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Original Research Article

Prevalence of Intestinal Parasites among Renal Transplant Recipients in Khartoum State

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ABSTRACT

Background: Although parasitic infections generally are asymptomatic in healthy individuals; their manifestations in immune-compromised individuals are more devastating.
Aim: to determine the prevalence of intestinal parasites among renal transplant recipients (RTR).
Methods: This is analytical cross sectional study approach on patients who underwent renal transplantation. It was conducted at the parasitology lab, faculty of Medical Laboratory Sciences, University of Khartoum from March 2014 to December 2015. Non probability samples namely convenience sampling method was followed. Stool specimens were collected from 200 renal transplant recipients attending Sudanese Kidney Association hospital in Khartoum state, Sudan, and 100 control groups that were collected from different wards.
Results: The overall frequency of intestinal parasites among RTR population was 24% (48/200) and in control group was 15% (15/100). The frequency of opportunistic and non-opportunistic intestinal parasites among the two groups of RTR was 14(7%), 34(17%) respectively. For both groups, infection with non-opportunistic parasites was more prevalent than that of opportunistic parasites (24% vs. 10% in group I with diarrhea) and (10% vs. 4% in group II without diarrhea) All (200) RTR were on immunosuppressant drugs; (76.5%) of the study patients were on tacrolimus (prograf) therapy and only (23.5 %) were on cyclosporine A (CsA) therapy. Of the total patients on tacrolimus there (22.5%) were diagnosed with intestinal parasites and only (1.5%) of them were on Cyclosporine therapy.
Conclusion: The results of this study support the need for routine assessment of study objects for intestinal parasites which could significantly benefit them by contributing in the reduction of morbidity, mortality and improve their quality of life.

Keywords: Intestinal parasites, immunosuppressant, renal transplant recipients.

INTRODUCTION

Intestinal parasites remain a major health problem in many developing countries, which may play a significant role in morbidity due to intestinal infections. [(1)] Many of these opportunistic pathogens, particularly the intracellular protozoa that predominantly affect the small intestine, produce their most overwhelming effects in patients with immune deficiency [(2)] Parasites important to transplantation are largely those that can replicate in humans and that cause infection which is regulated by immune mechanisms in the normal host. Although parasitic infections generally are asymptomatic in healthy individuals, their manifestations in immune-compromised

individuals are more devastating. When there is sufficient severe suppression of the immune response these pathogens trigger a severe form of the disease which in most individuals is, in general, systemic and fatal, especially if there is no early diagnosis and no adequate specific therapy. [3,4] In this study we aim to determine the prevalence of intestinal parasites among renal transplant recipients (RTR) with emphasis on opportunistic infections.

MATERIALS & METHODS

Study Design: This is analytical cross sectional study approach on patients who underwent renal transplantation. It was conducted at the parasitology lab, faculty of Medical Laboratory Sciences, University of Khartoum from March 2014 to December 2015.Non probability samples namely convenience sampling method was followed. Stool specimens were collected from 200 renal transplant recipients attending Sudanese Kidney Association hospital in Khartoum state, Sudan, and 100 control groups that were collected from different wards.

Study Population: The people included in this study were immunocompromised patients those who underwent renal transplantation and were resident in different areas of the Khartoum state and passed between 6 months to 20 years of their transplantation. Samples were collected from Sudanese Kidney Association hospital in Khartoum state from patients attending in and outpatient clinic. Three groups of study subjects were enrolled in this study as follow; group (I) includes patients underwent renal transplantation and complained of diarrhea, group (II) were patients who underwent renal transplantation but without symptoms and group (III) was control group (apparently healthy individuals).

Methods: For the detection of parasites, fresh stool samples were separated into two samples; one was preserved in SAF fixative. From this sample smears were made for permanent stains [5] and the remainder was used for Formalin/ether concentration technique. [6] The second sample was examined by wet preparation, [7] water emergency technique, [1,7,2] a larval concentration technique and the agar plate culture, for the detection of Strongyloidesstercoralis larvae. [8]

Quality Control: Quality control was performed at each step and procedure during this study (from construction of questionnaire to data analysis) to ensure the reliable performance and correct reporting of results.

Data Analysis: Questionnaire was used for collection of demographic and clinical data and observation check list for stool specimen.

Statistical analysis was done by using SPSS version 16.0. Data were summarized using frequency tables and bar charts. Categorical risk factors for diarrhea analyzed; and the strength of association measured by using the chi-square and its associated p value, it was considered to be statistically significant when the p-value obtained was less or equal to 0.05.

Ethical Consideration: Permission from the faculty and hospital directors were taken and consent was taken from patients enrolled in the study.

