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Prevalence of Parasitic Infections in Iranian Stable Hemodialysis Patients

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Abstract
Background: Hemodialysis (HD) patients are prone to infections as a result of impaired immune system. Early detection of disease helps to prevent complications. The aim of this study was to evaluate the prevalence of intestinal parasite infections in HD patients and compare it with control groups.
Methods: In a cross sectional study, the stool sample of 155 HD patients, and 294 controls were examined for parasitic contaminations. Control groups included: 130 patients' family, 16 staffs of three HD wards and 148 normal populations. Three stool samples were taken from each participant. Direct smear of stool were prepared and inspected by trichrome staining. Then, groups were compared with SPSS version12 by Chi-square and T-test methods.
Results: 43.9% of 155 HD patients were infected by intestinal parasites. There was 40% parasite infection in non diabetic and 45% in diabetic case groups with no significant difference between the 2 groups ($p > 0.05$). There was no relation between parasite infection with sex, HD duration and use of immunosuppressive drugs. 43.1% of control group was also infected. No significant difference was seen between the 2 groups ($p > 0.05$).The most common parasite was Blastocystis hominis in the 2 groups.
Conclusion: This study could not show increased parasite infection in HD patients compared to control groups. The high prevalence of intestinal parasites in HD patients and control groups, may indicate that population hygiene status is not well controlled, and emphasizes more health care providers' attention.

Keywords: End-stage renal disease; Intestinal parasite infections; Chronic kidney failure.

Introduction

Uremia impairs antigen presentation, T-cell activation, and cause impaired antibody production [1]. Hemodialysis (HD) patients are susceptible to opportunistic infections, as a result of leukocyte dysfunction [2,3], and impaired immunologic response (like phagocytosis, migration, bactericidal action of neutrophils)[4-8]. Infection is the second cause of mortality in dialysis survivors [9,10]. One of the hygienic indices is parasite infections in population. Cryptosporidiosis, Isospora belli,

Chilomastix mesnili, Blastocystis hominis, Endolimax nana, Entamoeba Coli, Entamoeba Hartmani and Dientamoeba fragilis are some of the opportunistic parasites which cause serious and recurrent infections in immunocompromised patients, but are self limited in normal healthy populations [11]. Studies regarding parasitic infections in HD patients revealed contradictary results and may be related to socioeconomic state and region of living [12,13].

In this study we aimed to evaluate the prevalence of parasite infections in a group of stable hemodialysis patients, and compare it with normal population.

Material and Method

This cross-sectional study was conducted on 155 hemodialysis patients from three university hospitals and three control groups (16 HD ward staffs, 130 persons from patients' family and 148 normal random population).Study was conducted between January 2009 to January 2010. Family groups were similar in eating and drinking habits, environment and home conditions, and normal random healthy population who had been referred to laboratory for other causes. The propose for selecting several control groups was to consider the effect of hygiene and living environments on the infection rate. None of the control groups suffered from diabetes mellitus, malignancy, leukemia, renal failure, autoimmune diseases and chronic cardiopulmonary disease. Exclusion criteria were history of taking antibiotics, mineral oil, Barium, Bisthmooth, anti malarial drugs, non-absorbable anti-diarrheal dugs (e.g. hydrated aluminomagnesium silicates and kaolin-pectin) during 2 weeks before getting the specimen [14]. All of the patients participated with informed consent. Demographic variables consisting age, sex, the length of the time they were on hemodialysis, cause of renal failure, history of any immunosuppressive drug treatment, history of renal transplantation, and diabetes mellitus were recorded.

Three containers were given to the patients, and three consecutive specimens were taken during tree alternate days. The watery or loose specimens immediately sent to laboratory for examination; if the specimen was formed and not watery, preserved in refrigerator in 10% aqueous formalin until examination. The stool samples were studied by a single technician. The specimens were evaluated by direct inspection with physiologic serum, and Lugol's solution, then concentration procedure was done for study sedimentation with formalin-ethyl acetate technique. After preparing thin smear from specimens, they stained with trichrom staining. While following intestinal parasites were common ,the specimens were studied for 15 types of parasites included *Giardia Lamblia*, *Cryptosporidiosis*, *Isospora belli*, *Iodamoeba Büchel*, *Hymenolepsis nana*, *Teniae*, *Chilomastix mesnili*, *Ascaris lumbricoides*, *Blastocystis hominis*, *Strongyloides stercoralis*, *Endolimax nana*, *Entamoeba Coli*, *Entamoeba histolytica*, *Entamoeba Hartman* and *Dientamoeba fragilis* [15]. The examiner was blinded to the clinical information.

