiology Center (RHEC) and regional Hygiene and Epidemiology Centers were used to assess the level of morbidity, determinants of the epidemic process, and the quality of implemented anti-epidemic and preventive measures. The state statistical report documents - form No. 1 "Report on infectious and parasitic diseases", primary materials of epidemiological examination of centers and form No. 2 - "Report on preventive and counter-epidemic measures carried out during infectious and parasitic diseases" were analyzed. 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. The work was carried out in 2 stages in 128 control families and a close inverse relationship was established with them.

A questionnaire survey and a complex parasitological examination of 390 family members were conducted.

In order to evaluate the parasitic pollution of the environment and its impact on the infection of the population, a comparative analysis of the results of laboratory examination of washings taken from soil, water, vegetables and fruits was carried out during 2007-2017 based on the data of Republic Hygiene and Epidemiology Center. The examination of the soil for helminth eggs was carried out according to the method of N.A. Romanenko (1996). The estimation of the amount of helminth eggs in drinking water was carried out according to the method of N.A. Romanenko and G. I. Novosilsev (1982). The amount of bifido- and lactobacteria, enterococci, staphylococci, conditionally-pathogenic lactose-negative enterobacteria (klebsiella, proteus, enterobacter, citrobacter, etc.), yeast-like and Candida fungi was determined when examining the microbiocenosis of the intestine. Examinations were carried out according to the standard methodology described in methodological recommendations for the diagnosis of intestinal dysbacteriosis (Gracheva N.M., Goncharova Q.I., 1986). When assessing the degree of microbiological changes, a specific grouping was used based on the following criteria: moderate microbiological changes (I degree of dysbacteriosis) - the presence of one type of conditionally-pathogenic flora up to 15% (non-hemolytic cocci 50) against the background of a normal level of bifido- or lactobacteria up to %), the presence of any number of intestinal bacteria with normal enzymatic activity; acute microbiological changes (degree III of dibacteriosis) - a significant reduction of bifidobacteria: more than 2 times ($<10^7$) together with a significant reduction (<105) of lactobacteria, regardless of other indicators of microbiocenosis; or the final amount of conditionally pathogenic flora (except non-hemolytic cocci) is higher than 50%, regardless of other indicators of microbiota; all other types of dysbacteriosis are included in the group of moderate changes (grade II of dysbacteriosis).

Diagnosis of helminthiasis was carried out as follows: 1) detection of helminth eggs in stool smears; 2) detection of helminth

eggs in itching taken from perianal folds; 3) detection of helminth eggs in faeces, vomit masses. When examining feces, the smear method was used, and Graham's method was used to diagnose enterobiosis.

Cytokine profile was quantitatively assessed by solid-phase enzyme-linked immunosorbent assay (EİA – enzyme immunoassay) during blood serum examination in dynamics. Quantitative amounts of thyrotropin, triiodothyronine and thyroxine were evaluated by solid-phase enzyme-linked immunosorbent assay. From the standard test systems of "Alkor Bio" (Russia) to measure the level of hormones: to determine the thyroid stimulating hormone - EİA-TTH-1, to determine the triiodothyronine hormone - thyroid EİA - triiodothyronine-01, to determine thyroxine - Thyroid - EİA - thyroxine-01 standard test systems were used.

Statistical processing of the obtained data was carried out using Statistica 6.0, Microsoft Exel 7.0 software package according to the generally accepted methodology. During the analysis of the results, the average mathematical number (M), the average error (m) was determined, the significance of the differences between the two average mathematical indicators was evaluated by t-Student's criterion, Van-der-Waerden's criterion, $\chi^2$ criterion, the linear correlation coefficient and its accuracy were calculated. They were accepted honestly when the difference of the compared indicators was $p<0.05$.

## RESULTS OF PERSONAL OBSERVATIONS AND THEIR DISCUSSION

We have analyzed the morbidity of 168 infected individuals in order to determine the main characteristics of helminthiasis and early detection of the disease. Laboratory examinations were carried out in dynamics before and after deworming in 168 people with helminthiasis. These 168 people formed the main group. The comparison (control) group consisted of 65 uninfected healthy individuals (36 women (55.4±6.2%) and 29 men (44.6±6.2%)). There were 112 women (66.7±3.6%) and 56 men (33.3±3.6%) among the patients in

the main group involved in the examination. During the distribution of children by age, it was found that 21 persons (18.4±6.6%) were from 1 to 7 years old; 38 persons (33.4±4.4%) were 8-11 years old and 55 (48.2±4.7%) were 12-15 years old. At the same time, the analysis of the obtained data showed that during the distribution of adults by age, 22 people (40.8±6.7%) were from 16 to 30 years old; 18 persons (33.3±6.4%) were aged 31-50 and 14 persons (25.9±5.9%) were over 50 years old. The distribution of patients of the main group by gender and age is presented in table 1. From the data presented in Table 1, it can be seen that 41 girls aged 12-15 years (36.6±4.6%) and 16 boys aged 8-11 years (28.6±6.1%; p <0.001) was the highest number. The largest proportion of infected adults was men from 16 to 30 years old - 9 people (16.1±4.9%) and women from 31 to 50 years old - 15 people (13.4±3.3%; p<0.001).

**Table 1.**
**Distribution of the main group of patients with helminth infections by gender and age groups, years**

| Age groups, years | Total (n=168) | | Men (n=56) | | Women (n=112) | |
|---|---|---|---|---|---|---|
| | Abs | % | Abs | % | Abs | % |
| Children: 1-7 years old | 21 | 12,5±2,6 | 9 | 16,1±4,9 | 12 | 10,7±2,9 |
| 8-11 years old | 38 | 22,6±3,2 | 16 | 28,6±6,1 | 22 | 19,6±3,8 |
| 12-15 years old | 55 | 32,7±3,6 | 14 | 25,0±5,7 | 41 | 36,6±4,6 |
| Total | 114 | 67,8±3,6 | 39 | 69,6±6,1 | 75 | 66,9±4,4 |
| Adults: 16-30 years old | 22 | 13,1±2,6 | 9 | 16,1±4,9 | 13 | 11,6±3,1 |
| 31-50 years old | 18 | 10,8±2,4 | 3 | 5,4±2,1 | 15 | 13,4±3,3 |
| Age 51 and older | 14 | 8,3±2,2 | 5 | 8,9±3,8 | 9 | 8,0±2,5 |
| Total | 54 | 32,2±3,6 | 17 | 30,4±6,2 | 37 | 33,1±4,5 |
| Final | 168 | 100 | 56 | 33,3±3,6 | 112 | 66,7±3,6 |

The distribution of individuals with helminthosis by gender and age showed that the highest specific gravity was found in women (66.7±3.6%), while in children - 66.9±4.4%, in adults - 33.1±4, was

5%. The specific gravity of men was relatively low - 33.3±3.6%, respectively, in children - 69.6±6.1% and in adults - 30.4±6.2%.

Among the examined persons, the etiological structure of helminthiasis was represented as follows: incidence rate of ascariasis in the general structure of helminthosis - 41.7±2.9% (70 cases), enterobiosis - 36.9±2.8% (62 cases), trichocephalosis - 2.9% (5 cases), 4.7% (8 cases) with hymenolepidosis, 3.7% (6 cases) with teniids, and 10.1% (17 cases) with other helminthosis (Figure 1). In addition to the above, the etiological structure of helminthosis among the examined persons, divided by age and sex, is represented as follows. So, according to the general structure of helminthosis among children, the level of morbidity with ascariasis is 45 cases (39.4±4.9%), with enterobiosis - 45 cases (39.4±4.9%), with others (with trichocephalosis, hymenolepidosis, teniidoses , etc.) – 24 cases (21.2±3.8%) were organized. The level of morbidity among adults in accordance with the general structure of ascariasis and helminthosis – 25 cases (46.3±6.8), enterobiosis – 17 cases (31.5±6.3%), with others (trichocephalosis, hymenolepidosis, taeniidoses, etc.) – 12 cases (22.2±5.6%) were organized.

