International Journal of Research Studies in Microbiology and Biotechnology (IJRSMB)
Volume 4, Issue 4, 2018, PP 1-6
ISSN No. (Online) 2454-9428
DOI: http://dx.doi.org/10.20431/2454-9428.0404001
www.arcjournals.org

Intestinal Parasite Infections among School Children in Arsi Negelle Town, Southern Ethiopia

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Abstract

Background: *Intestinal parasite infection is among the major public health problem and socio-economic concern that adversely affect the wellbeing of society. In developing country like Ethiopia it is common due to poor personal hygiene and limited availability of pure water, therefore this study aimed to determine the rate of intestinal parasitic infection and some associated risk factors among primary school children in Arsi Negelle town.*

Method: *School based cross-sectional study was conducted at Arsi Negelle primary school from May - June, 2014. The study subject was selected using systematic random sampling method. Information was collected from the study participants using questioner in addition stool specimen were collected for parasitological examination. Normal saline and Formol ether concentration techniques were used to examine the stool specimen.*

Result: *Out of 295 study subjects, 117 (39.6%) were infected with one or more intestinal parasites. Among the intestinal helminthes, A.lumbricoides was the predominant parasite 28(9.5%) followed by the protozoa E.histolytica/dispar 11(3.7%). The rate of infection was twice higher in females than male 75(64.2%), 42(35.8%) respectively. which is statistically significant p=0.028.*

Conclusion: *Intestinal parasitic infection was prevalent among primary school children in this study area and females were more infected. Activities such as health education on personal hygiene, environmental sanitation, pure water supply and early treatment may contribute in the reduction of the prevalence of intestinal parasites.*

Keywords: *Intestinal Parasites, School Children, Sothern Ethiopia*

1. INTRODUCTION

Intestinal parasites and protozoan infections are the most considerable public health problems throughout the world. Almost 3.5 billion people are infected and 450 million are diseased due to the infection of which the majority are children. This is because Children are active in the environment and often employ unhygienic behaviors. Majority of these carriers children will come up to schools which increase the possibility of transmission as well environmental contamination with the parasites [1].

Parasitic infection has unfavourable impact to children as it leads to growth retardation, reducing learning potential and also leads to anaemia [2].In Ethiopia it is common and cause serious public health problems.A considerable proportion of annual visits at outpatient services of the Ethiopia health institutions are due to such infections [3]. The range, though wide, several studies indicated the high prevalence of these infections in Ethiopia [4]. It is known that children are highly affected with intestinal parasites since their immune system is not yet fully developed [5].

Intestinal parasite infection leads to health complication mostly in primary school children. Such as: retarding the normal growth of the children, reducing the potential of the children towards learning

and also leads to anaemia [6]. Since school children are the future anticipate for the country assessing the prevalence of intestinal parasitic infection among primary school children is important.

2. MATERIALS AND METHODS

2.1. Study Setting

The study was conducted at Arsi Negele health centres, which is located at north east of west Arsi zone, Oromia region. Arsi Negele is rural town found at southern part, 232 km away from the capital Addis Ababa. The town is geographically coordinated at 7º41' north, 39°15' east in Great Rift Valley. The altitude of this town range from 1500-2300 meter above sea level, the average rainfall of the town is 1100mm. While 10-17^{0}C is the minimum temperature, 18-26^{o}C is the maximum and the average is 14-23^{o}C.The health center served about 72,114 people of the city and surrounding rural areas.

2.2. Study Design and Sampling

A school based crossectional study was conducted at Arsi Negele health center from May to June 2014 in two selected primary schools in Arsi Negelle town, namely Arsi Negelle number One and number three primary school. These two schools selected purposely since they are the largest school in the town which offer education for a total of 3050 students.

