

Prevalence of Intestinal and Urinary Parasites among Food-Handlers in Owerri Metropolis

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ABSTRACT:

Food handlers have been tagged as potential carriers of infectious pathogens which included parasites. Parasitic diseases were some of the leading causes of global mortality, with higher burdens of prevalence in developing countries, especially regions of the world, characterized with contaminated water, coupled with poor personal hygiene and poor sanitary treatment of food by handlers. This study was therefore designed to ascertain the public health safety of some food handlers within Owerri Metropolis, in Imo State, Nigeria. Early morning stool and urine samples were collected from 30 food handlers for the detection of parasites. The stool samples were concentrated by formol ether techniques. Results of urine and stool microscopy from the food handlers workers showed that 16(53.3%) out of the food handlers harboured parasite of which 3 (10%) had *Trichomonas vaginalis* in their urine, 1(3.3%) recorded concomitant infection with *Entamoeba histolytica*, *Ascaris lumbricoids* and *Trichuris trichiura*, 5(16.7%) had co-infection of *A. Lumbricoides* and *T.trichiura*, 5(16.7%) had hookworm infection while 2(6.7%) had *E. histolytica* in their stool samples. Neither adult microfilaria nor ova of *schistosoma* was detected in the urine of the workers. Majority of the food handlers relied solely on water from vendors at home, for domestic consumption. Also, the hygienic practices of the food handlers workers were questionable as majority of them did not remember whether they washed their hands or not, after defecation. Re-examination of stool and urine samples from the infected food handlers after treatment showed an effective therapy based on the absence of parasites from their specimens. Hence, it is recommended that there should be continuous and periodic enlightenment programmes on significance and practices of personal hygiene in order to reduce or prevent the occurrence of parasitic infections among food handlers.

Keywords: Intestinal, Urinary Parasites, Food-Handlers, Owerri Metropolis

INTRODUCTION:

World health organization (WHO) reported that intestinal parasites were responsible for one of the major health problems with socio-economic effects in the world (FAO, 1988). It was further stated that globally some 3.5 billion people were affected; in which 450 million were symptomatic and more than 200,000 deaths yearly. Parasitic intestinal infections continue to be an important cause of morbidity and mortality in the developing world, (FAO, 2003) also the most common intestinal helminthes leading to digestive disorders included *Tacnia saginata*, *hymenolepis nana*, *Ascaris lumbricoides*, *strongyloides stercoralis*, *Trichuris trichiura*, *Enterobius vermicularis* and hookworms.

Urinary parasites affect both males and females of the world population. The problems, posed by their presence in human systems range from discomfort to serious and debilitating conditions. Although, urinary parasites may be harboured by different personalities, their significance in food handlers still remains a subject of debate. Most common urinary/general parasites

include *T.Vaginalis*, *S.haematobium* and *W.bancrofti* (WHO, 2006).

Food safety is an increasingly important public health issue. Government all over the world are intensifying effort to improve food safety. These efforts are in response to an increasing number of food safety problems and rising consumer concerns.

Food handlers are people who have contact with food from preparation to the time of serving to the consumers. Food contamination may occur at any point during process through production processing, distribution and preparation (Berro et al, 2002, Caret and N.D. Agu, 1996), getting contaminated depends largely on the health status of the food handlers, their personal hygiene, knowledge and practice of food hygiene. The chances of food contamination largely depend on the health status of food handlers, their hygiene behaviours and practices, often food handlers are appointed without proper health examination. A study conducted in Asia showed that approximately 10-20% of food borne disease outbreaks were due to

contamination by the food handlers (WHO, 2002; Diedu et al, 2007).

METHODOLOGY:

Sampling:

In this investigation, sample random sampling was employed in the recruitment of food handlers. Out of 250 food handlers, 30 of them were selected by ballot. The study was a multi-disciplinary, experiment research, which was conducted by researchers in the departments of Public Health, Animal Science, Medical Laboratory Science. The research was designed to control/prevent food contamination by parasitic organisms, thereby enhancing the reliability of food items prepared and served to the members of the community.

A total of 30 stool and urine samples were collected from randomly selected individuals. Two sample, namely; early morning mid stream urine and fresh stool samples were collected. Both samples were collected early in the morning into clean and disposable universal containers and they were examined macroscopically and microscopically within 30 minutes of collection. The stool samples were analyzed using the formalin-ether concentration technique while the urine samples were examined by wet preparations only.