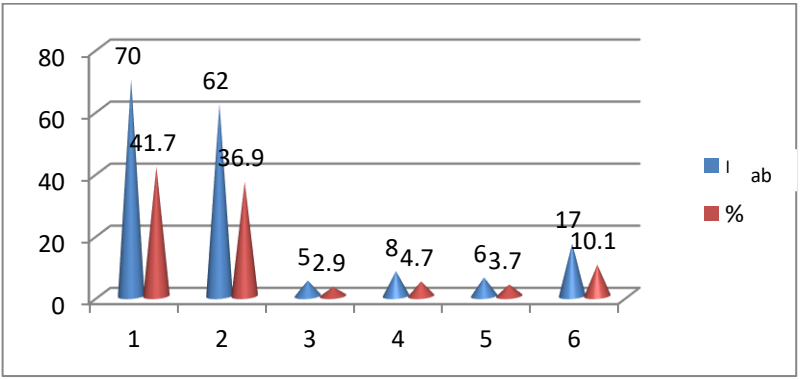


Figure 1. Etiological structure of disease with helminthosis among those examined (1-ascariasis, 2- enterobiosis, 3- trichocephalosis, 4- hymenolepidosis, 5- teniidoses; 6- others)

The received data show that according to gender, the incidence rate of ascariasis in children is 18 cases (25.7±5.2%), enterobiosis - 9 cases (14.5±4.5%), among boys, according to the general structure of helminthosis. (with trichocephalosis, hymenolepidosis, teniidoses, etc.) – 7 cases (19.4±5.2%) were organized. The obtained data show that according to gender, the incidence rate of ascariasis in children is 27 cases (38.6 ± 4.7%), enterobiosis - 36 cases (58.1 ± 6.3%), among girls, according to the general structure of helminthosis. with others (trichocephalosis, hymenolepidosis, teniidoses, etc.) – 17 cases (47.2±5.2%) were organized.

Helminthosis was divided according to the degree of severity as follows: mild degree - in 85 patients (42.3±3.8%; $p<0.001$), moderate degree - in 71 patients (37.5±3.7%), severe degree - in 12 patients (20.2± 3.1%; $p<0.001$) (figure 2).

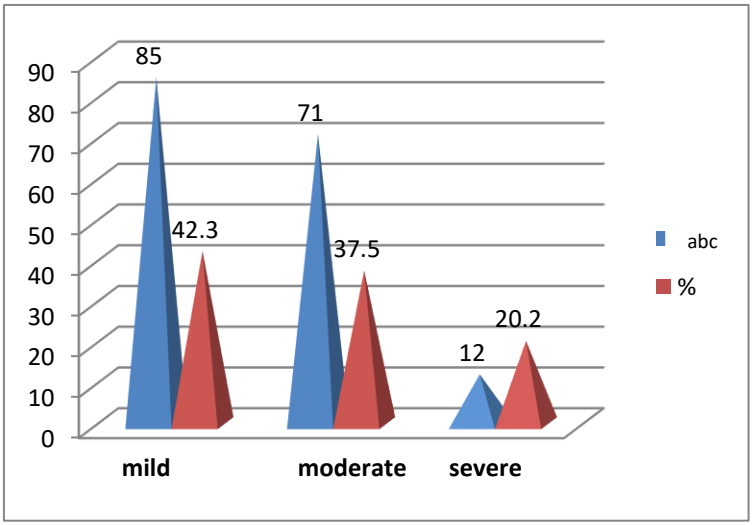


Figure 2. Disease severity of examined patients with helminthiasis

It should be noted that during the study of social factors in the observed patients, statistically significant differences in social status were found ($p<0.01$). The obtained data show that 31.5±3.6% of

families of patients of the main group (t=4.45; p<0.01) live in unsatisfactory living conditions. At the same time, 100.0% of patients in the control group positively evaluated their housing and household conditions. Before forming groups, patients were screened for the presence or absence of helminthiasis. During the analysis, it was found that the most common allergic diseases among those infected with intestinal infections are: allergic rhinitis (44.6±3.8% of cases), neurodermatitis (25.0±3.3% of cases), acute urticaria (21, 4±3.2% of cases). In the comparison group, respectively: allergic rhinitis -1.5%, neurodermatitis -3.1±2.1% (p>0.05), acute urticaria was not noted. Among other diseases, enterocolitis in 22.6±3.2% of cases (3.1±2.1% in the comparison group), chronic adenotonsillitis in 14.9±2.8% of cases (4.6±2.0% in the comparison group), diabetes diabetes was noted in 10.7±2.4% of cases (3.1±2.1% in the comparison group).

The financial level of the family is considered one of the main factors of the spread of intestinal infections. Thus, in families with very low financial status, the weight of healthy individuals (control group) is small - 7.7±3.4%, while the specific weight of infected individuals in these families is very high (main group) - 25.0±3.3% ($\chi2$=45.02, p<0.001). A similar situation is noticeable in families with low financial status - 18.5±7.3 and 56.5±3.8%, respectively ($\chi2$=47.33, p<0.001). In families with average financial status, the indicators show the opposite - 29.2±4.7 and 11.9±2.5% ($\chi2$=40.15, p<0.001). In families with high financial status, the specific weight of individuals in the control group was 44.6±6.2%, while the specific weight of individuals in the main group decreased at the same rate - 6.6±1.9% ($\chi2$=64.03, p<0.001 ). In total, 48 of 65 healthy individuals (73.8±5.4%) were from families with medium and high financial status, 137 of 168 individuals infected with helminths (81.5±2.9%, $\chi2$=1.23, p >0.05) belong to families with very low and medium financial status. We explain the high percentage of infestation in families with a medium and low financial level by the impossibility of obtaining the necessary amount of anthelmintic drugs, poor living conditions, insufficient caloric nutrition, and detergents. Therefore,

when providing medical assistance to the population, first of all, it is necessary to pay attention to families with low financial status. The obtained data show that the most infested families were families with 6 or more members - 61.91±3.7%. In families with 4-5 members, the rate of infestation was slightly lower and was 27.98±3.5%. In families with 1 to 3 members, helminth infection was 10.11±2.4% ($p<0.05$). This shows that in the group of infected individuals, on average, every third family is a microcenter of helminthiasis, and with the increase in the number of families, the probability of the spread of the infected worm increases rapidly. At the same time, it complicates the fight against helminthiasis and thus ensures the continuous flow of the infectious process for many years.

It was found that in families with a very strong positive correlation dependence, the specific weight of infected children increases along with the increase in the number of children ($r=\pm 0.90\pm0.08$) - from 25.0±3.3% to 56.5±3 to 3.8% ($\chi^2=40.32$, $p<0.01$). The reason for this situation is that, firstly, when there are a large number of children, it is difficult for parents to pay proper attention to the personal hygiene of each of them, and secondly, the financial situation of families with many children is generally unsatisfactory, which makes it difficult for them to turn to medical institutions in time, and to self-treat children infected with helminthiasis. has a certain effect on the treatment. In the group of healthy people (control group), many important treatment-prophylactic measures - i.e. paying attention to personal hygiene every day and being ready to go to medical facilities in time when sick - are significantly higher - 78.5±5.1% and 95.4±2%, respectively. 66,7%, not only in the main group of infected individuals - 44.6±3.8% ($\chi2=34.15$, $p<0.01$) and 66.7±3.6% ($\chi2=46.37$, $p<0$ ,01). The waiting position in the control group - at this time, their requests to doctors are delayed until the clinical picture of the disease (which causes serious concern and to some extent complicates their course) is fully revealed - is much lower than in the main group - 20.0±4.9 and 42.3 ±3.8% ($\chi2=31.24$, $p<0.01$). This indicator was unexpectedly much higher among individuals of the 1st group - 35.4±5.9%. However, surveys have

shown that during this form of treatment, parents preferred the use of modern highly effective means, especially "Vermox" and its analogues, in cases of children's illness, and at the same time, they did not completely deny the help of doctors. In the main group, this indicator was high -48.8±3.9% ($\chi^2$=11.06, p<0.01), but at that time they intended to use (or used) herbal preparations and were ready to consult doctors. The rate of disease concealment due to fear of going to doctors in both groups of examinees is almost the same - 29.2±5.6 and 21.4±3.2% ($\chi^2$=0.78, p>0.05). if those examined in the control group had detected it when they got sick and had taken appropriate measures, then the people in the main group would probably have hidden the fact that they had helminthiasis for a long time. The analyzed material inevitably gives rise to the idea that the state of the population's immune system has a high influence on the occurrence of helminth infections. It is known that climatic factors also affect the immunological state of the child's body. Especially as a result of a cold, the immune system is severely damaged, it is no coincidence that many inflammatory-infectious diseases often occur in the cold season of the year. To a certain extent, what has been said also applies to helminthoses. Thus, both the specific weight of the total morbidity with helminthosis and the morbidity with ascariasis and enterobiosis separately change at approximately the same level in winter - from 15.7±4.4 to 22.6±5.0% ($\chi^2$=1.89 , p>0.05) In spring, autumn and summer, the specific gravity of ascariasis honestly increases ($\chi^2$=5.32, p<0.02) and is 22.9±5.0%, 26.3±5.2% and It varies up to 35.1±5.7% ($\chi^2$=1.33, p>0.05). Morbidity with enterobiosis is at the same level throughout the year in winter, spring and summer ($\chi^2$=6.42, p<0.01) and 22.6±5.0, 24.3±5.4 and 19.6± It varies up to 1.1% ($\chi^2$=2.31, p>0.05). In autumn, an increase of up to 33.5±6.1% is observed. If we take into account that school-aged children go to school, and the majority of preschool-aged children go to special children's institutions, then the possibility of the child's body cooling down and thereby weakening its protective functions is quite real. Even in the winter months, illness with helminthosis, its widespread nosological forms - ascariasis and enterobiosis can be

explained precisely by this. Thus, the socio-epidemiological analysis of helminth infections first of all shows that they are socially adapted and subject to epidemiological regularities. A number of socio-epidemiological factors - factors that both favorably affect and limit the spread of helminthiasis among children - have been discovered, which opens up wide prospects for the organization and implementation of the prevention of the above-mentioned mass diseases among the child population.