The sample size was estimated using the single population proportion formula n=z^2 pq/.d^2 Where p=prevalence of intestinal parasite from previous study which is 72% [6]. A 95% confidence interval and a 5% margin of error where used. A sample size of 295 were divided proportionally in to two based on the number of students in each primary schools, accordingly 222 sampled students were from Arsi Negelle number one primary school which has a total of 2297 students and the rest 73 sampled students were from Arsi Negelle number three primary school which has a total of 753 students. Each participant students was selected by ten intervals from class roster

2.3. Data Collection and Laboratory Processing

After proper instruction, the children were given labelled stool collection cups and applicator sticks. From each individual participant of the study, about 2gm of fresh stool sample was collected. A portion of each of the stool samples was processed with a direct microscopic technique to detect cysts, trophozoites, eggs and larvae of intestinal parasites immediately. The remaining part of the samples was performed using formol-ether concentration technique.

2.4. Data Analysis

The data were entered and analyzed using SPSS statistical software of version 16. Initially the association between each exposure and the presence of infection was accessed using the Chi-squared test. Odds ratios were computed to measure the strength of association.

2.5. Ethical Consideration

Data was collected after official letters and ethical clearance obtained from The Department of Medical Laboratory Sciences, College of Medicine and Health Science, Hawassa University. Subsequently written permission was sought from the Head of health centre before the data collection. Also informed consent was obtained from students and students' guardians with full right to refuse to participate during the study at any time are respected. Confidentiality was maintained by coding each students starting from data collection to analysis.

3. RESULTS

3.1. Socio-Demographic Characteristics

From a total of 295 students, 129(43.7%) were male and the rest 166(66.3%) were female. Majority of the participants 154(52.2%) were found in the age ranges of 9-12 years followed by 112(38.0%) were >12 years of age. The dominant ethnic group was Oromo189 (64.1%) followed by Amhara which accounts 73(24.2%) (Table1).

Table1. *Socio-demographic characteristics of study participants*

Socio-demographic characteristics		Number of students	Percentage (%)
Gender	Male	129	43.7
	Female	166	56.3
Age group	<9	29	9.9
	9-12	154	52.2
	>12	112	38.0
Grade level	1-4	166	56.3
	5-6	76	25.8
	7-8	53	18.0
Ethnicity	Wolaita	13	4.4
	Amhara	73	24.7
	Oromo	189	64.1
	Others	20	6.8

3.2. Prevalence of Intestinal Parasites

The predominant intestinal parasites detected among the study participants were *Ascariselum-bricoides*28 (9.5%) followed by *Hook worm, Hymenolepis nanaand Entamoeba histolytica/ dispar* 17 (5.8%), 13 (4.4 %) and 11 (3.7%), were detected in individual students respectively (Table2). Generally 117 (39.6%) of the students were infected with different protozoan and helminthes parasites. Out of 295 study participants106 (35.9%), 9 (3.05%), and 2 (0.68%) of the students had single, double and triple infection respectively. The prevalence of both helminthes and protozoan were high in age groups less than 9 years as compared to other age groups (Table 2).

Table2. *Distribution of intestinal parasites by age group among study participant*

Types of parasites	**Age groups (%)**							
	<9(n=29)		9-12(n=154)		>12(n=112)		Total (n=295)	
	Male (n=13)	Female (n=16)	Male (n=67)	Female (n=87)	Male (n=49)	Female (n=63)	Male (n=129)	Female (n=166)
Helminthes	4	5	21	26	14	26	37(31.5)	56(31.5)
Hymenolepis nana	0	0	1	5	5	4	4	9
AscariseLumbricoides	2	0	8	5	2	11	12	16
StrongiloidStercolaris	0	0	1	0	2	3	3	3
Trichuristrichiura	1	3	2	1	2	1	5	5
Hook worm	1	1	5	6	0	4	6	11
*Taenia*species	0	0	3	7	0	0	3	7
Entrovious.vermicularis	0	1	1	2	3	0	4	3
Protozoan parasites	2	4	7	9	0	3	5	16
Giardia Lamblia	2()	2	1	2	0	3	3	7
Entamoebahistolytica	0(0)	2	2	7	0	0	2	9
Total individual	6	9	28	35	14	26	42 (35.8)	75 (64.2)
	15(51.7)		63(40.9)		39(34.8)		117(39.6)	

