

The True Picture of The Prevalence of Parasitic Diseases Among Children in The Kyrgyz Republic

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Abstract

This article presents the results of a study of sanitary epidemiological surveillance (SES) among preschool and school-age children conducted in the pilot districts of Osh, Naryn, Jalal-Abad and Batken regions of the Kyrgyz Republic (KR) in the period from 2015 to 2021 and describes the relevance of combined parasitic diseases, in particular helminthiasis, the problematic issues of epidemiological features of the combination of helminthiasis with a large range of parasitic diseases to assess the true picture of the infestation of children with parasitic diseases. SES for parasitic diseases is a system for collecting biomaterials (stool) of children using preservatives and taking scrapings from the anus, laboratory analysis to determine the types of parasites and the dissemination of epidemiological information on the prevalence of parasitic diseases and children with mixed infestations, necessary for planning, implementing and monitoring preventive programs. 39398 children of school and preschool age up to 14 years were examined. Preschool children accounted for 36.3% and schoolchildren below 14 years of age 63.6% of the total number of surveyed. During the analyzed period, the total infection rate of children below 14 in the republic amounted to 10.9% of the total number of examined, of which 5.7% are girls and 5.2% are boys.

Keywords: parasites, mixed invasion, intestinal parasitocenosis, mixed invasion, invasion, SES.

Introduction

The problem of parasitic diseases has always been relevant due to the peculiarities of diagnosis and clinical manifestations, the specifics of epidemiological surveillance, as well as the negative changes that have occurred in the organization of the parasitological service at the present stage. These diseases remain among the most widespread human diseases. And also, the relevance of our problem lies in the fact that scientific works in the field of virology and oncology, or robotics with on-on technologies, have now become “fashionable” and in demand. However, at the peak of medical and technological advances, we have to deal with problems with intestinal and tissue parasitosis. Traditional medicine has been fighting them since the time of Hippocrates, and the problem with parasitic diseases has not yet been completely eradicated. While we reach the pinnacle of medicine and technology, parasites adapt to

coexist with each other and form mixed mixes, while creating new platforms for humanity to work with. However, the influence of protozooses on the health of the population and the quality of life, especially the children's population, is underestimated. It is shown that in modern conditions, with insufficient coverage of the population with examinations for parasitosis, the incidence rate does not reflect the true situation [1]. Recently, so-called mixed invasions occupy a large place among helminthiasis, the diagnosis of which is especially difficult [2]. Studies on the combined course of protozooses with various infectious diseases are still rare.

Mixed invasion is a relatively new disease compared to other nosoforms. In this case, the child becomes infected simultaneously with several different types of parasites. According to the data of domestic and foreign scientific sources, the clinical course of such

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a disease is more severe than with monoinvasions [3].

Similar mixed invasions are found mainly in countries located along the tropical belt of the earth. Their peculiarity lies in the fact that several groups of parasites or even several of their varieties can parasitize at the same time. A person can walk barefoot along the beach during the day, drink insufficiently clean water, eat poorly washed exotic fruits and get a disease in which geo- and biohelminths will peacefully coexist inside. An in-depth analysis of clinical and laboratory data revealed that the clinical picture of mixed invasions was distinguished by its polymorphism.

With a mixed invasion, the development of functional changes in the respiratory organs, the biliary system, and the gastrointestinal tract is natural. These changes are detected already at an early age in children and increase with the duration of the clinical manifestations of invasion [1].

It is noted that viral hepatitis "A" in combination with giardiasis are characterized by the originality of the clinical picture: longer incubation and prodromal periods, a greater frequency of intoxication and dyspeptic syndromes in the icteric period, a slowdown in the normalization of biochemical parameters in the recovery period, an increase in the frequency of relapses in the convalescence period [4].

Statistical data of the World Health Organization (WHO), presented in 2006 on the increase in the incidence of parasitic diseases of protozoosis and helminthiasis, for example, enterobiasis by 7.6%. Globally, 1.5 billion people, or almost 24% of the world's population, are infected with soil-borne helminth infections. In the countries of Asia, Africa and Latin America, there is a trend of an annual increase in the infection rate of the world's population with protozoa [5, 6].

