Intestinal parasitosis among the elderly people in Kathmandu Valley

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ABSTRACT

Present study was carried out among the elderly people (60+ years of age) from August 2005 to July 2006 in Kathmandu Valley to assess the prevalence of intestinal parasitosis in them. Stool samples were collected from 235 elderly people (122 from government elderly home, 66 from private elderly home and 47 from the households in a rural community). The samples were examined by formal ether sedimentation and Sheather's sucrose floatation followed by Kinyoun's modified Ziehl-Neelsen staining. The overall prevalence of intestinal parasites was found to be 41.7%, out of which 30.6% had multiple parasitism. The government elderly home had significantly higher parasitic prevalence (50.8%) followed by the rural community (46.8%) and the private elderly homes (21.2%) ($P<0.05$). Males (43.8%) had slightly infection rate than females (40.4%) ($P>0.05$). There was equal infection rate with protozoa (25.8%) and helminths (27.0%). *Trichuris trichiura* (39.4%) and *Entamoeba histolytica* (19.7%) were the commonest helminth and protozoa, respectively.

Keywords: Elderly people, elderly homes, intestinal parasites, Kathmandu.

INTRODUCTION

Parasitic disease is a major public health problem in developing countries. WHO has estimated that *Ascaris lumbricoides*, hookworm and *Trichuris trichiura* infect 1.4 billion, 1.3 billion and 1.0 billion people worldwide, respectively.[1] The protozoan parasites although being less common are associated with the highest number of mortalities.[2]

Children being the major victim of the infection, most of the researches in intestinal infections are concerned with pediatric age group. However, these infections have been found to be common even among the elderly people. Gastrointestinal problems have been reported as the most common health problems of elderly people in Bangladesh and Myanmar and a leading cause of death.[3] Diarrhoea has been recognized as the commonest cause of hospitalization among the elderly people in Thailand. In India too, it is one of the top ten causes of hospitalization and death.[3] In Brazil and Central America, the reported prevalence of intestinal parasitosis among 60+ people were 3.8% and 48.0%, respectively.[4,5] In Bangladesh, Malayasia and China, the prevalence has been found 50.0%, 28.4% and 51.26%, respectively among 50+ people.[6-8]

Owing to poor sanitary and other living conditions of majority of Nepalese families, the elderly members could be the major victim of these infections. Earlier studies in Nepal have revealed gastrointestinal complain as the major health complain of old people.[9,10] The physical disability and less effective self care during old age lead to insufficient sanitary practice and poor personal hygiene which make old people more susceptible to gastrointestinal infections. The elderly have a predisposition to infectious diarrhoea. This predisposition could result from several factors including age related immune system dysfunction, achlorhydria, altered intestinal or colonic motility and changes in fecal flora.[11] Institutionalization of elderly people significantly increases the risk of infection from common source outbreaks such as food-borne epidemics and by person to person spread.[12] In this paper, we report the prevalence and the pattern of intestinal parasitic infection among the elderly people in Kathmandu Valley.

MATERIALS AND METHODOLOGY

Study population and sample collection: The stool samples were collected from the people above 60 years from a government and five private elderly homes and from the households in a rural community of the valley.

Processing of the samples: The samples were examined by formal ether sedimentation and Sheather's sucrose floatation followed by Kinyoun's modified Ziehl-Neelsen staining. The identification of the cysts, trophozoites, eggs, larvae and oocysts of the parasites was done based on their basic morphology under microscope

Statistical analysis: Chi-square test was used to evaluate apparent differences for significance. Association of intestinal infections with different variables was tested.

RESULTS

Out of 235 stool samples collected, 98 (41.7%) samples had one or more intestinal parasites. Of the 98 positive samples, 68 (69.4%) samples yielded single parasite, where as 30 (30.6%) samples had multiple parasites (Table 1). Among 3 study groups, the highest positive rate was found in government run elderly home (50.8%) followed by rural community (46.8%) and private elderly homes (21.2%) ($P<0.05$). The average positive rate in elderly homes was 40.4%. The parasite infection rate among male and female was found to be 43.8% and 40.4%, respectively ($P>0.05$) (Fig 1).

Out of 235 elderly people studied, 28.9% had monoparasitosis and 12.8% had multiparasitosis. No difference in multiparasitic and monoparasitic infection rates in two genders was observed (multiparasitosis: 30.8% in males and 30.5% in females; monoparasitosis: 69.2% in males and 69.5% in females).

