PREVALENCE OF GASTRO-INTESTINAL PARASITES IN RELATION TO AVAILABILITY OF SANITARY FACILITIES AMONG SCHOOLING CHILDREN IN MAKURDI, NIGERIA

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ABSTRACT

The prevalence of gastro-intestinal parasites in school children in relation to availability of sanitary facilities was investigated. Stool samples from 580 pupils from nine schools in Makurdi were examined for intestinal parasites. Sanitary facilities available within the schools were also noted. The overall prevalence rate of parasitic infection was 54.13%. Pupils in schools that had lower ratio of number of pupils per toilet had lower infection rates than those from schools with high ratio of number of pupils per toilet. This was however not statistically significant (X^2 2.272, df = 2, P > 0.05). The following parasites were encountered, namely Ascaris lumbricoides (11.89%), Ancylostoma duodenale (18.62 %), Strongyloides steroralis (1.89%), Trichuris trichura (4.65%), Tapeworm (3.79 %), Entamoeba histolytica (7.06 %), Schistosoma mansoni (1.55 %) and Entemoeba coli (2.41 %). The implications of these results were discussed highlighting the need for provision of sanitary facilities: like children friendly toilets, portable water and fencing the school premises from trespassers as long-term intervention strategies. Occasional activities like mass school based chemotherapy and health education are recommended as immediate intervention strategies to prevent and control intestinal parasites.

Keywords: Intestinal parasites, School children, Sanitary facilities

INTRODUCTION

Several environmental and socio-economic factors have been identified to be responsible for the continued persistence of intestinal parasites in children; some of these include poor sanitary conditions, unhygienic practices, absence of portable water, poor housing and poverty (WHO 1991, Edungbola and Obi 1992; Crompton and Savioli, 1993; Nwoke 2004, Amuta *et. al.,* 2004). Recent global estimate indicated that more than a quarter of the world's populations are infected with one or more of the most common parasites; *Ascaris lumbricoides,* hookworm and *Trichuris tichura* (Manen *et. al.,* 1997; Chan *et al.,* 1994).

School age children (3 – 16 years) are particularly at risk. Infants growing up in an endemic community where sanitation and waste disposal facilities are inadequate are usually infected soon after weaning. About 20 % of disability adjusted life years (DALYS) lost due to communicable diseases among children are a direct result of intestinal nematodes (Hanson 1999). Clinical manifestation among children habouring these parasites include abdominal pain, nausea, reduced appetite, iron-deficiency anaemia, retarded growth and impaired cognitive performance (Edungbola and Obi, 1992; Ogbe *et. al.,* 2002).

The presence or absence of sanitary facilities at home has been established as a strong determinant of the prevalence of gastro-intestinal parasites (Feachem *et. al.,* 1983; Manen *et al.,* 1997; Omudu, 2003). However, contemporary education polices has tremendously increased the time children have to spend in school. The school environment has therefore emerged as epidemiological foci in childhood parasitism.

Amuta *et. al.* (2004), reported a positive correction between contamination of school compounds with faecal pathogens and the availability of sanitary facilities in schools in Makurdi, Nigeria. This study further investigates possible relationship between the presence of sanitary facilities in school and prevalence of gastro-intestinal parasites in school children.

MATERIALS AND METHODS

This study was conducted in Makurdi, the Benue State capital. Nine primary schools participated. Permission was sought and received from the respective authorities in charge of the schools. A total of 580 pupils aged 5 – 18 years were randomly selected for parasitological investigation and the school was physically inspected for availability of sanitary facilities.

Additional bio-data information sought from the pupils included name age, sex, place of residence, type of toilets used at home and source of drinking water. Afterwards, the randomly selected children were each given a clean, dry, well-labeled specimen bottle with which their faecal samples were to be deposited. The procedure of introducing faecal material into the bottles was explained and

demonstrated to pupils with the assistance of their class teachers.

Faecal samples collected were transported to the laboratory for analysis. They were examined for ova; cyst and/or larvae of gastro-intestinal tract parasites using the direct wet mount microscopic examination and the formal -ether concentration technique (Wentworth, 1988; Ukaga *et al.,* 2002).

Inspection of Sanitary Facilities: A structured questionnaire was designed, discussed with school authorities and pre-tested was administered to participating school Head teachers to take inventory of available sanitary facilities within the school premises. Sanitary and demographic issues addressed in the questionnaire are shown in Table 1. Physical inspection of the school premises was also conducted to ascertain state of cleanliness.