The epidemiological situation in terms of parasitic diseases in Kyrgyzstan, as well as in our neighbors, has long been unfavorable. In terms of prevalence, parasitic diseases were second only to influenza and SARS [7]. For example, the proportion of children suffering from invasions in our republic was 84% only in the last decade. Now it has decreased to 74% [8]. In the republic, in recent years, there has been an increase in the infestation of the population with helminthiasis, from 28 thousand to 40 thousand helminthiasis are recorded annually, intensive rates range from 7900/0000 to 10000/0000 per population. In just one year, according to official data, more than 50 thousand cases of infection with parasites

among citizens are registered in the country, and given the remoteness of many regions from the main centers and the lack of an adequate number of examination points, the real number of such cases can increase 10 times. Among the parasitic diseases registered in the republic, the proportion of helminthiasis is on average 85%, of which the leading place is occupied by intestinal helminths [9].

The average long-term indicator of parasitosis per 1000 examined persons for the period 2015 to 2019 is 46.9. The risk group for all recorded parasitosis was children under 14 years of age with a specific weight of 80.4% [9]. As noted by the authors [10, 11], among the parasitic diseases in Kyrgyzstan over the past 30 years, the incidence of echinococcosis and alveococcosis has significantly increased, increasing from 5.4 to 100,000 people per year in 1991. to 13.1 per 100,000 population per year in 2014-2016.

Conducting sentinel epidemiological surveillance of parasitosis among children is described in detail in Order No. 2 dated January 11, 2010 of the Ministry of Health of the Kyrgyz Republic [12].

In connection with the above, the purpose of this work is to identify and epidemiologically analyze the true picture of the incidence among children of the population of the pilot districts of Osh, Naryn, Jalal-Abad and Batken regions of the Kyrgyz Republic with parasitic and intestinal mixed infestations by means of SS.

Tasks of SS: - assessment of the prevalence of parasitic and intestinal mixed invasions in various pilot districts of the population by administrative territories, taking into account demographic and behavioral data;

- identification of population subgroups at increased risk of infection;

- obtaining data to predict the development of parasitosis and mixed invasion at the district, regional and republican levels;

- provision of information for the development of preventive programs for planning, implementation and monitoring of preventive programs.

Research materials

The material of the study is data on the incidence of the population of the republic, collected over 7 years (2015- 2021) from the pilot regions of the republic on the basis of SS.

Research method

Parasitological, epidemiological, statistical and descriptive-analytical. The results obtained were processed by the statistical program SPSS.

The main stages of SS:

1. Preparatory stage - included organizational activities, determination of the method of selecting respondents, places of data collection and a formative study for a preliminary study of the situation in the territory where SS is planned in order to substantiate the sampling methodology, identify acceptable conditions for the participation of respondents, ensure the quality of data collection at the field stage, as well as preparing for the assessment of abundance.
2. The field stage, or the main study - included the collection of data from individuals of their key groups in the study area in accordance with the standard methodology for a specific algorithm, laboratory analysis of fecal samples.
3. Analytical stage - processing of the obtained sociodemographic, behavioral and parasitological laboratory data in special statistical programs, preparation of reports on the results of the study. Territory and locations of the study - in order to obtain complete and reliable data for the whole country, SS is conducted in pilot regions of the Kyrgyz Republic, as well as in those settlements where there is a deterioration in the epidemiological situation according to the data of epidemiological surveillance of cases of parasitic diseases. The territories where SES is carried out are called sentinel sites, and the places where data is directly collected are called sentinel points.

Results and discussion

One of the main methods of sentinel epidemiological surveillance is routine epidemiological surveillance, which is the registration of cases of parasitic diseases detected during laboratory testing of various contingents of the population, which is carried out according to epidemiological, clinical and other indications. In the KR, an average of 546,454 fecal samples are performed annually for parasitic diseases, which is about 8% of the country's population, while the coverage of surveys by district laboratories remains insufficient.

So, for example, according to Form 1, over the past three years (from 2017-2019), an average of 759,298 people were examined, and 26,197 of them

were identified, 34.5 per 1,000 examined. With a predominant concentration of parasitic diseases among key population groups, the most effective tool for epidemiological and parasitological surveillance is SES, which makes it possible to study the true picture and prevalence of parasitic diseases depending on the socio-demographic and behavioral characteristics of *sentinel group children* (Table 1).

