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EPIDEMIOLOGICAL CHARACTERISTICS OF GIARDIASIS IN THE AREA OF BELGRADE DURING THE PERIOD FROM 2007 TO 2020

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The aim of this paper was to analyze the epidemiological characteristics of Giardiasis around Belgrade from 2007 to 2020. A descriptive epidemiological study was applied. In the observed period, 265 new cases of giardiasis were registered in Belgrade, the average raw incidence was 18.92/100,000. Men (56%) were more likely to develop giardiasis than women (44%). Highest age-specific incidence rate was at the age of 2 years (10.3/100,000). The largest number of patients was registered in municipality Savski venac 106 (40%). Seasonal distribution indicates that the largest number of patients was registered in September and October. The epidemiological situation in Belgrade in the observed period shows a declining tendency of the number of patients and the incidence rate, which is most likely the result of improved hygienic and sanitary living conditions. *Acta Medica Medianae 2023;62(2): 31-37.*

Key words: *giardiasis, protozoa, diarrhea, hygiene*

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Introduction

Giardiasis is an infection mainly of the upper part of the small intestine caused by the flagellar protozoan Giardia Lamblia. Although in about 50% of cases the infection is asymptomatic, it can be accompanied by various intestinal symptoms, such as chronic diarrhea, steatorrhea, abdominal cramps, bloating, frequent soft and light fatty stools, fatigue, and weight loss. Fat absorption or liposoluble vitamins may occur. Extraintestinal invasion does not usually occur, but reactive arthritis can occur, and severe lambliasis can damage the duodenal and jejunal mucosa (1, 2). Giardia Lamblia protozoan infection is also associated with the development of nervous bowel syndrome and chronic fatigue (3).

Confirmed cases of giardiasis are defined as cases that meet the clinical description and criteria for laboratory confirmation (4). Laboratory diagnosis of Giardia mainly made by microscopic identification of cysts or trophozoites in stool samples, but several immunological tests and molecular methods are available for the diagnosis of giardiasis (5).

According to the latest data from WHO G: Lamblia is the third most common cause of diarrheal diseases worldwide with over 300 million cases per year, preceded only by rotavirus, Cryptosporidium parvum and hominis in the most vulnerable target group of children under five (3). The infection rate in asymptomatic children is 8−30% in developing countries and 1−8% in industrialized regions (5). The prevalence of Giardiasis in different regions ranges from 2−3% in industrialized regions to 30% in low-income and developing countries. Since 2004, Giardia has been classified as a „neglected disease initiative" by the WHO and is directly linked to poverty and poor drinking water quality (3).

Reservoir is human, possibly beavers and other wild and domestic animals. The infection is transmitted from person to person, cysts from the feces of the infected are transmitted through the hands to the mouth, especially in institutions and Children Care Facilities, which is probably the main way of spreading.

Localized epidemics can occur by ingesting cysts through fecal contaminated water, and much less frequently through fecal contaminated food. Sources of infection are unfiltered water from streams and lakes, which are accessible to fecal water contamination (1).

Infection is often self-healing, lasting an average of 3 to 25 days. People with AIDS can

have a much more severe and long-lasting infection. The period of infection can often last for months. Giardiasis is treated with antibiotics; the drug of choice is Metronidazole. The key preventive measures of giardiasis are: 1) education of family, staff and members of institutions, especially adults in children's institutions, on the implementation of personal hygiene and the need to wash hands before starting work with food, before meals and after using toilets; 2) filtration of city water sources that are exposed to human or animal feces contamination; 3) protection of water sources from fecal contamination; 4) hygienic method of fecal disposition (1).

The aim of this paper was to analyze the epidemiological characteristics of giardiasis around Belgrade during the period from 2007 to 2020.

Material and Methods

A descriptive epidemiological study was applied. For the analysis of epidemiological characteristics of lambliasis around Belgrade, data were collected from: reports of infectious diseases, surveys of patients, medical documentation, results of epidemiological and laboratory tests, annual reports on the movement of infectious diseases around Belgrade. The data of average raw incidence of giardiasis in the Republic of Serbia during the observed period were taken from the annual reports of infectious diseases in the Republic of Serbia.

