

PREVALENCE OF PARASITIC PATHOLOGY AMONG HUMANS IN BULGARIA: A RETROSPECTIVE COHORT STUDY OVER A TWO-YEAR PERIOD (2020 – 2021)

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ABSTRACT

The aim of this report is to review and assess the dynamics of parasitic diseases in Bulgaria during 2020-2021.

Materials and methods. The analysis is based on the annual reports of the Regional Health Inspectorates (RHIs) about the cases of registered parasitic diseases among humans in the country and on data from the National Reference Laboratory “Diagnosis of Parasitic Diseases” at the National Centre for Infectious and Parasitic Diseases (NCIPD), Sofia, for all examined cases.

Results. For the study period a total of 1,225,485 individuals were examined in the country’s parasitological laboratories at the Regional Health Inspectorates, stand-alone medical diagnostic laboratories and at the National Center for Infectious and Parasitic diseases (NCIPD), of whom 19,509 (1.59%) were diagnosed with a positive result for parasitic pathogens. Among the zoonotic helminth infections with local transmission, a special attention

deserve cystic echinococcosis and trichinellosis as the incidence of these parasitoses in Bulgaria is the highest among the European member states. The prevalence of ascariasis and trichuriasis in the country have been reduced to such an extent that they do not represent a public health danger any more. Data regarding community acquired giardiasis and hymenolepiasis can be interpreted in a similar way, while for enterobiasis, an increasing prevalence among both children and adults has been observed in recent years.

Although imported parasitic pathology is relatively limited in volume, Bulgarian climate and fauna are quite favorable for local transmission of a number of imported parasitic diseases. Control measures regarding this pathology consist in the timely detection and removal of infection sources.

Conclusion. In Bulgaria, there is a well-established system for surveillance and control of human parasitic diseases, which allows the acquisition of comprehensive information including patients demographic data and characteristics of the causative agents. This enables the monitoring of parasitic pathology among the population and an accurate assessment of the the endemic-related risks.

Key words: parasitic diseases; prevalence; surveillance; control

INTRODUCTION

Infections caused by various types of parasites are still a global health problem. Although parasitic diseases cause significant morbidity and mortality primarily in developing countries, cases are recorded in developed countries as well. Early diagnosis and treatment of infected individuals is critical not only to prevent individual morbidity and mortality, but also to reduce the risk of parasite distribution within the community (1).

A number of parasitic diseases have local distribution, and for some others imported cases are registered and conditions for their local endemic transmission are present in Bulgaria. In this regard, surveillance and control measures are of utmost importance in order to protect public health.

The aim of the present study is to perform an epidemiological analysis of infections with parasitic etiology among the Bulgarian population in and to

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assess the problem in the context of public health protection.

PATIENTS AND METHODS

Study design

This is a retrospective cross-sectional analysis of all registered cases of parasitic diseases in the country - local and imported, for a two-year period (2020 – 2021). The analysis was based on the annual reports of the Regional Health Inspectorates (RHIs) about the cases of registered parasitic diseases among humans and on data from the National Reference Laboratory “Diagnosis of Parasitic Diseases” at the National Centre for Infectious and Parasitic Diseases (NCIPD), Sofia, for all examined cases.

Ethical considerations

Only aggregated and depersonalized data for patients examined parasitologically for clinical, epidemiological and prophylactic indications were included in the study. In this regard, it was not necessary to obtain permission from the Institutional Ethics Committee.

RESULTS

For the study period 1,225,485 individuals were examined at the country’s parasitological laboratories (RHIs, stand-alone medical diagnostic laboratories and NCIPD), of which 19,509 (1.59%) were diagnosed with a positive result for various parasitic pathogens (Fig. 1).

PARASITIC DISEASES WITH LOCAL TRANSMISSION

Zoonotic diseases

Cystic echinococcosis and trichinellosis are medically and socially the most important zoonotic parasitoses registered annually in Bulgaria.

Cystic echinococcosis (CE)

In 2020-2021, a total of 184 patients with CE were registered (95 in 2020 and 89 in 2021), of whom 169 (92%) with primary and 15 (8%) - with recurrent CE (Fig.2). In our country the number of women diagnosed with CE usually slightly prevails that of men, as for the study period, i.e. 95 (52%) women vs. 89 (48%) men. The average incidence was 1.37‰ for 2020 and 1.29‰ for 2021. The latter incidence was the lowest recorded since the 1980s. Despite its significant reduction, the possibility of omissions in the registration of persons with CE is not excluded given the COVID-19 pandemic situation during the two years of the study.

