

ANNUAL ANALYSIS OF PARASITIC INFECTIONS IN BULGARIA IN 2022

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ABSTRACT

Introduction: Infections caused by parasites still represent an important global health problem. Although parasitic infections are responsible for significant morbidity and mortality in developing countries, they are also prevalent in developed countries. This study aims to establish the dynamics of the parasitic infections registered in the country (local and imported) and to analyze the situation, based on data from the previous years.

Methods: We used the annual reports of regional health inspectorates, diagnostic laboratories, medical universities, and data from the National centre of infectious and parasitic diseases about all individuals infected with parasitic diseases in the country.

Results: A total of 635,522 persons were examined in 2022, of whom 1.82% were diagnosed with various parasitic infections. In the local helminthic zoonoses such as echinococcosis and trichinellosis, a significant decrease in morbidity was observed, 1.3‰ (n = 89) for cystic echinococcosis and 0.16‰ (n = 9) for trichinellosis. For soil-transmitted helminthiasis (ascariasis and trichuriasis), the incidence was 6.7‰ and 0.5‰, respectively. Data on enterobiasis does not show any particular dynamics in 2022 either. The registered prevalence for the country was 1.48%, and for children from various childcare facilities - 2.45%.

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During the year, seven cases of vector-borne parasitic diseases were registered in the country: imported malaria was diagnosed in 5 patients (4 Bulgarian citizens and one foreigner), and autochthonous visceral leishmaniasis - in two persons.

Conclusions: The analysis shows that, in spite of a trend of declining morbidity for some socially significant protozoan and helminth infections, human parasitic diseases still represent a significant problem with social and medical consequences for the population of our country. Therefore, it is necessary to preserve and strengthen the surveillance and control network by including new personnel in the medical parasitology structures.

Keywords: parasitic diseases, incidence, prevalence, zoonoses

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INTRODUCTION

Infections caused by parasites still represent an important global health problem. Although parasitic infections are responsible for significant morbidity and mortality in developing countries, they are also prevalent in developed countries. Early diagnosis and treatment of parasitic infections are critical not only to prevent individual morbidity and mortality but also to reduce the risk of spreading in the community (1). The increasing burden of globally distributed parasitic diseases in the era of COVID-19 requires new efforts, targeting not only the clinical manifestations of the diseases but also - rapid diagnostic methods, novel therapeutic approaches, vaccine development and surveillance programs. All these are essential, together with the social, economic and environmental conditions (2).

This study aims to establish the dynamics of the parasitic infections registered in the country (local and imported) and to analyze the situation, based on data from the previous years.

Materials and methods.

Study design

It is a retrospective cross-sectional study of all registered cases of parasitic infections in the country for the period January-December 2022. Data was provided from the annual reports of the Regional Health Inspections (RHI) and the National Reference Laboratory for Diagnosis of Parasitic Infections (NRL)

at the National Centre of Infectious and Parasitic Diseases (NCIPD). Epidemiological indicators such as prevalence (for frequently asymptomatic or oligosymptomatic parasite infections) and morbidity per 100,000 population (for parasitic diseases with pronounced clinical symptoms) were determined. To establish trends in the dynamics of individual nosological units, the data for 2022 were compared with those for previous years.

Methods of parasitological diagnosis

Depending on the level of the laboratories performing parasitological diagnosis in the country (independent medical-diagnostic laboratories, laboratories at RHI, hospitals, Medical Universities, NCIPD), a wide range of diagnostic methods were used: microscopic, immunological, cultural and biomolecular.

Individuals examined for parasitic pathogens

According to prophylactic and epidemiological indications for parasitic diseases were examined children attending nurseries and kindergartens, professionals subjected to annual parasitological examinations, migrants arriving from countries

endemic for certain parasitic diseases, and patients referred by other medical institutions.

Ethical considerations

The analysis was based on routine diagnostic procedures in accordance with the rules of good medical practices, containing only aggregated depersonalized data that are practically retrospective in nature. Therefore, opinion statement and permission from the Institutional Ethics Committee were not required.

RESULTS

In 2022, a significant contingent of 635,522 individuals was examined in parasitological laboratories in the country, of whom 11,543 (1.82%) were diagnosed with various parasitic pathogens. Data on established parasitic diseases with local distribution are presented in Table 1.