Laboratory Procedure:

Urine Analysis:

The urine specimens were examined both macroscopically and microscopically.

Macroscopy: The urine samples were examined for their colour, clarity, turbidity and presence of blood cells.

Microscopy by wet preparation method: After mixing 5-10ml of each urine sample was separately transferred into conical test tubes. The urine samples were centrifuged at 3,000rpm for 5 minutes. The supernatants were discarded. The deposits were re-suspended by tapping the test tubes. With the aid of clean Pasteur pipettes, 2 drops of the deposits were introduced into slide and cover slips were applied. The mount was examined under the microscope with x 10 objectives to focus and x 40 objective for confirmation.

Stool Analysis:

The stool sample were examined by both;

(i) Macroscopy and (ii) Microscopy

(i) **Macroscopy:** Stool samples were examined for colour, odour, texture, consistency, presence of mucus or blood stains as well as the presence of segments or adults of helminthes.

Stool Concentration Techniques:

Formol ether concentration: With the aid of an applicator stick, 1g of faeces was emulsified in 4ml of 10% formol saline. Another 4ml of the 10% solution was added and it was mixed. The stool suspension was filtered through a sieve into a breaker. The filtrate was

transferred into a conical test tube and 4ml ether was added. The mouth of the conical test tube was closed with a cover and the content was mixed for 1 minute. The cover was removed and the content of the tube was centrifuged at 3,000rpm for 2 minutes. After centrifugation, four layers were observed. They were either layers, faecal debris, formol saline and the deposits. A swab stick was used to break and loosened the hard faecal debris and the tube was inverted to discard the ether, faecal debris and formol saline layers. The tube was tapped to re-suspend its deposit from which wet and iodine preparation were made.

Identification of candida albicans urine specimens of food handlers with positive microscopy results were aseptically and selectively cultured on sabouraud dextrose agar (SDA) aerobically at 30°C for 24-48 hours. With pre-sterilized wire loop, the isolated colonics of candida species were Gram stained and identified.

Treatment of Infected Food Handlers:

Food handlers who were infected with helminthes, albendazole (400mg) and secridazole (2g), were administered and a repeat dose was given a month later. A 7 days treatment with cortizal (fluconazole and tinidazole) was given to the food handlers in order to eradicate candidiasis and trichomonaasis. Re-assessment of infected food handlers. After initial laboratory findings, the infected food handlers were treated with chemo-therapeutic agents as stated above. Post-treatment samples were collected from the people concerned and were examined to verify the efficacy of the chemotherapy in the clearance of pathogenic micro organisms (i.e. parasites and yeasts) from the system of the food handlers.

Data Analysis:

Results obtained were analyzed with statistical packages and descriptive statistics was also used and results were presented in form of tables, pie chart and histograms.

RESULTS:

After examination of stool and urine sample from parasites while 16 (53.3%) were found harbouring parasites while 14 (46.7%) were negative table 1. Table 2 shows that out of the food handlers with parasitic infections, 3 (10.%) had *T. vaginalis* in their urine. However, stool microscopy result showed that 1(3.3%) of the food handlers had co-infection, comprising of *E. histolytica*, *A. lumbricoides*, *Taenia species* while 5(16.7%) recorded a co-infection of *A. lumbricoides* and *T. trichiura*. Five (16.7%) recorded Horkworm infection while 2(6.7%) of them were infected with *Entamoeba histolytica*. Table 3 shows the Urine microscopy results revealed pus cell, red blood cells, crystals, bacteria and candida. Sixteen (53.3%) of the food handlers had moderate/heavy density of pus cells, 2(6.7%) had similar density of red cells, 3(10.0%) for

crystals, 18 (60.0%) for bacteria while 7 (23.4%) had the same density for candida species. Information about the source through which the food handlers obtained water for domestic use revealed that 11(36.7%) of them obtained their water from born holes, 13(43.3) purchased from vendors, 2(6.7%) obtained from wells, while 4(13.3%) fetched water from rivers (Figure.1). Frequency of hand washing habits was determined among the food handlers, sixteen (53.3%) of them often washed their hands only at work. 12(40.0%) washed their hands only at home, 1(3.3%) washes his/her hands

at canteen and neighbour's house respectively (Figure 2). After defecation, 7(23.5%) of the cafeteria, staff washed their hands before meal, 11(36.7%) washes hand after meal while 12(40.0%) of the workers did not remember whether they washed their hands before or after meal (figure 3). On re-examination of food handlers' specimens comparisons of their urine and stool specimen microscopic results after treatment with chemotherapeutic agents showed effective clearance (i.e. 0% post treatment frequency) of the pathogenic micro organisms from the food handlers (Table 4).

