Parasitic Pathogens Associated with Diarrhoea in Mombasa, Kenya

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Abstract: A microscopic examination of a faecal specimens was designed to identify the enteropathogenic parasites in the diarrhoeal stool specimens in which neither enteropathogenic bacteria nor rotavirus was isolated in Caost Provincial General Hospital, Mombasa, Kenya. The parasites incriminated as causes of diarrhoea were *Entamoeba histolytica, Giardia lamblia, Trichuris trichiura*, hookworm and *Ascaris lumbricoides*. The cysts and ova of these parasites, however, were present with equal frequency in diarrhoeal, semi-formed and formed stool specimens, except the trophozoites of *E. histolytica*. The role of parasites in causation of diarrhoea is difficult to evaluate by the routine stool examination for parasites.

Key words: Parasite-related diarrhoea, Kenya

INTRODUCTION

Diarrhoeal diseases are one of the major public health problems related to transmissible diseases in all the developing countries (WHO, 1985). Although many investigations leave no doubt about the importance of parasitic infections in causing diarrhoea, it is not easy to assess the importance of parasitic infections as a cause of diarrhoea (Joe *et al.*, 1966; Ingram *et al.*, 1966). The main reason is that parasites were found in equal incidence in diarrhoea cases and controls. To provide reliable information as to the prevalence of parasite-related diarrhoeas, parasitological investigation is recommended to be complemented by bacterial and virological studies (WHO, 1980). The investigations done in various countries reported

Received for Publication January 11, 1993.
Contribution No. 2718 from the Institute of Tropical Medicine, Nagasaki University.

many parasitic enteropathogens associated with diarrhoea (Ingram *et al.*, 1966; Joe *et al.*, 1966; Forman *et al.*, 1971; Itotia *et al.*, 1978; Soenarto *et al.*, 1983; Casalino *et al.*, 1988; Stanton *et al.*, 1989; Nakano *et al.*, 1990).

The prevalence of protozoa and helminth infection differs by geographical, climatic and sanitary conditions. The present paper deals with the parasitic enteropathogens associated with diarrhoea in Mombasa, Kenya.

Materials and Methods

The present study was carried out in Coast Provincial General Hospital, Mombasa, during 2-week period between June and July, 1981. Faecal samples were obtained from the out-patients who admitted to the hospital. A total of 378 stool samples were collected. Although 52 samples showed a partial or complete lack of the information of the sex and age of the patients, they were examined for parasites. Faecal samples were classified into diarrhoeal, semi-formed and formed stools. Out of 87 diarrhoeal stool speciems, 74 were examined for the presence of enteropathogenic bacteria, rotavirus and parasites, and 13 were examined for the presence of parasites alone. Seventy three semi-formed and 218 formed stool specimens were examined for parasites alone. The diarrhoeal and semi-formed specimens were examined for vegetative forms of protozoa by the direct saline faecal smear within 4hr after collection of specimens, and then for the cyst, ova and larvae of parasites by the formol-ether-concentration technique. The formed stool speciems were examined for parasites by the concentration technique alone. The differences between groups were analysed using chi square statistics.

Results

Table 1 lists the incidence of each parasite found in diarrhoeal, semi-formed and formed stool specimens. One or more parasites were found in 44 (50.5%) diarrhoeal, 45 (61.6%) semi-formed, and 116 (53.2%) formed stool samples. There was no significant difference in overall infection rate of parasites among three types of stools, diarrhoeal, semi-formed and formed. The trophozoites of *Entamoeba histolytica* were found in two diarrhoeal specimens. However, *E. histolytica* cysts were found in equal frequency among diarrhoeal, semi-formed and formed specimens. *Giardia lamblia* is likely to be detected more frequently in semi-formed stools ($p<0.01$). *E. coli*, *Endolimax nana*, *Iodamoeba butschlii*, *Chilomastix mesnili* were identified in all forms of stools. Although the examination of formed stool was not done, *Trichomonas hominis* was frequently isolated in diarrhoeal and semi-formed stools.