The most affected age groups were 10-19 years with 32 patients (17.4%) and 30-39 years with 30 (16%) patients. The incidence among children and adolescents continued to be significant in 2020 and 2021. These data are an indicator of continued intensive transmission of the causative agent which would hardly be affected by short-term control measures. Among adults above 19 years of age, the highest number of patients was registered in the

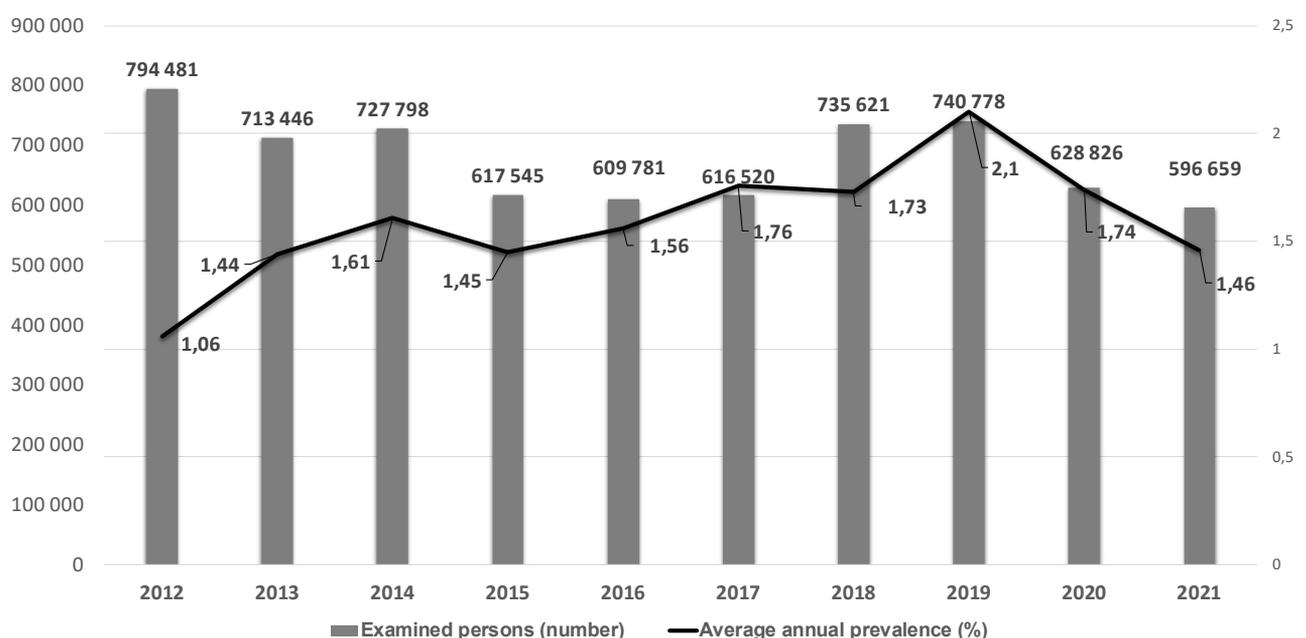


Figure 1. Total number of examined persons and average prevalence (in %) of parasitic infections among the population for the period 2012-2021

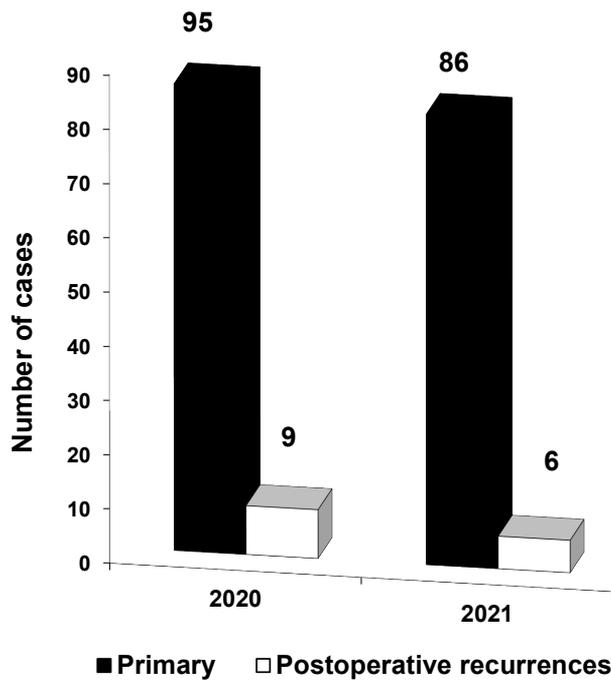


Figure 2. Primary cases and postoperative recurrences of CE (2020-2021)

group of active young people between 30 and 49 years – 58 (32%).

