Prevalence and Management Strategies of Perceived Intestinal Parasitic Infections by Households in Imo State Nigeria

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Abstract

BACKGROUND

Intestinal parasitic infections (intestinal worms) are major public health problems, especially in developing countries. This study was conducted to determine the prevalence and management strategy of intestinal parasitic infections (IPIs) employed by households.

METHODOLOGY

The study was carried out in Imo State, south-eastern Nigeria. Faecal samples from 1200 school children, aged 6-13 years were examined using the Kato Katz method and formol-ether concentration techniques. A structured and pre-tested questionnaire was used to collect data. The level of significance was set at P< 0.05.

RESULTS

The total prevalence of IPIs was 19.3%, which comprises eight parasites namely; Ascaris *lumbricoides* (3.4%), *Trichuris trichiura* (1.3%), hookworm (1.8%), *Strongyloides stercoralis* (0.2%), *Taenia* spp (0.5%), *Entamoeba histolytica* (5.3%), *Entamoeba coli* (3.7%), and *Giardia lamblia* (4.2%). There was high awareness of possible signs and symptoms of IPIs. Albendazole, Pyrantel pamoate and Mebendazole were the three most frequently used drugs and intermittent deworming with them was effective against the intestinal worm. The impact of deworming on the prevalence of intestinal worms was higher among children dewormed every 4 months, compared with other groups. Self-medication was a major practice amongst the study population. Households (33.9%) delayed up to 48 hours from the onset of symptoms before giving the child medical attention. The majority of households used plant extracts as alternative medication.

CONCLUSION

The management approaches in the study area were good although they did not regard IPIs as a serious public health problem for a growing child.

***Keywords**: Prevalence, Infections, Deworming, Management, Intestinal Parasite*

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Introduction

Intestinal parasitic infections (intestinal worms) are major public health problems confronting the world, especially in developing countries [1]. IPIs have been identified as neglected tropical diseases (NTDs) [2-4] and have received global attention. Although IPIs affect all age groups, it is a major cause of morbidity among school-aged children [5] due to their unhygienic practices and weak immune system [6, 7]. According to the World Health Organization (WHO), 870 million children live in areas of high prevalence [8]. Similarly, WHO

reported that globally over 568 million school-age children live in intestinal helminths prevalent areas [9]. The most affected regions of the world include Africa, South Asia, and South America [8]. Intestinal worms have been associated with socio-economic status, and poor environmental and personal hygiene [10, 11]. Additionally, negligence in mass deworming programmes, lack of awareness and cultural practices have been reported to contribute to continued infection transmission and reinfection [12]. In developing countries, periodic deworming with Albendazole, Pyrantel pamoate, Mebendazole and other Anthelminths was effective for the treatment of intestinal worm infection [13, 14]. Periodic evaluation of prevalence and control measures employed by families is a prerequisite to controlling infections due to intestinal worms and associated health challenges [2]. Investigation of perception and knowledge of control /treatment options in the study will contribute extensively to educating families as part of integrated control strategies as recommended by [15].

Materials and Methods

Study area

The study was carried out in Imo State, south-eastern Nigeria (figure 1). Imo State lies within latitudes 4°45'N and 7°15'N, and longitudes 6°50'E and 7°25'E, with an area of about 5,100 km^2. Imo State is mainly inhabited by the Igbo people and with a population of about 5.4 million people and a Population Density of 1,053/km^2, with 1.4 million below the age of 14 years(National Population Commission, 2016). The average annual temperature is above 20°C which creates an annual relative humidity of 75%, with humidity reaching 90% in the rainy season. These areas experience dry season from December to March and Harmattan commences from late December to late January. The study was conducted in eleven (11) randomly selected Local Government Areas in Imo State

