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Knowledge and risk factors of intestinal parasitic infections among women in Makurdi, Benue State

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ABSTRACT

Objective: To assess women's perceptions and risk factors that could expose them to intestinal parasitic infections in Makurdi, Benue State, Nigeria. **Methods:** A total of 750 faecal samples were collected from women at different reproductive stages (pre-menstrual, menstrual and post-menstrual), and the faeces were tested by the formol ether concentration technique. **Results:** A total of 426 (56.8%) samples were found positive for various intestinal parasites with hookworm (4.8%), *Ascaris lumbricoides* (9.3%), *Taenia* sp (2.1%), *Entamoeba histolytica* (18.9%) and *Entamoeba coli* (21.6%). Women at pre-menstrual and post-menstrual stages recorded higher prevalence rates with 72.8% and 63.9%, respectively. No significant difference in prevalence was observed between women at different reproductive stages and women infected by different parasites (χ^2=30.6, P> 0.05). Sweet things, rotten fruits and improperly cooked meat were perceived as the causes of intestinal parasitic infections among the pre and post menstrual women. Sources of drinking water like river, well, water bought from vendors and patronizing food vendors were observed as risk factors contributing to the prevalence of intestinal parasitic infections among women. Factors like not washing hands before eating and after defaecation, use of leaves and ordinary papers for cleaning after defaecation were also observed to be contributing to the prevalence of intestinal parasitic infections. **Conclusions:** Persuasive health education and rigorous hygiene measures should be employed in schools, maternity clinics and among the populace to reduce transmission and infection with intestinal parasites.

1. Introduction

Intestinal parasitic infections cause serious public health problem in Nigeria. They are more prevalent in the poor communities of the population with low income, poor handling of personal hygiene and environmental sanitation, overcrowding and limited access to clean water. It is estimated that 3.5 billion people are affected worldwide and that 450 million are ill as a result of these infections, with the majority being children[1]. Due to the fact that many of these infections are usually asymptomatic or produce only mild symptoms, they are often neglected until serious or chronic complications are noticed. The presence of these parasites in asymptomatic carriers plays a major role as source of infection to susceptible hosts[2].

In developing countries, young women, pregnant women, their infants and children frequently experience a cycle where repeated infection lead to adverse consequences that can continue from one generation to the next[3], especially because traditionally women handle water and food which are vehicles for transmission.

In women, these parasites are able to cause risks that can interfere with normal hormone function and undermine disease resistance and reproduction. The risks of infertility, miscarriages and late puberty in women are also caused by these infections[4]. Thus, the present study is to assess women's perceptions and risk factors associated with the prevalence of intestinal parasitic infections in Makurdi, Benue State, Nigeria.

2. Materials and methods

2.1. Study area

This study was carried out in Makurdi, capital of Benue

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State which is located at the heart land of guinea savanna zone in central, Nigeria. Makurdi lies between 7°(30′- 43′) N and 8°(30′- 35′)E. It also experiences typical tropical climate with two distinct seasons: the wet season which lasts from April to October and the dry season which begins from November to March.

The town is divided by the river Benue into the North and South banks and sub-divided into wards: North Bank, Wurukum, High level, Low level, Wadata, Fiidi and Ankpa mainly inhabited by civil servants, paramilitary, soldiers, traders, fishermen, farmers and craftsmen.

2.2. Study population

This study focused on women at different reproductive stages: pre-menstrual, menstrual and post-menstrual. A total of 750 women were randomly sampled and examined for intestinal parasites. Necessary approval was obtained from school authorities and parents. And individual consent was sought from each adult woman that participated in the study. A questionnaire was given to each participant to collect information on: sex, age, occupation, level of education, residential area, knowledge, attitudes and practices regarding intestinal parasitic infections.

2.3. Laboratory analysis

Stool specimens were collected from the women with universal bottles that were properly labeled with identification codes, the specimens were then taken to the microbiology section of the Federal Medical Centre Laboratory, Makurdi. The formol-ether concentration technique was employed to process the faeces as described by Cheesbrough[5].

2.4. Statistical analysis

Descriptive statistics and percentages were used to give a clear picture of background characteristics on the perceptions of women and risk factors regarding intestinal parasites. Chi-test (χ^2) was used to compare determinant factors and prevalence of intestinal parasites. *P*-value less than 0.05 was considered as statistically significant.