Infection rate of *Trichuris trichiura* is high. Ova of *T. trichiura* were more frequently detected in diarrhoeal and semi-formed specimens than in formed specimens ($p<0.01$). Hookworm ova were found in equal frequency among three types of stool specimens. Ova of *Ascaris lumbricoides* were more frequently detected in semi-formed stools ($p<0.01$). Eighty eight samples, 16 of diarrhoeal, 20 of semi-formed and 52 of formed stool specimens, cont-

ained evidence of two or more parasites.

Out of 87 diarrhoeal stool specimens, 74 were examined for the presence of enteropathogenic bacteria, rotavirus and parasites. One or more bacterial enteropathogens were isolated from 24 specimens; in 12 of them parasites were detected. Rotavirus antigen was detected in 3 specimens; in one of them parasites were isolated. Twenty six diarrhoeal stool specimens contained parasites alone; 14 of them had the mix infection with 2−4 agents. No pathogen was isolated in the remaining 21 specimens. Table 2 shows the parasites found in diarrhoeal stool specimens in which neither enteropathogenic bacteria nor rotavirus was isolated. Since it is a common belief that *E. coli*, *E. nana*, *I. butschlii*, *T. hominis* and *C. mesnili* are non-pathogenic protozoa, the parasitic pathogens incriminated as causes of diarrhoea in Mombasa were *E. histolytica*, *G. lamblia*, *A. lumbricoides*, hookworm and *T. trichiura*.

Table 3 shows the incidence of the parasites which were incriminated as causes of diarrhoea by age. Giardiasis seems to infect children exclusively.

Table 1. Parasitological examination of stool at Coast Provincial General Hospital, Mombasa, Kenya

	Diarrheic+	Semi-formed+	Formed++	Total
No. examined	87	73	218	378
No. positive for trophozoit, cyst ova, larve	44 (50.5)	45 (61.6)	116 (53.2)	205 (54.2)
Amoebae				
Entamoeba histolytica	6 (6.9)	4 (5.5)	14 (6.4)	24 (6.3)
E. coli	6	11	48	65 (17.2)
Endolimax nana	1	2	18	21 (5.6)
Iodamoeba butschlii	2	0	9	11 (2.9)
Flagellates				
Giardia lamblia	2 (2.3)	6 (8.2)	3 (1.4)	11 (2.9)
Trichomonas hominis	7 (8.0)	4 (5.5)	ND	11 (6.9)
Chilomastix mesnili	4	3	12	19 (5.0)
Nematodae				
Ascaris lumbricoides	3 (3.4)	9 (12.3)	8 (3.7)	20 (5.3)
Hookworm	12 (13.8)	10 (13.7)	31 (14.2)	53 (14.0)
Trichuris trichiura	31 (35.6)	25 (34.2)	48 (22.0)	104 (27.5)
Rhabditis larva	1	2	2	5 (1.3)
Trematodae				
Schistosoma mansoni	0	0	3	3 (0.8)
Cestodae				
Taenia spp.	0	0	1	1 (0.3)
Mix infection	16 (18.6)	20 (27.4)	52 (23.9)	88 (23.3)

+: Direct smear and concentration methods were combined.

++: Concentration method alone

( ) : per cent.

Table 2. Parasites found in diarrhoea in which neither enteropathogenic bacteria nor rotavirus was isolated

Patient No.	Parasites detected
1	*E. histolytica, T. trichiura, T. hominis*
2	*T. trichiura*, Hookworm
3	*E. histolytica, C. mesnili*
4	*T. trichiura, E. coli, E. nana*
5	*E. histolytica, T. trichiura, A. lumbricoides*
6	*G. lamblia*, Hookworm, *C. mesnili*
7	Hookworm, *E. coli*
8	*T. trichiura*, Hookworm, R-larvae, *E. coli*
9	*T. trichiura*
10	Hookworm, *I. butschlii*
11	*G. lamblia*
12	*T. trichiura*
13	*T. trichiura*, Hookworm, *T. hominis*
14	*E. histolytica*
15	*T. hominis*
16	*T. trichiura*
17	*E. histolytica, T. trichiura, T. hominis*
18	*T. trichiura*
19	*T. trichiura*
20	*T. trichiura*
21	*T. trichiura*
22	*T. trichiura, T. hominis, C. mesnili*
23	*T. hominis*
24	Hookworm, *A. lumbricoides, E. coli, C. mesnili*
25	*T. trichiura*
26	*E. coli, T. hominis, I. butschlii*