As we used published official data, the permission of the Ethics Committee was not required.

Link:
https://www.batut.org.rs/download/izvestaji/Godisnji%20izvestaj%20o%20zaraznim%20bolestima%202019.pdf

Link:
https://www.zdravlje.org.rs/index.php/izvestaji/centar-za-kontrolu-i-prevenciju-bolesti

Statistical analysis

Proportions, raw and age-specific incidence rates were used in the data analysis. To calculate the incidence rates, the number of new cases of giardiasis for the observed year was used as a counter, and the number of Belgrade residents according to the 2011 census data was used as a denominator. Statistical data processing was done using the Microsoft Office Excel 2007 program.

Results

During the period from 2007 to 2020, 265 new cases of giardiasis were registered in Belgrade, and the average raw incidence was 18.92/100,000. The highest number of new cases (32) and the highest raw incidence rate (2.00/100,000) of giardiasis were registered in 2007, and the lowest number of patients (4) and the lowest raw incidence rate (0.24/100,000) were registered in 2020. The highest age-specific incidence rate of giardiasis was recorded at the age of 2 years (10.3/100,000), and the lowest at the oldest age (60 to 69 and 70 and more years) (0.1/100,000) (Table 1). The distribution in relation to gender indicates that 117 females became ill, which makes 44% and 148 males, that is 56% of all patients. The proportion of affected women to the number of men is 1:1.3, from which it can be concluded that in the observed period, men were more likely to get sick than women (Figure 1).