The helminth and protozoan infection rates in males 27.0% and 25.8%, respectively. Similar trend was observed among females (helminth 24.0% and protozoa 21.9%) ($P>0.05$). Of the parasites detected, 54.5% were helminths and 45.5% were protozoa. The government run elderly home had helminthic and protozoal infection rates of 51.8% and 48.2%, respectively. Similarly, in the community, 74.2% helminths and 25.8% protozoa were detected among total infected. In contrast to these, the helminthic and protozoal infection rates in the privately run elderly homes were 31.3% and 68.8 %, respectively (Table 2).

DISCUSSION

In the present study, about two-fifth of the elderly people were found to be infected with one or more intestinal parasites. This finding was much higher than that observed in Brazil (60+ people),[5] Malayasia (50+ people)[7] and Iran (69+ people).[13] In contrast, studies done among 50+ people in China[8] and Bangladesh[6] have shown higher prevalence (51.3% in China and 50% in Bangladesh). These findings may correlate with the prevalence of parasitosis among the general population of the particular geographical area.

In Nepal, the prevalence ranges from 27.0% to 76.4% in different studies carried out among general population in different geographical areas.[14-17] The similarity of the study-result with the current trends of intestinal infection in the country may be due to the equal susceptibility of the elderly people towards the infections as the other age groups. However, illiteracy, poor living standard, poverty, improper hygiene, unsafe drinking water etc. might be the causes behind the increased rate of the parasitic infection among the elderly people in this study, as compared to the infection rate among the people of similar age group elsewhere.

Of the three study groups, the highest parasitic infection rate found in the government elderly home followed by community and private elderly homes appeared to be associated with the crowdedness, level of sanitation and degree of care provided. A relatively lower prevalence in the private elderly homes appeared to be associated with relatively better living condition. In one of the elderly homes, there was a provision of even single room per person and boiled drinking water. The parasitic infection rate seen in the community was quite closer to that of government elderly home, which reflected the relatively poor living status of Nepalese elderly people in the rural region even in the vicinity of the capital city.

The nearly equal parasitic infection rate found between two genders was in agreement with the trend observed by other studies in Nepal[15,16] and elsewhere in the world.[7,13] In contrary, males have been found to be infected significantly at higher rate in Brazil.[5] Similarly, a study from Nepal[18] and few studies from elsewhere[8,19] have shown higher infection among female.

Female were found to have 1.25 times more chances of being infected with *A. lumbricoides* than the male.[20] This indicated that the gender may or may not play role in parasitosis depending on the region and other environmental or behavioral factors. Generally, the increased mobility of the male increases the risk of infection among them, while the involvement of female in childcare and their low educational status is responsible for increased risk in them. Elsewhere, female reportedly have more soil contact during growing vegetables and eat raw vegetable with prepared food more often than males.[20] However, in this study, this was not true.

The ratio of monoparasitism and multiparasitism among total infected people (7:3) was consistent with the rate among general population in Brazil[5] and Lao PDR.[20] In the contrary, the multiparasitism rate was higher in Fujian Province (China) in 1998 and lower in the same place in 1999.[8] In Nepal, the rate of multiparasitism varies greatly in study populations and geographical areas.[16,17] Very low rate of multiparasitism (<5.0%) has been reported in one of the hilly regions in eastern Nepal.[17] Whereas, a report has shown very high rate (63.2%) in western Nepal, male being

the common victim of multiparasitism.[16] However, in this study, rates of monoparasitism and multiparasitism were found to be independent of the gender of the elderly people.

The rate of helminthic infection was almost equal to the rate of protozoal infection with no marked difference in two genders. However, other studies among general population in Nepal have found higher prevalence of helminthic infection.[16,18] Similarly, Oda *et al* has reported protozoa more among males than in female and explained to be due to genetic and physical factors.[21] Among the individual study groups, the higher helminthic infection rate in the community observed in this study might be due to the presence of more open land and agriculture as the major occupation of the people in the rural community, while water may be the cause behind higher protozoal infection rate in private elderly home.