Table 1: Questionnaire to assess sanitary and demographic conditions among schooling children in Makurdi, Nigeria

School identification code----------
Population of pupils----------
Please tick the appropriate answers

1.	Type of toilet facility Pit latrine------- Flush toilet -------None-------
1a.	Number of toilet facility ----------
1b.	Number of functional toilet ----------
2.	School's source(s) of water, Tap water ------ Well ------ Storage tank------None
2a.	Number of water sources available----------
3.	Availability of fence around the school Yes ------ No------
4.	Location of refuse dump within premise outside premise
4a.	Status of refuse dumps Approved------ Unapproved------
5.	General cleanliness of school compound very neat ------ Neat------ dirty ------ Very dirty------

Data Analysis: Chi-square test will be used to test association between the presence of sanitary facilities and prevalence of infection. Prevalence of infection and questionnaire will be analysed using simple percentage.

RESULTS

An overall prevalence of 54.13 % (314) infection rate was recorded in this study. Eight parasite namely *Ascaris lumbriciodes* (11.89 %), Hookworm, *Ancylostoma duodenale* (18.62 %), *Trichuris trichiura* (4.65 %) *Taenia* species (3.79 %), *Stronglyloides stercorais* (1.89 %), *Entomoeba histolytica* (7.06 %) *Schistosoma mansoni* (1.55 %) and *Entamoebi coli* (2.41 %) were isolated from the stool samples (Table 2). The infection rate was higher among female pupils (51.53 %) than their male counterpart. Chi-square test was utilized to test association between the presence of sanitary facilities and prevalence of infection; the result at ($P > 0.05$) showed that there was no significant association between availability of sanitary and level of infection.

While the percentage infection rates in schools with better sanitary facilities were lower (Table 3), this also was however not statistically significant when compared with other schools ($P > 0.05$).

The sanitary and demographic appraisal revealed that a high ratio of number of pupils shared toilet in most of the schools (Table 4). The absence of portable water within school premises was observed in all but two of the schools. The general cleanliness of school premises was poor but for only school H which was assessed very neat. In most of the schools, refuse were dumped in unapproved location thereby making it difficult for evacuation by concerned agencies and contributing to the build up of pathogens.

DISCUSSION

This study revealed a high prevalence of intestinal parasites in school pupils, this findings was in line with similar studies in Nigeria (Luka *et al.,* 2000; Ndifon, 1991; Adeyeba and Akinlabi, 2002; Ukpai and Ugwu, 2003) and else where (Menan *et al.,* 1997; Silva *et al*., 1997). The reasons for the high prevalence may be attributed to poor environmental conditions and personal hygiene, inadequate supply of portable water, poor excreta and waste disposal system. The difference in infection rate between male and female pupils was not statistically significant. Luka *et al., (*2000), Ukpai and Ugwu (2003) and Akogun and Badaki (1998) recorded higher infection rates in male and reasoned that this was as a result of gender differences in recreational activities.

The study observed that sanitary facilities were inadequate in schools and this is of epidemiological significance considering the number of hours pupils spend in school. The ratio of the number of pupils per toilet far exceeds that recommended (Feachem *et al.,* 1983). Furthermore the unavailability of water within school premises combines with the above factor to exacerbate the risk of infection. Amuta *et al* (2003) reported faecal contamination of soil samples collected from school compounds in Makurdi, as a result of indiscriminate stooling by pupils. Mizgajska, (1993), Etim and Akpan (1999), Nocks and Tanko, (2000) reported same for schools in India, Calabar and Zaria respectively.

This widespread contamination of the school environment with pathogenic organisms underscores the importance of proper disposal of waste in the protection and promotion of sustainable health. The provision of adequate sanitary facilities in school interrupts transmission of faecal –oral pathogens. Epidemiological evidence suggests that improvement of sanitation and community hygiene have considerable impact in reducing communicable diseases as do improved water supply. The absence of drinking water in schools may drive pupils to other unhygienic sources thereby increasing risk. Feachem *et al,* (1983) reported 20 % reduction in prevalence and intensity of intestinal parasitic infection through

provision of water, sanitation and improvement of personal hygiene in communities.