The rural population was not exposed to a greater infection risk as might be assumed based on the epidemiological features of the disease. A total of 93 (50.5%) patients with CE were city residents and 91 (49.5%) were residents of villages.

The annual incidence of CE in the different regions of the country varied widely, and the territorial distribution of cases was uneven. In 2020 and 2021, the highest morbidity was registered in the districts of Sliven - 5.70‰, Kardzhali - 5.32‰ and Yambol

- 4.30‰. In the regions of Veliko Tarnovo, Vidin, Ruse and Pernik, there were no recorded cases of CE during the study period.

Liver localization of hydatid cysts prevailed both among primary and recurrent cases. Liver involvement was found in 131 patients (71.2%), 41 (22.3%) had pulmonary CE, 4 (2.2%) were with multiple CE, 2 patients had splenic cysts (1.0%), and cysts with another localization were proven in 6 of the patients (3.3%).

Trichinellosis

In the last 2 years, 5 epidemic outbreaks were registered in Bulgaria (2 in 2020 and 3 in 2021) with 35 infected persons, of whom 34 were clinically manifested and one was asymptomatic. In 2020, the sources of *Trichinella*-infected meat were domestic pigs, and in 2021 - wild boars. In two of the outbreaks, the species of the causative agent was determined at NCIPD as *T. britovi*. In 2020, 3 sporadic cases were also recorded in each of the regions of Vratsa, Kardjali and Plovdiv with wild boar source meat. The affected by trichinellosis were 26 males and 12 females. The average incidence of trichinellosis for the two studied years was 0.28‰ (2020 - 0.18‰, 2021 - 0.37‰) (Fig. 3).

Two outbreaks were reported from Blagoevgrad region, one in 2020 in the village of Rupite, district of Petrich with four patients, and the other in 2021, in the village of Brezhani, district of Simitli with 14 infected persons. In Sofia, one outbreak was recorded in 2020 with six affected persons. During

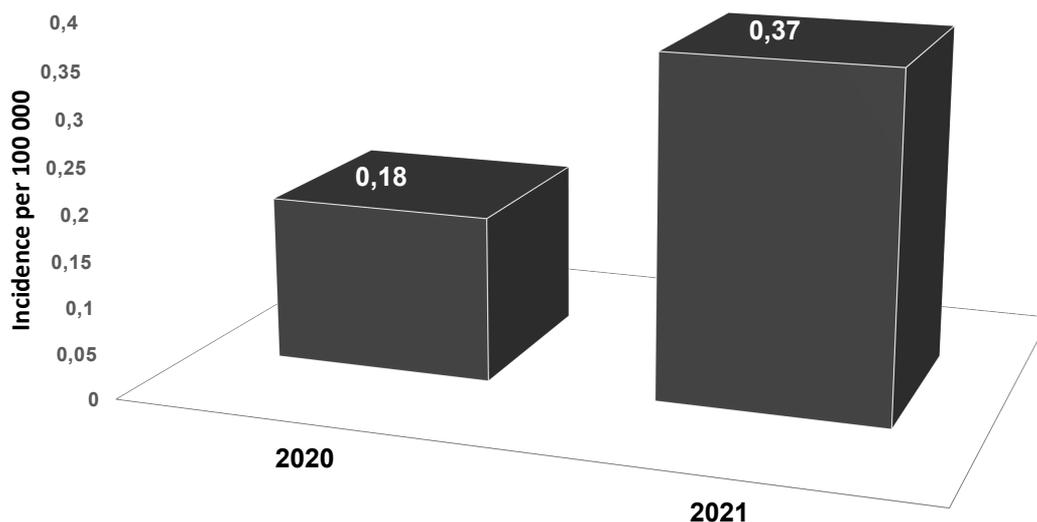


Figure 3. Incidence of trichinellosis for the period 2020-2021.

