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Intestinal Parasitic Infections In Patients With Cutaneous Leishmaniasis: Etiological Profile And Prevalence

Karimova Mavluda Turabdjanovna

Candidate of Medical Sciences, Associated professor, Department of Infectious and Children's Infectious Diseases, Tashkent State Medical University, Tashkent, Uzbekistan

Suvonkulov Uktamjon Toirovich

PhD in Medical Sciences, Assistant, Department of Surgical Diseases, Zarmed University, Samarkand, Uzbekistan

Anvarov Jakhongir Abralovich

PhD in Medical Sciences, Associated professor, Department of Infectious and Children's Infectious Diseases, Tashkent State Medical University, Tashkent, Uzbekistan

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Abstract: This study investigated the prevalence and etiological composition of intestinal parasitic infections in patients with cutaneous leishmaniasis. The findings indicated that the prevalence of Ascaris lumbricoides infection was approximately twice as high in the study group compared to the control group. In addition, Giardia lamblia and Hymenolepis nana were detected among the patients. No significant differences were observed in the incidence of mixed parasitic infections. These results highlight the importance of timely detection of parasitic infections and the implementation of comprehensive treatment strategies in patients with cutaneous leishmaniasis.

Keywords: Cutaneous leishmaniasis, intestinal parasites, Giardia lamblia, Enterobius vermicularis, Ascaris lumbricoides, Hymenolepis nana, mixed parasitic infections.

1.Introduction:

Cutaneous leishmaniasis (CL) remains a significant public health and socio-economic burden in many countries worldwide. According to the World Health

Organization (WHO), approximately 600,000 to 1 million new CL cases occur globally each year; however, only around 200,000 cases are officially reported. Nearly 95% of cases are concentrated in the Americas, the Mediterranean Basin, the Middle East, and Central Asia [1].

The chronic course of cutaneous leishmaniasis and the difficulties associated with its etiological treatment highlight the importance of timely diagnosis and management of comorbid conditions that may adversely affect disease progression. Cutaneous leishmaniasis and intestinal parasitic infections, particularly helminthiases, exhibit complex immunological interactions that may influence therapeutic outcomes. Epidemiological evidence indicates that intestinal helminth infections are common in regions endemic for CL, although their impact on treatment failure remains controversial. Notably, several studies suggest that strongyloidiasis may exert a protective effect against treatment failure during therapy with pentavalent antimonial drugs [2].

The persistent cutaneous pathological processes observed in CL, together with the absence of an effective vaccine and the challenges of etiological therapy, emphasize the need for modern diagnostic approaches and appropriate management of underlying or comorbid conditions that may adversely affect the clinical course of the disease [3]. In this context, reducing the duration of lesion persistence and minimizing the risk of complications are key therapeutic objectives. Particular attention should be paid to regions co-endemic for CL and intestinal parasitic infections, where treatment strategies should be optimized through targeted clinical and epidemiological investigations [4, 5, 6].

A case–control study found no significant association between general intestinal helminth infections and treatment failure in CL, with an adjusted odds ratio (aOR) of 0.65. In contrast, strongyloidiasis appeared to exert a protective effect, with an aOR of 0.34, suggesting that specific helminth infections may modulate host immune responses in a way that enhances therapeutic outcomes [2].

A randomized trial demonstrated that early antihelminthic therapy did not significantly accelerate healing in patients co-infected with helminths and Leishmania braziliensis. The study reported a high prevalence of persistent lesions, with no statistically significant difference in cure times between the treatment and control groups [7].

The immune system provides protection against both microparasites (viruses and bacteria) and macroparasites (unicellular protozoa and multicellular metazoa). In humans, acquired resistance to Leishmania major is mediated by a Th1-type immune response [8]. A similar pattern is observed in experimental models of CL. In L. major-infected mice, resistance or susceptibility to infection is associated with Th1 and Th2 responses, respectively. For example, in the C57BL/6 mouse strain, resistance to L. major is characterized by high levels of IFN-γ, a Th1 cytokine that activates macrophages, thereby facilitating the destruction of Leishmania parasites and the control of infection [9, 10].