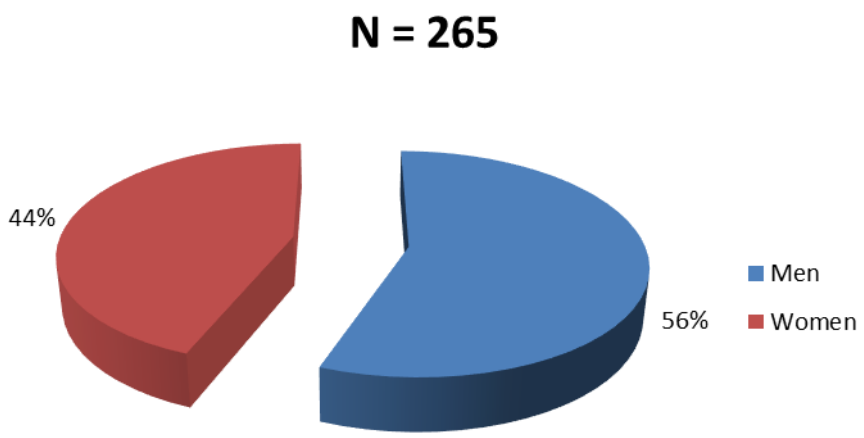

Figure 1. Distribution of new cases of giardiasis by gender, Belgrade, 2007–2020

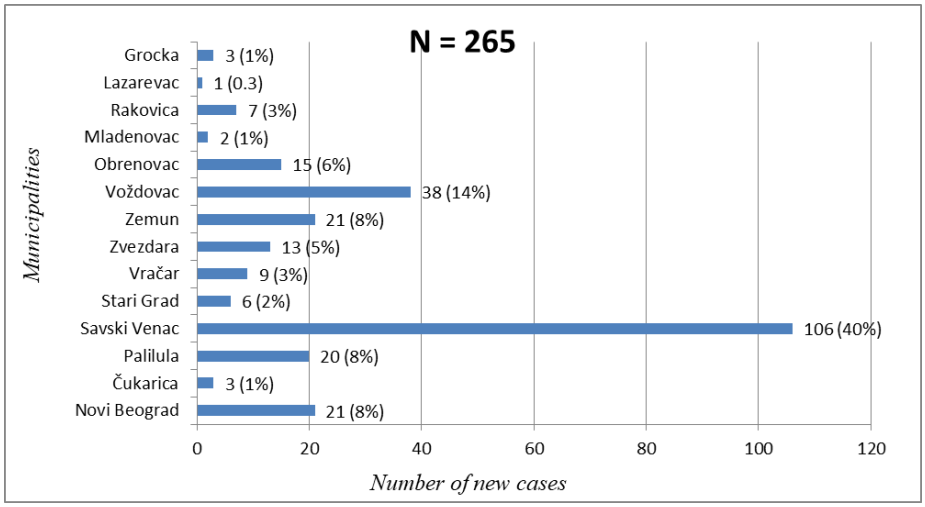

Figure 2. Distribution of new cases of giardiasis by municipalities, Belgrade, 2007–2020

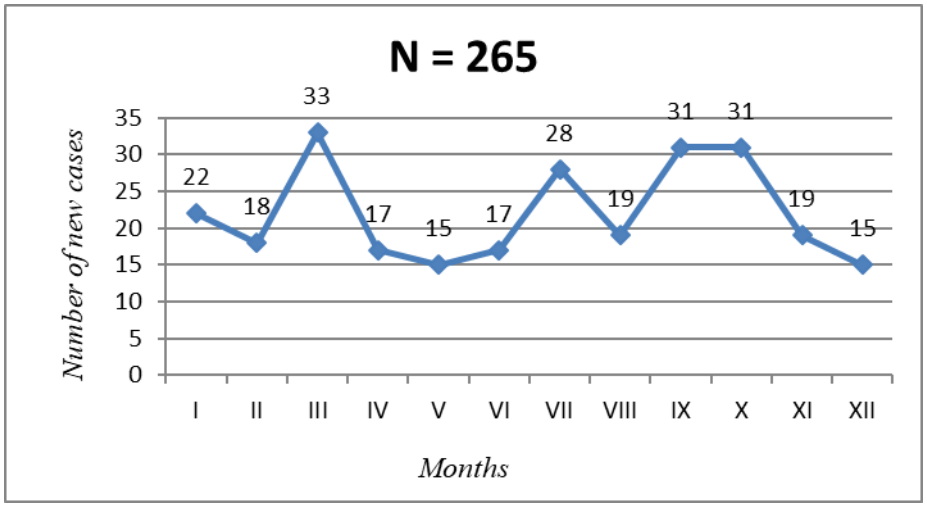

Figure 3. Distribution of new cases of giardiasis by months, Belgrade, 2007–2020

The highest number of patients was registered in the municipalities of Savski venac 106 (40%) and Voždovac 38 (14%), and the lowest in the municipalities of Lazarevac 1 (0.3%), Mladenovac 2 (1%), Grocka 3 (1%) and Čukarica 3 (1%). There were no registered cases of giardiasis in other Belgrade municipalities (Figure 2). Giardiasis is registered throughout the year with seasonal increases in summer and early autumn. The largest number of patients was registered in September and October. In that period, 62 patients (23.39%) became ill, and the lowest number of patients, 15 (5.6%), was registered in May and December (Figure 3).

Discussion

According to the results of our study, in the period from 2007 to 2020, 265 new cases of Giardiasis were registered in Belgrade, and the average raw incidence rate of giardiasis during the observed period ranged from 2.0/100,000 to 0.24/100,000 inhabitants (6). In Serbia, in the period from 2011 to 2017, the average raw incidence rate was from 1.77/100,000 to 1.29/100,000 inhabitants (7, 8). In the same period, in the Europe Union (EU), the average raw incidence of giardiasis ranged from 5.49/100,000 to 5.5/100,000, and in the United States (US) from 6.4/100,000 to 6.0/100,000 (9–12). In Belgrade, the number of people suffering from giardiasis was 1.3 times higher among men than women. As in our study, in EU countries, in 2016, the number of giardiasis patients was 1.3 times higher in men than in women (13). Observing the incidence of giardiasis by age groups in Belgrade, it was noticed that the age-specific rate of giardiasis was highest in the age group of 2 years (10.3/100,000),

Table 1. *Number of new cases and age-specific incidence rates (per 100,000) for giardiasis, Belgrade, 2007–2020*