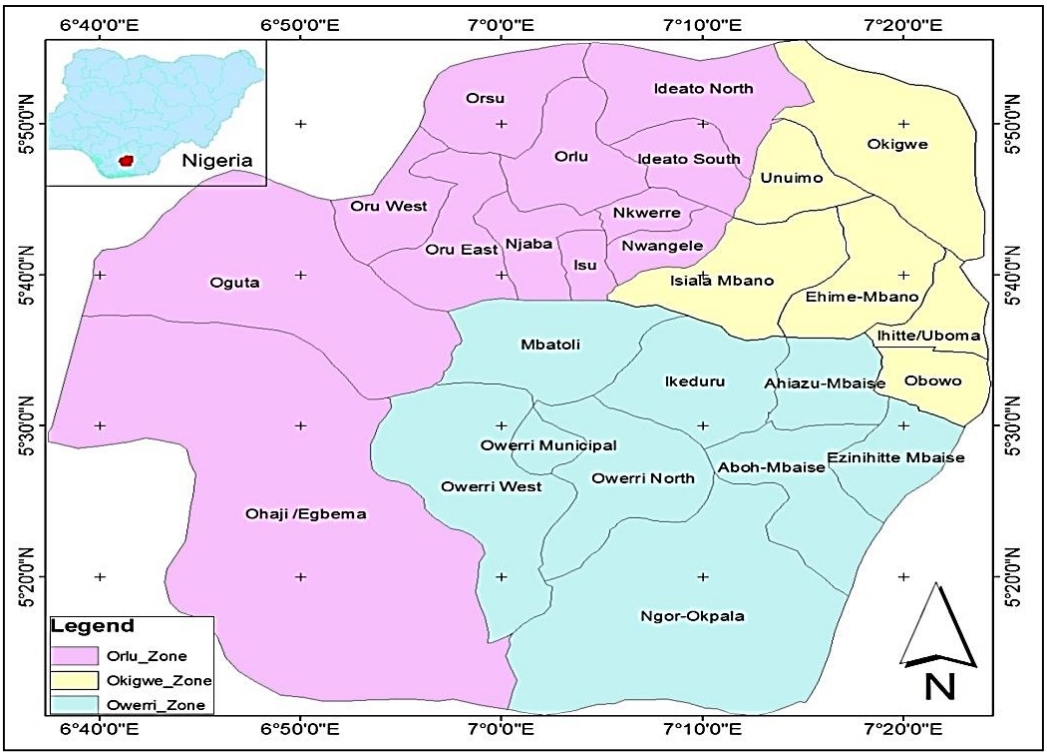

Figure 1:
Map of Imo State showing Orlu, Owerri and Okigwe zones. Source: Imo State Ministry of Urban and Rural Development

Sample and sampling techniques

The method described by Daniel [16] for the determination of sample size was employed. A random selection process was used to select 1200 pupils between the ages of 5-13 years, for the study. Nine hundred and fifty-six mothers/guardians of subjects, out of 1200 randomly selected pupils, completed their questionnaires.

Participants were notified of the day of sample collection. Stool samples were collected from the pupils with the aid of clean, dry, caped, well-labelled sterilized stool specimen bottles. Their mothers and class teachers assisted to ensure compliance. This study's unique identification numbers were also assigned to the sample bottles matching the bio data of the individual participant provided in a re-filled questionnaire. All stool samples were transported to Parasitology Laboratory, Federal Medical Centre, Owerri for analysis. The faecal samples were examined with formol-ether concentration and the Kato Katz method technique.

Data collection tool

A well-structured and pre-tested questionnaire was used to collect information needed for the study. The questionnaire sought questions on management strategies employed by mothers in the treatment of perceived intestinal worm infection. Knowledge of intestinal worms was first tested by ascertaining the local names they are known with followed by testing their basic knowledge of the clinical symptoms and what causes it.

Data analysis

Statistical Package for Social Sciences (SPSS) version 15 software package was used to analyze the quantitative data. Data generated from the research were sorted into categories and observations and then analyzed by using simple frequency tables and percentages. Chi-square at $P< 0.05$ level of significance was employed to test relationships between variables.

Ethical considerations

Ethical clearance was obtained from Imo State Specialist Hospital Umuguma, Owerri Imo State, Nigeria before the commencement of the study. Ethical considerations were applied by the issuance of results of the laboratory analysis to participants who were assured of the confidentiality of the data collected.

Advocacy visits were made to the Chairmen of the Local Governments Areas, the Local Governments' health officers and Executive Education Secretaries to solicit their support. The head teachers at the selected primary schools were also visited. The needs, benefits and objectives of the study were extensively discussed with the teachers and parents/guardians of participants and verbal consent was obtained before the commencement of the study.