To determine the rate of carriage of tapeworm eggs under the nails of children of different ages, we examined samples taken from under the nails of 114 children and 54 adults. Analyzing the indicators of the data, it should be noted that 73 (43.45±3.8%) out of 168 examined people had lice eggs in the samples under the nails.

During the analysis by age groups, we found that in children from 1 to 11 years of age, weevil eggs were found in 57.62±6.4% of cases, in 12-15-year children, in 41.81±6.7% of cases ($p<0.05$) is defined in samples. The lowest rate (28.12±7.9%) was noted among people aged 31 and 50 and over. Undoubtedly, timely parasitological examinations, differentiation of various forms of causative agents of helminthiasis and their effective, specific treatment are still considered an important measure of both maintaining the parasitological safety of children and reducing mass morbidity with helminthosis. The obtained data show that the aggravation of the epidemiological situation of intestinal nematodes is conditioned by current social factors, that is, these infestations have become socially dependent in urban conditions. Data collected on the basis of a questionnaire survey of children, their parents and staff of children's preschool institutions show that the spread of helminthiasis is influenced by the financial well-being of families, their housing and communal conditions, and the cultural and hygienic level.

The health of the population from parasitosis is considered one of the priority areas of the WHO's activity - it called on all countries where this disease is registered to reduce the level of the disease by 80% within 10 years. Since ascariasis, enterobiosis and teniidoses are widespread in our republic, we gave priority to their analysis. The

highest level of morbidity with helminthosis was found in Baku city and Absheron peninsula (26.5%). The second place is the Evlakh-Ismayilli zone (18.0%), the Sheki-Zakatala zone (13.1%), Ganja-Gazakh zone (12.4%), Lankaran zone (11.7%), Guba-Khachmaz are the next places. zone (10.6%) and other zones (7.7%) (Figure 3).

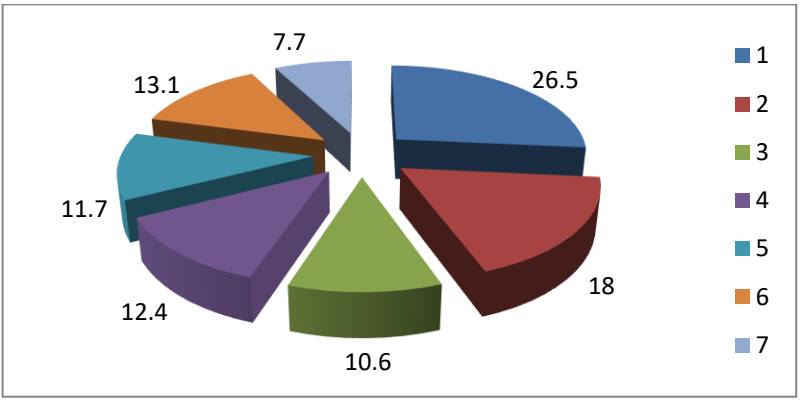


Figure 3. The dynamics of prevalence of major helminthiasis in Azerbaijan in 2007-2017 (% by total number; 1- Baku city and Absheron; 2- Evlakh-Ismayilli; 3- Guba-Khachmaz; 4- Ganja-Kazakh; 5- Lankaran; 6- Sheki-Zakatala; 7- Others)

The received data show that enterobiosis (13.0%), followed by ascariasis (11.2%), taeniidoses (1.1%) and others (1.2%) were the most common among helminthoses in the city of Baki and the Absheron Peninsula. . Ascariasis (7.5%), followed by enterobiosis (5.2%), teniidoses (4.2%) and others (1.1%) were the most common in the Evlakh-Ismayilli zone. In the Guba-Khachmaz zone, ascariasis (4.2%), followed by enterobiosis (2.9%), teniidoses (2.1%) and others (1.4%) were the most common. Ascariasis (5.4%), followed by enterobiosis (4.6%), teniidoses (1.1%) and others (1.3%) were the most common in the Ganja-Kazakh zone. (12.4%). Ascariasis (6.1%), followed by enterobiosis (3.7%), teniidoses (0.8%) and others (1.2%) were the most common in Lankaran zone. Enterobiosis (6.2%) was the most common in Sheki-Zakatala zone, followed by

ascariasis (3.9%), teniidoses (1.9%) and others (1.1%). In other regions, emterobiosis (2.8%), followed by ascariasis (2.3%), teniidoses (1.4%) and others (1.2%) were the most common. Guba-Khachmaz zone (10.6%) and other zones (7.7%). In general, the situation of helminthosis during the analyzed period was represented as follows: the highest indicators were related to ascariasis - 40.6%, then enterobiosis - 38.4%, taeniidoses - 12.6% and others 8.4% (Figure 4).

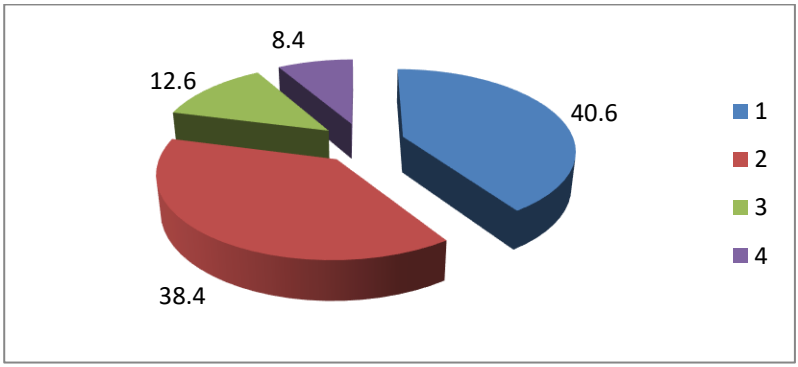


Figure 4. Etiological structure of main helminthosis in Azerbaijan in 2007-2017 (% by total number; 1- Ascaridosis; 2- Enterobiosis; 3- Taeniidoses; 4- Others)

In order to study the prevalence of intestinal parasites among children, a total of 114 children from 3 to 15 years old with intestinal nematodes (İN) were examined. In order to explain the question of the level of interaction of İN in children with nosoforms of various diseases, we conducted the following analysis. Among 114 children with İN and 52 children without İN, information on the morbidity of children in the last 2 years was obtained. A total of 14 nosoforms were registered, and in suspicious cases, parents confirmed their diagnosis at regional children's polyclinics. First of all, let's note that the specific weight of morbidity with different noso-forms between children with İN and without İN is significantly different according to the Van der Waerden criterion ($X=8.12$; $p<0.01$), i.e. is much higher than that of children. Thus, according to the questionnaire,

34.6±6.6% of cases were recorded among children without İN, while the variability of individual nosoforms occurs within a rather narrow range - from 1.90±0.8 to 9.65±4 up to .1% incidence (t=5.89; p<0.001), the overall indicator is much higher in the group of children with İN and is on average 84.2±3.4% (t=15.38; p<0.001) does. At the same time, the specific weight of individual diseases among children with İN was the highest and varied in a wider range than among children without İN. So, according to the frequency of detection, all nosopharms can be divided into 3 groups. The first group consists of tonsillitis, acute respiratory diseases and dyspepsia, their frequency varies from 13.2±3.4 to 21.05±3.8% (t=1.21; p>0.05). In our opinion, this is not only related to the possible systemic symptoms of İN, but rather to the physiological aspects. First, the hygienic status of the oral cavity during İN is extremely low, which is a direct evidence of intensive colonization of the oral cavity with microorganisms. As a result, the risk of developing acute respiratory diseases, tonsillitis, its chronicity and subsequent tonsillectomy among children increases.

Second, as it is known, İN has a severe effect on the gastrointestinal tract, which is characterized by dyspepsia syndrome. The second group of diseases (the frequency of its detection is low (t=4.31; p<0.001)) consists of pharyngitis, bronchitis, asthma, infectious diseases and allergies, that is, conditions related to the unfavorable hygienic status of the oral cavity to one degree or another - from 4.8±0.8 to 6.0±0.8% (t=1.29; p>0.05). The third group of nosoforms with a lower detection frequency (t=2.14; p<0.01) consists of cardiovascular, endocrinological, neurological diseases and gastrointestinal disorders - from 2.63±1.1 to 8.77 Up to ±2.7% (t=1.76; p>0.05).

