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Studies on Intestinal Helminths Infection and Habits among Clinically Diagnosed Typhoid Fever Patients Attending Health Care Facilities in Okpokwu Local Government Area of Benue State, Nigeria.

*Abah Emmanuel A[1]., Abakpa Regina E.[2], Egwu Regina E[3]. and Attah Moses O[4].
[1,2,3]Department of Zoology, Joseph Sarwuan Tarka University, Makurdi, Benue State
[4]Department of Science Laboratory Technology, Benue State Polytechnic, Ugbokolo.

Abstract

Enteric infections like salmonellosis and intestinal parasitosis are widespread diseases affecting human population in Nigeria. Poor personal and environmental hygiene, waste disposal and consumption of uncertified foods sold by commercial vendors are major factors that encourage stable transmission. The present study investigated intestinal helminthes infection and habits among clinically diagnosed typhoid fever patients attending health care facilities in Okpokwu Local Government Area of Benue State, Nigeria. Direct Wet Mount Technique, Formol-ether Concentration Technique and Modified Ziehl-Neelsen Method were the standard techniques used for this study. Four hundred and thirty six (436) typhoid fever patients were consented and participated in this study. The overall prevalence of intestinal parasites in the present study was 30.7 %. The intestinal helminthes identified in this study and there prevalence include, *Ascaris lumbricoides* (7.34 %), hookworm (4.13 %), *Strongyloides stercolaris* (3.21 %) and *Trichuris trichiura* (2.06 %) with total prevalence of 16.74 %. The result revealed that there is synergetic relationship between intestinal helminths infections and typhoid fever in relation source of drinking water (P=0.028). Since both diseases share social circumstance such as poverty and hygiene, the populace should be educated on the importance of personal hygiene and appropriate drugs should be made available at reduced and affordable costs.

Key words; Helminths, Infections, Prevalence and Association

1.0 INTRODUCTION

1.1 Background of the Study

Intestinal helminths infections are the main health problems which can cause mortality and morbidity among infected people. They are also associated with stunting of linear growth, physical weakness and low educational achievement in children. Moreover, they cause iron deficiency anemia, loss of appetite and other physical and mental problems [1].

Intestinal parasitosis refers to a group of diseases caused by one or more species of protozoa, cestodes, trematodes and nematodes. These parasites are responsible for the major share of morbidity and mortality in those communities where there is over-crowding, poor environmental sanitation and personal hygienic practices, which make them a great concern for the developing countries. The prevalence of different parasites differs between immunocompetent and immunodeficient individuals [2].

Enteric infections like *Salmonella* and intestinal helminths are widespread diseases affecting the population in Nigeria [3]. Poor personal and environmental hygiene, waste disposal as

well as consumption of food sold by commercial vendors are major factors that encourage stable transmission [4]. Although school children are particularly at high risk of enteric infections due to their undeveloped hygienic habits, it is necessary to understand the pattern of infections of these diseases among young adults who have just gained independence from their care-givers [5].

Enteric *Salmonella* species are bacteria that are responsible for typhoid fever. The bacteria can survive in water for one week, two weeks in sewage and one month in ice cream. However, boiling of water or milk destroys the organisms [3].

The disease-Typhoid fever, like the gastrointestinal parasitic infections, is one of the most important life threatening but under estimated enteric infectious disease. The incidence of typhoid fever is significantly high.

1.2 Statement of the Problem

Transmission of intestinal parasites and enteropathogenic bacteria is affected directly or indirectly through objects contaminated with faeces. These include food, water, nails, and fingers, indicating the importance of faecal-oral human-to-human transmission [6]. Accordingly, food-handlers with poor personal hygiene working in food-serving establishments could be potential sources of infections of many intestinal helminths, protozoa, and enteropathogenic bacteria [7]. Food-handlers who harbour and excrete intestinal parasites and enteropathogenic bacteria may contaminate foods from their faeces via their fingers, then to food processing, and finally to healthy individuals [8]. Compared to other parts of the hand, the area beneath fingernails harbours the most microorganisms and is most difficult to clean [9].

1.3 Aim

The aim of this study was to investigate intestinal helminths and habit among clinically diagnosed typhoid fever patients attending health care facilities in Okpokwu Local Government Area of Benue State, Nigeria.

