

Intestinal Parasitic Co-Infection in Reaction and Non-Reaction Leprosy Patients of Dhanusha, Nepal

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ABSTRACT

Development of reaction in leprosy patients causes severe complication in treatment. In order to analyze the association between leprosy-reaction and gastrointestinal parasitic co-infection, 100 each leprosy patients with reaction and non-reaction were identified and their stool samples were microscopically examined. The overall frequencies of intestinal parasites observed were 33 percent protozoa and 5.5 percent helminths. *Entamoeba histolytica* and *Giardia lamblia* were most prevalent parasites in both group of leprosy-reaction and non-reaction patients. *Trichomonas hominis*, *Strongyloides stercoralis* and *Ancylostoma duodenales* were found only in leprosy-reaction patients. There was positive co-relation between intestinal parasitic co-infection and development of reaction in leprosy patients.

Keywords: Parasites, Leprosy, *Mycobacterium leprae*, Cellular immunity

INTRODUCTION

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium leprae* and *M. lepromatosis*. *M. leprae* is a non-motile, non-spore forming, microaerophilic, acid-fast staining bacterium that usually forms slightly curved or straight rods (Daffe *et al.* 1993, Vissa & Brennan 2001). Macrophages and peripheral nerves (especially Schwann cells) are the prime infection target of this pathogen. Once established in tissue, *M. leprae* colonization and immunological reactions to its antigens can cause enlarged thickened peripheral nerves and sensory neuropathy, cutaneous lesions, disfigurement and severe disability (Robbins 2009).

Leprosy-reactional episodes (REs) are serious complications of leprosy. During the course of leprosy 16-56 percent of patient develop irreversible nerve function impairment (Britton & Lockwood 2004) caused by the leprosy-reaction. Substantial fractions of leprosy-reaction (30-40%) are diagnosed concurrently with leprosy (Scollard *et al.* 1994, Ranque *et al.* 2007), which could partially explain the persistent detection of severe disability at the leprosy diagnosis (Pannikar 2009). Chronic intestinal parasitic infections have become the subject of speculation and investigation in relation to the spreading and severity of infectious diseases such as leprosy, tuberculosis and HIV/AIDS (Bentwich *et al.* 1995, Diniz *et al.* 2001, Co *et al.* 2007). The recent study suggested that a pre-existing infection by intestinal helminthes may facilitate the establishment of *M. leprae* and *M. tuberculosis* infection or its progression to more severe form of disease (Stewart *et al.* 1999, Co *et al.* 2007, Diniz *et al.* 2010).

Leprosy-reaction episodes are increasing in Nepal and posing a serious complication in treatment. This study focuses on linkage between development of reaction in leprosy patients with the intestinal parasitic infection in between reaction and non-reaction leprosy patients at Lalgadh Leprosy Service Centre (LLSC), Dhanusha, Nepal.

MATERIALS AND METHODS

The study was designed to assess the association between leprosy-reaction and parasitic co-infection using purposive sampling method. Leprosy-reaction and non-reaction patients were differentiated by the leprosy expert (Dermatologist) of LLSC, Dhanusha.

A total of 200 leprosy patients, 100 each from reaction and non-reaction visiting at LLSC, Dhanusha during the year 2011-2012 were included in this study. The fresh morning stool samples provided by the patients were microscopically examined using direct smear technique at the laboratory of LLSC. For the further confirmation, positive samples were re-examined at parasitology laboratory Central Department of Zoology. The parasites found in both leprosy-reaction and non-reaction patients were compared.

RESULTS

The prevalence of intestinal parasitic infection was higher in reaction leprosy patients (51%) than non-reaction leprosy patients (26%). The protozoan parasitic infection was seen frequent in both reaction and non-reaction leprosy patients than helminths (Fig. 1).

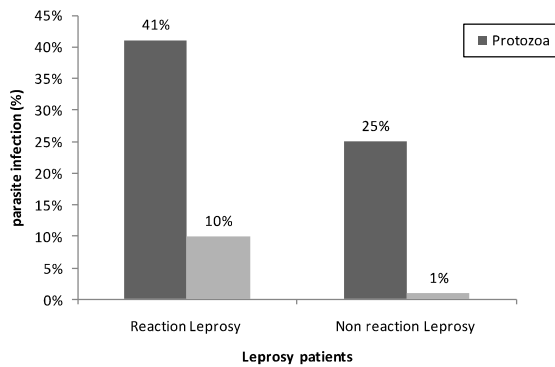


Fig. 1. Prevalence of intestinal parasites in leprosy patients

Table 1. Comparison of specific intestinal parasites in leprosy patients

Parasites	Leprosy-reaction patients (N=100)			Non-reaction leprosy patients (N=100)			Total (N=200)
	M(%)	F(%)	Total(%)	M (%)	F(%)	Total(%)	No .of parasites
<i>E. histolytica</i>	13	12	25	11	5	16	41 (20.5%)
<i>G. lamblia</i>	6	2	8	4	5	9	17 (8.5%)
<i>T. hominis</i>	4	4	8	0	0	0	8 (4%)
<i>Nematoda</i>							
<i>A. duodenales</i>	3	1	4	0	0	0	4 (2%)
<i>S. stercoralis</i>	2	3	5	0	0	0	5 (2.5%)
<i>Cestoda</i>							
<i>H. nana</i>	1	0	1	1	0	1	2 (1%)