Results

Types and prevalence of parasites

The types and prevalence of parasites identified are shown in Table 3.1. Eight (8) intestinal parasites comprising *Ascaris lumbricoides* (3.4%), *Trichuris trichiura* (1.3%), hookworm (1.8%), *Stongyloides stercoralis* (0.2%), *Taenia* spp. (0.5%), *Entamoeba histolytica* (5.3%), *Entamoeba coli* (3.7%), and *Giardia lamblia* (4.2%) were identified. The most prevalent intestinal parasite was *E. histolytica* (5.3%) while. *S. stercoralis* had the least prevalence of 0.2%. Out of the 232 children infected, 45(3.8%) had a double infection while no triple infection was reported.

Mothers' perception of clinical symptoms of intestinal parasitic infections

Nine hundred and fifty-six respondents completed their questionnaire. As shown in Table 3.2, most of the respondents in this survey were able to correctly mention at least one sign and symptom of intestinal parasitic infections. The most mentioned symptom was vomiting

490(29.2%), followed by abdominal/stomach pain 394 (23.5%).

Mothers' perception of the causes of intestinal parasitic infections

Table 3.3 shows the knowledge and perception of mothers on the causes of intestinal worms, majority of the mothers had good knowledge of possible causes of intestinal worms while 37.3% (23.1+6.7 +3.3+2.8) of mothers did not know the causes of intestinal worms.

Drug of choice and prevalence of intestinal parasitic infections

As shown in Table 3.4, 696 out of 956 respondents practised deworming. The three most frequently used drugs by respondents were Albendazole (22.8%), Pyrantel pamoate (19.5%), and Mebendazole (14.1%). Others include Levamisole (10.3%), Praziquantel (4.0%) and Piperazine 2.3%. There was significant variation in the prevalence of intestinal worms for all drugs used by the subjects.

Period of deworming and prevalence of intestinal parasitic infections

Table 3.5 shows the test of the relationship between periodic deworming and the prevalence of intestinal parasitic infections. The highest (36.8%) prevalence of intestinal worms was recorded in children who were dewormed annually, followed by those who were dewormed biannually (28.5%).

Table 1:
Types and prevalence of parasites in the study area

Number Examined	**Species**	**Prevalence**
1200	*A. lumbricoides*	41(3.4%)
	T. trichuria	16(1.3%)
	Hookworm	21(1.8%)
	Taenia spp.	6(0.5%)
	S. stercoralis	2(0.2%)
	E. histolytica	64(5.3%)
	G. lamblia	40(3.3%)
	E. coli	42(3.5%
Total prevalence		**232(19.3%)**
1200	**Double infection**	**Prevalence**
	E. histolytica + *G. lamblia*	9(0.8%)
	T. trichiura+ *E. histolytica*	13(1.1%)
	A. lumbricoides + *E. coli*	14(1.2%)
	E. histolytica + *E. coli*	2(0.2%)
	G. lamblia + *E. coli*	7(0.6%)
Prevalence of double infection		**45(3.8%)**

***Table 2*:**
Mothers' Perception of Clinical Symptoms of Intestinal Parasitic Infections

Clinical sign	**No. of responses**	**Percentage (%)**
Abdominal/stomach pain	394	23.5
Abdominal distention	60	3.6
Diarrhoea/blood in stool	66	3.9
Emaciation	100	6.0
Salivation	72	4.3
Weakness	96	5.7
Vomiting	490	29.2
Loss of appetite	164	9.8
Anorexia	20	1.2
Fever and headache	196	11.7
Increased appetite	18	1.1
Total	1676	100%

The least prevalence of intestinal parasitic infection was recorded in children who were dewormed three times in a year (26.3%). The study showed a significant relationship between periodic deworming and the prevalence of intestinal parasitic infections (P = 0.043).

Medical management practices of symptoms by households.

Table 3.6 shows management practices of intestinal infection by families. The majority of mothers 378 (39.5%) were visiting patent stores, 122 (12.8%) practised self-treatment with a home remedy, 114 (11.9%) visited hospitals, 98 (10.3%) visited Trado-medicine practitioners, 206 (21.3%) visited health centres while 40 (4.2%) resorted to faith. Self-treatment with a home remedy, a visit to a patent store and an application of trado-medicine were classified as self-medication.

Treatment seeking time from onset of symptoms by households

As shown in Table 3.7, the majority of mothers 632(66.1%) started treatment less than 48 hours from the onset of clinical symptoms while 324(33.9%) of mothers started treatment within two days of the onset of clinical symptoms.