It is worth noting that morbidity rates differ significantly between children in groups with different nosoforms of İN. Children have a higher incidence of ascariasis and enterobiosis - respectively, both equally - 39.4±4.9% of cases (t=0.89; p>0.05), while children's incidence of giardiasis is 28.9±4 .2% cases (t=9.12; p<0.001), trichocephalosis – 3.50±1.2% cases (t=0.23; p>0.05). In this regard, İN has not been studied in detail, and our findings open wide pers-

pectives for a more precise study of the impact of İN on children's health. Conducted studies İN- made it possible to discover such an important factor that creates favorable conditions for the development of children - this is the behavior of children. For example, various harmful habits (especially those that have a negative effect on the child's body) are quite widespread among children, but their frequency is greater among children with İN than among children without İN.

According to the final data, some harmful habits among children with İN, such as not washing hands with soap before eating, are relevant-ag- from 13.3±5.2% to 28.9±6.7%, chewing solid objects (tips of pencils and pens, etc.) and nail-biting habits prevail, the frequency of their detection is 8.33±5.5 and 26.7±6.6%, respectively ($t=0.21$; $p> 0.05$). Not washing raw vegetables before use from 4.44±1.8% to 24.4±6.4%, not washing hands with soap after going to the toilet from 22.2±5.8% to 25.0±8.8 It was found to change up to %. The frequency of detection of other habits is honestly lower ($t=5.29$; $p<0.001$) and from 8.33±5.5 to 15.5±5.5% ($t=2.86$; $p>0.05$ ) varies up to As among children with İN, the frequency of detection of harmful habits in those without İN varies within the same limits - from 1.90±0.8 to 10.2±1.3% ($t=3.21$; $p<0.001$). That is, the dependence of harmful habits on the etiological factor is not so great, but the frequency of their detection among children who were not diagnosed with İN at the time of the examination may lead to the development of İN in later periods of life.

In recent years, the importance of behavioral factors in the prevalence of İN among children has been specially noted, which has been confirmed in our research. A comprehensive assessment of a large number of scientific works on İN allows to consider these diseases among children's socio-dependent pathologies, the basis of their spread are socio-epidemiological initial conditions. Conducting a prospective examination of children made it possible to reveal a number of similar preconditions, which are of scientific and experimental interest both for the effective organization of professional

help and treatment provided to children, and for the implementation of a complex of measures for the prevention of İN.

It is quite clear that material condition cannot directly affect the spread of İN, its effect is carried out through many known factors. In such families, psycho-emotional stress is very high, which can stimulate the development of İN. As it is known, constant stress can create favorable conditions for the weakening of the immune resistance of the child's body and ultimately the development of İN. The conducted examinations confirm that, as a rule, unfavorable financial situation of families coincides with unsatisfactory living conditions. Therefore, these two factors have a complex negative impact on health. It is no coincidence that children with İN are more often found in families with unsatisfactory living conditions than children without İN - 23.7±4.0% and 13.5±4.8%, respectively ($t=3.12$; $p<0.01$). And on the contrary, their number is less compared to the second, that is, families living in satisfactory housing conditions - 51.7±4.7 and 65.5±6.6% ($t=4.51$; $p<0.001$). During the current research, we encountered a very important fact related to children's health - this is the inadequate attitude of parents in relation to the assessment of children's health and the measures taken for its rehabilitation. among children is lower on some indicators than among children without İN. Only one answer (value) - "healthy" - was very high in the second group of children and accounted for 28.1±4.2 and 42.2±6.8% of cases, respectively ($t=5.12$; $p<0.001$ ). Sharp differences are noticeable in other answers. Thus, the parents of children with İN rated their children's health as "very weak" in 16.7±3.5% cases, and "poor" in 21.9±3.9% cases. Analogous responses (rates) of parents of children without İN are significantly better - 3.8±1.7% ($t=5.33$; $p<0.001$) and 7.91±3.7% of cases ($t=6.67$; $p< 0.001$). At the same time, the first group of parents rated their children as "healthy" in 28.1±4.2% cases, while the second group of parents rated this rating in most of their children - in 42.2±6.8% cases ($t=5.12$ ; $p<0.001$).

Summarizing the answers given by the parents, the following conclusion can be reached. The lower scores obtained on the health status of children with İN once again indicate its systemic effect, as a

result of which the risk of children becoming ill with various nosoforms of the disease increases. In addition, often due to their financial situation, parents do not seek medical help and try to treat their children on their own, which aggravates the situation and eventually leads to hospitalization of children. Such high morbidity and frequent absences from school usually affect children's success rates. As can be seen, the "relatively satisfactory" and "satisfactory" levels of general success indicators among schoolchildren with İN are much higher - 12.2±3.3% and 48.9±5.0%, respectively, than among schoolchildren without İN - 4, 34±1.3% ($t=3.25$; $p<0.001$) and 26.1±6.5% ($t=6.12$; $p<0.001$). At the same time, the "good" and "excellent" levels of general achievement indicators among them are much lower - 18.4±3.8 and 13.3±3.3%, their levels are statistically honestly higher among schoolchildren without İN and 32.6± 6.9% ($t=5.08$; $p<0.001$) and 28.3±6.6% ($t=5.98$; $p<0.001$).

In practice, the main requirements for the newly recommended methods are: high sensitivity and specificity, simple and quick reactions, cost-effectiveness, possibility to examine a large number of samples at the same time. Feces and blood taken from a sick person are usually the object of helminthological examination. We have carried out a planned survey of patients, collection of clinical and epidemiological anamnesis and selection of patients for further examinations. Patients were selected by random sampling. Among those examined were both patients with various clinical symptoms and healthy individuals.

A total of 151 people were examined. We divided all the examined into 2 groups: group 1 - 85 patients aged 16 years and older, group 2 - 66 patients aged 1 to 16 years. The obtained data show that 33.1±3.8% of infected patients were detected by EİA, and 35.1±3.8 ($\chi^2=0.14$; $p>0.05$) by PCR. It should be noted that such a comparative assessment of the effectiveness of the leading diagnostic methods of helminthosis in such representative material was conducted for the first time. For this reason, it is noteworthy that invasiveness was detected in 55 patients (36.4±3.8%) when both methods were applied simultaneously. Joint analysis of diagnostic and clinical

examination made it possible to reveal 3 forms of the clinical course of invasion in 55 patients with invasion: hidden - 23 patients (41.8±6.6%), clinically expressed - 19 patients (34.5±6.4%) and atypical form – 13 patients (23.7±5.8%). The PCR method was highly effective in all clinical forms of invasion. In latent form in 22 patients (95.6±2.6%), in clinically expressed form in 18 patients (94.7±2.9%), in atypical form in 12 errors (92.3±3.4%; $\chi 2$=0, 42; p>0.05). The EİA method was also highly effective in clinically expressed and atypical forms of invasion - respectively, in latent form in 19 patients (82.6±5.0%), in clinically expressed form in 17 patients (89.5±4.2%), atypical in the form of 11 lines (84.6±4.8%; $\chi 2$=5.08; p<0.05).

In the first days of the disease, IgM appears in the blood, their titer gradually increases, reaches its maximum level 3-4 weeks after infection, and then decreases and remains up to 10 months. After IgM, IgG is formed soon and shows its activity in the extravascular area. IgE antibodies appear 2 weeks after the beginning of the invasion, reach a maximum level after a few weeks, and then their level returns to the initial level. In 12 cases (24.0±6.0%) it was simultaneously detected in 2 or even 3 classes of immunoglobulins. IgG immunoglobulins in 15 cases (30.0± 6.4%), IgM immuno-globulins in 11 cases (22.0±5.9%; $\chi 2$=0.08; p>0.05) and IgE immunoglobulins in 24 cases (48.0 ±7.1%; $\chi 2$=82.08; p<0.01) was found (Figure 5).

First of all, let's consider the frequency of titer of immunoglobulins in cases of EİA positive 50 infections due to helminthosis. The titers of immunoglobulins varied from less than 1:100 to more than 1:1600, but the specific gravity of different titers was not the same. Thus, IgM immunoglobulins were often detected in titers of 1:200 and 1:400 - only 5 cases out of 11 cases (45.5±9.1%). 1:800 titers in 2 cases (18.2±5.3%; $\chi 2$=20.8; p<0.05) and 1:1600 titers in 1 case (9.1±4.0%; $\chi 2$=0.54 ; p>0.05) was found.

But in 3 cases (27.2±8.9%; $\chi 2$=12.36; p<0.01) non-diagnostic titers - 1:100 and below 1:100 were also detected is observed (Figure 6). The obtained data show that titers of 1:200 and 1:400 were mostly found - in 10 out of 24 cases (41.7±7.6%). The frequency of 1:800

titers was 3 cases (12.5±4.4%; $\chi 2$=15.89; p<0.01) and 1:1600 titers - 2 cases (8.3±3.2%; $\chi 2$=0 .71; p>0.05). Insignificant titers, i.e. titers of 1:100 and below 1:100, also predominate - only 9 cases (37.5±7.6%; $\chi 2$=22.07; p<0.01).