The immune response to CL is complex, with cytokine profiles playing a central role in disease progression and lesion healing. Intestinal parasitic infections may modulate host immune responses, potentially affecting the severity and duration of CL. Although the interplay between CL and intestinal parasites is intricate, current evidence indicates that helminth infections do not universally compromise treatment outcomes. Further research is needed to clarify these relationships and their implications for patient management [11, 12].

Bryson K.J. et al. demonstrated that the development of CL in BALB/c mice is associated with active IL-4 production and the induction of a Th2 immune response, rendering these animals more susceptible to Leishmania major infection [13]. The role of IL-4 was further supported by Lazarski Ch.A. et al., who reported that administration of monoclonal antibodies against IL-4 in BALB/c mice infected with L. braziliensis led to reductions in both lesion size and parasitic load. Moreover, IL-4 was shown to decrease lymphocyte infiltration and impair parasite clearance in L. major-infected mice, contributing to persistent skin infection and inflammation [14]. A positive correlation between elevated IL-4 and IL-2 levels in patients with CL was also reported in studies by Abidova Z.M. et al. [15].

The aim of the present study was to investigate the prevalence and etiological spectrum of intestinal parasitic infections in patients with CL.

2. Methods

The study was conducted over a period of three years at the Clinic and Polyclinic of the L.M. Isaev Scientific Research Institute of Medical Parasitology. A total of 140 patients with CL, aged 19 to 61 years (mean age: 39 ± 0.54 years), were examined (main group), of whom 76 (54.2%) were female and 64 (45.8%) were male. The control group comprised 100 residents of Samarkand city who were screened for intestinal parasitic infections

at the polyclinic affiliated with the Institute. Patients were selected randomly and examined throughout all seasons of the year.

The diagnosis of CL was confirmed by microscopic examination of smears obtained from leishmaniomas or ulcers, stained using the Romanowsky–Giemsa method. The presence of Leishmania amastigotes (Borovsky bodies) in the smears served as the diagnostic criterion. The stained smears were air-dried and examined under a microscope using a ×90 or ×100 objective lens and a ×7 or ×10 ocular lens. In addition, epidemiological data collected from the patients—including place of residence, seasonality, and history of insect bites—were considered, along with the stage of ulcer development and its external characteristics.

To diagnose intestinal parasitic infections, stool samples were collected from all 140 patients in the main group on three alternate days using Turdiyev stool transport medium. The samples were analyzed at the laboratory of the Scientific Research Institute of Epidemiology, Microbiology, and Infectious Diseases. The results were compared with the parasitological examination data of 100 residents of Samarkand city who underwent preventive screening at the Clinic of the L.M. Isaev Scientific Research Institute of Medical Parasitology (control group). The main and control groups were matched for age and sex.

Data were processed using a Pentium-IV computer and Microsoft Office Excel 2010, including its statistical analysis functions. The arithmetic mean (M), standard deviation (σ), and standard error of the mean (m) were calculated. To compare mean values, statistical significance was assessed using Student's t-test (t), and the probability of error (p) was determined. A p-value of <0.05 was considered statistically significant.

3. Results

The main group comprised 140 patients aged 19 to 61 years, including 76 women (54.2%) and 64 men (45.8%). The age distribution was as follows: 19–29 years — 34 patients (24.3%), 30–39 years — 41 (29.3%), 40–49 years — 32 (22.8%), 50–59 years — 23 (16.5%), and ≥60 years — 10 (7.1%). Among the examined patients, 99 (70.7%) were rural residents, while 41 (29.3%) were urban residents. The control group consisted of individuals matched to the main group by age and sex.