3. Results

Table 1 shows the prevalence of intestinal parasitic infections among women at different reproductive stages. As regards to the general prevalence of intestinal parasitic infections among the three categories of women, pre-menstruals had the highest incidence of infection (72.8%, 182/250), followed by the post-menstruals (63.9%, 129/202) and the menstruals (38.6%, 115/298). However, there was no significant difference between women at different reproductive stages and general prevalence of intestinal parasitic infections (χ^2=30.6, *P*>0.05). With reference to individual parasites, *Entamoeba coli* and *Entamoeba histolytica* recorded high prevalence rates with 21.6% and 18.9 %, respectively, while *Taenia* sp had the least prevalence rate with 2.1%. As regards to the prevalence of intestinal parasitic infections within groups, pre-menstrual women infected by *Entamoeba coli* (28.4%), *Entamoeba histolytica* (22.0%) and *Ascaris lumbricoides* (17.2%) had the highest prevalence rate, while in the post-menstruals these parasites recorded 25.7%, 23.3% and 8.9%, respectively. The least prevalence rates of all the parasites encountered were found among the menstrual women except for *Taenia* sp (3.7%) and hookworm (5.4%). No significant difference was observed between the prevalence of individual intestinal parasites and reproductive stages (χ^2= 30.6, χ^2= 27.3 and χ^2= 11.4, respectively for pre-menstruals, menstruals and post-menstruals, *P*>0.05).

Table 1

Prevalence of intestinal parasitic infections among women at different reproductive stages [*n*(%)].

Reproductive stages	Distribution of parasites				
	Hk	*As*	*Eh*	*Ec*	*Ta*
Pre-menstrual	13(5.2)	43(17.2)	55(22.0)	71(28.4)	0(0.0)
Menstrual	16(5.4)	9(3.0)	40(13.4)	39(13.2)	11(3.7)
Post-menstrual	7(3.5)	18(8.9)	47(23.3)	52(25.7)	5(2.5)
Total	36(4.8)	70(9.3)	142(18.9)	162(21.6)	16(2.1)

Notes: Hk = Hookworm, *Eh*= *Entamoeba histolytica*, *Ec* = *Entamoeba coli*, *As* = *Ascaris lumbricoides*, *Ta* = *Taenia* sp.

Table 2 shows the prevalence of intestinal parasitic infections due to different risks. A total of 64.8% women who were fond of sweet things had infection (103/159), followed by improperly cooked meat (64.2%, 87/173), unknown food risk (64.2%, 68/106), rotten fruit (55.9%, 104/186) and unclean water (50.8%, 64/126). However, among the pre-menstruals 85.7% and 77.6% were due to sweet things and rotten fruits, respectively. In the post-menstruals, 68.5% were due to improperly cooked meat, and 73.5% were caused by unknown reason.

In relation to sources of drinking water, relatively high prevalence of 69.1% (163/236) was observed among those who drank water bought from water vendors popularly known as "*mai-ruwa*", 72.2% and 64.9% for those whose source of drinking water were river(13/18) and well(61/94), respectively. The least prevalence rate was observed among those that drink tap water (47.0%, 189/402).

With regards to eating habits, women that never patronized food vendors had the highest prevalence rate (62.3%, 104/167) than those that always and sometimes patronized food vendors, 39.5% (98/248) and 59.1% (104/167), respectively.

Women that habitually washed their hands before eating were less infected (33.5%, 90/269) than those who did not (65.2%, 43/66). The highest prevalence rate was observed among those who sometimes washed their hands (70.6%, 293/415). With regards to hand washing after defaecation, women that always washed their hands after defaecating had the lowest prevalence rate (38.5%, 116/301), while those who did not and those who sometimes washed their hands after defaecating had 85.7% (24/128) and 67.9% (286/407), respectively. All pre-menstruals women who did not washed

Table 2
Effects of risk factors on the prevalence of intestinal parasitic infections. [%(n/n)]

Risks		Pre-menstrual	Menstrual	Post-menstrual
Food	Sweet things	85.7 (72/84)	30.0(15/50)	64.0(16/25)
	Rotten fruits	77.6(52/67)	46.5(33/71)	39.6(19/48)
	Unclean water	56.9(29/51)	28.6(14/49)	80.8(21/26)
	Improperly cooked meat	61.5(8/13)	39.6(42/106)	68.5(37/54)
	Unknown reason	60.0(21/35)	50.0(11/22)	73.5(36/49)
Sources of drinking water	River	100.0(1/1)	0.0%(0/0)	70.6(12/17)
	Well	44.4(4/9)	52.8(28/53)	90.6(29/32)
	"Mai-ruwa"	76.3(71/93)	65.8(52/79)	62.5(40/64)
	Tap water	72.1(106/147)	21.1(35/166)	53.9(48/89)
Patronizing food vendors	Always	66.7(14/21)	21.1(15/68)	71.4(5/7)
	Sometimes	77.6(125/161)	23.9(44/184)	65.5(93/142)
	Never	63.2(43/68)	65.2(30/46)	58.5(31/53)
Washing hands before eating	Yes	40.4(21/52)	16.5(23/139)	59.0(46/78)
	No	65.2(43/66)	0.0(0/0)	0.0(0/0)
	Sometimes	89.4(118/132)	57.9(92/159)	66.9(83/124)
Washing hands After defaecation	Yes	35.6(16/45)	39.5(68/172)	38.1(32/84)
	No	100.0(17/17)	0.0(0/0)	63.6(7/11)
	Sometimes	79.3(149/188)	37.3(47/126)	84.1(90/107)
Clean-up mterials	Leaves	83.3(15/18)	0.0(0/0)	100.0(2/2)
	Paper	85.5(47/55)	31.3(5/16)	61.8(21/34)
	Tissue paper	68.1(94/138)	33.3(68/204)	48.3(42/87)
	Water	66.7(26/39)	53.8(42/78)	81.0(64/79)