(Age groups) (Year)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2007-2020
<1 *No (Rate*)*	0	0	1(5.8)	0	0	0	0	0	0	0	1(5.8)	0	0	0	2(0.8)
1 *No (Rate*)*	0	1(5.8)	0	0	2(11.6)	1(5.8)	0	0	3(17.4)	1(5.8)	0	0	1(5.8)	0	9(3.7)
2 *No (Rate*)*	1(6.0)	0	1(6.0)	0	1(6.0)	0	1(6.0)	4(24.2)	3(18.1)	6(36.3)	4(24.2)	2(12.1)	0	0	24(10.3)
3 *No (Rate*)*	0	1(6.2)	0	0	1(6.2)	3(18.8)	1(6.2)	4(25.1)	1(6.2)	1(6.2)	5(31.3)	3(18.8)	1(6.2)	0	21(9.4)
4 *No (Rate*)*	3(19.3)	0	3(19.3)	0	1(6.4)	0	1(6.4)	1(6.4)	2(12.8)	3(19.3)	2(12.8)	0	0	1(6.4)	17(7.8)
5 *No (Rate*)*	2(12.9)	0	1(6.4)	0	1(6.4)	2(12.9)	0	1(6.4)	0	1(6.4)	0	0	0	1(6.4)	9(4.1)
6 *No (Rate*)*	0	0	0	0	0	2(12.9)	2(12.9)	2(12.9)	3(19.3)	1(6.4)	0	0	0	0	11(5.0)
7-9 *No (Rate*)*	0	0	0	1(2.1)	0	5(10.7)	1(2.1)	1(2.1)	2(4.3)	2(4.3)	1(2.1)	0	0	0	13(2.0)
10-14 *No (Rate*)*	2(2.7)	1(1.3)	0	1(1.3)	0	1(1.3)	2(2.3)	0	3(4.0)	0	0	0	0	1(1.3)	11(1.0)
15-19 *No (Rate*)*	0	1(1.1)	0	3(3.5)	2(2.3)	1(1.1)	2(2.3)	1(1.1)	1(1.1)	0	1(1.1)	0	1(1.1)	0	13(1.0)
20-29 *No (Rate*)*	17(7.6)	13(5.8)	8(3.5)	4(1.7)	1(0.44)	3(1.3)	4(1.7)	2(0.89)	2(0.89)	3(1.3)	3(1.3)	1(0.44)	3(1.3)	0	64(2.0)
30-39 *No (Rate*)*	3(1.1)	7(2.7)	1(0.3)	1(0.3)	1(0.3)	2(0.7)	4(1.5)	2(0.7)	0	1(0.3)	2(0.7)	1(0.3)	1(0.3)	0	26(0.7)
40-49 *No (Rate*)*	3(1.3)	1(0.4)	2(0.9)	1(0.4)	1(0.4)	1(0.4)	1(0.4)		3(1.3)	2(0.9)	5(2.2)	1(0.4)	1(0.4)	1(0.4)	23(0.7)
50-59 *No (Rate*)*	1(0.4)	0	2(0.8)	2(0.8)	1(0.4)	0	3(1.2)	0	0	4(1.6)	0	2(0.8)	0	0	15(0.4)
60-69 *No (Rate*)*	0	1(0.5)	0	1(0.5)	1(0.5)	0	1(0.5)	0	0	0	0	0	0	0	4(0.1)
70+ *No (Rate*)*	0	0	0	0	0	1(0.5)	0	2(1.0)	0	0	0	0	0	0	3(0.1)
(Total)	32(2.0)	26(1.63)	19(1.19)	14(0.88)	13(0.81)	22(1.33)	23(1.37)	20(1.21)	23(1.39)	25(1.51)	24(1.45)	11(0.66)	9(0.54)	4(0.24)	265(1.1)

followed by the age group of 3 (9.4/100,000) and 4 (7.8/100,000) years, and the lowest in persons aged 60 and over (0.1/100,000). Epidemiological research conducted in the European Union in 2016 indicated that the age-specific incidence rate of giardiasis was highest in the age group of 1 to 4 years (19.4/100,000), and lowest in people aged 65 and over (3.3/100,000), like the results of our study (13).