Of the registered echinococcosis cases in 2022, 80 (90%) were primary and 9 (10%) were postoperative relapses, with 51 (57.3%) of the affected persons being male and 38 (42.7%) - female. The most

Table 1. Parasitic diseases with local transmission recorded in Bulgaria

Nosological entity	Number of examined	Number of positive	Incidence per 100,000 / Prevalence in %
Zoonanthroponoses with epidemic risk			
Echinococcosis	573	89	1.3 per 100,000
Trichinellosis	35	11	0.16 per 100,000
Taeniasis	284,949	2	0.03 per 100,000
Soil-transmitted helminth infections			
Ascariasis	423,577	460	6.7 per 100,000
Trichuriasis	284,949	37	0.5 per 100,000
Community-acquired parasitic diseases			
Enterobiasis	449,741	6,656	1.48%
Giardiasis	430,791	503	7.4 per 100,000
Hymenolepiasis	413,039	99	1.45 per 100,000
Urogenital trichomoniasis	4,166	335	8.0%
Opportunistic parasitic infections			
Visceral leishmaniasis	17	2	0.03 per 100,000
Toxoplasmosis	8,773	1,455	16.58%
Blastocystosis	411,956	1,593	0.39%
Cryptosporidiosis	190	1	0.02 per 100,000
Pneumocystosis	88	10	0.16 per 100,000

affected age group was 30-49 years with 32 (40%) affected persons, followed by 50-69 years with 20 cases (22.5%), and children and adolescents between 5 and 19 years with a total of 19 cases (21.3%). There were no reported cases of echinococcosis in children under 4 years of age. The organ localization of echinococcal cysts was as follows: liver in 65 patients (73%), lung in 13 (14.6%), multiple echinococcosis in 5 (5.7%), and other localization in 6 (6.7%). The regions with the highest incidence of echinococcosis were Sliven - 7.06‰, Razgrad - 5.57‰ and Yambol - 3.4‰. In the regions of Vidin, Vratsa, Gabrovo, Montana, Pernik, Smolyan and Targovishte, there were no recorded cases for 2022.

During 2022, an epidemic outbreak of trichinellosis was reported in the village of Brestovitsa, Plovdiv region in January with nine affected persons (6 males and 3 females), out of 33 who had consumed raw-dried meat from wild boar. *Trichinella* larvae were not detected in the meat and minced meat provided for examination at the NCIPD. Two sporadic cases were also registered in males from the towns of Petrich and Novi Pazar. Both had consumed raw meat purchased from the commercial network

Cases of soil-transmitted helminthiasis (ascariasis and trichuriasis) were registered throughout the country, with most cases of ascariasis diagnosed in the regions of Blagoevgrad, Sofia-capital and Burgas, and of trichuriasis - in the regions of Varna and Sliven. The RIH parasitology units reported 153 settlements endemic for soil-transmitted helminthiasis in 10 country regions. In 43 (28%) of them prophylactic examinations were carried out, and 130,830 persons were examined, of whom 49 (0.04%) were diagnosed with ascariasis. Etiological treatment was prescribed for all infected, and control tests proved a 100% effectiveness of the treatment.

Imported parasitic diseases

In 2022, 4,920 persons were examined for imported parasitic infections: five Bulgarian citizens and 4,915 foreigners. Parasitic infections were found in 75 (1.5%) persons (71 foreigners and 4 Bulgarians).

A total of 1,993 persons were examined for malaria in 7 regions of the country and in NCIPD, of whom 4 were Bulgarians and 1,989 -foreign citizens (mostly migrants at the refugee centres in Sofia, Haskovo and Sliven regions). In 2022, five cases of imported

malaria with causative agent *P. falciparum* were registered in four Bulgarian patients and one foreign citizen. In one of the Bulgarian patients, the disease ended up with a fatal outcome.

In 2022, 2,927 foreign citizens were examined for other imported parasitic infections. In 70 of them the following parasite species were found: *B. hominis* (n = 29), *G. intestinalis* (n = 30), *A. lumbricoides* (n = 6), *H. nana* (n = 6), *T. trichiuris* (n = 1), *E. vermicularis* (n = 1). No autochthonous secondary foci were established from the imported infections and all infected individuals were promptly treated.

DISCUSSION

In 2022, with the gradual abatement of the COVID-19 pandemic, a larger volume of medical parasitology activities were carried out in the country as compared to 2021. The number of examined persons was significantly higher (635,522 vs. 596,659 for 2021) and respectively the established prevalence of parasitic pathology for 2022 was 1.82% vs. 1.46% for 2021.

Cystic echinococcosis (CE) is a disease of great medical importance for Bulgaria. A study by Rainova et al. (2022), found an average incidence for the period 2011-2021 of 3.7 per 100,000 (3). In the recent years, the disease has shown a permanent downwards trend, both in absolute numbers of registered cases (192 in 2019, 95 in 2020, and 89 for each of 2021 and 2022), and as incidence (2.74; 1, 37; 1.29 and 1.3 per 100,000 for 2019, 2020, 2021 and 2022 respectively). All age groups were affected, with people between the ages of 30 and 49 years comprising up to 40% of all infected. Unfortunately, the relative share of children and adolescents with CE was high - 21.3%, which in our opinion necessitates an active information campaign among this contingent regarding prevention measures. The relative share of recurrences in 2022 (10%) is comparable to that in previous years (6.7% for 2021 and 9.5 for 2020), (4) which questions the correct application of anti-relapse drug prophylaxis after surgical or PAIR treatment.