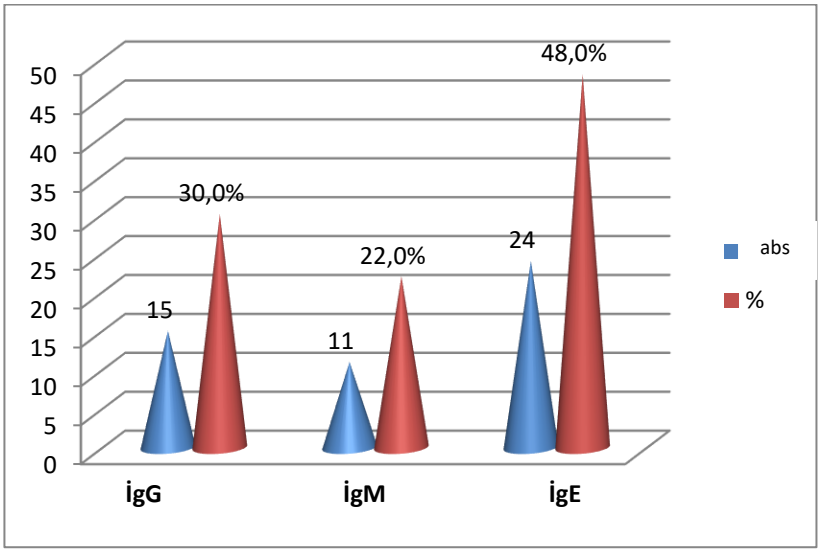


Figure 5. Results of IFA on classes of immunoglobulins among infected patients

A different picture is observed in the frequency of different titers of IgG immunoglobulins. Thus, in only 3 out of 15 cases, the titers were lower than 1:100, which can be explained by the absence of those immune globulins (20.0±3.4%). Titers equal to 1:100 can be counted in the same way - 2 cases (13.3±3.0%; $\chi^2$=1.27; p>0.05). Medium titers prevailed - 1:200 and 1:400 titers belong to them - only 7 cases (46.7±6.1%; $\chi^2$=51.32; p<0.01). High titers were also quite frequent - titers of 1:800 and 1:1600 belong to them - only 3 cases (20.0±3.4%; $\chi^2$=22.37; p<0.01).

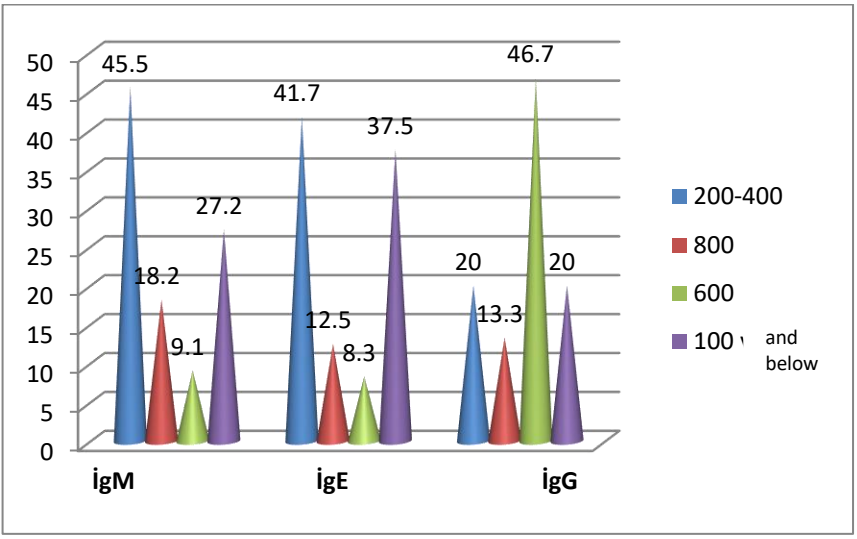


Figure 6. Data of titration of IFA results by classes of immunoglobulins among infected patients.

During the examination of patients with various degrees of dysbacteriosis and the intestinal stage of ascariasis and those who did not detect ascarid eggs after deworming during dynamic observation (3 times with an interval of 10 days), statistically significant data (as a criterion of the effectiveness of treatment in favor of the study of dysbacteriosis) were obtained. The conducted comparison gives reason to consider the dynamic determination of severity of dysbacteriosis as a new diagnostic criterion of the effectiveness of ascaridosis treatment. In Table 2, the frequency of detection of dysbacteriosis was analyzed in 31 patients (in whom worm eggs were not detected during dynamic observation) compared to the group of patients in which ascarid eggs were detected (n=28) after treatment. Analyzing the presented indicators, it can be concluded that the frequency of detection of grade III-IV dysbacteriosis during effective deworming in patients of the 1st group in dynamics was much lower ($p<0.05$). In the 2nd group (where deworming gave an ineffective result), when analyzing the indicators of the severity of dysbac-

teriosis, grade III-IV dysbacteriosis was found much more than in the first group.

**Table 2.**

**Dynamics of indicators of severity of dysbacteriosis in patients with the intestinal stage of ascariasis depending on the effectiveness of deworming**

| Dysbacteriosis rate | Effective deworming, n=31 (Group 1) | | | | Ineffective deworming, n=28 (Group 2) | | | |
|---|---|---|---|---|---|---|---|---|
| | Before treatment | | After treatment | | Before treatment | | After treatment | |
| | abs. | % | abs. | % | abs. | % | abs. | % |
| I – II | 22 | 64,7± 8,2 | 29 | 85,3± 5,9* | 19 | 63,3± 8,8 | 12 | 40,0± 8,9* |
| III-IV | 11 | 32,4± 8,0 | 1 | 2,9* | 11 | 36,7± 8,8 | 18 | 60,0±8,9* |
| Norm | 1 | 2,9 | 4 | 11,8 | - | - | - | - |

*Note: * - differences between groups of patients are honest (p<0.05).*

Out of 168 analyzed examination cards infested with helminths, 61 had repeated applications (36.3±3.0%), 107 had 1 application for examination - (63.7±3.0; $\chi^2$=21.32, p<0, 01) was recorded. The conducted studies showed that intestinal dysbacteriosis was not detected in only 9 people (in 5.35% cases). Grade I dysbacteriosis in 28 patients (16.7±2.8%). At this time, the number of lactobacilli, bifidobacteria, full-fledged intestinal bacteria, the main representatives of the normal microflora in feces, was found to decrease by 1 or 2 times. This stage often goes hidden, undetected. Grade II was detected in 15 patients (8.92%). At this stage, it is characterized by a decrease in the number of E.coli, the detection of pathogenic species among them, the occurrence of lactobacilli in low quantities, and a sharp decrease in the number of bifidobacteria. It is also accompanied by an increase in the number of fungi, proteins, and pathogenic staphylococci.

Grade III was found in 67 patients (37.5±3.7%). At this stage, it is characterized by a sharp increase in the number of microorganisms such as St.hemolyticus, S.aureus, Enterococcus hemolyticus. Grade IV was detected in 53 patients (31.53±3.6%). At this stage, the indicators of intestinal microbiocenosis are markedly different from

the norm. A sharp increase in the number of many pathogenic microorganisms is noted. Dysbacteriosis of the first degree was noted in 28 patients (16.7±2.8%), in connection with this, 21.6±4.4% applied to the laboratory several times, while 1 application was much higher - 41.8±4 .1% ($\chi 2$=22.34; $p<0.01$).

The final information on acute dysbacteriosis was noted in 120 examination cards (71.4±3.5%), of which 67 patients (37.5±3.7%) had grade III and 53 patients (31.53±3.6%) grade IV ($\chi 2$=12.86; $p<0.01$) dysbacteriosis was detected. This difference is due to 2 reasons. The first reason is that outpatient doctors are not professional enough in determining the degree of dysbacteriosis and sometimes attribute it to a barely noticeable degree. The second reason is due to the fact that acutely noticeable degrees of intestinal dysbacteriosis are the most severe among other degrees of dysbacteriosis, they have a chronic course, therefore, patients are more often referred to inpatients. The frequency of recording I and II degrees of intestinal dysbacteriosis was 21.6±3.2 and 35.7±3.7% of repeated examinations.