We have many years of experience in conducting SS at the national level on an annual basis. SES allows timely identification of regions with an unfavorable epidemiological situation for a parasitic disease, response measures. The results of SS are necessary for monitoring and developing preventive programs for planning, implementing and optimizing supervision. During the analyzed period, we examined 39,398 children of school and preschool age up to 14 years old in 246 kindergartens and 348 schools in Osh - 55.9%, Naryn - 9.9%, Jalal-Abad - 6.1% and Batken - 27.9% to the regions of the republic in the period from 2015 to 2021.

Of these, (47.1%) are girls and 52.1% are boys. Preschool children accounted for (42.4%) and school children under (14 57.5%) of the total number of those surveyed.

Table 1: Pilot territories and points of sentinel epidemiological surveillance

No	Pilot regions	Pilot areas	Number of examined children
1	Osh	Kara-Suu	12439
		Alai	5522
		Aravan	2147
		Kara-Kulzha	716
		Nookat	1235
2	Naryn	Ak-Talinsky	293
		At-Bashinsky	560
		Zhumgalsky	487
		Kochkor	1247
		Naryn	1326
3	Jalal-Abad	Aksy	77
		Ala-Bukinsky	1206
		Bazar-Korgon	446
		Suzak	687
4	Batken	Kadamzhai	7016
		Batken	1076
		Leilek	2918
Total:		17	39398

In the process of conducting SS, 16,735 preschool children from 246 kindergartens aged 2 to 6 years were included in the study, subject to voluntary and anonymous participation (table 2).

Table 2: Age distribution of preschool children in the total sample,

SS, KR

Age	Prevalence frequency	%
2	1413	8,4
3	3208	19,6
4	3704	22,1
5	4744	28,3
6	3666	21,9
Total:	16735	100

Gender and age structure: among the conducted SS of children, the proportion of men is 52.8%. The minimum age of the children was 2 years, the maximum age was 13 years, the average age was 7.5 years. Concerning children of school age up to 14 years, in the process of conducting SS, 22,660 schoolchildren from 348 secondary schools in Osh, Naryn, Jalal-Abad and Batken regions were included in the study, with voluntary and anonymous participation. As shown in

Table 3, the structure of the respondents was dominated by persons in the age category of 8 years (28.7%) 9 years (24.21%) and 7 years 18.0%.

Table 3: Age distribution of school-age children under 14 in the total sample, SS, KR

Age	Prevalence frequency	%
7	4304	18,9
8	6516	28,7
9	5488	24,21
10	3748	16,5
11	1676	7,7
12	542	2,3
13	386	1,7
Total:	22 660	100

In the context of a high rate of spread of parasitic diseases in the republic, constant monitoring and optimization of the fight against parasitosis is necessary. Particular attention should be paid to the behavioral factor of children in kindergartens and schools, which causes a high risk of infection. When analyzing children by age group by region (Table 4), the age category is from 2 to 5 years in Naryn (48.1%) and Jalal-Abad (55.1%) regions. In the category from 6 to 9 years in Batken (67.9%) and Osh (51.9%) regions.

Data analysis shows that the frequency of occurrence of parasitosis in the republic is very diverse. As expected, a relatively high infection rate was noted in the south of the country. Among all 20 types of helminths officially registered in the country, we took the following relatively widespread nosological forms: ascariasis, enterobiasis, giardiasis, hymenolepiasis, amoebiasis, dicroceliasis and teniarinhoz. Of these

parasitoses, the most common ones were selected: ascariasis, enterobiasis, giardiasis, hymenolepiasis, and children with mixed parasitosis, i.e.

Table 4: Age structure of the surveyed children by regions, SS

Sentinel site	Age categories		
	2-5 лет	6-9 лет	10-13 лет
Osh (N=22059)	8317 (37,7 %)	11 467 (51,9 %)	2275 (10,3 %)
Naryn (N=3913)	1884 (48,1 %)	1312 (33,5 %)	717 (18,3 %)
Jalal-Abad (N=2416)	1333 (55,1 %)	863 (35,7 %)	220 (9,1 %)
Batken (N=11010)	1657 (15 %)	7084 (67,9 %)	2269 (20,6 %)
Total:	13191 (33,5%)	20726 (52,6%)	5481 (13,9%)

giardiasis, hymenolepiasis, and children with mixed parasitosis, i.e. with mixed invasions. During the analyzed period, the total infection rate of children under 14 in the republic amounted to 10.9% of the total number of those surveyed, of which 5.7% are girls and 5.2% are boys. The frequency of occurrence of parasitosis in the republic varies according to the number of detected nosoforms and consists of the following sequence: enterobiasis, giardiasis, ascariasis, hymenolepiasis and mixed invasion.