The highest percentage of giardiasis patients in Belgrade was registered in the municipalities of Savski venac 106 (44%), Voždovac 38 (14%), Novi Beograd and Zemun 21 (8%), and the lowest in the municipalities of Lazarevac and Mladenovac 1 (0.3%), Grocka and Čukarica 2 (1%). While in the municipalities of Barajevo, Sopot and Surčin, no disease was registered. Giardiasis was registered throughout the year with seasonal increases in late summer and early autumn. The highest number of patients was registered in September and October 62 (23.39%), with the appearance of a smaller peak in March 33 (12.45%), and the lowest in May and December 15 (5.66%). A similar situation was observed in 2017 in EU countries where giardiasis is registered throughout the year, with a peak in September and a smaller peak in March (10). The seasonal trend is pronounced in the United States, the number of patients increased in the summer and autumn months (from June to October), with a peak in August (14). According to the Atlanta Centers for Disease Control in the United States, giardiasis is the most common intestinal parasitic disease with over a million cases per year (15). During 2012–2017.year, public health officials from 26 countries reported 111 giardiasis epidemics (760 cases) to the National Epidemic Reporting System (NORS). Three main ways of spreading the infection have been identified: exposure to water in 29 (26%) epidemics, person-to-person contact in 28 (25%) epidemics, and contaminated food in 6 (5%) epidemics. In 48 (43%) epidemics, the route of transmission was not determined. Private homes and childcare facilities have been the most common outbreak locations for all modes of transmission (2). In comparison, in our study no epidemic of giardiasis was registered around Belgrade in the observed period from 2007 to 2020.

Conclusion

During the study period from 2007 to 2020, 265 new cases of giardiasis were registered on the territory of Belgrade. The largest number of new patients was recorded at the beginning of the study in 2007, and the smallest in the last year of the study in 2020. Among the patients, there were more males, aged 2 years old. On the territory of Belgrade, the largest number of patients was registered in the Belgrade municipalities (Savski venac, Voždovac), and in the months of early autumn (September, October), which corresponds to the seasonal distribution of giardiasis.

Epidemiological situation of giardiasis around Belgrade in the observed period shows a declining trend in the number of patients and the incidence rate, which is most likely the result of improved hygienic and sanitary living conditions. Continuous health education of the population is necessary, to be informed about the manner of transmission of giardiasis and the application of general prevention measures, as well as to raise awareness of the importance of timely reporting to the health service, at the appearance of the first symptoms of the disease due to appropriate therapy. Further research is necessary in this field to identify models with which it would be possible to monitor and understand the time characteristics of contagious diseases.

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EPIDEMIOLOŠKE KARAKTERISTIKE ĐARDIAZE NA PODRUČJU BEOGRADA U PERIODU OD 2007. DO 2020. GODINE

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Cilj ovoga rada je da se analiziraju epidemiološke karakteristike đardiaze na području Beograda u periodu od 2007. do 2020. godine. Primenjena je deskriptivna epidemiološka studija. U posmatranom periodu, na području Beograda registrovano je 265 novoobolelih od lamblijaze, a prosečna sirova incidencija iznosila je 18,92/100.000. Muškarci (56%) su češće obolevali od lamblijaze nego žene (44%). Najviša uzrasno specifična stopa incidencije zabeležena je u uzrastu od dve godine (10,3/100.000). Najveći broj obolelih registrovan je u opštini Savski venac 106 (40%), a sezonska distribucija ukazuje na to da je najveći broj obolelih registrovan u septembru i oktobru. Epidemiološka situacija đardiaze na području Beograda u posmatranom periodu pokazuje opadajuću tedenciju broja obolelih i stope incidencije, što je najverovatnije rezultat poboljšanja higijenskih i sanitarnih uslova života. *Acta Medica Medianae 2023;62(2):31-37.*

Ključne reči: *đardiaza, protozoa, dijareja, higijena*