Table 3:
Mothers' Perception of the Causes of Intestinal Parasitic Infections

	No. of responses	Percentage	Calcification
Eating improperly cooked meat	120	5.7%	Right
Eating sugary fruits/candies	486	23.1%	Wrong
Drinking contaminated water	410	19.5%	Right
Eating spoilt and dirty food	258	12.3%	Right
Eating with unwashed hands	324	15.4%	Right
Consumption of unripe fruits	132	6.3%	Wrong
Eating unwashed fruits & vegetables	198	9.4%	Right
Occur naturally in the body	70	3.3%	Wrong
Through insect bite	58	2.8%	Wrong
No idea	46	2.2%	None
Total	2102	100%	

Table 4:
Relationship between Drug of Choice and Prevalence of Intestinal Parasitic Infections among Study Participants

Drug of choice	No of Respondents	No. of infected	No. of Non-infected
Mebendazole	134(14.1%)	40(29.9%)	94(70.1%)
Albendazole	218(22.8%)	58(26.6%)	160(73.4)
Pyrantel pamoate	186(19.5%)	72(38.7%)	114(61.3%)
Levamisole	98(10.3%)	36(36.7%)	62(63.3%)
Piperazine	22(2.3%)	8(36.4%)	14(63.6%)
Praziquantel	38(4.0%)	4(10.5%)	34(89.5%)
Total	696(100%)	218(31.3%)	478(68.7%)
*P= 0.006.			

Table 5:
Association between Period of Deworming and Prevalence of Intestinal Worms

Number of de-worming	Infected	Non-infected	Total
Once a year	98(36.8%)	168(63.2%)	266(100.0%)
Once in 6 months	90(28.5%)	266(71.5%)	316(100.0%)
Once in 4 months	30(26.3%)	84(73.7%)	114(100.0%)
Total	218(31.3%)	478(68.7%)	696(100.0%)
*P =0.043			

Action taken by mothers if their child is not recovering after days of treatment

As shown in Table 3.8, 500 out of 956 respondents admitted that their children didn't recover after some days of treatment. A majority (52.6%) of mothers who practised self-medication visited the hospital when their child's/ward's recovery was delayed after days of treatment; 147 (29.4%) continued to seek medical care from patent men for alternative drugs, while 18.0% resorted to faith. Summarily, 47.4% (continued with patent medical care and resorted to faith) did not visit the hospital even after days of delayed recovery.

Common plant and plant materials used as a home remedy

As shown in Table 3.9, 518 out of 956 households admitted they used plant and plant materials as alternative medicine. The three most frequently used plant species were *Citrus aurantium/ Citrus aurantifolia* (25.5%), *Ocimum basilicum* (23.9%) and *Allium sativum /Zingiber officinale* (19.3%).

The attitude of mothers

Table 3.10 shows the attitude of households towards intestinal parasitic worm infections. A majority, 59.9% of households did not see worm infections as a serious public health problem, while 40.1% regarded worm infections as a serious problem.

Discussion

The low prevalence (19.3%) of intestinal parasitic infections as recorded among primary school children in Imo zones, showed a decline in infection rate when compared with previous works by Okafor-Elenwo *et al*. [17] and Udensi *et al*. [18] in Southern Nigeria, where they reported prevalence of 24.8% and 47.7% respectively.

Table 6:
Medical Management Practices of Symptoms of Intestinal Worm Infection by Households

Management practice	Frequency	Percentage (%)
Self-treatment with home remedy	122	12.8
Hospital	114	11.9
Patent store	378	39.5
Visit Trado-medicine	98	10.3
Health Centre	204	21.3
Faith	40	4.2
Total	956	100

Table 7:
Treatment seeking time from onset of symptoms by households

Time	Frequency	Percentage(%)
Less than 2 days	592	61.9
With 2-5 days	324	33.9
No treatment	40	4.2
Total	956	100

Table 8:
Action Taken by Mothers if the Child was not recovering after Days of Treatment

Treatment action	Frequency	(%)
Hospital	263	52.6
Report back to the patent man for alternative treatment	147	29.4
Faith	90	18.0
Total	500	100

A lower prevalence was also reported by Angora *et al*. [19] in another developing country in Africa. The low prevalence could be because of improved sanitation and fair knowledge of intestinal parasitic infections and management approaches as reported in the study area. The prevalence of double infection was 3.8%. This corroborated the works of Damtie *et al*. [2] and Abah and Arene [20]. These reports support the fact that double infection is a norm in developing countries.