2021 an epidemic outbreak was reported at Sestrimo village in the region of Pazardzhik with 9 clinically and laboratory proven cases, and one in the region of Burgas at Kosti village with two infected persons. AS compared to the years before the COVID-19 pandemic, fewer outbreaks (5 in total) and infected persons (38) were recorded in 2020 and 2021. The sources of *Trichinella*-contaminated meat and meat products during the two years of the study were different - domestic pigs in 2020 and wild boars in 2021, indicating that the measures regarding private animal husbandry and wild animals hunting should be strengthened. The EU regulation № 2015/137527 stating that all animals intended for human consumption and susceptible to *Trichinella spp.* must be examined by the enzymatic method for presence of parasitic larvae is not strictly followed. Human factor is extremely important for transmission of trichinellosis. Wild carnivores actively participate in the sylvatic cycle of its circulation in the environment. Hunters, leaving carcasses of shot wild canids without burying or burning them, contribute to the maintenance of the epizootic cycle among feral pigs (who are omnivores). It is also important to carry out health promotion activities, especially during the pre-epidemic season.

Taeniasis

Cases of taeniarhynchosis were registered mainly in the districts of Shumen and Sofia-capital. Single cases of this parasitic disease were found in other regions

of the country, also. No change was observed in the dynamics of morbidity. The number of registered cases remained at the same level. A total of 16 cases of taeniarhynchosis were registered in 2020 and 2021, (2020 – 7, 2021 – 9) and the average incidence for the period was 0.11‰ (2020 - 0.1‰, 2021 – 0.13‰). In Shumen region, 6 persons with taeniarhynchosis were reported (average incidence rate for the period of 1.745‰), in the capital of Sofia – 4 (incidence rate of 0.15‰), in Varna region – 2 (incidence rate of 0.43‰). A single case was registered in each of the districts of Kardzhali, Razgrad, Gabrovo and Pazardzhik. For each registered case of taeniarhynchosis, an epidemiological survey was conducted and epidemiological survey cards were filled out. All patients underwent etiologic treatment until negative control samples were obtained. In the last two years, no cases of pork tapeworm disease were reported in the country, but patients with cysticercosis were sporadically diagnosed.

Soil transmitted helminthiasis (STHs)

Two nosological units from this group are locally transmitted in the country - ascariasis and trichocephaliasis.

A contingent of 866,658 individuals (2020 – 505,889, 2021 – 360,769) was subjected to morphological studies for ascariasis and trichocephaliasis during the study period. A total of 953 persons were diagnosed with ascariasis (2020 - 446, 2021 - 507) and 93 persons - with trichocephaliasis (2020 - 34, 2021 -

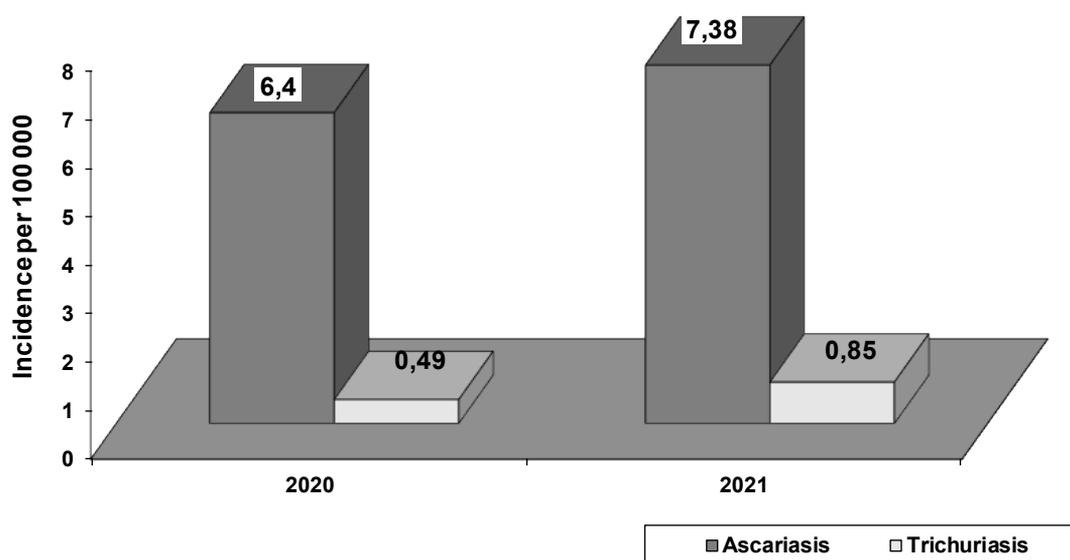


Figure 4. Dynamics of STHs for the period 2020-2021 (nuber of cases per 100,000)

59). The average incidence of ascariasis during the study period was 6.9‰ and of trichocephaliasis - (0.67‰ Fig. 4).