RESULTS

A total of 300 fecal samples were collected from study participants for parasitological study. Two hundred were renal transplant recipients receiving immunosuppressant drugs. Hundred were control group contained apparent healthy individuals

The overall frequency of intestinal parasites among RTR population was 24% (48/200) and in control group was 15% (15/100). No statistically significant difference in frequency of parasite species was detected between cases and controls ($p > 0.05$) (Table 1). The frequency of

opportunistic and non-opportunistic intestinal parasites among the two groups of RTR was 14(7%), 34(17%) respectively. For both groups, infection with non-opportunistic parasites was more prevalent than that of opportunistic parasites (24% vs. 10% in group I with diarrhea) and (10% vs. 4% in group II without diarrhea) (Table 2). For both groups, the most prevalent species were the same, including *C. parvum*, *G. lamblia* and *B. hominis*. More specifically, the following parasites were identified in renal transplant recipients group: *C. parvum* (14) 7% *G. lamblia* (17) 8.5%, *B. hominis* (8) 4%, *E. histolytica and E. coli* (1) 0.5%, *Hymenolepis nana* (4) *2%, Endolimax nana* (3)1.5% (Figure 1). Frequencies of opportunistic and non-opportunistic intestinal parasites among control group were 15% and 1% respectively. Moreover, there was no statistically significant difference in the prevalence of parasites species between cases and controls except *C. parvum* which was significantly higher in renal transplant recipients (P=0.003), all details summarized in (Table3).

Table 3 shows the magnitude of single and multiple parasitic (poly parasitism) infections in renal transplant recipients and in controls. Multiple parasitic infections were observed in a total of 5/200 (2.5%) renal transplant recipients and 1/100(1%) controls ($p < 0.05$). The species of parasites was frequently seen as multiple infections in RTR were *G. lamblia*, *H. nana* and *B. hominis*.

One hundred (50%) of study subjects had diarrhea, and (50%) were without diarrhea. Regarding other clinical details for the patients with diarrhea, 39% reported abdominal pain and bloating (29%) anorexia, (44%) and (27%, 45%) had history of parasitic disease and chronic disease respectively. In patients without diarrhea 17% reported abdominal pain and bloating (20%) anorexia, (19%), (32%) had history of parasitic disease, and (36%) had history of chronic disease (Figure 2).

All (200) RTR were on immunosuppressant drugs; (76.5%) of the study patients were on tacrolimus (prograf) therapy and only (23.5 %) were on cyclosporine A (CsA) therapy. Of the total patients on tacrolimus there (22.5%) were diagnosed with intestinal parasites and only (1.5%) of them were on Cyclosporine therapy. There was statistically significance between immunosuppressant agents and infection with intestinal parasites positivity in group I (P value= 0.019). All details are summarized in (Table 4).

Table 1: Overall frequency of intestinal parasites among renal transplant recipients and control

	Patients (n=200)	Control (n=100)
Positive	48(24%)	15(15%)
Negative	152(76%)	85(85%)
Total	200 (100%)	100(100%)
P value	0.231	0.413

Table 2: Spectrum of opportunistic and non opportunistic parasites between renal transplant recipients with and without diarrhea and control.

Parasites	Patients with diarrhea (n=100)	Patients without diarrhea (n=100)	Total (n=200)	Control (n=100)	P value
Opportunistic parasites	10 (10%)	4(4%)	14(7%)	1(1%)	0.003
Non opportunistic parasites	24(24%)	10(10%)	34(17%)	14(14%)	0.562
Total	34(17%)	14(7%)	48(24%)	15(15%)	

Table 3: Pattern of single and multiple parasitic infections among renal transplant recipients and control.

Parasite species	Renal transplant recipients(n=200)	Control (n=100)
B.hominis+C.parvum	3(1.5%)	(1)1%
H.nana+C.parvum	1(.5%)	0
G.lamblia+ C.parvum	1(.5%)	0
Single species	43 (21.5%)	(14)14%
Total	48(24%)	(15)15%

Table 4: Association between diarrhea, medication and parasitic infections

	Patients with diarrhea (n=100)		Patients without diarrhea (n=100)	
	Tacrolimus	CsA	Tacrolimus	CsA
Total	78%	22%	75%	25%
Parasites positivity	33%	1%	12%	2%
P (value)	0.019		0.101	

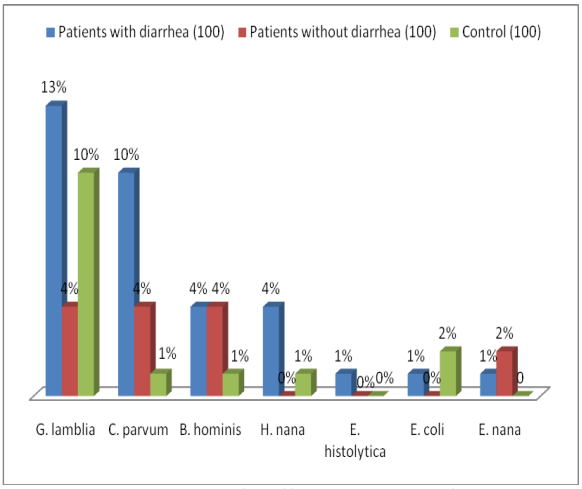

Figure 1: Frequency of different species of intestinal parasites detected among patients with and without diarrhea and control.

