Prevalence of Parasitic Infestation among Under-5 Children of Low Socio-economic Status

Lutfun Nahar[1], Sagarmay Barua[1], Golam Firoz[2] and Anwar Hossain[1]*

[1]Institute of Nutrition and Food Science, University of Dhaka, Bangladesh.
[2]Radda Barnen, Mirpur-10, Dhaka, Bangladesh.

Abstract

Prevalence of parasitic infestation amongst the under-5 children of low socio-economic status was investigated in the present study. A total of 41.5 percent of the children under study was found to be infected with at least one of the three intestinal parasites. Rate of infestation increased with the increase of age, the highest rate (70.0%) being associated with age group 36-59 months. Prevalence rate of single, double and triple infections were 31.0% 7.7% and 2.8% respectively. Prevalence of infestation was significantly ($p<0.005$) lower amongst the higher income group. Prevalence of infestation tended to be lower amongst the children of literate mothers as compared to those of illiterate ones. Children of small (≤ 4 members) and big (≥ 5 members) families were equally infested. Parasite infested children were significantly ($p<0.05$) more malnourished as compared to parasite-free ones.

Introduction

Parasite infestation ranks as one of the most common melodies affecting mankind in developing countries of the world. Recent global estimates indicate that soil-transmitted worm infestation and schistosomiasis are among the most common infection in the world. Aescaris lumbricoides infects approximately one quarter of the world's population, hookworm infects about one fifth of the population and trichuris trichura infects over 500 million people[1,2,3]. Parasitic infestation is very often associated with malnutrition.

Malnutrition and parasitic infestation is common in developing countries, especially among the children in communities of low socio-economic status. Worms are transmitted by improper disposal of faeces and thus the infection are endemic in areas where sanitation is poor and knowledge of disease

Bangladesh Journal of Nutrition, Vol. 12, Nos. 1 & 2, December 1999. Institute of Nutrition and Food Science, University of Dhaka, Bangladesh.

* *Author for Correspondence*

prevention is minimal, especially worm humid areas of the tropics and subtropics[4]. The section of the children population residing in slum and rural areas suffer most. Parasitic infestation contributes significantly to protein calorie malnutrition[5,6]. The role of intestinal parasites as competitors of nutrients is well established. Malabsorption of protein, carbohydrate, fat and vitamin A among children with ascaris has been reported in several studies[7-10]. The role of intestinal parasites in the increase of anemia has been well recognized.

Along with nutritional inadequacy and anemia, parasitic infestation is one of the most widespread health problem in Bangladesh. The magnitude of this problem on the health of our people has been reported in some previous studies[11-14]. The present study was undertaken to find out the prevalence of parasitic infestation among the under-5 children of low socio-economic status attending a maternal and child Health centre at Dhaka. The study also aimed at measuring the impact of socio-economic status upon parasitic infestation. Growth achievement was studied in relation to their parasitic infestation.

Materials and Methods

The study reported here was conducted among the children attending a Maternal and Child Health Centre (Radda Barnan, Mirpur/10) at Dhaka. Usually children from low socio-economic status attend this Centre for health problem and immunization. The study subjects were slum dwellers. In the present study, the target population was the under-5 children of age 6-59 months. Two hundred and fifty children were selected randomly for the study. Out of them, 198 children participated in the study. Household demographic and socio-economic information was collected by using pre-tested questionnaire. A small plastic container was supplied to each mother to collect the stool. Mothers were requested to bring the stool sample of their children within three days. Only 142 subjects supplied the stool. Stools were examined for parasites using standard microscopic method[15]. Height and weight of all the children (n=198) were recorded by standard method and compared with the NCHS standard. Nutritional status of the children was determined by weight for age (wt./age) criteria using Gomez Classification. Statistical analysis was performed by using SPSS package programme. (SPSS/PC$^+$ version 3.0: SPSS Inc., Chicago).

Results

Table 1 shows the prevalence of parasitic infestation according to age group. Among the study population, a total of 41.5% of the children were infected with at least one of the three intestinal parasites. The prevalence was lowest (10.9%) among the youngest group of children aged 6-11 months. The rate of infestation increased with the increase of age group. The rate for the age group 12-23 months and 24-35 months were 55.8% and 66.7% respectively. The highest rate (70.0%) was among the older children of age group 36-59 months.