In 2021, a significantly smaller contingent was examined as compared to 2020, but the number of infected persons was higher. There are established endemic areas for ascariasis and trichocephaliasis in the country, which are reported by the parasitological structures at the RHI. In 6 country regions 159 endemic settlements were observed for STHs in 2020, and in 2021 - 153 settlements. A total of 57 (2020 - 30, 2021 - 27) settlements were covered with prophylactic examinations for the period and 11,334 (2020 - 4619, 2021 - 6715) persons were examined, of whom 63 (0.6%) (2020 - 23, 2021 - 40) were diagnosed with ascariasis. Etiological treatment was carried out for all infected persons, and the follow-up examinations proved a 100% effectiveness of the applied treatment. Most cases of ascariasis were recorded in the regions of Kardzhali, Blagoevgrad and Gabrovo, and of trichocephaliasis - in the regions of Varna, Sliven, Burgas and Yambol. It should be emphasized that a large share of those diagnosed with trichocephaliasis were residents of social institutions (homes for children deprived of parental care and homes for mentally retarded). In both 2020 and 2021, a 30% smaller contingent was covered with morphological studies for STHs than in the previous years. This fact could be explained by the COVID-19 pandemic situation despite the

commitment of the entire available staff of the RHI to implement all control activities and anti-epidemic measures.

Toxocariasis

Toxocariasis is not subjected to mandatory notification, therefore prevalence data for our country are incomplete. Diagnosis of this zoonotic helminthiasis is carried out by serological methods, and in spite of increasing number of tests every next year, it is restricted to some of the major regions of the country: Sofia, Varna, Plovdiv, Pleven and Targovishte. For the period 2020-2021, a total of 1,705 persons suspected for toxocariasis were examined by ELISA, of whom 304 (18%) were positive. the seropositivity observed in the previous years ranged between 16 and 20%. This trend is likely to continue in the forthcoming years, as it is necessary to examine a larger number of children and people of lower socio-economic class.

COMMUNITY ACQUIRED PARASITIC DISEASES

Enterobiasis

It continues to be the most common community acquired parasitic disease, of particular importance for organized children’s groups. During the period, a contingent of 652,352 (2020 - 286,447, 2021 - 365,905) was examined and a significant number of positive persons were identified - 9,903 (2020 - 4,407, 2021 - 5,496). The trend of rising prevalence, which started after 2012, has persisted in the last two

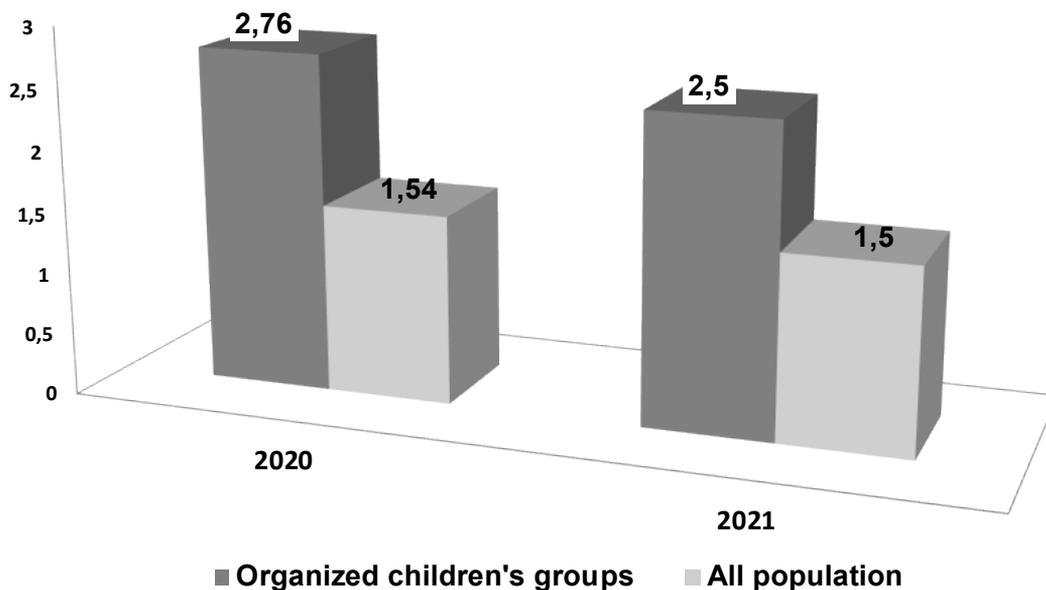


Figure 5. Prevalence of enterobiasis for the country and among children’s groups (2020-2021)

years, with values recorded in 2020 and 2021 being 1.54% each (Fig. 5).