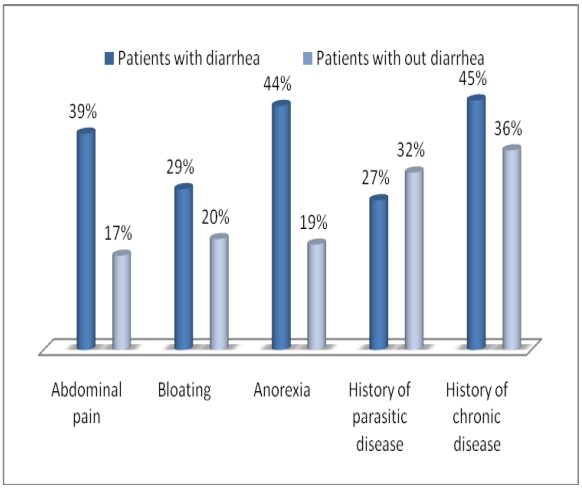

Figure 2: Common symptoms in renal transplant recipients with and without diarrhea.

DISCUSSION

This study has evaluated the frequency of opportunistic and common intestinal parasitic infections among renal transplant recipients with and without diarrhea comparing to healthy individuals. Among the parasites, *C. parvum*, *H. nana*, *G. lamblia and B. hominis* were detected in patients and control, there was association between frequency of parasitic infection and age, occupation, duration of work and place of work. This illustrates the equal exposure to the infection and suggests an effect of environmental conditions on infection. Undoubtedly, continuous health supervision, annual medical examination and prompt treatment of infected renal transplant recipients minimize the infection rates.

In this study, among 200 investigated patients, 24% (n= 48) of cases were positive for intestinal parasitic infection compared to (15%) in control. This infection rate was much higher than that reported recently by M Nateghi, [9] who found that 32 patients (4.5%) were positive for parasitic infections. In a retrospectively analyzed 657 renal transplanted populations, Valar *et al* [10] found a prevalence of parasitic infections 2.4% (16/657). High infection frequency of intestinal parasites in our study may be due to immunosuppressed state, age, malnutrition, contact with animals, and crowdedness and low level of sanitation.

The rate of the occurrence of non-opportunistic extracellular intestinal parasites such as *G. lamblia*, *B. hominis* and *E. histolytica/dispar* found to be higher than opportunistic parasites in cases and control (34% vs 14%) and (14% vs. 1%) respectively. According to our results, there was no statistically significant difference in the overall frequencies of intestinal parasites between transplanted subjects and control .The reason that the results obtained from transplanted patients were similar to that of control group might be due to the fact that the majority of infections were non opportunistic, thus show no correlation to immune status of the patients. 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. [11, 12]

The low use of cyclosporine A (23.5%) by study participants is likely to affect the overall frequency of intestinal parasites. 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. [10] In laboratory models, CsA reduces survival and growth in a wide range of protozoa and helminthes. CsA is apparently antiparasitic against malaria, *Schistosoma*, adult tapeworms and filarial nematodes. By contrast, it acts as an immunomodulator against *trypanosomes* and *Giardia*, by exacerbating the infection. This more or less could explain the higher incidence of Giardiasis among the population. There are few reports in the literature regarding giardiasis in immune-compromised hosts. [10]

As diarrhea is an important gastrointestinal symptom in renal transplant infected patients, and in Sudan diarrheal disease usually attributed to immunosuppressant drugs imbalance dose. Thus a comparison was conducted between the associated intestinal parasites in diarrheic and non-diarrheic patients. Among the fecal samples for parasite identification, the diarrheic states were closely associated with the presence of parasites in the stool samples. This association is in agreement with Lew et.al, other studies showing that only 20% of the diarrheic patients with AIDS presented an obscure etiology, whereas in more than 50% (of patients) parasites were diagnosed. [13] The significant association between parasite positivity and diarrhea was more evident for G. lamblia, C. parvum, and B. hominis infections.

It was evident that multiple parasitic infections were more common in renal transplant recipients (2.5%) than in controls (1%), this is in agreement with Mehdi Azami*et.al* that found (8% vs. 2.2%) in renal transplant recipients and control respectively. In our study, *C. parvum* occurred in co-infection with other intestinal protozoan parasites, such as *B. hominis*, *G. lamblia* and *H. nana*. Hence this strongly indicates the facility of worsen immune system in establishment of multiple parasites in immunocompromised patients. Also 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. So it is very important to target these common infections while treating renal transplant recipients for opportunistic infections in developing countries like Sudan. [14]

CONCLUSION

Fecal carriage of intestinal parasites is common among RTR; therefore they require treatment and follow up to ensure their cure. The results of this study support the need for routine assessment of study objects for intestinal parasites which could significantly benefit them by contributing in the reduction of morbidity, mortality and improve their quality of life. We suggest that parasitological stool examinations with emphasis on *Blastocystis sp*. and *Cryptosporidium sp*. should be included in routine follow-up exams of individuals undergoing renal transplantation.

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