Table 1. Prevalence rate of parasitic infestation according to age group.

Age group (Months)	Parasite free (%)	Parasite infested (%)	Total number
6-11	89.1(49*)	10.9 (6)	55
12-23	44.2 (23)	55.8 (29)	52
24-35	33.3 (5)	66.7 (10)	15
36-59	30.0 (6)	70.0 (14)	20
6-59	58.5 (83)	41.5 (59)	100 (142)

x^2 = 36-15, d. f. = 3 (sign), P < 0.005

* Values in the parenthesis represent the number of subjects.

As depicted in Table 2, the overall prevalence rates of single, double and tripe infections were 31.0%, 7.7% and 2.8%, respectively. Among the single infected children, most were infected with ascaris lumbricoides, whereas trichuris plus ascaris combination was the most common infection among the double infected children. A total of 24.7% were infected with ascaris lumbricodies and 5.6% with ascaris plus trichuris. Triple infection was present in 4 cases. Ascaris and trichuris was common in triple infected children.

Table 2. Percent prevalence of single, double and triple infection of Children.

Parasite infestation	Age (months)				
	6-11 n=55	12-23 n=52	24-35 n=15	36-59 n=20	Total number n=142
Single infection	-	-	-		31.0 (44)
Ascaris	5.5 (3)*	40.4. (21)	33.3 (5)	30 (6)	24.7 (35)
Trichuris	3.6 (2)	3.8 (2)	0	0	2.8 (4)
Giardia	1.8 (1)	3.8 (2)	13.3 (2)	0	3.5 (5)
Double infection	-	-	-	-	7.7 (11)
Ascaris + Trichuris	0	5.8 (3)	13.3 (2)	15 (3)	5.6 (8)
Ascaris + Giardia	0	0	0	5 (1)	0.7 (1)
Ascaris + E. Histolytica	0	0	6.7 (1)	0	0.7 (1)
Trichuris + Giardia	0	0	0	5 (1)	0.7 (1)
Triple infection	-	-	-	-	2.8 (4)
Ascaris + Trichuris + Giardia	0	1.9 (1)	0	0	0.7 (1)
Ascaris + Trichuris + E. Histolytica	0	0	0	15 (3)	2.1 (3)

Table 3. Distribution rate of parasite infested children according to family income per month.

Family Income (Taka per month)	Parasite free (%)	Parasite infested (%)	Total number (n)
<2000	41.8 (23)*	58.2 (32)	55
2000-4000	68.2 (30)	31.8 (14)	44
>4000	72.5 (29)	27.5 (11)	40
	59.0 (82)	41.0 (57)	100 (139)

x^2 = 11.25, d.f. = 2, P <0.005

* Values in the parenthesis represent the number of subjects.

Table 4. Percent distribution of infested children by mother's education.

Mother's education	Parasite free	Parasite infested	Total number
Illiterate	54.1 (33)	45.9 (28)	61
Literate	61.7 (50)*	38.3 (31)	81
	58.5 (83)	41.5 (59)	100 (142)

* Values in the parenthesis represent the number of subjects.

The percent distribution of parasite infested children according to family income per months is illustrated in Table 3, Prevalence of infestation decreased significantly with ($P<0.005$) the increase of income. Prevalence of infestation was highest (58.2%) among the lowest income group (<Tk. 2000/= per month) : while the prevalence was lowest (27.5%) among the highest income group (>Tk. 4000/= per month).

Table 4 represents the percent distribution of infested children by mother's education. The prevalence of infestation tended to be higher amongst the children of illiterate mothers as compared to these of literate ones.

Table 5. Percent prevalence of parasitic infestation in relation to family size.

Family size	Parasite free	Parasite infested	Total number
≤ 4	59.4 (38)*	40.6 (26)	64
≥ 5	59.2 (45)	40.8 (31)	76
	59.3 (83)	40.7 (57)	100 (140)

Table 6. Relationship between Parasitic infestation and nutritional status of Children.