Table 1: Distribution of parasite among food handlers frequency

Food handlers	N	(%)
With parasite	16	(53.3%)
Without parasite	14	(46.7%)
Total	30	(100.00)

Table 2: Distribution of Parasites in Specimen of food handlers

Urine	Stool		(%)		
Parasite	Nn	(%)	n		(%)
E. h+A.4 T.s	30	-	-	1	(3.3)
A.1+T.1	30	-	-	5	(16.7)
Hw	30	-	-	5	(16.7)
E.h	30	-	-	2	(6.7)
T.v	303	(10.0)	-	-	-

Keys:

E.h = *Entamoeba histolytica*,

A.1 = *Ascaits lumbricoides*,

T.S = *Taenia Species*,

T.t = *Trichuris trichiura*,

Hw = hookworm,

T.v = *Trichomas Vaginalis*.

Table 3: Microscopy result of urine samples from food handlers

Urine	(-)	+	(++/+++)	
Components	n(%)	n(%)	n(%)	Total
Pus cells	4(13.3)	10(33.3)	16(53.3)	30
Red cells	22(73.3)	6(20.0)	2(6.7)	30
Crystals	25(33.3)	2(6.7)	3(10.0)	30
Bacteria	12(40.0)	0(0)	18(60.0)	30
Candida	23(76.7)	2(6.7)	5(16.7)	30

Keys:

(-) = Negative

(+) = Scanty

(++/+++)= Moderate/heavy

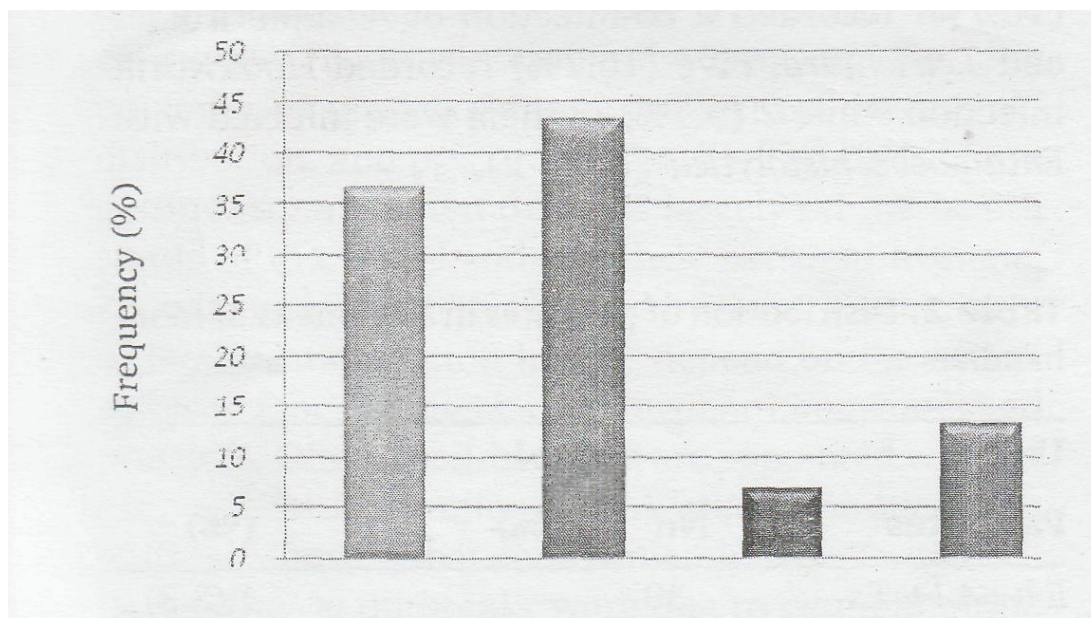


Figure 1: Source through which the food handlers obtained water for domestic use

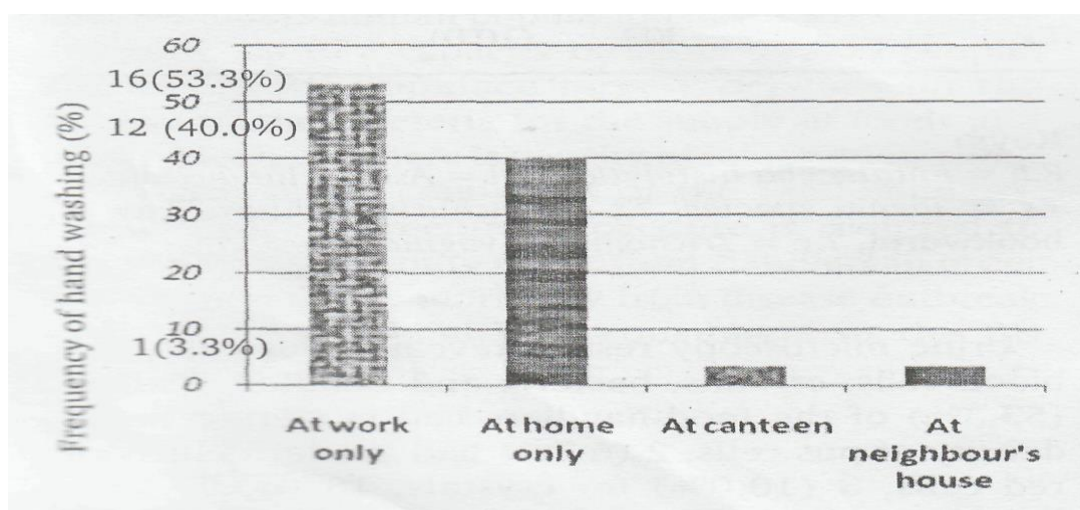


Figure 2: Frequency of hand washing habits among food handlers.

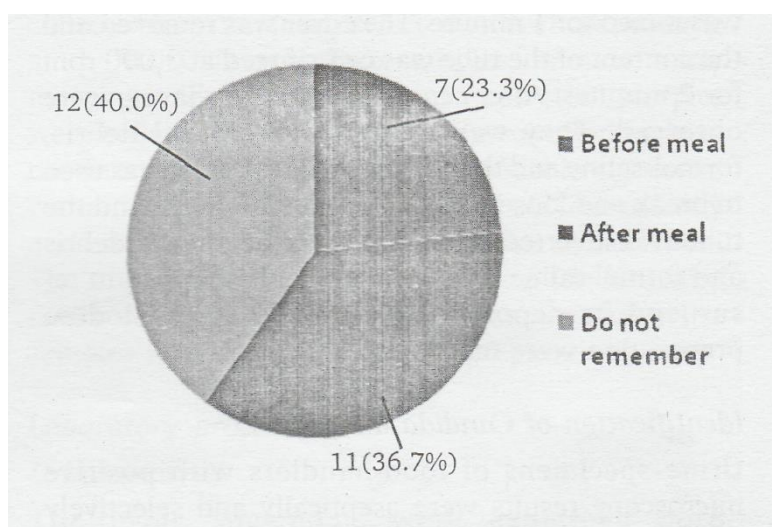


Figure 3: Frequency of hand washing habits among the food handlers after defecation.

Table 4 comparison of microscopy results of stool and urine samples of food handlers before and after treatment.

Before		After	
Parasites	N	n(%)	n(%)
Eh+A.1+T.s	30	1(3.3)	0(0)
A.1+T.t	30	5(16.7)	0(0)
Hw	30	5(16.7)	0(0)
E.h	30	2(6.7)	0(0)
T.v	30	3(10.0)	0(0)
C	30	7(23.3)	0(0)

Key:

E.h = *Entamoeba histolytica*

A.1 = *Ascaris Lumbricoides*

T.s = *Taenia species*, T.t = *Trichuris trichura*

Hw = Hookworm = *Trichomona vaginalis*

C = *Candida albicans*

DISCUSSION:

Estimation of intestinal parasites for the surveillance of public health, the high prevalence of these infections was very closely associated with poverty, poor personal and environmental hygiene. Observation of moderate to heavy population of pus cells in the urine of the food handlers was an indication of inflammation which often resulted from infections. Findings revealed that a little above fifty percent of the food handlers had parasitic infections. The parasites harboured by the food handlers include *T.vaginalis*, *E. histolytica*, *A.Lumbricoides*, *T.species*, *T.trichiura* and hookworm.

