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Asymptomatic giardiasis-more prevalent in refugees than in native inhabitants of the city of Nis, Serbia

Research Article

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Abstract: Giardiasis is a parasitic infection of the digestive tract, most commonly occurring in closed communities such as schools, kindergartens, prisons, and campuses. The civil war in the former Yugoslav republics and in Kosovo caused a large number of refugees to take shelter in the territory of Serbia. Such large numbers of refugees could be accommodated only in the collective centers. Our aim was to examine the differences in the prevalence of asymptomatic giardiasis among 122 refugees from the former Yugoslav republics who lived in the collective centers in Nis, Serbia, and 241 native Nis inhabitants. Conventional microscopic examination (CME) of three stool samples with or without concentration technique and the enzyme immunoassay (EIA) methods were used. The CME method of three stool samples is considered the gold standard in our statistical survey. Asymptomatic giardiasis is found in 7 refugees (5.7%) using the EIA method, while using the CME (3 samples) *Giardia duodenalis* (*G. duodenalis*) was detected in 6 persons (4.9%). Using the EIA method and the CME (3 samples) *G. duodenalis* was detected in only 1 person in the population group of native inhabitants (0.4%). Asymptomatic giardiasis was more prevalent in the population group of refugees accommodated in collective centers than in native inhabitants in the Nis municipality, Serbia.

Keywords: *Giardia duodenalis • Prevalence • Refugees • Enzyme immunoassay*

1. Introduction

The prevalence of *Giardia duodenalis* (*G. duodenalis)* symptomatic and asymptomatic infection is high in the population groups in schools [1-3], institutions for children daily care [4,5], the institutions for mentally retarded persons [6], psychiatric institutions, prisons, and among international travelers [7]. A high prevalence of giardiasis has also been recorded among immigrant refugees [8,9] and in population groups with low economic status [10-12].

During the recent wars in the region of former Yugoslavia, 13,000 refugees have moved to the territory of the city of Nis. Currently, there are 1000 refugees in

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the refugee camps. These camps are inadequate for the accommodation of such a large number of people and have substandard facilities. In these circumstances, there are many risk factors in the refugee camps that could increase the rate of intestinal infections, especially giardiasis.

The aim of this study is to determine and compare the prevalence of the *G. duodenalis* parasite in the stool of asymptomatic volunteers from population groups of refugees accommodated in collective centers and of native inhabitants of middle or high socio-economic status, from the urban territory of the region of Nis, Serbia.

2. Material and Methods

Our examination enrolled 363 examinees without symptoms of digestive tract (DT) infections. The study group consisted of 122 refugees accommodated in three refugee centers on territory of city of Nis; adults aged 40±1.1 years on the average, 53 males (43.4%) and 69 females (56.5%). 241 persons in the control group of native inhabitants were age-matched 38±1.1 years on the average, 103 males (42.7%) and 138 (57.2%) females. For the control group, people of middle and high socioeconomic status were chosen from persons undergoing mandatory health controls; these people were age-matched with the test-group, were living in their own apartment (of adequate size and sanitary conditions), and had an adequate standard of living (income) in the urban portion of the city of Nis.

Investigation was done in 2006 in the laboratory of the Department for Parasitology, Public health Center-Nis and Institute for Microbiology and Parasitology, Medical Faculty, Nis. The local ethics committee approved of the study.

Parasitological examination of fresh stool samples without preservation involved microscopic examination of three successive stool samples in the period of 1-3 days (over a 10 day period). Stool samples were processed and examined within two hours after the sampling.

Microscopic examinations with detection and identification of *G. duodenalis* by direct stool examination and by the use of conventional concentration technique (formalin ethyl acetate sedimentation technique) have already been used in practice [13]. The results were considered positive if *G. duodenalis* parasite was identified by the conventional microscopic examination method. Two experienced microscope technicians verifyied each slide for at least 10 minutes before the finding was declared negative.

A portion of every fresh stool specimen was stored immediately after reception at -20ºC and tested later by the enzyme immunoassay method (EIA, Ridascreen, Giardia; R-Biopharm, Germany), according to manufacturer instructions. One lab technician, unaware of the microscopic results, performed this test. The EIA method results were obtained by using a micro plate reader with a wavelength set to 450 nm. When different EIA and CME results were obtained, both tests were repeated. The EIA results were compared to those obtained by CME, because a positive result in CME was considered as truly positive (gold standard).