The average prevalence in the different regions of the country varies significantly: from 5.25% for Yambol to 0.7% for Plovdiv. The regions with prevalence higher than the average for the country were as follows: Sliven - 4.5%, Ruse - 3.7%, Varna - 3%, Burgas - 2.6%. Lower prevalence was found in the regions of Lovech - 0.4%, Stara Zagora - 0.5%, Sofia city and Sofia region - 0.9% each.

From an epidemiological point of view, enterobiasis in children's institutions is the most important parasitic disease in the country. A total of 150,526 (2020 - 71,251, 2021 - 79,275) children from various types of day care facilities were tested and those positive for enterobiasis were: 1968 in 2020 and 2013 in 2021 (total 3981). The number of children examined during the two years of the SARS CoV 2 pandemic was significantly lower than that in 2019, when a contingent of 163,879 children was covered with prophylactic examinations. The average extent of enterobiasis in children from organized childcare groups for the study period was 2.63% (2020 - 2.76%, 2021 2.5%). For comparison, in 2012, the average prevalence among children from day care facilities was 0.9%. Data show that by 2020, this number among children has risen about 2.5 times. Higher than the average prevalence for the period was found in the districts of Yambol - 6.1% and Sliven - 4.7%.

The reasons for the recently increased prevalence of enterobiasis among children and among the entire population, are probably complex and include both, poorly developed hygiene habits of children and lack of etiological drugs in the country's pharmaceutical network. In 2021, enterobiasis prevalence showed no dynamics and it is possible that this trend will continue in the coming years.

Giardiasis (Lambiosis)

The average incidence of giardiasis for the two years of the study was 7‰ (2020 - 7.19‰, 2021 - 6.8‰) in a total of 571,948 examined persons (2020 - 303,575, 2021 - 268,373). A total of 1081 cases of giardiasis were reported for the country (2020 - 490, 2021 - 591) and it is striking that in more than 10 regions during the study period not a single case of giardiasis was detected. The average morbidity

is reported by the regions of Yambol - 63.2‰ and Sliven 40.1‰. 121,881 (2020 - 42,703, 2021 - 79,178). Children from various types of childcare facilities were covered by tests, and 0.37% of them were found to be infected in both years of the survey. The largest number was registered in the age group 0 - 9 years - a total of 653 (2020 - 356, 2021 - 297). In the coming years, giardiasis will retain its health and social importance with probably about 600 cases annually which means that a better collaboration between preventive and clinical medicine specialists is needed.

Hymenolepiasis

The prevalence of hymenolepiasis did not show deviations in the last two years and remained at 0.03% (between 80 and 100 cases per year). Although hymenolepiasis is considered to be widespread,, not a single case was registered in in 2021 in 22 regions of the country. Against this background, a relatively high prevalence was established in the regions of Yambol - 1% and Sliven - 0.3%.

The problems with hymenolepiasis are a result of the more difficult diagnosis, and the lack of highly effective anthelmintic drugs in the country, which is a prerequisite for occurrence of relapses and steady prevalence.

Urogenital trichomoniasis

Diagnosed cases of urogenital trichomoniasis are relatively few, but for the last two years the number of those tested positive, is increasing. The total number of examined individuals was 7324 (2020 - 3016, 2021 - 4308 and the number of positive ones was 877 (12%) (2020 - 243, 2021 - 634).

Laboratory tests for urogenital trichomoniasis are carried out only in Gabrovo, Sofia-city, Ruse, and Varna.

Urogenital trichomoniasis should be a subject of routine diagnosis in the parasitological laboratories and they should be preferred when referring patients for etiological diagnosis. This will allow improved registration and clarification of its real prevalence.

OPPORTUNISTIC PARASITIC DISEASES

The trend of insufficient awareness of parasitologists and other medical specialists of opportunistic parasitic

infections, with the exception of toxoplasmosis, persisted during the study period.

Toxoplasmosis

In the country, a significant contingent of 19,724 persons (2020–9521, 2021–10204) was examined for toxoplasmosis, mainly according to clinical indications. The average seropositivity for the period was 15.02% (2020 - 15.37%, 2021 - 14.67%). Serological tests for specific IgG, IgM and IgA antibodies are mainly carried out in private laboratories and at NCIPD, using sensitive and specific tests based on ELISA and ECLIA methods. The avidity of anti-toxoplasma IgG antibodies is also studied at NCIPD and some other laboratories, It allows to determine more accurately the time of infection which is important for pregnant women with evidence of recently acquired infection. In 2020, 5 babies under 1 year of age (4 girls and 1 boy) were diagnosed with congenital toxoplasmosis, which is a subject of mandatory notification and registration, according to Ordinance No. 21 of the Ministry of Health of 2005. No cases of congenital toxoplasmosis were reported in 2021.

