Intestinal parasitic infections in renal transplant recipients

ABSTRACT

The impact of intestinal parasitic infection in renal transplant recipients requires careful consideration in the developing world. However, there have been very few studies addressing this issue in Iran. This study was conducted to determine the prevalence of intestinal parasitic infections in renal transplant recipients in Iran. Stool specimens from renal transplant recipients and control groups were obtained between June 2006 and January 2007. The samples screened for intestinal parasitic infections using direct smear, formalin-ether sedimentation, Sheather's flotation and modified Ziehl-Neelsen staining methods. Out of 150 renal transplant recipients, 33.3% (50), and out of 225 control group, 20% (45) were infected with one or more type of intestinal parasites. The parasites detected among patients included *Entamoeba coli* (10.6%), *Endolimax nana* (8.7%), *Giardia lamblia* (7.4%), *Blastocystis* spp. (4.7%), *Iodamoeba butschlii* (0.7%), *Chilomastix mesnili* (0.7%) and *Ascaris lumbricoides* (0.7%). Multiple infections were more common among renal transplant recipients group ($p < 0.05$). This study highlights the importance of testing for intestinal parasites among Iranian renal transplant recipients. Routine examinations of stool samples for parasites would significantly benefit the renal transplant recipients by contributing to reduce severe infections.

Keywords: intestinal parasites, renal transplant recipients, prevalence.

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INTRODUCTION

About 340 parasitic species infect more than three billion people worldwide with varying morbidity and mortality.[1] Infections cause significant morbidity and mortality among immunosupressed hosts. Acquisition of infection, clinical severity, and outcome of a parasitic disease depend on innate and acquired host immunity as well as on the parasites' own response against the host when the infection is established. The incidence and prevalence of parasitic infections in transplant recipients is unknown since only a few patients are symptomatic.[2] Only 5% of known human-pathogenic parasitic infections have been reported in transplant recipients. This certainly does not represent the true prevalence because only those infections that cause significant morbidity would be expected to find their way in to the literature.[1] Since the use of cyclosporine has become a cornerstone in prophylactic immunosuppression, this syndrome has become exceedingly rare, owing to the strong parasiticidal effect of the drug against a wide range of organisms, as documented in mice and humans.[1,3] The new immunosuppressive drugs used to prevent graft rejection have lead to an increase in parasitic infections in renal transplant recipients. The purpose of our study was to evaluate the prevalence of intestinal parasites in renal transplant recipients and compare with healthy individuals.

MATERIAL AND METHODS

This cross-sectional study was conducted from June 2006 to January 2007 at Nor hospital, a referral hospital for kidney transplantation in Isfahan, Iran. Stool specimens were collected from 150 renal transplant recipients and 225 non-immunosuppressed cases that were from different wards and selected randomly as the control group. These samples were examined

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microscopically following direct and formalin-ether concentration method.[4] In brief, samples were collected in labeled, leak-proof, and clean plastic stool cups and brought to the laboratory immediately. Direct microscopy of the smears in a saline (0.85% NaCl solution) and Lugol's iodine was performed for the detection of ova, larvae, trophozoites, and cysts of intestinal parasites. In addition, a concentration procedure was employed that involved mixing the stool samples with formalin, treating with ether, centrifuging afterwards. The layers of ether, formalin, and debris were discarded, and the residues were used to investigate for the presence of intestinal parasites.[4] Also, we used of Sheather's flotation method and modified Ziehl-Neelsen staining technique for detection of coccidian parasites.

The data was analyzed using SPSS version 13 statistical package. A comparison of the frequency of parasites between cases and controls was performed by chi-square test. Subsequently, the Wilcoxon Rank Sum test was used to compare multiple parasitic infections in cases and controls. p value < 0.05 was considered significant.

RESULTS

A total 375 fecal samples were collected for this study. 150 were renal transplant recipients with a mean age of 42 years. Of these, 104 (69.4%) were males and 46 (30.6%) were females (Table 1). The control group included 225 subjects (Table 1). There were no statistically significant differences between males and females in two groups ($p > 0.05$).

Intestinal parasites were detected in 33.3% of the renal transplant recipients and in 20% of the control. Table 2 shows the prevalence of intestinal parasites detected in the study subjects. No statistically significant difference in prevalence of individual parasite species was detected between cases and controls ($p > 0.05$). Protozoa intestinal parasites were most common than helminthes both in renal transplant recipients (29.4% versus 0.7%) and in controls (19.2% versus 0.9%) (Table 2), $p < 0.05$.

Table 3 shows the magnitude of single and multiple parasitic infections in renal transplant recipients and in controls. Multiple parasitic infections were observed in a total of 15 renal transplant recipients and 20 controls ($p < 0.05$). The species of parasites most frequently seen in multiple infections in renal transplant recipients were *Entamoeba coli* and *Blastocystis* spp.