DISCUSSION AND CONCLUSION

Leprosy-reactions are characterized by an intense and sudden activation and reactivation of host immune responses that frequently affect the peripheral nerves. The clinical manifestations of leprosy-reactions are an acute inflammation of pre-existing lesions which can become erythematous, oedematous and infiltrated. Development of reaction in leprosy patients is still not well understood. Some studies have shown the association of protozoan as well as helminth parasites and development of reaction in leprosy patients (Dolo *et al.* 2002, Diniz *et al.* 2010).

Leprosy patients were found to be infected with six different species of protozoan and helminth intestinal parasites. The intestinal parasites observed in the study include 3 species of protozoa i.e. *E. histolytica*, *Giardia lamblia* and *T. hominis* and 3 species of helminths i.e. *A. duodenale*, *S. stercoralis* and *H. nana*. The frequently observed protozoan parasites were *E. histolytica* (25%) in reaction leprosy patients and (16%) in non-reaction leprosy patients, as well as *G. lamblia* (8%) in reaction leprosy patients and (9% in non-reaction leprosy patients. Both *E. histolytica* and *G. lamblia* were not found to be associated with the development of leprosy-reaction. while, an intestinal commensal flagellate parasite, *T.*

Co-infection of *Entamoeba histolytica* (20%) in leprosy patients was high than other parasites but *Hymenolepis nana* was recovered from single patient of each in reaction and non-reaction leprosy. *Trichomonas hominis*, *Ancylostoma duodenale* and *Strongyloides stercoralis* were found in only reaction leprosy patients. Parasitic co-infection in both male (39%) and female (37%) was almost same (Table 1).

hominis, was observed only in reaction leprosy patients with each (4%) infection in male and female. However this parasite was not reported from leprosy patients so far earlier. The presence of this parasite assumed that it might possess certain immuno-modulatory mechanism in the host, which favours the growth of *M. leprae* infection to more severe form of the disease. Therefore further investigation is required to understand the immunopathology of this intestinal parasite.

Helminths infection, particularly the nematodes which include *A. duodenales* (4%) and *S. stercoralis* (5%) were found only in reaction leprosy patients when compared to non-reaction leprosy patients. These findings are similar to that of earlier results of Diniz *et al.* (2010) in which helminth co-infection has shown in lepromatous leprosy patients.

Among the Cestodes only *H. nana* was found with infection of (1%) in each leprosy-reaction and non-reaction patients. However this parasite is not reported from other studies. Nematodes were more prevalent than Cestodes which is supported by the previous studies of nematode co-infection in leprosy patients (Diniz *et al.* 2001) and prevalence of *A. duodenales* in leprosy patients (Dolo *et al.* 2002). The present study did not reveal other

nematodes like *A. lumbricoides* and *T. trichiura* in either of the leprosy-reaction or non-reaction patients, but reported by other studies (Hong *et al.* 1983, Diniz *et al.* 2001, 2010).

In this study, overall helminths infection was higher (5%) in reaction leprosy patients compared to non-reaction leprosy patients. This study suggested that intestinal helminthes parasitic co-infection might have intervened with the normal immune response to mycobacterial infection (Stewart *et al.* 1999) and the possibility of an existing infection with intestinal helminths may facilitate a subsequent infection with *M. leprae* (Abulafia & Vignale 1999, Goulart *et al.* 2002, Co *et al.* 2007).

The prevalence of *S. stercoralis* infection was higher in reaction leprosy patients indicating helminths co-infection in lepromatous leprosy patients (Diniz *et al.* 2010). Leprosy-reaction and *Strongyloides* co-infection was found to be intimately associated as shown by previous observations (Leang *et al.* 2004 and Corti *et al.* 2011). *S. stercoralis* infection were observed from those reaction patients who were subjected to prolonged immunosuppressive therapy of steroids (prednisolone), regardless of drug dosages, which further support the study regarding *S. stercoralis* hyperinfection syndrome in leprosy patients subjected to immunosuppressive therapy of steroids (Hagelskjaer 1994, Leang *et al.* 2004 and Corti *et al.* 2011). As *S. stercoralis* infection was observed higher in leprosy-reaction patients, such patients should be diagnosed early because it has huge mortality rate of about 87% (Leang *et al.* 2004), therefore prevention is utmost important. Also *A. duodenale* infestation in reaction patients was 4% and is supported by its presence in leprosy patients through previous demonstration (Dolo *et al.* 2002, Diniz *et al.* 2010).

Intestinal parasitic co-infection particularly with *S. stercoralis* and *A. duodenale* (helminths) as well as *T. hominis* (protozoa) in leprosy patients may have influenced in development of reaction in leprosy patients. Hence further investigation is required to understand the immunopathology of these parasites, in the case of reaction leprosy patients.

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