From the total of 295 students about 117 students were positive for one or more intestinal parasite, of these 117 parasite infected students 106 (90.5%), 9 (7.7%) and 2 (1.7%) account for single, double and triple infection respectively**.**

3.3. Intestinal Parasite and Possible Risk Factors

Even if there is no statistically significant association observed between the ages of the respondents with intestinal parasites, students with age group < 9 years were highly infected with intestinal parasites compared to the other age groups. (p=0.334, 95% CI= (0.085-1.881). As to sex of the respondents 166(56.2%) were females and 129(43.7%) were males of these 166 females, 75(45.1%) and from 129 males, 42(32.5%) were infected at least with single intestinal parasites. The chi-square showed that sex has statistically significant association with intestinal parasitic infection on primary school children, the odds of the female being infected with intestinal parasitic infection is 1.71 times higher than that of the males.(p=0.028, at 95%CI(1.10-2.75).

Concerning the shoe wearing habits of the study participants, the majority of respondents, 277(93.8%) wore shoes and 18(6.1%) of the respondents didn't wore shoes. The odds of the students who were not wore shoes was 1.56 times more likely infected with intestinal parasitic infection than those students who wore shoe (Table 3). On the other hand finger nail trimming and intestinal parasitic infection has no statistically significant association (p=0.338), 95% CI (0.77-2.11). However, those students who did not trim their finger nail were 1.28 times more likely infected with intestinal parasitic infection than those who trimmed their finger nail (Table 3).

Table3. *Bivariate analysis of intestinal parasitic infection and potential risk factors among study participants*

Risk factors		**Parasite examination results**				
		Positive (n=117)	Negative (n=178)	Total (n=295)	p-value	Crude OR (CI 95%)
Gender	Male	42	87	129		
	Female	75	91	166	0.028	1.71(1.1-2.7)
Age	<9	15	14	29	0.334	0.40(0.08-1.88)
	9-12	63	91	154	0.811	0.35(0.59-1.93)
	>12	39	73	112	-	1
Grade level	1-4	78	88	166	-	1
	5-6	21	55	76	0.098	1.72(0.9-3.2)
	7-8	18	35	53	0.442	0.74(0.3-1.5)
Latrine access	Yes	166	178	294	-	1
	No	1	0	1	0.74	1.32(0.85-1.20)
Shoe wearing	yes	105	172	277	-	1
	no	12	4	18	0.03	1.56 (0.82-1.6)
Hand washing habit	Yes	108	169	277	-	1
	No	9	9	18	0.35	1.56(0.60-4.06)
Finger nail trimming	Trimmed	78	128	206	-	1
	Not trimmed	39	50	89	0.33	1.28(0.77-2.12)
Mothers education	Literate	74	127	201	-	1
	Illiterate	43	51	94	0.145	1.44(0.88-2.37)
Habit of eating raw meat	Always	21	22	43	0.72	1.88(0.94-3.77)
	Sometimes	49	63	112	0.99	1.53(0.92-2.56)
	Never	47	93	140	-	1
Water source	Pipe	106	166	272	-	1.00
	River	5	4	9	0.325	1.95(0.51-7.4)
	Spring	2	3	5	0.968	1.04(0.17-6.35)
	Well	3	2	5	0.354	2.34(0.38-14.2)
	Others	4	2	2	0.576	0.55(0.54-5.08)

Regarding mothers education and intestinal parasitic infection, there were no statistically significant association, however whose mothers were illiterate had 1.44 times risk for intestinal parasitic infection than those students whose mothers were literate (Table 3).

4. DISCUSSION

The result of this study showed that the overall prevalence of intestinal parasitismwas found to be 117(39.6%). The rate was quite lower than the finding reported elsewhere in Ethiopian; Ochollo, southwest Ethiopia 56.8% [7] Lake Langano 83.3% [8], and 83% in Jimma [3], also compared from urban slum of Karaki, 52.8% [9]. This difference might be due to the methods used to detect the parasites and/or low rate of those parasites in the study area.