Infestation	Malnourished Wt./Age	Normal	Total
Parasite free	80.7 (67)*	19.3 (16)	83
Parasite infested	91.4 (53)	8.6 (5)	58

$x^2 = 10.51$: d.f.3, $P<0.05$.

* Values in the parenthesis represent the number of subjects

Prevalence of parasitic infestation in relation to family size is shown in Table 5. About equal proportion of children of family size (≤4 member) and (≥ 5 member) were infested with parasites and their respective values were 40.6% and 40.8%.

Table 6 depicts the relationship between parasitic infestation and nutritional status. Amongst parasite infested children, 91.4% were malnourished by Gomez classification (wt./Age), while amongst parasite free children 80.7% were under weight.

Discussion

In present study, prevalence of parasitic infestation was found to be quite high (41.5%). Previous studies in Bangladesh reported even higher prevalence (65.8-99.03%) amongst the children of different socio-economic status[11,13,16]. Amongst several possibilities, lower prevalence in present study may be attributed to the fact that mothers under present study were given orientation on child care and general hygiene in the centre. Children of lower age group (6-11 months) were less infected. This may account for their dependence on breast-feeding, which saves them from outer contaminations. On the other hand, higher prevalence amongst higher age group may account for their higher exposure to outer environment and access to outer foods. This finding is in agreement with the previous reports[11] in Bangladesh which has shown that prevalence rate was lowest in the first year which gradually rose and reached the maximum around the age of 7 years. Prevalence of infestation decreased significantly with the increase of income. Moreover, children of illiterate mothers tended to be more infested as compared to those of literate mothers. Parasitic infestation is directly related to general hygiene and sanitation which in turn are dependent on socio-economic status of a community. If the community is economically depressed, several implications including over crowding, poverty and poor sanitation may follow. Poor sanitation includes inappropriate facilities for the disposal of human excreta. Previous investigation in poor urban and rural community support that ascariasis is mot prevalent amongst the people of the low socio-economic status[17, 18].

In a study in Panama[19], it was also observed that the uninfected children had mothers with a slightly higher degree of education and their families had a greater mean monthly income. In the present study, greater proportion of infected children were malnourished as compared to uninfected ones. Associations between parasitic infestation and malnutrition have been reputed in serval previous studies[5,9,10]. Presence of intestinal parasites

causes a mild anorexia and consumption of less food than the uninfected children[20]. It is also suggested that parasitic infestation impairs gestro-intestinal function and affects on mucosal integrity[21]. Absorption of vitamin A has been reported to be reduced in ascariasis[22]. Malabsorption Syndrome accompanied by anaemia has been shown to occur in patients with heavy Giardia lambia infection[5]. Heavy trichuriasis has been associated with anaemia, protein energy malnutrition, chronic diarrhoea and dysentery[23,24]. Trichuris trichura, hookworm and schistosoniasis causes blood loss from gastrointestinal tract or urinary system[25]. Notably as a part of this study, we also looked into the association between parasitic infestation and prevalence of anaemia amongst our study population which has been published else where[27]. In our study, children infested with TT and Giardia showed comparatively lower hemoglobin level as compared to noninfested one, though the difference was not statistically significant. Latham *et al.* reported significantly higher growth in children after antiascariasis treatment, Gupta *et al.*[26] also reported significantly higher weight gain as a result of one year long periodic piperazine administration. No single factor appears to be responsible for parasitic infection, rather a collection of factors of medical, biological, economic and cultural nature–working in synergestion, appear to be significant than any single factor working independently.

References

1. Crompton D.W.T and Nesheim, M.C., Nutritional Science and Parasitology: a case for collaboration, Bioscience, 1982; 32 : 677-680.
2. Peters W. and Gilles, H.M.A., Colour Atlas of Tropical Medicine and Parasitology, London : Wolfe Medical Publications, 1977.
3. Walsh J. A. and Warren K.S. Selective primary health care. New England. J. Med. 1979; 301 : 957-974.
4. Ukoli F.M.A., The socio-economic consequences and prospects for the control of parasitic diseases in tropical Africa. In : Introduction to Parasitology in Tropical Africa. (New York : John Wiley and Sons), 1984 : 3-17.
5. Gupta M.C., Intestinal parasitic infections and malnutrition. Indian J. Pediat. 1980; 47 : 505-509.
6. Stephenson L. S., Compton D.W.T., Latham. The Relationship between ascaris infection and growth of malnourished preschool children in Kenya. Am. J. Clin. Nutr. 1980; 33 : 1165.
7. Sivakumar B, Reddy V., Absorption of Vitamin A in children with ascariasis. J. Trop. Med. Hyg. 1975; 78 : 114-115.