Although Bulgaria, together with Croatia occupied leading positions in terms of incidence of trichinellosis among the EU member states in 2021 (5), of the

number of epidemic outbreaks, the number of registered cases and the incidence per 100,000 for 2022 give grounds for slight optimism (Table 1).

Based on many years of hard work, the cases of soil-transmitted helminth infections endemic in the country (ascariasis and trichuriasis) have been reduced to an extent that does not burden the health care system, and in both diseases, there is a decrease in the number of annually registered cases (6).

Sporadic cases of taeniasis caused by *Taenia saginata* have been established in Bulgaria for many years, while those caused by *Taenia solium* and cysticercosis were not been registered in the last five years (4, 6).

Of great medical importance for the country are the community-acquired parasitic diseases (enterobiasis, giardiasis and hymenolepiasis), as they most often affect children and adolescents. After 2018, a significant increase in enterobiasis cases was observed. While in 2017 the prevalence in the age group up to 19 years was 1.56%, it increased to 2.1%, 2.36%, 2.76%, 2.5% (6) and 2.45% for the five following years, respectively. These data reveal a poor level of hygiene and health education on the matter among the population. The other two infections (giardiasis and hymenolepiasis) have maintained relatively similar morbidity rates in the recent years.

Among the opportunistic parasitic infections, toxoplasmosis is the most widespread. The seroprevalence in the country in the recent years was relatively similar: 19.97% for the period 2015-2017 (7), 18% for 2018 (6) and 16.58% for 2022. Three cases of congenital toxoplasmosis have been reported in children up to 1 year old from Plovdiv region. These data show that the laboratory control of toxoplasmosis and the diagnostic algorithms applied in pregnant women are good, and although monitoring is not mandatory, result in few cases of congenital toxoplasmosis, and incidents during pregnancy.

Among opportunistic infections, blastocystosis is in second place with prevalence of 0.39%, and relatively constant distribution among the population in the recent years (0.17%, 2020 and 0.44%, 2021) (4).

Noteworthy, the introduction of PCR methods for detection of *Pneumocystis jirovecii* DNA in NCIPD, the diagnosis of human pneumocystosis has significantly improved, together with the possibility for timely

treatment and a favourable outcome of this life-threatening disease. In 2022, there were 10 patients with *Pneumocystis pneumonia*, as compared to 18 and 11 in 2020 and 2021.

Cryptosporidiosis is very rare in the country, and only one case of the disease was confirmed in the past year.

Regarding imported parasitic pathology, malaria is imported into the country every year. In 2022, five cases of imported malaria with the causative agent *P. falciparum* were registered. Unfortunately, one of the affected Bulgarian citizens, co-infected with SARS-CoV-2, had a fatal outcome due to serious complications that occurred during the treatment of the co-infection. For the period 2000 - 2020, a total of 232 cases of imported malaria were registered in Bulgaria. Of these, 34 (14.7%) developed complications, eight of which were fatal. All patients with complications and fatal outcomes had malaria caused by *P. falciparum*. In all but one of the deaths, the diagnosis was made more than three days after the first clinical manifestations (9).

The rest of the parasitic pathology imported into the country consists of protozoa and helminths affecting the gastrointestinal tract, which also have a local distribution. All were diagnosed in foreign citizens, most of them migrants, and importantly they were diagnosed and treated promptly and the occurrence of autochthonous secondary foci was not allowed.

CONCLUSION

Based on the data for 2022, although considerable number of parasitic diseases are registered in the country every year, none of them exerts serious pressure on the public health care system. With A permanent trend of reduction is observed for the two entities with most serious medical and social impact (cystic echinococcosis and trichinellosis). Never-the-less they require increased attention as our country is still the leader in terms of morbidity among the member states of the EU. Although the import of malaria in the country is low, the disease is still a problem in terms of health knowledge, timely diagnosis and treatment. The presence of illegal migrants, some of whom are parasite carriers, poses a risk of local epidemic outbreaks, not only from malaria but also from other imported pathologies

for which suitable climatic and fauna conditions exist. Therefore, the continuous improvement of the qualification of specialists working in the field of medical parasitology and large-scale health information campaigns among the risk contingents are extremely important.

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Disclosure of conflict of interest

There is no conflict of interest.

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