The data entry and the analysis were performed using the Epi Info (Ver.6.04) software and SPSS (Ver. 8.0 for Windows). The performed tests were the χ^2 test and the Fisher's exact test. The agreement of the EIA method and the CME for three stool samples (the gold standard) was determined based on the calculated κ (*kappa*) value gradation by Cohen [14]. The sensitivity (Se), the specificity (Sp), the positive predictive value (PPV), the negative predictive value (NPV), and the diagnostic efficiency (De) of the EIA method regarding the gold standard were calculated.

3. Results

Positive results were observed in 7 refugees (7/122; 5.7%) using the EIA method, while using the CME *G. duodenalis* was detected in 6 persons (6/122; 4.9%). There were more male (5/53; 9,4%) than female persons (1/69; 1.4%) in the group of refugees where *G. duodenalis* parasite was found. Here we neglected the statistically insignificant differences ($p>0.05$). In the control group of native inhabitants the lower prevalence of asymptomatic giardiasis was found. Using the EIA method and CME, *G. duodenalis* was detected in 1 male person (0.4%).

This investigation demonstrated a statistically significant difference ($p<0.01$) in the prevalence of asymptomatic giardiasis in the group accomodated in the collective refugee centers compared to the prevalence of this parasitic infection in urban inhabitants of Nis.

The differences in the prevalence of asymptomatic giardiasis in the refugee group obtained by using these two methods are not statistically significant ($p>0.05$). Moreover, the EIA method shows an almost perfect agreement compared to the gold standard (κ=0.99; Se=100%; Sp=99.1%; PPV=85.7%; NPV=100%; De=99.2%). In control group, the EIA method shows a perfect agreement (κ=1,0; Se=100%; Sp=100%; PPV=100%; NPV=100%; De=100%).

4. Discussion

Collective centers in Nis are the facilities for refugees from the territories of former Yugoslavia and Kosovo, who have come to Serbia during the recent wars. Due to the extremely tough economic situation in the country, these centers cannot provide accommodation in adequate residential conditions, since numerous persons are sharing an extremely small living space. Main deficiencies are represented in a small number of sanitary units used by a large number of people, as well as inadequate conditions for personal hygiene maintenance. Insufficient infrastructural provision of the settlement and a large number of stray animals (dogs and cats) roaming uncontrolled through the settlements represent additional risk factors for the introduction and spread of infections in collective centers [6]. Many of those persons accommodated in the collective centers do not have adequate employment and earnings, which additionally affects the quality of their life, primarily regarding their nourishment and hygiene maintenance. The prevalence of asymptomatic giardiasis in the refugee subgroup was detected in 4.9% of examined persons, obtained by the CME method, *i.e.* 5.7% using the EIA method.

Reference literature data are scarce regarding the prevalence of giardiasis in such communities. Our results are similar to the findings of giardiasis prevalence in the group of immigrants into the USA (6%), though those examinees were not living in collective centers [8]. Also, parasitologic investigations in Sweden [9] demonstrate that *G. duodenalis* is present in 17% of refugees and asylum seekers, but this protozoa was found in a small number (3/252) of refugees from the former Yugoslav republics (mainly Bosnia). Though the proportion of positive findings of asymptomatic giardiasis in refugees from the collective centers was lower compared with the abovementioned studies, it is still markedly higher than the percentage in controls (0.4%). Also, a high percentage of asymptomatic giardiasis in the studied refugees is markedly higher than that among the people on sanitary control[1]. The prevalence of asymptomatic giardiasis in a healthy population group on sanitary control was 0.4% in 2004 (64 positives out of 14,833 examined), 0.4% in 2005 (109 positives out of 23,875 examined), 0.3% in 2006 (93 positives out of 31,230 examined) and up until December 1, 2007, 0.2% (64 positives out of 33,600 examined). A low percentage of asymptomatic giardiasis among the healthy Nis inhabitants on sanitary control can be explained by long-lasting mandatory systemic epidemiologic prevention measures.

Based on our results, the conclusion may be drawn that the prevalence of asymptomatic giardiasis in the population group of refugees accommodated in collective centers is significantly higher than in the control group of native inhabitants. It may well be that the implementation of hygienical-epidemiological measures, as well as the activity related to the education of refugees in the collective facilities, would decrease the prevalence of giardiasis, assuming of course, that improvement of life conditions is not a feasible option. The results of studies investigating other groups with high risk of digestive infections show significant decrease of the giardiasis prevalence as the result of implemented prescribed hygienic steps, as well as the appropriate public health education [15].

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