their hands after defaecating were infected. With regards to the type of materials used for cleaning after defaecation, women who used leaves as clean-up materials recorded the highest prevalence rate (85.0%, 17/20), while the least prevalence was found among women that used tissue paper (47.6%, 204/409). Those used paper displayed prevalence as 69.5% (73/105), and 67.3% (96/132) for those washing hands only with water.

4. Discussion

The relatively high prevalence of intestinal parasitic infections observed among women at different reproductive stages in Makurdi indicated high level of inadequate sanitation, poor environmental and personal hygiene and lack of knowledge about transmission of such infections. The high level of infection among those that presumed sweet things and rotten fruits as causes of intestinal parasitic infections ascertain their level of ignorance towards transmission and the causative agents. This may be explained with the fact that in Nigeria there are over 30 million women with no appropriate training in healthcare, family health and quality of life, food and nutrition[6,7]. The high level of infection observed among the category that did not wash hands after defaecation and before eating could be the result of poor hygienic habits whereby soiled fingernails, dirty hands and indiscriminate eating exacerbates the transmission of these parasites among the populace. The observation that dirty hands play a significant role in the faeco-oral transmission of intestinal parasitic infections has also been reported in Thailand[8]. The fact that intestinal parasites can infect all members of women populations with school aged children, adolescent girls and women of child bearing age being at greater risk to heavy infections is clearly observed in this study[9,10].

The use of leaves and ordinary paper after defaecation has been observed to put individuals especially the young pre-menstruals at higher risk of infection. The relatively low prevalence rate of infection among water users shows its importance in the prevention of intestinal parasites. Unlike users of ordinary paper and leaves, there is a higher tendency for water users to further wash their hands properly with soap.

The pre-menstrual group made up of children was more susceptible to intestinal parasitic infections and this could be probably due to their care free attitude towards personal hygiene practices, poor defaecation habits, playing in dirts and geophageous habits. These children could also be infected during their playing hours either in school or at home where they play incessantly with sand, forage food remains on streets, eat and drink water from any source in an indiscriminate manner. Similar rate of infection among school children of both sexes exhibiting similar behavioural habits has been reported by Houmsou and Amuta[11]. Bariweri *et al*[12] also observed similar trends in their study conducted in Yenagoa metropolis, Niger-Delta, Nigeria. These observations imply that children play important role in maintaining transmission of intestinal parasites since they easily aggregate to play at home and in school under unhygienic conditions with inadequate toilet facilities and no potable water.

The perceptions on the causes of intestinal parasitic infections as presumed by the women simply showed ignorance and unawareness of the transmission potentials by these women.

It is worth mentioning that unwholesome practice like the habit of defaecating inside polythene bags or paper materials and throwing such human faeces on major roads, streets, highways, gutters, flowing streams, open environment or rivers sometimes exhibited by many people in different parts of Nigeria are important factors that sustain transmission. Such behaviour encourage flies to transfer cysts, larvae and eggs of intestinal parasitic infections onto food items displayed along roads thus posing serious threat to consumers. Another transmission factor is during rainy season; faeces are often washed into wells, streams and rivers which are potential sources of drinking water. Those that are in the habit of scooping water from broken pipes in gutters are also exposed to these parasites. Likewise, domestic animals or pets foraging and roaming on the streets and refuse dumps can feed and even carry such parasites on their body or hooves putting at risk their owners.

Sources of drinking water and patronizing food vendors were observed as risk factors among the women. Prevalence rate of intestinal parasitism in respondents that relied on river water (72.2%), "*mai-ruwa*" (69.1%) and well (64.9%) were higher than those that relied on tap water (47.0%). This implies that sources of drinking water are potential sources of infection. Contamination of water occurs sometimes during fetching processes. Those that rely on water vendors are mostly unaware of the sources of such water. However, it is observed that those water vendors do not always obtain water from taps as they claim but sometimes from broken pipes in gutters and running surface water. Even if water is obtained from a clean source, the "*jerry-cans*" used for fetching could easily contaminate it because they often appear dirty.

The higher prevalence rate observed in women of the pre and post-menstrual stages that always and sometimes patronized food vendors maybe due to the fact that these groups are not always able enough to prepare their everyday meal thereby exposing them to food vendors. The pre-menstruals could also be exposed to food vendors in schools. The fact that food vendors play important roles in maintaining the vicious cycle of transmission of intestinal parasitic infections has also been reported in Kenya and Ghana[13,14] .

Conflict of interest statement

We declare that we have no conflict of interest.

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