1.4 Objectives of the Research

The specific objectives of the study included:

- To determine the prevalence of intestinal helminths infection among clinically diagnosed typhoid fever patients in Okpokwu Local Government Area Benue State
- To determine the factors associated with intestinal helminths infection among clinically diagnosed typhoid fever patients in Okpokwu Local Government Area Benue State
- To establish possible synergetic relationship between typhoid and intestinal helminthes infections in the study.

1.5 Justification of the Study

The high prevalence of parasite infections and the wide distribution of various parasites in people living in tropic regions remains a major concern, and most control activities are focused on drug-supported de-worming campaigns.

Health education, sanitation, personal hygiene and other means of prevention remain still not well developed, and only few studies have investigated the impact of information, education and communication on parasite infections in school children.

This study would therefore, provide pre-control data that would narrow the knowledge gap in this subject matter.

2.0 MATERIALS AND METHODS

2.1 Study Area

Okpokwu Local Government Area was created in 1976 and takes its name from the Okpokwu stream. The local government area is made up of Okpoga, Edumoga and Ichama districts with Okpoga as the headquarters. Okpokwu Local Government Area lies between latitude 7^0 03' 27.60" N and longitude 8^o12' 21.60" E.

The local government area shares boundary with Otukpo, Ohimini, Ogbadibo and Ado local government areas of Benue State; Olamaboro local government area of Kogi State and Isi-Uzo local government area of Enugu State.

Okpokwu Local Government Area has a population of 175,596 (2006 census). The population of the local government area is projected to be 213,938 (as at 2014).

Samples were collected from the Local Government Comprehensive Health Centers in Ugbokolo, Ojapo and Olanyega. Samples were also collected from the Local Government clinics in Okpoga, Ichama, Ojigo and Ekeh.

Fig 1; Map of Benue State showing Okpokwu Local Government Area

2.2 Sample Size

The sample size was 436. The study sample was determined by statistical calculations using the Yaro Yamen's formula and the proportional sampling for the estimation of the study population. The Yaro Yamen's formula is given thus:

$$n = \frac{N}{1+N(e)^2}$$

Where:

n = Sample Size

N = Population

e = Level of precision or confidence level $(0.05)^2$ (Ogunniyi, 2009).

2.3. Methods of Data Collection

2.3.1. Collection of Stool Samples

Disposable plastic cups and applicator sticks were distributed to each study participant along with brief instruction on how to collect the stool. They were instructed to bring sizable (about 3 grams) fresh stool sample of their own. Each plastic cup was labeled with codes of patients. The stool samples were carried to the Microbiology Laboratory of the Benue State Polytechnic Ugbokolo for parasitological examination [10].

2.3.2 Ethical clearance

Ethical clearance was sought from the Department of Health and Human Services Okpokwu Local Government Area, Benue State.

2.3.3. Socio-demographic data collection

Standard questionnaire was used to collect appropriate information about characteristics of the study patients, such as age, sex and marital status, habit, residence of patients and source of drinking water.

2.4. Laboratory Parasitological Examination Procedures

2.4.1. Direct wet mount technique

A direct wet mount of stool in normal saline (0.85 % NaCl solution) was prepared and was examined for the presence of motile intestinal parasites and trophozoites under compound light microscope (40 x magnification). Lugol's iodine staining was used to detect cysts of intestinal parasites [10].

2.4.2. Formol-ether concentration technique

Among the different parasitological techniques for stool analysis, formol - ether concentration technique as described by Cheesbrough [10] was employed in this study.

2.4.3. Modified Ziehl-Neelsen method

A thin smear was prepared directly from fresh as well from sediments of concentrated stool and allowed to air dry. Then the slides were fixed with methanol for 5 minutes and stained with carbol fuchsin for 30 minutes.

The slides were then washed with tap water and decolorized with acid alcohol (1 ml HCl and 99 ml of 96 % ethanol) for 1-3 minutes. After washing the slides with tap water, it was counter stained in methylene blue for another 1 minute. Finally, the slides were washed in tap water and allowed to air dry. The slides were then observed under compound light microscope with X1000 magnification. Each slide was observed for 10 minutes to decide whether it is negative or positive [10].

