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Full Length Research Paper

Pattern of intestinal helminthiasis among under five in a rural community of Plateau State, Nigeria

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Helminthic infestation is a serious public health problem which imposes a great burden on poor populations in the developing world. This is among the most common infections worldwide affecting the poorest and most deprived communities. Under fives are vulnerable to heavy helminthic infestation which in turn can give health effects such as anemia, growth stunting, protein-energy under nutrition and poor cognitive development. The study was conducted to the determine the pattern and prevalence of intestinal helminthiasis among under fives in Chanso community of Plateau state. A cross sectional study conducted in 2014 among 237 under fives, EPI info statistical software version 3.5.4 was used for data analysis and 95% confidence interval was used in this study with a p ≤ 0.05 considered statistically significant. The prevalence of intestinal helminthiaisis was 58.2% with 91.3% of the studied subjects having single helminthic infestation. The mean age of the under fives was 32.2 ± 16.4 months. This study has demonstrated a high level of helminthic infestation among under fives and the need to provide appropriate intervention to address it.

Keywords: Pattern, Helminthiasis, Under five, Rural community

INTRODUCTION

Helminthic infestation is a serious public health problem which imposes a great burden on poor populations in the developing world (PAHO, 2011). This is among the most common infections worldwide affecting the poorest and most deprived communities (WHO, 2014; Nyantekyi et al., 2010; PAHO, 2011). More than 1.5 billion people about 24% of the world's population are infected with soil-transmitted helminthes infections worldwide (WHO, 2014). Over 270 million preschool-age children and over 600 million school-age children live in areas where these parasites are intensively transmitted (WHO, 2014). The four most common helminthes are roundworm (*Ascaris lumbricoides*), whipworm (*Trichuris trichiura*), and the anthropophilic hookworms (*Necator americanus* and *Ancylostoma duodenale*). Recent worldwide estimates suggested that *A. lumbricoides* infects 1.221 billion people, *T. trichiura* 795 million, and hookworms 740 million. The greatest numbers of infections occur in the Americas, China and East Asia and Sub-Saharan Africa (WHO, 2014; PAHO, 2011).

Under fives are particularly prone to helminthic infestation particularly in rural communities where they play with feacal contaminated soil, eat part of the soil, walk bare footed in additional to the fact that hand washing practice is poor in such rural settings (WHO, 2014; Nyantekyi et al., 2010). Under fives are vulnerable to heavy helminthic infestation with in turn can have resultant health effects such as anemia, growth stunting, protein-energy under nutrition and poor cognitive development (Tripura et al., 2013; Bethony et al., 2006; Mbae et al., 2013). In view of this, the pattern and prevalence of intestinal helminthiasis was assessed among under fives in Chanso community of Mangu Local Government Area (LGA) of Plateau State.

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MATERIALS AND METHODS

Study area and population

This study was conducted in Chanso community in Mangu LGA of Plateau state. Chanso community is one of the rural practice centres of the Department of community medicine, University of Jos. Chanso community has an access road, a Primary Health care centre (PHC), a government owned primary and secondary schools, electricity and telecommunication network. It is predominantly an agrarian community. This study was conducted among under fives in the community.

Study design: This was a cross sectional study conducted in 2014 using quantitative method of data collection

Inclusion and exclusion criteria: All children aged 6 to 59 months whose mothers' gave consent to participate in the study were recruited while children below 6 months and above 59 months as well as children 6 to 59 mothers of age whose mothers' declined consent were excluded from the study.

Sampling technique: Following households census in the community, a total of 202 households were obtained. Household was defined as a group of person living together under the same roof and eating from the same pot. All eligible under five in all the households in the community were sampled starting from the household in the centre of the community.

Preparation for data collection: Advocacy visit was paid to community leader to solicit his support. Eight resident doctors from the department of Community Medicine Jos University Teaching Hospital (JUTH) were trained as research assistants to aid with the administration of questionnaires as well as in distribution of stool sample bottles and it retrieval with the stool samples. Two laboratory scientists from the public health laboratory of the Department of Community Medicine conducted the stool analysis. The study spanned a period of 1 month while data and sample collection was done over a period of 7 days.

Ethical consideration: Informed consent was obtained from the mothers of all the under fives, anonymity and confidentiality of the information obtained was assured and maintained.

Data collection instrument: A semi–structured interviewer administered questionnaire was used to obtain information regarding the under fives from their mothers. A sterile universal bottle duly labelled with the child's name and household number was used collecting the stool sample.