Cryptosporidiosis

Laboratory tests of cryptosporidiosis are still few - 19 (2020) and 218 (2021) and they are carried out only in some parasitological laboratories in the regions of Varna, Plovdiv and Sofia - city (mainly at NCIPD - 198 examined for 2021). Five individuals were diagnosed with coccidiosis, of whom one was HIV- positive. Having in mind that cryptosporidiosis is a subject of mandatory notification and registration according to Ordinance 21 of the Ministry of Health (2005), it is necessary to increase the awareness of health-care providers of this infection in case of enterocolitis and especially - in immunocompromised patients. In addition to microscopic staining diagnostic methods, immunochromatographic rapid tests are now available which helps to improve laboratory diagnostics.

Visceral leishmaniasis

During the studied period only two cases of local visceral leishmaniasis were registered in the country (one each in 2020 and 2021). In 2020, an 8-year-old child from the city of Sofia became ill, and in 2021, a 63-year-old man from the village of Klyuch in the

region of Blagoevgrad, was the infected person who was also co-infected with COVID-19.

Single cases of visceral leishmaniasis have been reported over the past 4 years, with data suggesting that the disease affects more often adults than children.

Pneumocystosis

Tests for pneumocystosis are limited and are performed in few laboratories (Varna, Plovdiv and Sofia-city). In Sofia, laboratory examination is carried out at NCIPD where both staining microscopic methods and RT-PCR methods are applied. During the study period, a total of 113 patients with suspected pneumocystis pneumonia were examined (2020 – 36, 2021 – 77), of whom 29 (26%) had a positive result (2020 – 18, 2021 – 11). The introduction of molecular-biological diagnostic methods significantly increased the establishment of the etiological diagnosis, thereby clarifying its actual spread.

Blastocystosis

The number of people examined for this parasite is increasing every year. In 2020, out of 309,690 investigated 515 revealed a positive result, and in 2021 – among 360,524 examined 1,596 were diagnosed with blastocystosis. The prevalence was respectively : 0.17% (2020) and 0.44% (2021).

IMPORTED PARASITIC DISEASES

During the study period, the influx of refugees decreased, but did not disappear, and meanwhile the global COVID-19 pandemic occurred. Travel to and from our country was significantly limited, but never-the-less many Bulgarian citizens visited tropical destinations. Ordinance No. 17 of 2008 of the Ministry of Health regulates the procedures for diagnosis, prevention and control of imported parasitic diseases, The relevant tests were carried out most often for foreign citizens, the majority of them - refugees. In 2020, 2,271 persons were examined, of whom 36 were Bulgarian citizens and 2,235 - foreigners. A total of 85 persons (3.74%) were diagnosed. In 2021, the number of examined was 5,912, with 57 Bulgarians and 5,855 foreigners, of whom 142 (2.4%) were diagnosed with parasitic infection (5 Bulgarians and 137 foreigners).

Malaria

As one of the most severe tropical infections, especially in non-immune population, malaria remains a life-threatening disease, especially if diagnosis and treatment are delayed. In the last two years, a total of 6,180 persons were examined for malaria (2020 – 1,609, 2021 – 4,571), of whom 60 were Bulgarian citizens and 6,120 - foreigners. Malaria was diagnosed in 14 persons (2020 – 5, 2021 – 9). Among the examined individuals 6,083 were tested because of prophylactic reasons and 97 by clinical indications.

The causative agents established were *P. falciparum* in 13 of the patients and *P. vivax* in one of them. Eleven of the infected were Bulgarian citizens and three were foreign citizens. In 2021, for two of the Bulgarian citizens with tropical malaria (Varna and Silistra) there was a fatal outcome, most likely due to delayed seek of medical help.

The trend of predominant importation of malaria from the African continent continued during the study period. Imported malaria was recorded in 11 countries during the last two years. Most patients were infected while staying in Nigeria, Sudan and Cameroon. Most cases were registered and treated in Sofia (7) and Plovdiv (3).

The fact that 64% of patients with imported malaria were registered during the potential malaria season (April-October) in our country deserves attention. It indicates a certain, albeit small, risk of recovery of the local transmission of infection in case of delayed diagnosis, etiological therapy and anti-epidemic measures. The lack of medications for treatment of tropical malaria in the pharmaceutical network further complicates the situation.