8. Brown KH, Gilman RH, and Khatun M. Absorption of macronutrients from a rice-vegetable diet before and after treatment for ascariasis in children. Am J Clin Nutr. 1980; 33 : 1975-1982.

9. Tripathy K, Gonzalez F, Lotero M and Balanos, O Effect of ascaris infection on human nutrition. Am. J. Trop. Med. Hyg., 1971; 20 : 212.

10. Tripathy K, Duque E, Balanos O, Lotero M, and Mayora, LG. Malabsorption syndrome in ascariasis. Am. J. Clin. Nutr., 1972; 25 : 1276.

11. Muttalib M. 1982. Prevalence of Intestial Parasites in Rural Children in Bangladesh. In Touch (VHSS Newletter), No. 57, (Sept.-Oct.).

12. Nazir PH. Common Helminthic Problems in Prediatrics and their Management. Sylhet Med. J. Aug. 1982; 6(5) : 7-10.

13. Saha, BD and Zaman MN. Helminthic infestation in under five children in Rangpur and Dinajpur districts. Bang. Paediatr. 1981; 5 : 12.

14. Institute of Nutrition and Food Science, University of Dhaka. Studies on the etiology of anemia in Bangladesh : Effects of helminthes and safe water, 1982.

15. Khaleque SA, Textbook of Pathology. 1976; 1 : 251-255.

16. Haque N. and Seikh AA, Incidence of intestial parasites in children of different socio-economic population of Dacca City. Bang. Med. Res. Coun. Bulletin 1976; 2(1) : 1-7.

17. Pellet PL, Commentary : Changing concept of world malnutrition. Ecology of Food and Nutrition, 1983; 13 : 115-123.

18. World Health Organization Sixth Report on the World Health Situation. Part I Global Analyses, (Geneva : WHO), 1980.

19. Carrera E, Nesheim MC and Crompton DWT. Lactose maldigestion in Ascaris–infected pre-school children. Am. J. Clin. Nutr. 1984. 39 : 255-264.

20. Crompton DWT, Influence of Parasitic infection on food intake. Federation Proceedings, 1984; 43 : 239-245.

21. Northrop CA, Lunn PG, Wainwright M and Evans I, Plasma albumin concentrations and intestinal permiability in Bangladeshi children infected with Ascaris lumbricoides., Transaction of the Royal Society of Tropical Medicine and Hygiene, 1987; 81 : 811-815.

22. Mahalabanis D, Islam KN, Mitra TK. and Agarwal SK Vitamin A absorption in ascariasis. Am. J. Clin. Nutr, 1976; 29 : 1372-1375.

23. Gilman RH, Chong YH, Davis C, Greenburg G., Virik HK and Dixon HB, The adverse consequences of heavy Trichuris infection. Transaction of the Royal Society of Tropical Medicine and Hygiene, 1983; 17 : 432-438.

24. Cooper ES, Bundy DAP, and Henry F J Chronic dysentry, stunting and whipworm infestation. Lancet, 1986; 2 : 280-281.

25. Farid Z, Patwardlan VN, Darly WJ Parasitism and Anaemia. Am. J. Clin. Nutr. 1969; 22(5) : 498-503.

26. Gupta, MC, Mithal S, Arora KL, and Tandon BN, Effect of periodic deworming on nutritional status of Ascaris– infested pre-school children receiving supplementary food. Lancet, 1977; 2 : 108-110.

27. Nahar L, Barua S, Firoz G and Hossain A, Nutritional Anemia amongst under-privileged urban children : A study in a Mother and Child Care Centre in Dhaka City. Bang. J. Nut, 1995; 8(1-2) : 21-27.