Table 3. Incidence of parasites which may be incriminated as causes of diarrhoea by age

Age years	No. examined	*E. histolytica*	*G. lamblia*	*A. lumbricoides*	Hookworm	*T. trichiura*
0− 1	36	0	3 (8.3)	2 (5.6)	0	8 (22.2)
2− 3	35	0	3 (8.3)	3 (8.6)	3 (8.6)	13 (37.1)
4− 5	13	1 (2.9)	0	2 (15.4)	3 (23.1)	6 (46.2)
6− 9	21	1 (7.7)	0	4 (19.0)	9 (42.9)	14 (66.6)
10−19	42	1 (4.8)	1 (2.4)	0	12 (28.6)	10 (23.8)
20−29	97	10 (10.3)	0	2 (2.1)	9 (9.3)	20 (20.6)
30−39	36	3 (8.3)	0	1 (2.8)	5 (13.9)	8 (22.2)
40−	46	2 (4.3)	0	2 (4.3)	8 (17.4)	11 (23.9)

( ) : Per cent

Discussion

The role of parasites in causation of diarrhoea is difficult to evaluate, because the parasites are found in equal incidence in diarrhoea cases and controls with the exception of *G. lamblia* (Ingram *et al.*, 1966). The present study revealed that intestinal parasites appeared with approximately equal frequency in diarrhoeal, semi-formed and formed stools, with the exception of trophozoites of *E. histolytica*. In our study, trophozoites of *E. histolytica* were exclusively isolated in diarrhoeal stool specimens and *G. lamblia* was frequently found in semi-formed stool specimens. The routine stool examination for parasites provides less reliable information on the parasitic enteropathogens associated with diarrhoea. The present study, therefore, was designed to identify the parasites in diarrhoeal stool specimens in which neither enteropathogenic bacteria nor rotavirus was isolated. Consequently, *E. histolytica*, *G. lamblia*, *T. trichiura*, hookworm and *A. lumbricoides* were incriminated causes of diarrhoea in Mombasa, Kenya. Amoebiasis, giardiasis and trichuriasis are infections with a global distribution in which diarrhoea is a common symptom (WHO, 1980). Hookworm and *A. lumbricoides* were found in the stool specimens from U.S. marines admitted to a hospital because of diarrhoea in Vietnam (Forman *et al.*, 1971).

It is a common belief that a substantial number of cases of diarrhoea are caused by parasties. The present study revealed that the relative importance of parasitic agents as the causes of diarrhoea in Mombasa, Kenya is high, 31 per cent of all reported diarrhoea being caused by the parasites.

In the present study, it was not possible to carry out the stool examination quantitatively and so the intensity of infection was not known in our study. The heavy load of the certain types of parasites may cause the diarrhoea. A certain amount of diarrhoea may be caused by the association between the presence of parasites and the nutritional and immune status of the host (WHO, 1980). It is also possible that infection superimposed on pre-existing parasite infection could result in diarrhoea (Soenarto *et al.*, 1983). Although it is difficult to measure the relative importance of parasitic agents in all reported diarrhoea, the present study strongly emphasizes the importance of parasitic infestation in causing diarrhoea in the developing countries.

Acknowledgments

We are indebted to Prof. M. Mugambi, the ex-Director of the Kenya Medical Research Institute for his permission and encouragement in conducting this study. This study was supported by the Kenya Medical Research Institute and the Japan International Cooperation Agency, Japan.

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