Data were analyzed by SPSS statistical package version 12 (SPSS Inc, Chicago,USA), with chi-square, T-student and Fisher Exact tests to comparison between groups and finding the correlations. P-value < 0.05 was considered significant.

Results

In this study we entered 449 interviewee including 155 hemodialysis patients, 130 patients' family, 148 normal individuals and 16 HD ward staffs. They were 221 women (49.2%, 95%CI [45%-54%]) and 228 men (50.8%, 95%CI [46%-55%]). Mean (±SD) age of the patients was 54(±17) year. The mean length of time patients were on hemodialysis was 36(±33) months. Forty of HD patients (25.8%) had history of cardiovascular disease; thirty-five patients (22.5%) had diabetes mellitus; twenty-one patients (13.5%) had history of renal transplantation; twenty patients (12.9%) had history of using immunosuppressive agents. 51.5% of dialysis patients, 55.7% of patients' family, 54.1% of normal population and 37.5% of dialysis staffs were infected by intestinal parasites. All groups had higher protozoan infection than helminthes infection. There was not significant difference in parasite infections between 4 groups (P =0.129).

The rate of parasitic infections is described in Table 1.

Table 1. The rate of parasite infections in all groups of the study. (p=0.45)

Groups	Infection with one parasite %	Infection with at least two parasites %
HD patients (n = 155)	29	21.3
Patients' family (n =130)	26	20
Normal population (n = 148)	17.5	15
Staffs of dialysis wards (n =16)	18.7	31

There was not relationship between age and rate of infection in HD patients. There was a significant relation between age and parasite infection in patients' family (P =0.038) (Figure1).

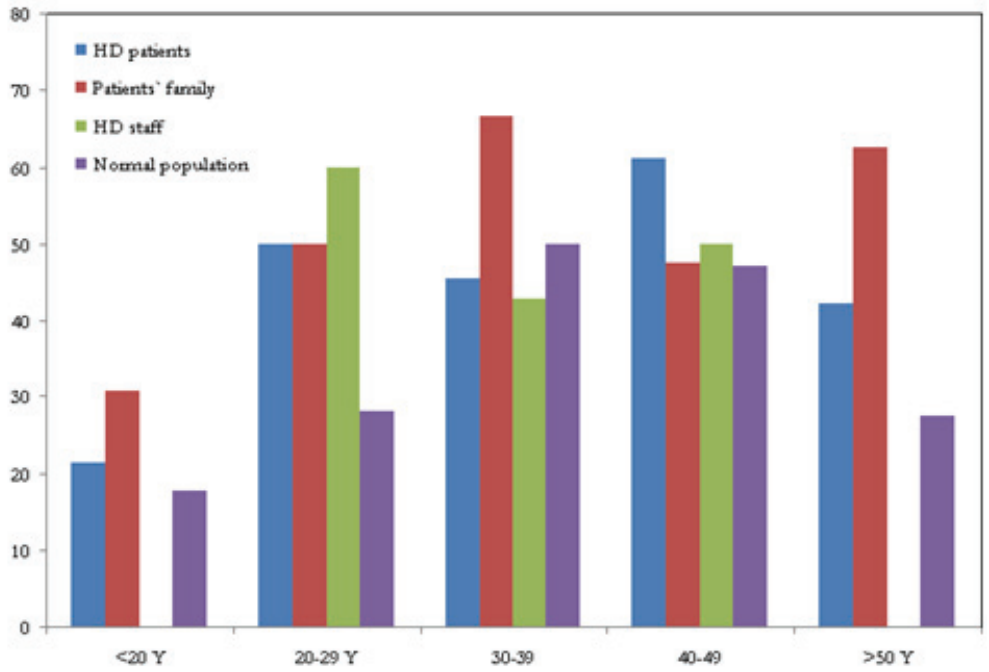

Figure 1. Age of 4 groups with parasite infection. There was a significant relation between age and parasite infection only in patients' family group. (p=0.038)

There was not relationship between parasite infection and sex in all study groups (P >0.05).