Other imported parasitic diseases

During prophylactic examinations for intestinal parasites of foreign citizens (refugees), 219 infected persons (2020 – 80, 2021 – 139) were found out of 2,755 tested (8%) during the two years of the study. Through microscopic studies, 9 types of parasites were diagnosed: *B. hominis*, *G. intestinalis*, *A. lumbricoides*, *H. nana*, *T. trichiuris*, *A. duodenale*, *E. coli*, *Iodamoeba buetschlii*, *E. vermicularis*. No autochthonous secondary outbreaks were registered, and those infected were promptly treated.

Although infected persons arriving from countries endemic for parasitic diseases were less than 10%, a strict supervision of the imported diseases is necessary along with maintenance of a constant awareness and readiness to carry out adequate anti-epidemic measures for prevention of local spread. To this end, general practitioners should be well acquainted with importable parasitic diseases with a special focus on malaria, and a high proficiency level should be maintained in the specialized parasitological network to provide early diagnosis, adequate therapy and timely anti-epidemic measures, along with health-promotional activities among travelers to tropical destinations.

DISCUSSION

Control of parasitic diseases in humans has been carried out since the etiology and natural history of these infections were recognized and their harmful effects on human health and welfare were appreciated by policy makers, medical practitioners and public health professionals. While some parasitic infections such as malaria remain difficult to overcome, others, as helminth infections in particular, can be effectively controlled (2).

In Bulgaria, there is a well-established system for surveillance and control of human parasitic diseases which enables the acquisition of comprehensive information including demographic data of the diagnosed persons and type of causative agents. This enables the monitoring of parasitic pathology among the population and assessing the risk related to the endemic process with high accuracy.

A certain decrease in the number of persons covered by parasitological examinations was observed for the period (2020 - 2021) as compared to previous years, but without any significant dynamics of the average prevalence during the last ten years (Fig. 1).

Among the zoonotic helminth infections with local transmission, a special attention should be paid to CE and trichinellosis, whose incidence in Bulgaria ranks first among the other member countries of the European Union (3, 4). According to the European Center for Disease Control (ECDC), for 2021, 283 confirmed cases of CE were registered in the EU countries, of which 89 (31.4%) were from Bulgaria (5). Our country is also first in terms of incidence

per 100,000 (1.29), though during the last 10 years, a permanent downward trend has been observed, both in the number of registered cases per year (from 320 cases in 2012 to 89 in 2021), and in the incidence rate (4.37 per 100,000 for 2012 and 1.29 per 100,000 for 2021). In the case of trichinellosis, no significant dynamics was found regarding the recorded cases per year, which fluctuated from 60 (2014) to 13 (2020).

STHs are among the most widespread parasitic diseases on a global scale. Improvements in the living conditions, availability of treatment, targeted control and health education programs have led to their nearly full elimination in Western Europe. Today, ascariasis and trichocephaliasis occur mainly among marginalized populations and in the poorer countries of Eastern and Central Europe, where the environmental and socioeconomic conditions facilitate their transmission (6). Data from the current study, along with previous ones, give us the reason to believe that the prevalence of ascariasis and trichocephaliasis is reduced to the extent that nowadays they do not represent a danger for the public health in Bulgaria (4, 7). Data regarding community acquired parasitic diseases as giardiasis and hymenolepiasis, could be interpreted in the same way, while in the case of enterobiasis, a trend of increased prevalence among both children and adults has been observed in the recent years, which, in our opinion, is due to an insufficient health education, shortcomings in the treatment of infected persons and neglect of the problem by some medical professionals (8).

Imported parasitic pathology was relatively limited in volume. However, favorable climate and fauna conditions for occurrence of a local transmission exist in Bulgaria, that may facilitate the import and distribution of a number of parasitic diseases. Control measures regarding this pathology are related to the timely detection and removal of the source of infection. In Bulgaria, there is an algorithm for diagnosis, hospitalization, treatment, prevention and control of imported parasitic diseases, but it is difficult to be applied to illegal migrants. Possible gaps in the system of surveillance and control of imported parasitic diseases are a prerequisite for reestablishment of already eradicated parasitic diseases, such as malaria, and for emergence

of diseases that have not been endemic in the country. The strict implementation of the individual components of epidemiological surveillance of local and imported parasitic diseases requires active participation of the specialists from the specialized parasitological network and effective organizational and methodological work with professionals working in the pre-hospital and hospital care systems, for a better awareness of the diagnostic and therapeutic measures needed to decrease parasitic morbidity.

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DISCLOSURE OF CONFLICT OF INTEREST

There is no conflict of interest.

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