Table 2: Sex related distribution of gastrointestinal parasites in pupils

Gastro-intestinal Parasites	Male			Female			Total		
	a	b	c	a	b	c	a	b	c
Ascaris lumbriodes	287	32	11.15	293	37	12.62	580	69	11.89
Ancylostoma duodenale	287	52	18.11	293	56	19.11	580	108	18.62
Trichuris trichuira	287	12	4.18	293	15	5.12	580	27	4.65
Taenia species	287	12	4.18	293	10	3.41	580	22	3.79
Strongyliodes stercolaris	287	4	1.39	293	7	2.39	580	11	1.89
Entamoeba histolytica	287	19	6.62	293	21	7.16	580	40	7.06
Schistosoma mansoni	287	4	1.39	293	5	1.70	580	9	1.55
Entamoeba coli	287	14	4.87	293	14	4.77	580	28	2.41
Total	**287**	**149**	**47.03**	**293**	**165**	**51.53**	**580**	**314**	**54.13**

a = No. Examined, b = No. Infected c = Percentage (%)

Table 3: Prevalence of gastrointestinal parasites in pupils in relation to sanitary facilities

Schools	Sanitary facilities	Number examined	Number infected (%)
A	**Toilet/No water/No Fence**	60	33 (55.00)
B	**Toilet/No water/Partially fenced**	60	30 (50.00)
C	**Toilet/No water/Partially fenced**	60	41(68.33)
D	**Toilet/No water/No fenced**	60	35 (58.33)
E	**Toilet/No water/Fenced**	60	20 (33.33)
F	**Toilet/water/Fenced**	60	27(45.00)
G	**Toilet/No water/No Fenced**	60	40 (66.67)
H	**Toilet/water/Fenced**	80	28 (35.00)
I	**Toilet/No water/Partially Fenced**	80	60(75.00)
Total		**580**	**314 (54.13)**

Table 4: Some sanitary and demographic information on schools

Schools	Type/number of toilets	Available water for pupil	Available refuse dump	Population of pupils	Ratio of pupil per toilet
A	**Pit latrines 8 (17.39 %)**	STK- 1 WLL- 0 PIP- 0	Approved-0 Unapproved-2	1308	163:1
B	**Pit Latrines 11(23.91 %)**	STK- 1 WLL- 0 PIP- 0	Approved-0 Unapproved-1	2210	276:1
C	**Pit Latrines 5 (10.86 %)**	STK-0 WLL- 0 PIP- 0	Approved-1 Unapproved-1	1364	682:1
D	**Pit Latrines 14 (30.43 %)**	STK- 1 WLL- 1 PIP- 0	Approved-0 Unapproved-3	1966	140:1
E	**Water cistern 6 (30.00 %)**	STK- 1 WLL- 1 PIP- 1	Approved-1 Unapproved-2	500	83:1
F	**Pit Latrines 4(8.69 %)**	STK- 1 WLL- 1 PIP- 0	Approved-1 Unpproved-0	755	188:1
G	**Pit Latrines 2 (4.34 %)**	STK- 1 WLL- 0 PIP- 0	Approved-1 Unapproved-0	613	306:1
H	**Water cistern 14 (70.00 %)**	STK- 1 WLL- 1 PIP- 1	Approved-2 Unapproved-0	1225	87:1
I	**Pit Latrines 2 (4.34 %)**	STK- 1 WLL- 1 PIP- 0	Approved-0 Unapproved-2	230	115:1
TOTAL	**Pit latrine 46(69.69 %)** **Flush toilet 20(30.31 %)**	**STK**-8(57.14%) **WLL**4(33.33%) **PIP**-2(14.28 %)	**Approved**-6(35.29 %) **Unapproved-**11(64.71 %)	10,171	154:1

Keys: STK= Storage tank, WLL= Well, PIP= Tap water

The school environment offers an ideal terrain for intervention activities aimed at controlling parasitic diseases and elimination of potential risks. Provision of adequate toilet facilities that children are trained in using and are happy to use will certainly discourage indiscriminate defaecation elsewhere. Provision of portable water within school premises and fencing

the school compound to ward-off trespassers and stray animals that defeaecate inside or round classrooms. This will go a long way in reducing parasitic disease transmission within the school environment. Schools without fence are vulnerable to trespassers who often defecate inside classes or within school premises. Traner (1985) and Edungbola and Obi (1992) highlighted further intervention initiatives that can be practicably undertaken by respective school authorities

School-based parasitic disease intervention though mass chemotherapy and interactive health education has already commenced in some privilege communities in Nigeria (Etim *et al.,* 2002; Ogbe *et al.,* 2002).

The outcome of this study underscores the urgent need for provision and improvement of sanitary facilities in schools. Consistent intervention strategies targeted at the parasites by way of deworming campaigns, environmental sanitation through provision of sanitary facilities and adherence to personal hygiene ethics through health education. These will go a long way to reducing the scourge of gastro-intestinal parasites in children. The involvement of parents and other stakeholders in designing and implementing these interventions are fundamental to their success.

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