2.5 Data Analysis

Data entry and analysis was performed using SPSS software. Statistical analysis was done using Chi-square to evaluate any association between intestinal parasitic infections and typhoid fever. Odds ratio was used to measure the strength of association between presence of parasite and typhoid fever. Observed differences in data were considered significant and noted in the text if $P<0.05$.

3.0 RESULTS

Four hundred and thirty six (436) typhoid fever patients participated in this study.

Table 1 showed that 51 (35.4%) out of 144 patients that use open space/field were positive for intestinal parasite. Patients that uses pit toilet and water closet had 55 (29.7%) and 28 (26.2%) prevalence respectively. The chi-square analyses showed that the type of toilet is not associated with intestinal parasitic infections and typhoid fever at $p = 0.492$.

Table 1; Prevalence of Intestinal Helminths among Typhoid Fever Patients in Relation to Type of Toilet Facility

Variables	No. Examined	No. Positive	Prevalence (%)
Pit Toilet	185	55	29.7
Water Closet	107	28	26.2
Open Space/Field	144	51	35.4
Total	**436**	**134**	**30.7**

χ^2 @2df (parasite and toilet facility) =1.42, p=0.492 (p>0.05)

From table 2, patients who do not wash their hands after using the toilet and those who do not wash their hands always had 31(37.3) and 55(34.6) had positive result for intestinal parasite. Those who wash their hand after using the toilet had 24.7 prevalence. The chi square analyses showed that hand washing after toilet is not associated with intestinal parasitic infections and typhoid fever at p= 0.255 which is greater than 0.05

Table 2; Prevalence of Intestinal Helminths among Typhoid Fever Patients in Relation to Hand Washing after Toilet use

Variables	No. Examined	No. Positive	Prevalence (%)
Yes	194	48	24.7
No	83	31	37.3
Not Always	159	55	34.6
Total	**436**	**134**	**30.7**

χ^2 @2df (parasite and hand washing habit) =2.73, p=0.255 (p>0.05)

Table 3 above showed that 69 (38.5%) out of the 179 samples from patients that uses river/stream as source of drinking water were infected with intestinal parasites. Those who use other sources of water had 27.9% followed by borehole at 24.6%. The lowest rate of infection was in those who use pipe-borne water (16.7%). The chi square analyses showed that source of drinking water is significantly associated with intestinal parasitic infections and typhoid fever (p= 0.028).

This showed that there is synergetic relationship between intestinal parasitic infections and typhoid fever in relation to source of drinking water.

Table 3; Prevalence of Intestinal Helminths among Typhoid Fever Patients in Relation to Source of Drinking Water

Variables	No. Examined	No. Positive	Prevalence (%)
Pipe-Borne Water	24	4	16.7
Borehole	122	30	24.6
River/Stream	179	69	38.5
Others	111	31	27.9
Total	**436**	**134**	**30.7**

χ^2 @df (parasite and source of drinking water) =9.10, p=0.028 (p<0.05)

Figure 2 shows frequency of occurrence of intestinal helminths. *Ascaris lumbricoides* had the highest prevalence rate followed by hookworm, *Strongyloides stercolaris* and *Trichuris trichiura*.