T. trichiura detected as the commonest parasite in the study, infecting almost two-fifth of the total infected elderly people was similar to the finding of Chai *et al* [22] among the people of same age group but the rate of infection was lower. *T. trichiura* has been reported as the commonest helminth also elsewhere in the world.[7,19] This might be due to incomplete removal of this helminth with a single dose of anti-helminthic drug, particularly in heavy infection.[23] However, very low *T. trichiura* infection rate has been reported among 45 + people by Blangero *et al*[24] in a specified community of Nepal. The infection rate of just around one quarter of the total infected people aged above 50 years has been reported in Brazil.[5]

Quite lower infection rate by *A. lumbricoides* in the study was in agreement with prevalence of the helminth observed among 40+ people in Iran.[13] However, *Ascaris* has been reported as the commonest parasite among general population[15-17] and among hospital visiting patients in Nepal during a period of ten years.[18] In this study, the prevalence of hookworm infection was marginally higher than that of *A. lumbricoides* but very low as compared to *T. trichiura* infection rate as reported in Lao PDR.[20] On the other hand, higher prevalence of hookworm infection has been reported among 45+ people in specified communities in Nepal[24] and 50+ people elsewhere in the world.[25]

In contrary to the finding of *G. lamblia* as the commonest protozoa among different age groups in Nepal,[21] *E. histolytica* has been found to be the commonest one in this study. Elsewhere, *Endolimax nana* has been reported as the commonest protozoa among 60+ people.[5] Very low prevalence of *E. histolytica* infection has been reported among 40+ people in Iran[13] and the healthy elderly in India.[26] Infection with *E. histolytica* is common in inhabitants of developing countries; it predominantly affects people with poor socioeconomic conditions, poor hygienic practices, and malnutrition. In this study, the prevalence rate of *E. coli* was found to be somewhat lower than the finding among 60+ people in Brazil.[5] However, Rai *et al* has reported *E. coli* as the commonest protozoa in a western district of Nepal.[16]

Very low prevalence of *G. lamblia* observed in this study was in agreement with the findings of Gambhir *et al*[26] among healthy Indian elderly people indicating the risk of infection with *G. lamblia* to decrease with ageing.[27] As a reaction to infection with *Giardia*, both humoral and cellular immune response generated by host secretary IgA and IgM appear to play role in clearance of intestinal infection. This gives some degree of protection against reinfection.[21] So, the chronically exposed people, especially elderly group have lower attack rate. However, greater prevalences of *G. lamblia* have been reported among 40+ people in Iran.[13]

Very low prevalence (0.8%) of *C. cayetanensis* found in this study might be due to the immunity developed after repeated attack[28] This finding was much lower than the finding of Kimura *et al* (9.2%) reported in Nepal.[29] Similarly, a higher rate of cyclosporosis was observed in young and elder adults up to 60-year-old in Peru.[30] An ongoing study in Nepal has revealed *C. cayetanensis* at significant rate from the vegetables, particularly the green onion (personnel communication).

C. parvum is generally found to infect the immunocompromised hosts including the elderly people. The prevalence rate of *C. parvum* found in this study was quite consistent with the findings of Lee *et al* [31] among 60+ people. Elderly people are reportedly at higher risk of *C. parvum* infection.[32] Comparatively, higher prevalence of *C. parvum* have been reported among elderly people elsewhere.[31-33] Cryptosporidiosis among the elderly people without immunocompromised status may be due to the higher prevalence of the organism in the environment.[26] Higher rate of *C. parvum* infection (5.2%) has been reported among HIV victims in Nepal.[34] Cryptosporidiosis has been found to be positively associated with diarrhoea.[26] In this study also, around one-fourth of the subjects with diarrhoea had *C. parvum*.

Thus, present findings showed that the elderly people in the developing countries like Nepal are under significant threats of the intestinal parasitic infections and the related morbidities. The condition can be remarkably improved by availing them with appropriate nutrition, safe drinking water, hygienic living conditions, periodic health check-ups and the regular deworming. Beside

these, raising awareness among the elderly through the health education programmes can be an effective intervention.

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Table-1: Pattern of parasitic infections in elderly people

Type of infection	Total	Percentage
Single parasite	**68**	**69.4**
Protozoa	34	34.7
Helminth	34	34.7
Multiple parasite	**30**	**30.6**
Protozoans	5	5.1
Helminthes	9	9.2
Protozoans + Helminthes	16	16.3
Total	**98**	**100.0**