Despite their widespread distribution, nematodes remain one of the undetected pathologies. In this regard, the methods of searching for early verification of ascariasis and enterobiosis in order to carry out timely deworming do not lose their relevance. The main group included 120 individuals in whom the presence of ascariasis or enterobiosis was proven either by the detection of eggs of these helminths or by visual detection of adult helminths themselves in feces. The control group consisted of 64 people, in whom no helminth eggs were detected during examination by laboratory methods, and neither anamnesis, nor epidemiological, nor clinical data indicated the presence of ascariasis or roundworm infestation. In addition, despite the fact that the number of individuals with a decrease in the amount of intestinal bacteria with normal enzymatic activity was found to be low, this symptom was identified in more than 90% of individuals infected with ascarids. Such a high frequency of detection of a decrease in the total amount of intestinal bacteria with normal enzymatic activity cannot be considered a differential diagnostic

criterion between ascariasis and enterobiosis. In this regard, we tried to summarize all the results obtained and at this time we analyzed all individuals infected with ascariasis and enterobiosis in one place. Thus, the group of persons infected with confirmed nematodes (ascariasis and enterobiosis) consists of 150 patients. In total, in all of group 1, deviations from the norm were found in 119 of 132 patients and they were represented in the following manner. In 63 of 132 patients infected with helminths (23.48±3.7%; $\chi^2$=14.8; p>0.05) conditionally pathogenic gram-negative bacteria (lactozone-negative enterobacteria) or hemolytic intestinal bacteria were found among the intestinal microflora. came (29.6±3.9%). An increase in the number of intestinal bacteria with low enzymatic activity by more than 10% of the total number of intestinal bacteria was found in 43 (32.57±4.1%; $\chi^2$=8.56; p>0.05) patients. In 34 patients (25.75±3.8%; $\chi$2=12.28; p>0.05) significant reduction of bifido-bacteria was noted: 2 times ($10^7$) and lower ($<10^7$). In 77 patients (58.33±4.3%), a significant reduction of lactic acid microbes (lactobacteria) was observed: 2 times ($10^5$) and lower ($<10^5$) (table 3).

In most of the observations, a significant decrease in the level of intestinal bacillus was noted in patients infected with nematodes, so that the amount of intestinal bacillus was reduced by 2 times or more compared to normal values. In 125 patients (94.69±1.9%), a decrease in the total number of intestinal bacteria with normal enzymatic activity was observed. In 128 patients (96.96±1.4%), the indicators of intestinal microbiocenosis were different from the norm.

The results of the present study show that compared to the comparison group, the number of patients with a normal composition of the intestinal microflora in the main group is honestly less, and the number of patients with a low number of intestinal bacteria with normal enzymatic activity and a high number of intestinal bacteria with low enzymatic activity in the microbial landscape of the intestine is significantly higher. also, they have a large amount of coccal flora, a decrease in the level of lactic acid microbes, and the presence of Candida fungi is more noticeable.

**Table 3.**
**Characteristics of intestinal microbiocenosis in persons with intestinal nematodes (ascariasis and enterobiosis), n=132**

| Differences in intestinal microbiocenosis parameters from the norm | Number of patients | |
|---|---|---|
| | Abs. | % |
| Decrease in the total number of intestinal bacteria with normal enzymatic activity - below 300 million/g | 125 | 94,69±1,9 |
| Increase in the number of intestinal bacteria with low enzymatic activity by more than 10% of the total number of intestinal bacteria | 43 | 32,57±4,1 |
| An increase of more than 5% of the total number of lactozone-negative enterobacteria | 31 | 23,48±3,7 |
| Any number of hemolytic intestinal bacilli | 36 | 29,6±3,9 |
| Presence of cocci flora more than 25% of the total number of microbes | 33 | 27,27±3,9 |
| Any amount of hemolytic cocci (S. aureus) | 25 | 18,93±3,4 |
| Significant reduction of bifidobacteria: 2 times ($10^7$) and lower ($<10^7$). | 34 | 25,75±3,8 |
| Significant reduction of lactic acid microbes (lactobacteria): 2 times ($10^5$) and lower ($< 10^5$). | 77 | 58,33±4,3 |
| Presence of Candida fungi | 12 | 9,09±2,4 |
| The total number of patients whose intestinal microbiocenosis indicators differ from the norm is | 128 | 96,96±1,4 |

Analyzing the data presented in Table 4, it can be said with high certainty that the course of the disease was accompanied by a significant increase in the level of cytokines. The analysis of correlations between the intestinal stage of ascariasis and the level of cytokines in patients and their clinical course showed that they change together. Before proceeding to the interpretation of the correlation between the dynamics of cytokines and clinical symptoms, let us note that intoxication syndrome was observed in 92,8±3.2% of patients, and gastrointestinal tract dysfunction syndrome was observed in 66.2±6.0% of patients. We found a close correlation between: intoxication syndrome and IL-1 (r=0.93); to intoxication syndrome and TNF-a (r=0.84); intoxication syndrome and IL-6 (r=0.72). Thus, depending on the results of the treatment,

the examination of the dynamics of cytokines can serve as an additional measure of the effectiveness of the performed deworming.

**Table 4.**

**The amount of cytokines in patients with the intestinal stage of ascariasis depending on the effectiveness of helminthic treatment**

| Cytokines | M±m, pq/ml | | p< |
|---|---|---|---|
| | Before treatment (n=55) | After treatment (n=55) | |
| İL-1 | 108,6±14,2* | 51,6±12,2 | 0,05 |
| İL-6 | 85,2±11,4* | 46,2±15,2 | 0,05 |
| TNF-a | 94,8±14,2* | 33,1±11,3 | 0,05 |
| Control group (n=30) | | | |
| İL-1 | 22,3±11,4 | | |
| İL-6 | 19,6±7,7 | | |
| TNF-a | 20,1±5,2 | | |

The amount of thyroid hormones was studied in 68 patients with the intestinal stage of ascariasis. 43 women and 25 men were under observation. The age of the patients varied from 19 to 55 years. To characterize the functional state of the thyroid gland, the following were determined: TTH, thyroxine and triiodothyronine in dynamics 6 weeks after the end of treatment. Based on the received data, it can be stated with complete certainty that the amount of TTH in the blood serum of elderly patients with the intestinal stage of ascariasis increased, while the amount of T3 and T4 decreased. During the examination of TTH and thyroid hormones T3 and T4 in patients with the intestinal stage of ascariasis before treatment with anthelmintics, we found that the amount of TTH in the blood serum increased by -1.8 times, and the amount of T3 thyroid hormones decreased by 24.8%, T4 - by 24.6%. after the treatment, during the dynamic examination conducted after 1.6-2,6 months, the level of TTH decreased, which was accompanied by a general increase in the amount of T3 and T4. The data we obtained give reason to assume that the secretion of thyrotropin hormone increases and the amount of T3 and T4 decreases in patients with the intestinal stage of

ascariasis. Such changes are reciprocal - when the amount of triiodothyronine (T3) and thyroxine (T4) decreases, TTH secretion naturally increases. The decrease in the amount of thyroxine and triiodothyronine was the basis for giving an opinion about the development of hypothyroidism in the patients we examined. This idea (about the development of hypothyroidism) is confirmed to some extent by the detection of both anamnestic (weakness, high fatigue) and objective clinical symptoms (skin dryness, crusting, nail breakage and hair loss) in the patients we examined.

The performed examinations allow obtaining the following results:

1. Examination of the state of the microflora of the large intestine, the dynamics of cytokine indicators can be used as a criterion for evaluating the effectiveness of the deworming of the intestinal stage of ascariasis in elderly patients.

2. According to our data, the dynamic change of T3, T4, TTH due to the effect of treatment cannot be taken as an honest criterion of antihelminthic treatment. The examination of the amount of T3, T4, TTH in the intestinal stage of ascariasis in elderly patients allowed to reveal clinically important signs of hypothyroidism, which should be taken into account when organizing treatment.

In order to determine immunoglobulin E as a diagnostic indicator for allergic rhinitis (AR) in patients with helminthiasis, we examined 64 patients with AR, and all laboratory studies were performed before and after treatment. These 64 patients formed the main group. The control group consisted of 25 practically healthy children of the same age as the patients of the main group. The control group consisted of 12 girls (48.0±9.8%) and 13 boys (52.0±9.8%). Among the patients in the main group, there were 22 girls (34.4±5.9%) and 42 boys (65.6±5.9%). When divided by age, 28 patients (43.7±6.2%) were 12-14 years old, 36 patients (56.3±6.2%) were 15-17 years old. According to the severity of AR, 3 patients had mild (4.7±2.7; $p<0.001$), 26 patients had moderate (40.6±6.1%) and 35 patients had severe (54.7±6.1%; $p <0.001$) was evaluated as degree. All children from the main group with AR were

also divided by duration of disease. We divided the children in the main group into 3 groups: group 1 - AR lasting up to 2 years, group 2 - AR lasting from 2 to 4 years, and group 3 - AR lasting from 4 years. In general, the duration of the disease according to the number of children with AR up to 2 years old - 12 people (18.8±4.9), between 2 and 4 years old - 38 people (59.4±6.1%), over 4 years old - 14 people (21, 8±5.2%). Parasitological examination of feces for the detection of Ascaris worm eggs gave positive results only in 22 (34.4±5.9%) adolescents. Studies have shown that the average level of IgE in the blood is 660 İU/ml (243.5-1500), and the number of eosinophils is 510 cells / mm 3 (284-811).