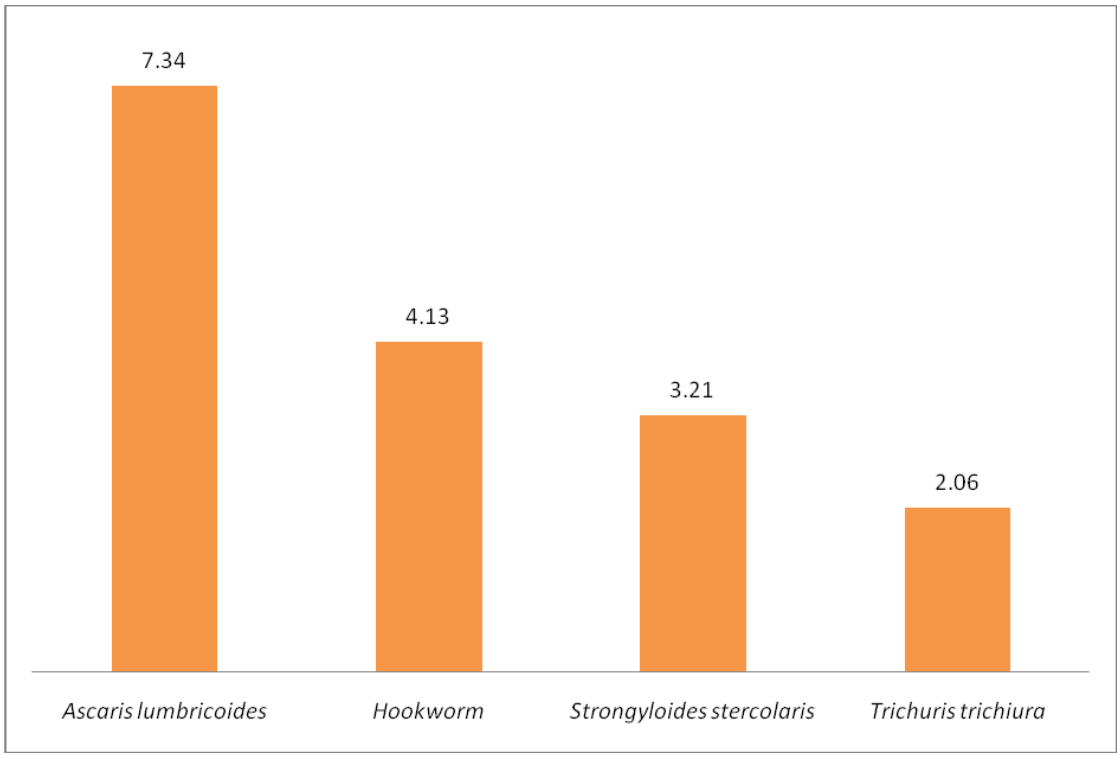

Figure 2: Prevalence of Intestinal Helminths among Typhoid Fever Patients.

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4.0 DISCUSSION

This study carried out among clinically diagnosed typhoid fever patients attending health care facilities in Okpokwu Local Government Area of Benue State showed an overall prevalence of 30.7%. The prevalence of intestinal helminthes in this study is lower than 43.3% that was found by Ejenika *et al.*, [7] in Jos Nigeria, 41.2 as reported by Hailegebriel [11] especially with high prevalence of parasites in developing countries. In some rural communities in North – Eastern Nigeria, a higher prevalence of 80.9% was reported amongst Almajiri school children [12]. Similar results of (58.5%) and (51.0%) were also observed in rural communities in Benue State, Nigeria.

The overall prevalence similar to 30.6% as reported by Adekunle, [13]. This work is close to the prevalence of 29% gastro-intestinal parasites that was observed amongst in-patients of Igbinedion University Teaching Hospital, Okada, Edo

State reported by Okafor-Elenwo *et al.*, [14].

There is no association between intestinal helminths and typhoid fever patients in relation to type of toilet facility (p=492). Out of the 144 samples collected from patients who defecates in open field, 51(35.42%) were infected with intestinal helminthes. Patients who uses pit toilet and water closet had 55(29.7%) and 28(26.2%) prevalence respectively. This agrees with Amuta *et al.*, [15] who reported that availability or lack of sanitary facility especially toilet would greatly determine the infection rate of intestinal parasite in any place.

Patients who do not wash their hands after using the toilet and those who do not wash their hands always had 37.3% and 34.6% prevalence rate. The chi square analysis showed that hand washing after toilet use is not associated with intestinal helminths infection and typhoid fever at p=0.225. This result is in less than that of Mama and Alemu, [16] who reported 43% prevalence rate in people who do not wash their hand after using the toilet. This agree with assertion of Abdulhadi *et al.*, [1] work in Kano, that food may be contaminated by hands that have not been washed after defecation or from flies that land on both food and feces hence increasing the risk of transmission of intestinal parasites for consumers.