Data collection: Eight trained research assistants participated in the data collection after a detailed explanation as to the purpose of the study was given to all the mothers of the under fives. Verbal as well as written informed consent was obtained before the administration of the questionnaire and collection of stool samples. Names and household numbers of the sampled under fives were duly written on the stool sample bottles which also corresponded with the information obtained in the questionnaire. The stool sample bottles were distributed to the mothers of all the eligible under fives in the evening following administration the questionnaires which was then retrieved early in the morning with early morning stool samples of the children. .

Stool sample collection and examination: Detailed explanation was given to the mothers of the under fives on the aim of the study and they were instructed to put about 2g of fresh early morning stool of their under fives in the labelled sterile sample bottles given to them. The collected samples were immediately transported to the laboratory of the JUTH comprehensive health centre Gindri which is about 10 kilometres from Chanso for light microscopy and differential diagnosis of protozoa cyst. Stool smears were examined under light microscope with direct saline smear and lugol's iodine solution using suitable objective len preceded by macroscopic examination of the stool samples for consistency, colour and odour. All slides were view within 8 hours of preparation and all the under fives regardless of the examination findings were treated with mebendazole and those with *S.mansoni* had additional treatment with praziquantel.

Data analysis

Data analysis was done using Epi info™ statistical software package version 3.5.4 developed by CDC 1600 Clifton Rd. Atlanta, GA 30333 USA. Multiple logistic regression was used to identify factors predicting helminthic infestation. Ninety-five (95%) confidence level was used for the study and a $P \leq 0.05$ was considered statistically significant.

RESULT

A total of 237 under fives participated in this study from 202 households with some households having more than one under fives. The mean age of the children in this study was 32.2 ± 16.4 months with age group 37–48

Table 1: Characteristics of the under fives

Characteristics	Frequency	Percentage n = 237
Age (Months)		
6 – 12	46	19.4
13 – 24	54	22.8
25 – 36	51	21.5
37 – 48	68	28.7
49 – 59	18	7.6
Mean age	**32.2 ± 16.4 months**	
Sex		
Female	116	48.6
Male	121	51.1
Birth order		
First	46	19.4
Second	35	14.8
Third	23	9.7
Fourth	31	13.1
Fifth	35	14.6
Greater than fifth	67	28.3
Intake of anti – helminthic within 6 months prior to the study		
Yes	18	7.6
no	219	92.4

months accounting for 68 (28.7%) of the under fives while age group 49 – 59 months had the lowest proportion accounting for 18 (7.6%). This study had more male under fives 121 (51.1%) while 116 (48.9%) were females. On order of birth of the studied subjects, 46 (19.4%) were first children of their parents, 35 (14.8%) second, 23 (9.7%) third, 31 (13.1%) fourth and 35 (14.6%) fifth respectively. Furthermore, the level practice of period deworming of under fives was poor in Chanso community as only 18 (7.6%) of the under fives had been dewormed within six months prior to the study. (Table 1)

The prevalence of helminthiasis among the under fives in this study was 58.2% with majority (91.3%) of the studied subjects having single helminthic infestation and only 12 (8.7%) with multiple helminthic infestation. *A. lumbricoides* was seen in stool samples of 103 (43.5%) under fives closely followed by Hook worm seen in 24 (10.1%) of stool samples examined. Others included *T. Truchiuria* 4 (1.7%), *T. saginata* 5 (2.1%), *S. Mansoni* 9 (3.8%), *H. Nana* 1 (0.4%), *F. Hepatica* 2 (0.8%) and *S. stercoralis* 3 (1.3%) respectively. (Table 2)

Factors such as age, sex, history of use of anti-helminthic within six months prior to the study and birth order of the under fives were related to positive stool examination findings. Positive history of use of anti-helminthic within 6 months prior to the study had statistically significant relationship as use of anti-helminthics was protective against helminthic infestation ($p = 0.0002$). Similarly, under – fives who were fourth in their order of birth in the various households were also less likely to have helmintics infestation ($p = 0.0024$) Table 3.

DISCUSSION

The prevalence of helminthic infestation in this study was 58.2% which is more than the 24.6% obtained in another study conducted within the same state but in different rural settings (Okolo et al., 2006). This variation in prevalence could be due to the fact that this study was conducted purely among under fives—while the other studied children aged 6 months to 18 years of which some of the studied subject may have anti-helminthic at one point or the other in addition to the fact that the study was conducted in Fulani communities. Fulanis are known in Nigeria to keep a fairly neat environment as a cultural principle in addition to the fact that there is a higher possibility that defecation is usually done deep in the bush in the course of cattle rearing and grazing. Other studies done in Nigeria reported an overall prevalence of 18%, 41.9%, 52%, 54.7%, 97.5% respectively