Anti-Ascaris IgE was positive in 48 (75.0±5.4%) adolescents. Correlation coefficients were as follows: between total IgE level and eosinophil count 0.36 ($p=0.001$), between total IgE level and anti-Ascaris IgE 0.54 ($p<0.001$) and between eosinophil count and anti-Ascaris IgE 0. 28 ($p=0.01$). A final multiple linear regression model showed that anti-Ascaris IgE increased total serum IgE with a coefficient of determination of 0.25 ($p<0.001$). This effect occurred regardless of the number of eosinophils and the presence of helminthiasis. In patients with respiratory allergies and high serum IgE levels, living in regions with a high risk of worm infestation, the quantitative amount of anti-ascaris IgE may be more effective and preferable than the parasitological stool test. The verification of parasitic infestations in the examined patients (n=56) was carried out by means of parasitological, serological (EİA) and mixed methods, which were confirmed in 46%, 41%, 13% of cases, respectively. Taking into account the fact that the titer of specific antibodies in double sera does not actively increase in the dynamics of treatment, we have set ourselves the goal of conducting detailed laboratory examinations (including immunological methods) of patients with helminthiasis, including those resistant to specific treatment. There were 56 patients with enterobiosis under observation, including 26 people who were resistant to primary specific treatment. As a result of detailed clinical-laboratory and instrumental examinations carried out in 47 people (83.9%), mainly concomitant chronic diseases of the

gastrointestinal tract (chronic gastroduodenitis, chronic enterocolitis) dysbiotic changes, enzymatic and motor function disorders) and hepatobiliary system (chronic cholecystitis, chronic pancreatitis, chronic hepatitis, including viral hepatitis B and C in 15 people) were detected. Based on the inclusion of enterobiosis immuno-deficiency as one of the markers, we studied the immune status of patients using the spectrum of cellular and humoral factors of immunity. For this purpose, we created 2 groups of patients (with and without immunomodulators) for comparative evaluation of the results of pathogenetic treatment on their immune status in the preparatory period before the appointment of specific treatment. 26 people in the 1st group (main) received immuno-modulators against the background of traditional treatment, and 30 people in the 2nd group (comparison) received only traditional treatment. The immune status of patients before treatment was characterized by moderate leukocytosis (up to 20.6%; $p<0.01$), neutropenia (up to 42.5%; $p<0.001$), decreased functional-metabolic activity of neutrophils. As a result, in the observation groups of patients with enterobiosis, after the immunocorrective treatment, the level of specific IgG antibodies increased by 2 times ($p<0.001$), general and secretory IgA - by 2 times ($p<0.001$) during IFA, which was accompanied by clinical and parasitological recovery. accompanied. Based on the results of long-term dispensary observation on patients with various parasitosis, we have developed monitoring of laboratory examination and treatment, taking into account that practical doctors prefer immunological methods in the screening diagnosis of infectious and parasitic diseases at the modern stage. Thus, the results of this examination allow to determine the priority directions in the study of parasitosis in the territory of the Republic, to determine the level of infection of the population, as well as to determine the interrelationship between it and the degree of environmental pollution with invasive forms of helminths, to develop an algorithm for monitoring the laboratory examination and treatment of patients with parasitosis .

By using exploratory epidemiological control, 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 evaluate the impact of the behavioral factor on the level of morbidity and the development of the epidemic process. In order to find out the behavioral risk factors that determine the high level of infection of the population, a survey was conducted among schoolchildren about personal and collective hygiene rules, the presence of harmful habits in children, as well as the nature of water supply and the presence of pets. The presence of harmful habits, for example, biting nails, sucking fingers, was indicated in the answers of 63% of respondents. The following answers confirm that schoolchildren do not expect personal hygiene rules: during the survey, 48% said "I wash my hands once a day" and 41% said "I don't wash my feet". Fruits and vegetables are also involved as a risk factor in infection with intestinal helminths. From the answers of the respondents, it was found that 63% of people can eat them without washing and wiping them. Finally, pets can also play a role in the infection of children. 52% of the surveyed people have pets, they play with them, take care of them and do not always follow the rules of personal hygiene.

The complex ecological situation of parasitic diseases has caused another problem - the problem of mixed-infestation in unexamined children and schoolchildren who have not been cured of single helminthosis or protozoa. At this time, the second and third parasites easily enter the child's weakened body and create a parasitic mixed-invasion. It should be noted that mixed invasion was found in 28% of examined children. The detection of mixed infections among the examined children is alarming. At this time, 2 types of parasites were detected in 24.1±1.2% of children, 3 types of parasites were found in 6.1±0.6% of examined children, and 4 types of helminths were found in 2,0±0.1%. Mixed infections were manifested in the following order: pinworm + giardia, pinworm + ascarida, pinworm + ascarida + giardia, ascarida + dwarf tapeworm + pinworm and giardia.

On the basis of the socio-epidemiological examinations carried out at the next stage, a comprehensive action plan was developed for the prevention of intestinal parasitosis among the population, for

lowering their general level of morbidity and increasing health indicators. The conducted studies showed a high level of indicators of adoption of the measures implemented for the prevention of these invasions by understanding the socio-economic importance of IN (prior to the sanitary campaign, n=390), which was confirmed by the Van der Waerden criterion when comparing the ranks of the indicators 6-8 months after the sanitary campaign after (n=321) and after 11-13 months (n=295) confirm the honest scores obtained (X=2.72 and X=2.84, respectively; $p<0.05$). 6-8 months after the sanitary campaign, the frequency of epidemiologically significant behavioral factors increased from 13.0±1.7 (51 people) to 7.5±0.7% (24 people, $t=5.09$; $p<0.001$) and after 11-13 months - decreased to 4.0±0.6% (12 people, $t=3.59$; $p<0.001$). During this period, the epidemiological significance of social factors decreased more - from 40.0±2.1% (157 people) to 24.0±1.1% (77 people, $t=9.88$; $p<0.001$) and 8.0±0.7% (24 people, $t=12.62$; $p<0.001$). The decrease in the epidemiological significance of hygienic factors occurred at the same rate - from 30.0±2.3% (117 people) to 16.0±0.9% (51 people, $t=9.65$; $p<0.001$) and 7.0±0.7% (21 people, $t=8.42$; $p<0.001$). Employees of children's institutions, small traders, housewives are exposed to the highest risk of infection with nematodes. In them, the influence of this professional factor is very strong and it is practically impossible to change it. Therefore, if before the sanitary campaign the frequency of these groups was 25.0±2.2% (98 people), then it decreased, but it was not so sharp: after 6-8 months it was 20.0± up to 1.0% (64 people, $t=3.12$; $p<0.01$), after 11-13 months – up to 16.6±1.0% (49 people, $t=2.48$ ; $p<0.05$).

The ecological-parasitological characteristics of the circulation of the causative agents of parasitosis in the environment stimulate the creation of conditions for the formation of the risk of human infection. Due to variable anthropogenic load on ecological biotopes and changes in the nature and intensity of population migration, there is a potential danger of the emergence of new foci of parasitic diseases, including those that are not typical for the studied regions. According to parasitological indicators, the human habitat in the territory of the

republic is not safe for the health of the population. The extent of soil contamination with parasites varies from 3.5 to 24.7%, and reaches 60% in areas irrigated with sewage. One of the main sources of the spread of helminths is soil, untreated sewage, and their sediments, which are often used as fertilizers without proper disinfection. Uncontrolled population migration in the spread of parasitic diseases is also of ecological importance. We associate population infection with helminthiasis with many factors and their nature.

First - these are biotic factors, and the following apply to them: fairly simple life cycles - this allows the parasite to "fall" into the host's body; high reproductive capacity of helminths (including growth in larval stages); susceptibility of the host to parasite infestation; presence of sufficient populations of the parasite and host at all stages of the life cycle. Secondly, these are abiotic factors that promote the spread of helminths: the mountainous terrain of the region. Thirdly, these are anthropogenic factors and consist of a large number of constituent elements: insufficient development of the sanitary-hygienic culture of the population in the absence of mass media; unimproved system of detection of helminths; low socio-economic standard of living of the population; population migration; failure to perform preventive examinations for helminth eggs; lack of full supply of population with anthelmintic preparations; their expensiveness, non-application of deinvasion methods in wastewater treatment facilities (which ensure effective removal of helminth eggs). Helminths continue to be one of the widespread mass diseases and significantly determine the health level of the population in our republic. In this regard, one of the methods of radical solution to the problem of helminthosis is to make the population and medical workers aware of the need to protect the environment from parasitic diseases as an important condition for maintaining and restoring the health of the population. For this purpose, it is necessary to develop and expand the network of preventive measures, which includes increasing the level of education of the population with all modern mass media.For the first time in our republic, we have conducted complex and large-scale parasitological examinations of the water of underground and

tubular wells, filter wells and springs. There, giardia cysts (26.6±0.8%), cryptosporidia oocysts (12.5±0.3%), oncospheres of teniids (4.7±0.1%), ascariasis (21.5±0.5%) ), toxocar (14.5±0.2%), we have found the eggs of bi-tail (14.8±0.1%), hairy headworm (5.4±0.4%). The extensive indicators of contamination of water samples with the causative agents of intestinal parasitosis were 1.6 times higher than in the water of underground wells, while these indicators were 5.4 times higher in the water of tube wells. Giardia cysts (42.5±0.6%), cryptosporidia oocysts (18.4±0.2%), ascarida (26.5±0.1%) and toxocariasis (12.6±0, 6%) eggs were recorded.