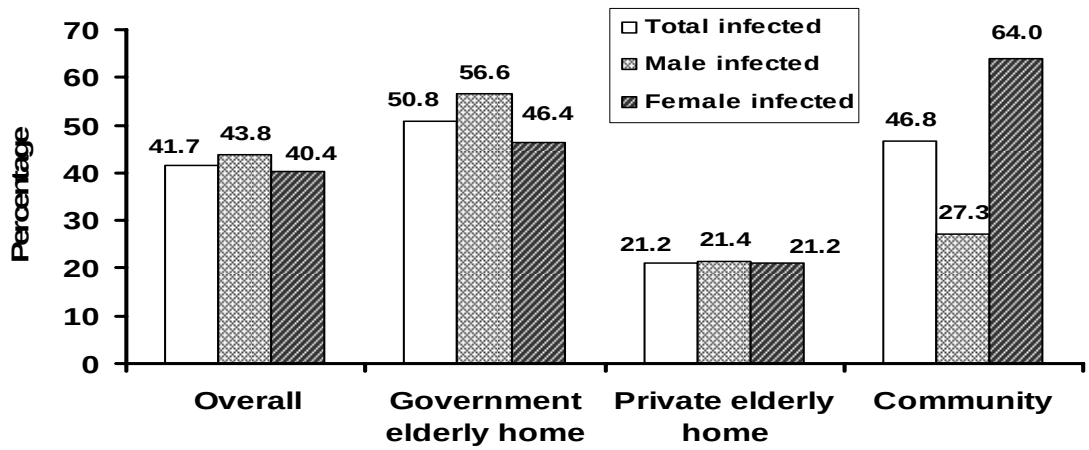

Fig. 1 Distribution of parasites in two genders of different study groups (n=235)

Table-2: Frequency of the parasites detected in different study groups

Parasites	Elderly people at			Total
	Government elderly home	Private elderly home	Community	
Total Helminthes	**44 (51.8%)**	**5 (31.3%)**	**23 (74.2%)**	**72 (54.5%)**
T. trichiura	32 (37.6%)	4 (25.0%)	16 (51.6%)	52 (39.4%)
A. lumbricoides	5 (5.9%)	-	3 (9.7%)	8 (6.1%)
Hookworm	6 (7.1%)	1 (6.3%)	4 (12.9%)	11 (8.3%)
S. stercoralis	1 (1.2%)	-	-	1 (0.8%)
Total Protozoans	**41 (48.2%)**	**11 (68.8%)**	**8 (25.8%)**	**60 (45.5%)**
E. histolytica	16 (18.8%)	5 (31.3%)	5 (16.1%)	26 (19.7%)
E. coli	15 (17.6%)	4 (25.0%)	2 (6.5%)	21 (15.9%)
B. hominis	5 (5.9%)	1 (6.3%)	1 (3.2%)	7 (5.3%)
G. lamblia	2 (2.4%)	-	-	2 (1.5%)
E. hartmani	-	1 (6.3%)	-	1 (0.8%)
C. cayetanensis	1 (1.2%)	-	-	1 (0.8%)
C. parvum	2 (2.4%)	-	-	2 (1.5%)
Total Parasites	**85**	**16**	**31**	**132**

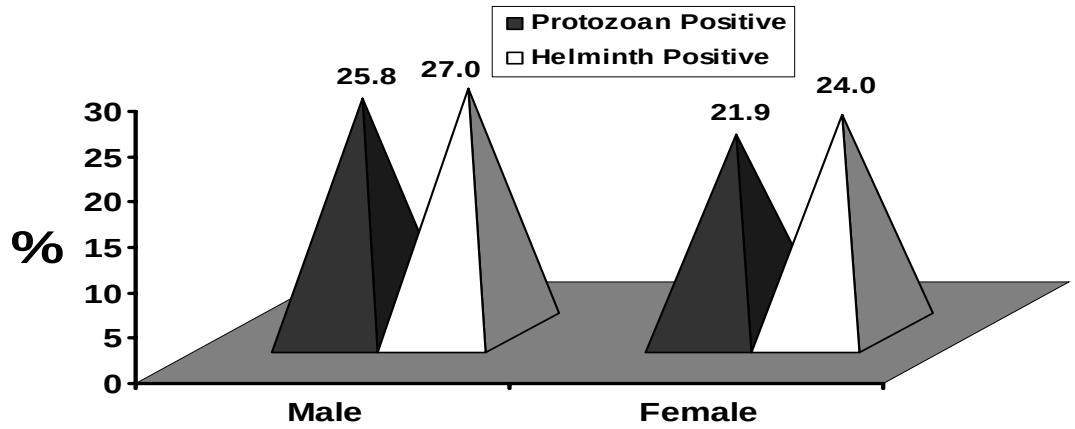

Fig. 2. Distribution of protozoal and helminthic infections in two genders.