Table 2: Prevalence and pattern of helminthic infestation

Parameters	Frequency	Percentage n = 237
Stool parasite status		
Positive	138	58.2
negative	99	41.8
Pattern of helmintic infestation*		
Hook worm	24	10.1
S. stacoralis	3	1.3
S. mansoni	9	3.8
F. hepatica	2	0.8
H. nana	1	0.4
T. saginata	5	2.1
T. trichuria	4	1.7
A. lumbricoides	103	43.5
Status of infestation		
Single	126	91.3
Mutlple**	12	8.7

*= multiple infestation recorded; **= *A. lumbricoides* plus anyone of the others

Table 3: Factors predicting helminthic infestation

Variables	odds ratio	95% Confidence Interval	P - value
Age (months)			
13 – 24	0.8487	0.3611 – 1.9947	0.7068
25 – 36	1.0677	0.4409 – 2.5857	0.8846
37 – 48	1.4223	0.6212 – 3.2566	0.4046
49 – 59	2.3938	0.4290 – 13.3575	0.3192
6 – 24	1	-	-
Sex			
Male	1.0490	0.5856 – 1.8813	0.1320
Female	1	-	-
Use of anti- helminthic			
Yes	0.0534	0.015 – 0.2488	0.0002
No	1	-	-
Birth order			
First	0.6174	0.2177 – 1.7500	0.3644
Second	0.6027	0.2024 – 1.7945	0.3630
Third	1.8073	0.4507 – 7.2478	0.4036
Fourth	0.1753	0.0571 - 0.5384	0.0024
Fifth	0.4759	0.1811 – 1.2506	0.1320
Greater than fifth	1	-	-

(Onyemaobi et al., 2011; Babatunde et al., 2013; Adefioye et al., 2011, Egwunyenga et al., 2005; Ugbomoiko et al., 2006). This observed variations in overall prevalence within the same country could be attributable to the variation in the timing of the different studies, as well as other factors such as, environmental conditions, availability of lavatory and hand washing facilities and personal hygiene practices in the different

areas where these studies were conducted.

Other studies carried in Kenya and Cameroon reported lower prevalence of 25.6% and 42.4% respectively when compared to the 58.2% from this present study (Mbae et al., 2013; Nkengazong et al., 2010). While higher overall prevalence of 66% and 68.8% were obtained in studies done in Pakistan and Indian (Mumtaz et al., 2009; Ullah et al., 2009). The difference in the prevalence could also be due to various reasons adduced above.

The pattern of helminthic infestation in this study is similar to what was observed in other similar studies. *A. lubricoides* was the most prevalent followed by Hook worm then *S. manoni* others were *T. Saginata* and *T. Trichiuria*. The findings of this study is in synergy with findings of studies reporting higher prevalence of *A. lumbricoides* (Ugbomoiko et al., 2006; Adefioye et al., 2011; Adeyeba et al., 2002; Taiwo et al., 2000; Okolo et al., 2006). Other studies reported contrary findings of Hook worm and *E. Histolytica* as the most prevalent helminthic infectation respectively (Babatunde et al., 2013; Onyemaobi et al., 2011; Mbae et al., 2013; Khan et a.l, 2012). The higher prevalence of *A. lumbricioides* could be due to the fact the study was conducted in a rural setting where children play with soil and probably eat faecal contaminated soil. As well as the higher likelihood of practice of open defecation, improper washing of vegetables and fruits before consumption since the community is purely agrarian. Poor practices of hand washing could also be contributory. The prevalence of hook worm infestation could also be attributable to the possibilities of the under fives walking barefooted on feacal contaminated soil around in the community. Infestation with a single helminth was the most common form of infestation in this study while very few (8.7%) of the subjects had multiple infestation. This finding is in tandem with what was reported in other studies (Workneh et al., 2014; Nkengazong et al., 2010; Ullah et al., 2009).

History of previous use of anti-helminthics and birth order of the under fives were found to have positive statistically significant influence of the presence of intestinal helminths as under fives who had been given anti-helminthics with 6 month prior to the study were unlikely to have helminthic infestation and similar subjects with fourth birth order. Other studies found age, positive history excessive crying of the child and rented household by the family to have significant association with infestation (Mehraj et a.l,2008; Adefioye et al., 2011).

This study could not access the availability of lavatory facilities in the households, availability of hand washing facilities as well as the educational status and socio – economic status of the mothers. Bringing to bear the need for further studies to be conducted in order to access the influence of these factors on helminthic infestation so as to develop and structure a suitable and long lasting intervention strategies.

CONCLUSION

This study has demonstrated a high level of heminthic infestation among under fives and the need to provide intervention geared toward achieving low helminthic infestation in the community.

Conflict of Interest: No conflict of interest declared

Source of funding: No external funding was used for this study.

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