In addition, the causative agents of intestinal parasitosis were also detected in the water of the mine wells taken from the widely distributed irrigation sources in the region. 6 types of parasitic agents were detected in water: giardia cysts (33.0±0.5%), cryptosporidia oocysts (11.4±0.2%), ascarida (23.1±0.7%), toxocar (16, 8±0.1%), weevil (12.1±0.2%), hairy worm eggs (3.6±0.1%).A total of 386 soil samples were examined, eggs of geohelminths were found in 130 samples (33.7±2.4%). In total, 194 ascarids, 213 roundworms, 88 trichostrongylids, 62 teniids, 277 toxocars, 29 fasciola eggs, as well as a large number of eggs and larvae of animal and bird parasites were found. Toxocar eggs of dogs are more resistant to environmental factors, therefore, invasion stages were found more among them - 34.7±2.9%, invasion eggs of ascarids -23.2±3.05% ($p>0.01$) , hookworm eggs -15.0±2.5% ($p<0.05$) and least trichostrongylids invasion larvae -8.0±2.6% ($p<0.05$).

The data obtained during the epidemiological examinations made it possible to formulate the main directions of the epidemiological control of actual helminthoses, to collect primary information, and to process them during operative and retrospective analysis (Figure 7).

Thanks to the obtained information, we have developed an effective management system of actual helminthosis in the territory of the Republic, the basis of which is the epidemiological control system The need for constant monitoring of the level of infestation of the population of the republic by developing a scheme for mass

deworming and social mobilization of the population using epidemiological control is substantiated. Based on the cartogram drawn up taking into account local conditions and invasion indicators, the invasion level and structure of the population of the republic was evaluated by regions.

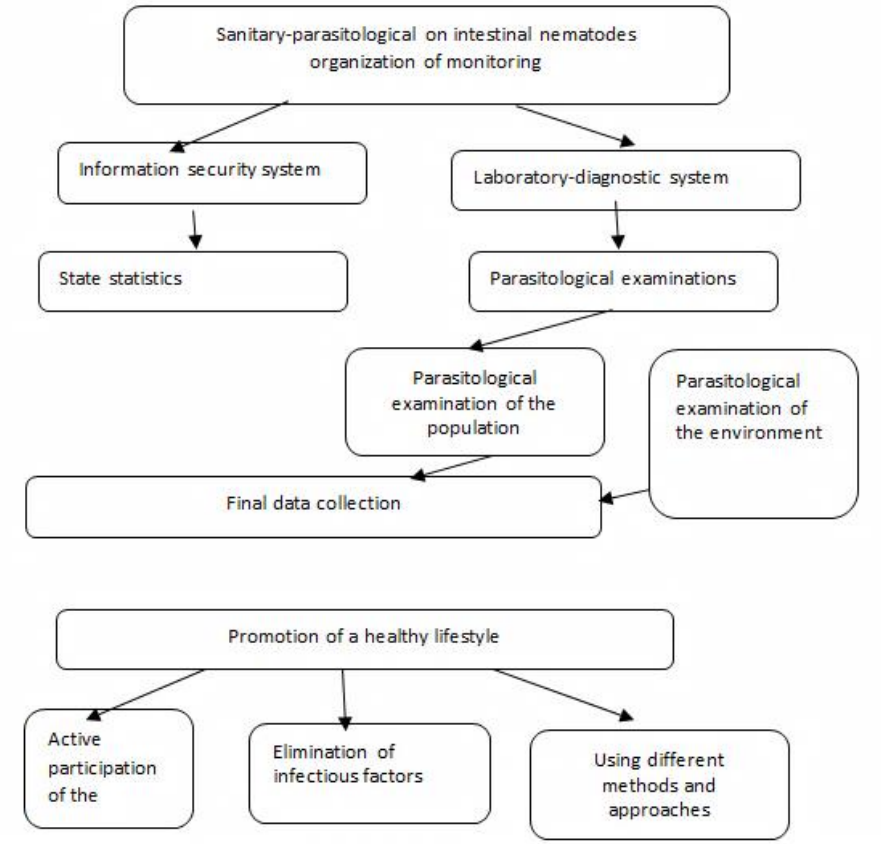


Figure 7. The structure of the data area of the sanitary epidemiological system during helminthiasis

Clinical and microbiological characteristics and markers of nematodes at the modern stage have been revealed thanks to the

conducted examinations, which can help in the diagnosis of hidden or difficult to detect helminthosis. Correction of microecological changes occurring during nematodes significantly increases the effectiveness of anthelmintic treatment, which ensures a more durable treatment effect. The implementation of a differentiated epidemiological control system on different groups of helminthiasis, depending on the mechanism of foci formation in the republic, allowed to carry out a complex of organizational and preventive measures aimed at reducing the incidence of IN in the population.

## RESULTS

1. 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%; $p<0.001$) [9, 11, 29].

2. 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%) [33]

3. 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 [14, 16, 18].

4. 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 EİA (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 EİA method was also highly effective - 82.6±5.0% - 89.5±4.2%, respectively [19, 22, 26].

5. 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 MBY (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% [21, 22, 28].

6. 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 IL-1, IL-6 and 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 [26].

7. 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 [23].

8. 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 [10, 25, 27].

9. 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 [32].

## PRACTICAL RECOMMENDATIONS

1. Examination of the state of the microflora of the large intestine, the dynamics of cytokine indicators can serve as an additional criterion for evaluating the effectiveness of the deworming of the intestinal stage of ascariasis in elderly patients.

2. We found a correlation of the dynamics of cytokines with clinical symptoms: intoxication syndrome and IL-1 (r=0.93); to intoxication syndrome and TNF-a (r=0.84); intoxication syndrome and IL-6 (r=0.76). Also, a strong correlation between the level of cytokines and the gastrointestinal tract dysfunction syndrome was determined. In the pair of IL-1 and gastrointestinal tract dysfunction syndrome - r=0.82; -r=0.76 in the pair of TNF-a and gastrointestinal tract dysfunction syndrome; IL-6 and gastrointestinal tract dysfunction syndrome pair - r=0.74.

3. Violation of T3, T4 production in thyroid gland requires correction of thyroid function in patients with intestinal stage of ascariasis. Our data confirm that the examination of T3, T4, TTH levels in patients with the intestinal stage of ascariasis is important for the diagnosis of hypothyroidism.

4. Mass examinations of the population for intestinal helminthiasis are offered during the examination of the elderly population and children in organized collectives. When providing medical assistance to the population, first of all, attention should be paid to families with low financial status.

5. It is important to determine the effectiveness of sanitary-helminthological monitoring and the measures taken on environmental objects.

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1. Халафли Х.Н., Агаев И.А. Состояние заболеваемости дисбактериазом кишечника инвазированных гельминтозами в г.Баку // - Бишкек: Научно-практический журнал «Здравоохранение Кыргызыстана", - 2008. №4, - с.121-125.

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## LIST OF ABBREVIATIONS

| | | |
|---|---|---|
| AR | – | allergic rhinitis |
| ARD | – | acute respiratory diseases |
| CPİ | – | children's preschool institutions |
| EEC | – | Exploratory epidemiological control |
| EİA | – | enzyme immunoassay |
| GİT | – | Gastrointestinal tract |
| HEC | – | Hygiene and Epidemiology Center |
| HIV | – | human immunodeficiency virus |
| İFR | – | immunofluorescence reaction |
| İg G, M, A | – | immunoglobulin G, M, A |
| İL | – | interleukin |
| İN | – | intestinal nematodes |
| İP | – | intestinal parasites |
| MR | – | methodical recommendation |
| PCR | – | polymerase chain reaction |
| PHAR | – | passive hemagglutination reaction |
| TTH | – | thyrotropin hormone |
| TNF | – | tumor necrosis factor |
| T3 | – | triiodothyronine |
| T4 | – | thyroxine |
| USE | – | ultrasound examination |
| WHO | – | World Health Organization |

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