Parasite infections in diabetic and non diabetic case groups was 40% (14 patients) and 45% (54 patients) respectively. There was not significant difference between diabetic and non diabetic case groups (P=0.372). There was no significant difference in the length of the time, they were on dialysis time (P =0.791), history of renal transplant (P =0.27), history of immunosuppressive agents (P =0.094), cause of renal failure (P =0.82), and history of diabetes mellitus (P =0.372) with parasite infection. None of the specimens were infected by Ascaris lumbricoides, Strongyloides stercoralis, Isospora Belli and Taniae. The most common cause of parasite infection was *Blastocystis Hominis* (8%), *Entamoeba coli* (5.6%) and *Endolimax Nana* (4.2%) in whole studied population. The highest prevalence rate in HD patients was 48.7% for *Blastocystis hominis*, followed by *Cryptosporidium* (17%) and *Entamoeba coli* (12.1%). There is not any significant relationship in intestinal parasite infection types between all groups (P =0.376).

Discussion

In this study we found that 51.5% of dialysis patients, 55.7% of patients' family, 54.1% of normal population and 37.5% of dialysis staffs were infected by intestinal parasites. Indeed protozoa and helminthes can cause serious infections in immunocompromised hosts, especially in patients with impaired cellular immunity [16] Uremic status causes acquired immunodeficiency syndrome [2-8]. In our study, increases in the prevalence of parasite infection in HD patients in comparison to control groups was not found , also increased risk of infection in diabetic patients was not seen too.

This prevalence rate was higher than previous report by Nasiri in normal population of Karaj of Iran, in which prevalence of parasite infection was 4.7% [15]. Kulik et al. [16] in the study on 86 hemodialysis and 146 healthy controls found, 45.1% of dialysis patients and 25.7% of controls were infected with intestinal parasites. There was a significant difference in prevalence of parasite infections in HD group in comparison to control participants [16]. While we have shown higher rate of Cryptosporidiosis in HD patients in our previous study too [17], in another study in Iran, no higher rate of this fungi in hemodialysis was seen [18]. In present study, there was not significant association between duration of dialysis and age of the patients with parasite infection. This result was found in our previous study too [17], however in contrast to this finding Hazarati et al. showed significant increase in parasite infection with duration of dialysis [18]. In the present study, no increase in parasitic infection, in HD patients who have a history of renal transplant immunosuppressive agents taking, also causes of renal failure was not contributed to parasitic infection in HD patients, similar results was in agreement with our finding [13,19-21]. In this study, the most common cause of parasitic infections was *Blastocystis hominis* (8%), *Entamoeba Coli* (5.6%) and *Endolimax nana* (4.2%). In the study of Kulik et al. [16] the most frequent parasitic infections was *Blastocystis hominis* (% 18-20.1), *Endolimax nana* (%14-16.3), *Cryptosporidiosis* (%4-4.7) and *Entamoeba Coli* (%4-4.7) [16]. In an another study in 1997 in Tehran, Iran, the majority of parasitic infections in cancer patients was *Blastocystis hominis* (18.2%) and *Giardia Lamblia* (11.9%) [19]. It seems that *Blastocystis hominis* is a common cause of parasitic infections in these immunocompromised patients. While it was assumed that increased time of uremic status might weaken immune system progressively and resultant increased risk of infectious disease, however other factors like water and food hygiene, population general health may influence the findings.

Conclusions

This study could not show increased parasite infection in HD patients compared to control groups. The high prevalence of intestinal parasites in HD patients and control groups, may indicate that population hygiene status is not well controlled, and emphasizes more health care providers' attention.

As a result of immunosuppressive status in HD patients, we recommend stool exam for parasite detection in HD patients suffer from diarrhea.

Ethical Issues

The study was approved by Isfahan University of Medical Sciences' Ethics Committee, Isfahan, Iran.

Conflict of Interest

The authors declare that they have no conflict of interest.

Authors' Contributions

SS carried defined the aim of research and the design of experiment and carried out the experiments. NP, NN, MK, MK, FP, LK and AE participated in the design of the study and performed the laboratory exams and also statistical analysis. HN coordinates and helped to draft the manuscript. All authors read and approved the final manuscript.

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