Since enterobiasis is one of the most widespread diseases among children, it leads in the frequency of occurrence in most cases - 4% of the total number of those examined. This is followed by giardiasis - (2.70%), ascariasis - 1.80%, hymenolepiasis - 1.20% and the list is closed by mixed invasion 0.90% of the total number of examined persons. Calculations on the number of identified per 1000 examined persons are presented in table 5.

Table 5: Detections per thousand examined persons from 2015 to 2021

Nosoforms	Number of identified per 1000 examined persons
Enterobiasis	41,6
Giardiasis	27,6
Ascariasis	18,3
Hymenolepiasis	12,6
Mixed invasion	9

The dominant part of children are infected with enterobiasis

- 41.6, followed by giardiasis in terms of detection - 27.6, in third place is ascariasis - 18.3, then hymenolepiasis

12.6 and the list is closed by children with mixed

invasions - 9 per 1000 examined persons Such nosoforms as enterobiasis, giardiasis, ascariasis, and hymenolepiasis are considered one of the most widespread and frequently occurring parasitosis in the republic.

Recently, according to our data, cases of detection of mixed invasions in children of preschool and school age up to 14 years have become more frequent. Previously, the main problem in the republic was the lack of official registration of this type of disease. There was no column "Mixed invasion" in the statistical reporting form No. [18] "State statistical reporting" in the form No. 1 "Report on infectious and parasitic diseases". For this reason, the sanitary and epidemiological surveillance service did not receive data on mixed invasions, since this type of isoform was not officially registered. However, in 2021 we managed to introduce the introduction of the "Mixed invasion" column in the above statistical forms and now we have the opportunity to receive monthly information throughout the country on the epidemiological situation of mixed invasions in children of preschool and school age up to 14 years (Fig. 1).

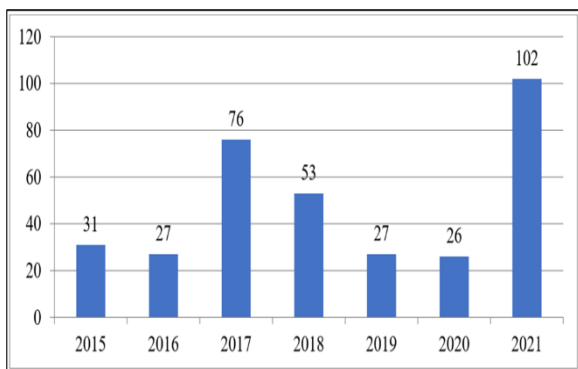


Fig 3: Prevalence of mixed invasions in children under 14 years of age from 2015-2021

Conclusions

1. Mostly among children are persons aged 2 to 14 years of preschool and school age.
2. Compared with the statistical data of the Ministry of Health of the Kyrgyz Republic for 2015-2019, there has been a significant increase in parasitic disease results from our study over this period. Osh region 9%/5%; Naryn region 12%/22%; Jalal-Abad city 3%/30% and Batken region 42%/48% respectively.
3. According to data from 2015 to 2021, the maximum detection of mixed invasions occurs in 2021. The minimum detection rate was registered in 2020 due to the pandemic.

4. For 1000 service. persons were children with enterobiasis - 41.6, giardiasis - 27.6, with hymenolepiasis - 12.6 and children with mixed invasions - 9.

Recommendations

1. For the timely detection of parasitic diseases among children, it is necessary to carry out work to expand the SS among schoolchildren with mandatory health education.
2. Identified children with parasitic diseases should be treated until complete recovery.
3. On a regular basis, specialists of the Center for Health and Sanitary and Epidemiological Surveillance, FMCs, TB, FOS and FAPs should provide methodological and advisory support for the treatment of parasitic diseases.
4. To obtain reliable data on the prevalence of parasitic diseases among children during SS, improve laboratory research methods (scraping, enrichment, Kalantoryan, Kato-Katz, etc.).

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