The study also showed 38.5% rate of prevalence among those who use river/stream water as source of drinking water. Those who use other sources had 27.9% followed by those who use borehole at 24.6%. The least rate of prevalence was in those who use pipe-borne water (16.7%). This result is in agreement with Atswe *et al.,* [17] in his work in Vandeikya, Benue State that those whose stream/river as source of drinking water has high prevalence rate of intestinal parasite. This is because in rural community were open defecation is practiced; surface water always washes egg of parasite and faecal materials into the river/stream. The chi square analysis showed that source of drinking water is significantly associated (P=0.0191) with intestinal helminths infections and typhoid fever patients.

The intestinal helminths identified in this study include, *Ascaris lumbricoides*, hookworm, *Strongyloides stercolaris* and *Trichuris trichiura*. *Ascaris lumbricoides* recorded the highest prevalence of rate followed by hookworm, *Strongyloides stercolaris* and *Trichuris trichiura*. The helminthes *T. trichiura*, *Ascaris lumbricoides* and the hookworm have been observed to cause infections of varying degrees in 48 million people worldwide [18, 11].

Ancylostoma duodenale (hookworm) was the most prevalent intestinal helminth identified in the children. Incidence of hookworm infection is directly related to exposure to soil where filariform larvae live in and penetrate human skin. Thus, poor personal hygiene and sanitation observed in some of these patients increased the risk of hookworm infection.

The presence of *Ascaris lumbricoides*, and *Trichuris trichuria*, observed was indicative of fecal-oral transmission which may be related to non-washing of feacal contaminated hands by the children after the use of their toilets. *Strongyloides stercoralis* and *Ancylostoma duodenale* seen in samples are indicative of regular bare body contact with soil, through which cysts/larvae of the parasite bear through the skin.

Intestinal parasites, as identified in this and other studies, have been reported to occur mostly in the high humid tropical regions of the world, Nigeria inclusive. The climatic conditions over these regions favour the survival and transmission of these parasites. Other factors such as low income, poor environmental sanitation and personal hygiene, lack of potable drinking water and inadequate healthcare, and poor educational awareness, encourage the high prevalence rates of these infections at any given time/place. In places where there is increased public sensitization and awareness programmes coupled with good sanitation and proper personal hygiene, very low incident rates of gastrointestinal infections with parasites are usually recorded [9].

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This result evidently shows a high level of intestinal helminthes infection especially among the rural dwellers. Such prevalence has been attributed to ignorance, poverty, poor environmental and personal hygiene, shortage of clean potable water and indiscriminate defecation. Parasitic infections of the gastro-intestinal tract of man are amongst the most common infections in the area.

The helminthes *T. trichiura*, *Ascaris lumbricoides* and the hookworm have been observed to cause infections of varying degrees. Intestinal parasitic infections are a serious public health problem because they can cause iron deficiency, anaemia, growth retardation in growing adults and children as well as causing varying physical and mental health conditions. High prevalence of infections associated with intestinal helminthes can be attributed to poverty, poor environmental hygiene and inadequacies in medical services.

In Nigeria, a considerable amount of human and animal wastes are discharged into the soil daily leading to seepage with pathogenic organisms which includes cysts, eggs and larvae of these helminths.

This showed that there is synergetic relationship between intestinal helminths infections and typhoid fever in relation to source of drinking water. The co-infection of *Salmonella* species with helminthes could complicate treatment of enteric fever caused by *Salmonella* bacteria. This is because the worms could provide a focus for multiplication of this bacterium, which are then released into the blood stream, causing septicemia. This explains why chemotherapy for *Salmonella* infection must be administered with anti-helminthic treatment to be efficient. This association can also result in early relapses of typhoid fever as opined by.

5.2 Recommendations

Since both diseases share social circumstances such as poverty and hygiene, governments' involvements in the improvement of the standard of living of individuals in areas of high endemicity is hereby recommended. Also, cases of the disease should be detected and promptly treated to avoid further transmissions. The populace should be educated on the importance of personal hygiene and appropriate drugs should be made available at reduced and affordable costs. A continuous monitoring of microbiological and parasitological surveillance is crucial.

Drinking water from a good source, proper washing of food items especially vegetables before eating is highly advocated. Adequate de-worming at most every 3 month is required and eating of balanced diet to build up immunity to fight parasitic infections.

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