From the result of the study, of mothers' knowledge of the causes of intestinal parasitic infection, the majority of the mothers exhibited good knowledge of the causes. This is similar to the report by Stanley *et al.* [21] in the South Southern part of Nigeria.

On the signs and symptoms of worm infection, there was high awareness of possible signs and symptoms of intestinal worm infection as respondents were able to correctly mention at least one sign and symptom. The exhibition of knowledge aided in the good deworming practice observed in the study area. This finding corroborates the study of Gebreyohanns *et al.* [22] in a developing country.

The most frequently used drug was Albendazole (22.2%) followed by Pyrantel pamoate (19.5%). A lower prevalence of intestinal worms was recorded among children who practised deworming with the listed drugs. Studies conducted by Conterno *et al.* [14] and Muchiri *et al*. [23]indicated that intermittent deworming with albendazole was most effective in treating intestinal worms. Albendazole, pyrantel pamoate and all the drugs used by the respondents were among the drugs recommended by WHO, [24] for intermittent deworming [13, 14].

The impact of deworming on the prevalence of intestinal worms was higher among children that were dewormed every four (4) months when compared with other groups as the least prevalence (26.6%) was recorded among the group. This is comparable to the reports of Stanley *et al*. [21], Conterno *et al.*, [14] and Kirwan *et al*. [25] which observed that periodic deworming is an effective intervention measure against the burden of intestinal worm infection.

Self-medication was a major practice in the study area and according to Parulekar *et al*. [26], this is a norm in developing countries.

Table 9:
Some Common Plant and Plant Materials used by Households as Home Remedies for the Treatment of Intestinal Worms

Common name	Botanical name	Frequency	Percentage (%)
Utazi leaf	*Gongronema latifolium*	40	7.7
Lemon/lime	*Citrus aurantium*/Citrus aurantifolia	132	25.5
Wormwood	*Artemisia absinthium*	32	6.2
Bitter kola	*Garcinia kola*	60	11.6
Garlic/Ginger	*Allium sativum/ Zingiber officinale*	100	19.3
Scent leaf	*Ocimum basilicum*	124	23.9
Red clover	*Trifolium pratense*	30	5.8
Total		518	100%

Table 10:
The Attitude of Households Towards Intestinal Parasitic Infections

Variables	Frequency	Percentage (%)
Serious	384	40.1
Not Serious	572	59.9
Total	956	100

However, existing data has shown that self-medication is mostly based on self-evaluation and is associated with potential health problems due to incorrect self-diagnosis, infrequent but severe adverse reactions, dangerous drug interactions, incorrect manner of administration and risk of abuse [27,28].

Investigation on the time spent by mothers from the onset of clinical symptoms before the commencement of treatment showed that some mothers (33.9%) delayed up to 48 hours before giving their child medical attention. This attitude supported the fact that worm infection was not seen as a serious public health problem in the study area, and according to Ngwese *et al.* [29], could be dangerous for children harbouring heavy infections. This might also be due to poverty and inaccessibility to medical care [30,7].

This showed that 47.4 % (continued with patent medical care or resorted to faith) of households did not visit a hospital for adequate care even after days of delayed recovery. This might be due to poverty, illiteracy, and belief system. These have been recorded as major challenges in disease prevention and control in developing countries [7].

The majority of households made use of plant and plant materials as alternative medicine. This practice is not new, according to Aschale *et al.* [31], many medicinal plant species have been applied for the treatment of gastrointestinal worm infections. In line with the study, previous researchers have reported the use of *Citrus aurantium/Citrus aurantifolia* [32], *Artemisia absinthium* [33]; *Ocimum basilicum* [34]; and *Trifolium pratense* [35] for the treatment of intestinal worm infections.

On the general attitude of mothers towards intestinal worms, 59.9% did not believe that intestinal worm infections are a serious public health problem for a growing child and even of treatment. This could be due to ignorance of associated health problems such as malnutrition and anaemia. This finding is in line with the findings of Sady and Al-Mekhlafi [36] in Yemen. This could explain why some mothers (33.9%) waited for 2-5 days after manifestations of some symptoms before the commencement of treatment.

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