Parasitological examination for coexisting intestinal parasitic infections was conducted in both the main and control groups using the coproscopic method. Stool samples (at least three per individual) were collected in Turdiyev stool transport medium at 1–2 day intervals from all patients in the main group and from individuals in the control group.

In the study groups, the prevalence of Giardia lamblia cysts was 21.42% in the main group and 16.0% in the control group. Infection with Enterobius vermicularis showed similar rates in both groups, at 6.42% and 6.0%, respectively. Ascaris lumbricoides infection was detected in 4.28% of patients in the main group, compared to 2.0% in the control group. Hymenolepis nana infection was found in 5.0% of the main group and 3.0% of the control group (Table 1)

Table 1

Intestinal Parasitic Infections Identified in the Study Groups (Absolute Indicators/%)

Identified Intestinal Parasites	Giardia lamblia		Enterobius vermicularis		Ascaris lumbricoides		Hymenolepis nana		Mixed Parasitic Infections		Total	
Groups	*Abs. ind.*	*%*	*Abs. ind.*	*%*	*Abs. ind.*	*%*	*Abs. ind.*	*%*	*Abs. ind.*	*%*	***Abs. ind.***	***%***

Main group, (n=140)	30	21,42	9	6,42	6	4,28	7	5,00	9	6,42	**61**	**43,57**
Control group, (n=100)	15	15,00	6	6,00	2	2,00	3	3,00	4	4,00	**30**	**30,00**
Total (n=240)	**45**	**18,75**	**15**	**6,25**	**8**	**3,33**	**10**	**4,16**	**13**	**5,41**	**91**	**37,91**

The co-occurrence of intestinal parasitic infections, referred to as mixed parasitoses, was observed in 6.42% of patients in the main group and 4.0% in the control group. No statistically significant difference in the prevalence of mixed parasitic infections was detected between the two groups. The most common combinations of mixed infections were Giardia lamblia + Enterobius vermicularis and Giardia lamblia + Hymenolepis nana. The overall prevalence of intestinal parasitic infections was 43.57% in the main group, compared to 30.0% in the control group.

4. Discussion

The results of this study indicate that co-infections with intestinal parasitic infections are relatively more common in patients with CL, which may be related to the fact that 70.7% of patients in the main group resided in rural areas. Notably, the overall prevalence of intestinal parasitic infections was 43.57% in the main group, compared to 30.0% in the control group. Specifically, Giardia lamblia infection was detected in 21.42% of patients in the main group and 16.0% in the control group. These findings are consistent with those reported by Martínez D. and colleagues [2].

Infection with Ascaris lumbricoides was detected in 4.28% of patients in the main group, compared to 2.0% in the control group, indicating that patients with CL are approximately twice as likely to be infected with this helminth. This observation may be related to interactions between leishmaniasis and intestinal helminth infections through their effects on host immune responses, consistent with the findings reported by Gabriel Á. and colleagues [11].

Mixed parasitic infections (Giardia lamblia + Enterobius vermicularis and Giardia lamblia + Hymenolepis nana) were observed in 6.42% of patients in the main group, compared to 4.0% in the control group. No statistically significant difference in the prevalence of mixed parasitic infections was detected between the two groups, indicating a similar trend within the population.

Overall, the study results suggest a relatively higher co-occurrence of intestinal parasitic infections in patients with CL, with a particular increase in the likelihood of Ascaris lumbricoides infection. Therefore, comprehensive screening for intestinal parasitoses in patients with CL and the timely implementation of treatment strategies for identified parasitic infections are crucial.

5. Conclusion

Concomitant intestinal parasitic infections were detected in 43.62% of patients with CL, including Giardia lamblia (21.42%), Enterobius vermicularis (6.42%), Ascaris lumbricoides (4.28%), Hymenolepis nana (5.0%), and mixed parasitic infections (6.42%). The etiological composition and prevalence of intestinal parasitic infections did not differ significantly from those observed in the general population.

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