DISCUSSION

Protozoa and helminthes are among the most important pathogens that can cause infections in immunocompromised hosts. These microorganisms particularly infect individuals with impaired cellular immunity; such as those with hematological malignancies, renal or heart transplant patients, patients using high doses of corticosteroids, and patients with acquired immunodeficiency syndrome.[5]

In this study, we evaluated the prevalence of intestinal parasites in renal transplant recipients, comparing to healthy individuals. According to the results the overall prevalence's of either helminthes or protozoan parasites were not statistically different between two groups. This observation may agree with several reports stating that intestinal parasitic infections in immunocompromised patients depend largely on the prevalence of intestinal parasitism in the local community.[6,7]

Prevalence of intestinal parasites in renal transplant recipients are not known in Iran, so we had to compare our results to other studies on immunocompromised individuals such as HIV patients. Intestinal parasitic infection did not appear to be highly prevalent in our population. An intermediate to low level of prevalence was found in comparison with data from prevalence studies carried out in other regions[8,9] In a recent study carried out on renal transplant recipients, the overall prevalence of intestinal parasites was 2.4%.[10]

In the present study, *E. coli* was the first most prevalent parasite detected in both groups, without significant difference and followed by *Endolimax* nana and *Giardia lamblia*. In a recent study in Iran, rate of infection with *E. coli, E. nana*

Table 1. Age and sex distribution of renal transplant recipients and controls

Age	Renal transplant recipients		Controls	
	Male No. (%)	Female No. (%)	Male No. (%)	Female No. (%)
<20 years	1 (1)	4 (8.7)	23 (19.5)	30 (28)
21-35 years	30 (28.8)	14 (30.4)	28 (23.7)	39 (36.4)
36-50 years	41 (39.4)	10 (21.7)	26 (22)	23 (21.5)
51-65 years	27 (26)	13 (28.3)	22 (18.6)	15 (14)
>65 years	5 (4.8)	5 (10.9)	19 (16.1)	0 (0)
Total	104 (69.4)	46 (30.6)	118 (52.5)	107 (47.5)

Table 2. Prevalence of intestinal parasites in renal transplant recipients and controls

Parasite species	Renal transplant recipients (n = 150) No. (%)	Controls (n = 225) No. (%)
Entamoeba coli	16 (10.6)	17 (7.6)
Endolimax nana	13 (8.7)	15 (6.7)
Giardia lamblia	11 (7.4)	4 (1.8)
Blastocystis spp.	7 (4.7)	5 (2.2)
Iodamoeba butichilli	1 (0.7)	1 (0.4)
Chilomastix mesnili	1 (0.7)	0 (0)
Cryptosporidium spp.	0 (0)	1 (0.4)
Ascaris lumbricoides	1 (0.7)	0 (0)
Hymnolepis nana	0 (0)	2 (0.9)
All protozoa	49 (29.4)	43 (19.2)
All helminthes	1 (0.7)	2 (0.9)
Total infected	50 (33.3)	45 (20)

Table 3. Single and multiple parasitic infections in renal transplant recipients and controls

Subjects	Parasites detected		
	One No. (%)	Two No. (%)	Three No. (%)
Renal transplant recipients (n = 150)	135 (90)	12 (8)	3 (2)
Controls (n = 225)	205 (91.2)	5 (2.2)	15 (6.6)

and *G. lamblia* in HIV patients have been reported 0.16%, 0% and 4.1%, respectively.[6] In other study carried out on renal transplant recipients in Brazil, *G. lamblia* was the third most prevalent parasite (3/16) and *Strongyloides stercoralis* was the common parasite (11/16) in these patients.[10]

Cryptosporidium infection is prevalent in communities with overcrowding and low level sanitation,[11] and its prevalence reaches up to 36% in certain developing countries.[12] In Iran, the exact coccidian infection rates are not known and there are very few studies on cryptosporidiosis. The previous reports indicate the prevalence of this infection in diarrhea patients of 4.7%[13] and in HIV-patients of 1.5%.[6] The isolation rate was low in our subject (0.4%), compared to control group. This could be attributed to the relatively preserved immune status of our study subject.

Cyclospora cayetanensis is an opportunistic protozoan related to outbreaks, and in endemic areas, causing prolonged diarrhea in immunocompetent, as well as, in immunocompromised individuals.[14] According to our study, none of investigated specimens were positive to *C. cayetanensis* infection. Recently, a study suggested a rare distribution of this parasite in Iran, with only two cases reported so far.[15,16]

S. stercoralis has the unique feature of transmitting from the parasitic form to the infective stage within the body, rather than emerging and forming free-living stages, causing autoinfection.[17] This may lead to latent infection for an indefinite period in an immunocompetent host, but may also cause fatal hyper-disseminated infection organ transplant recipients, cancer and other immunosuppressive condition.[18] In the present study, no *S. stercoralis* were detected in both groups. It is a fact that, the use of Cyclosporine A (CsA) has become a cornerstone in prophylactic immunosuppression among renal transplant recipients. Cyclosporine A with powerful properties of immunosuppression, acts on parasitic infections in various ways.[19] There are few articles that reported CsA has reduced the incidence of strongyloidiasis in renal transplant recipients.[1,20] The rate of infection with *S. stercoralis* in HIV-patients in Iran[20] and renal transplant recipients in Brazil[10] have been reported 0.2% and 68.8% respectively.

The detection of such common intestinal parasites in both patients and controls could be a reflection of the poor environmental sanitation and personal hygienic practices, which emphasize the need for intervention measures at the community level to reduce the risk factors of acquiring intestinal parasites.

It was also evident that multiple parasitic infections were more common in renal transplant recipients than in controls, which strongly indicates the facilitated establishment of parasites in immunocompromised patients. It is very important to target these common infections while treating renal transplant recipients for opportunistic infections in developing countries like Iran.

In conclusion, the magnitude of intestinal parasitic infection was high both in renal transplant recipients and controls. Routine examination of stool samples for parasites could significantly benefit the renal transplant recipients and uninfected individuals by contributing to reduce clinical severity and improved quality of live.

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