On the other hand the rate observed in this study was comparable with previous study conducted at different district in Ethiopia;Northwest Ethiopia 34.2% [10], Babile town eastern Ethiopia 27.2% [11], Tigray northern Ethiopia 28.6% [12] Gamo area, Southern Ethiopia 39.9% [13] and in Chandigarh, North India [14]. This variation in prevalence might be due to differences in climatic condition, environmental sanitation, seasonal variation, public awareness and regular de- worming program being conducted by the government in the community and in the schools [15].

The rates of *Ascarislumbricoides* (22.5%) *Tenia* species ((15.2%) and *Entamoeba histolytica /dispar* infection (14.7%) observed in the study are in line with reports done elsewhere in Ethiopia [3, 10,13 and 16,]. However the finding was less than study in Chilga distict, Northern Ethiopia [17] and

Ochollo, southwest Ethiopia [7] where the rates were 42.9% and 42.1% respectively. Similarly, the 9.4 % of *Giardia lamblia* diagnosed in the study was also in agreement with a study conducted in Nepal [18 and 19].

The rate of amoebiasis and giardiasis in this study was 3.7% and 3.4%, respectively. This is nearly similar to that of 3.1% and 3.6%, respectively [2] and higher than report of 1.9% and 0.2% respectively [7]. In this study, multiple infection (polyparasitism) occurred in 11 students (3.7%) of 295 participant examined. The double and triple infection were seen in 9(3%) and 2(0.68%) of the examined children respectively. Thus the multiple infection occurred at very low rate compared to the previous study conducted in Northern Ethiopia, [20].South West Ethiopia 56.7% [2], Ochollo, southwest Ethiopia 19.4% [7]and Nepal [18], which is 24% for mixed parasitic infection. The sample size and study population could attribute to their observed differences in detection of various parasites.

The rate of parasitic infection with different risk factors were analysed like with the latrine access, finger nail trimming, hand washing habit, shoe wearing habit and water source but most of these factors were not show significance association with intestinal parasites infection in this study (p>0.05)however, in regard to sex females are likely to be infected 1.71 times higher than amale (p= 0.028 ;CI, 1.10-2.75). On the anther hand those who have not shoe wearing were 1.56 time more likely infected by parasitic infection than those wore shoe (p=0.03) (Table 3).

In this study, both protozoan and helminthes infection were more prevalent in school children especially in those under 12 years of age than other age groups while there were reduction as the age increase, the reason could be due to the slow developing of immunity to the parasite and better awareness of washing hands and other personal hygienes.

5. CONCLUSION

This study shows that intestinal parasite infestation were prevalent in varying magnitude among the primary school children. The proportion of infection in female was higher than that of males. Also the proportion of helminthes infection was slightly higher than that of the protozoan infection. The first three commonly detected parasites in decreasing order were *A. lumbricoides*, *H. Worm* and *E. histolytica /dispar*. *A. Lumbricoides* from the helminthes and *E. histolytica/dispar* from protozoa were the predominant parasites detected. From the independent variable mentioned, only sex had statistically significant association with intestinal parasites. This might be due to information biases of the respondent student. The finding of the study indicates much work remains to be done in the school and in general community to improve the health status of the students. Measure such as continuous health education, keeping personal hygiene including hand washing, trimming of finger nail, pure water supply proper school based deworming and treatment of infection at the earliest stage can reduce the parasitic infestation in school children and in the whole community.

AUTHORS CONTRIBUTION

AG and ZS; contributed to conception and design, acquisition of data, analysis of data; TL,EA and MH contributed in revising the paper critically and final approval of the version to be published; MH and EA contributed in interpretation of data, Analysis and interpretation of data also revising the paper critically and final approval of the version to be published during contributions.

ACKNOWLEDGMENT

The authors would like to acknowledge the support of Arsi Negele primary school teachers for selecting study participants and study participants, for giving time during data collection.

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Citation: *A. Geleta et al., "Intestinal Parasite Infections among School Children in Arsi Negelle Town, Southern Ethiopia", International Journal of Research Studies in Microbiology and Biotechnology (IJRSMB), vol. 4, no. 4, pp. 1-6, 2018. http://dx.doi.org/10.20431/2454-9428.0404001*