Highest rates of parasitic infections were with ascaris and hookworm. Hookworms sucks between 0.03-0.2ml of hosts blood daily. In addition, its secretion which contained some measures of anticoagulant led to uncontrollable blood loss from hosts, leading to microcytic and hypochronic types of iron-deficiency anemia. Almost every case of *Ascaris* infection also showed co-infection with *T.trichiura*. These were nematode parasites of humans that infect enormous numbers of hosts.

Entamoeba histolytica infection among the food handlers in the cafeteria was significant as the cysts are usually ingested and transmitted through contaminated water, food and careless unhygienic practices. In topics, contaminated vegetable and food are also important sources. Asymptomatic cysts carriers are the main source of infection and may be responsible for severe epidemic outbreaks where sewage leaked into the water supply or break down of sanitary discipline occurs as in institutions.

Food- handlers play an important role in transmitting parasitic diseases. Food handlers are individuals who are responsible for the preparation and serving of food to customers. Any contamination of raw materials equipment and utensils or the hands of food handlers can result in the transmission of intestinal parasitic helminthes egg to the consumers. Mild to heavy pyuria (i.e. pus cells in urine) as observed in urine of the

cafeteria workers is an indication of urinary tract infection (UTI). Agents of UTI range from bacteria, parasites fungi to viruses. Candiduria (yeast cells in urine), as observed with 7 food handlers was an indication of yeast infection while those with bacteriuria (bacteria in urine) may probably have bacterial infection. In this study, no ova of schistosome was seen and *T.vaginalis* was the only observable parasite in the urine of the studied food handlers. *T.vaginalis* is pathogenic to both males and female and the trophozoite of this pathogenic parasite was predominantly transmitted by sexual intercourse. There have been other suggestions that *T.Vaginalis* may be contacted through toilet seats and sharing of under wears, there is however no known hypothesis about the spread of this parasite was fragile and may be easily destroyed by the gastric acidity. Information generated from the questionnaires addressed the quality of water used for domestic consumption and the subjects practices of hygiene. Majority of the food handlers solely relied on water from vendors for domestic consumption at home. The quality of purchased water, as well as its impact on community health and food handlers, greatly depended on the sources of water and the integrity of the vendors. Based on responses from the food handlers, the hygiene standards of the people, in relation to washing of hands, were questionable, since the majority of them only washed their hands at work. The hygiene practices of the cafeteria workers were also questionable as majority of them did not remember whether they washed their hands or not, after defecation. Food handlers are the most important sources in the transfer of micro-organisms to food, from their skin, nose and bowel, to the food prepared and served by them. Apart from unhealthy food handlers, disease carriers who are handling food also play important roles in transmitting diseases; this imposes a great threat to the health of the public certainly there were many other modes, by which food borne diseases are transmitted. These include preparation of food with utensils which have been

infected by handling or washing in contaminated water also by flies alighting on food after feeding on exposed infected faeces or by insects or rodents during storage of food, etc. However, the role of food handlers in the transmission of food borne diseases comes atop.

CONCLUSION:

The present study revealed a high prevalence of intestinal and urinary parasitic infections among food handlers in Owerri Metropolis, Nigeria. The findings demonstrated that poor personal hygiene practices, inadequate hand washing habits, and the use of unsafe water sources contributed significantly to the transmission of parasitic infections among the food handlers. The commonly detected parasites included *Entamoeba histolytica*, *Ascaris lumbricoides*, *Trichuris trichiura*, hookworm, and *Trichomonas vaginalis*.

The study also showed that appropriate chemotherapy resulted in complete clearance of the detected parasites after treatment. Since food handlers play an important role in food preparation and public health safety, routine medical examination, health education, and strict adherence to hygienic practices should be encouraged. Provision of safe water supply and periodic screening of food handlers are also recommended to reduce the risk of food-borne parasitic infections within the community.

Ethical Approval:

Ethical approval for this study was obtained from the Department of Animal and Environmental Biology, Imo State University, Owerri, Nigeria. Informed consent was obtained from all participants before specimen collection and analysis.

Conflict of Interest:

The authors declare that there is no conflict of interest regarding the publication of this study.

Funding:

The authors received no external funding for this study.

Limitation of Study:

The major limitation of this study was the relatively small sample size of food handlers examined within the study area. Further studies involving larger populations are recommended for broader epidemiological assessment.

REFERENCES:

1. Abdolla, M.A., Suleiman, S.E., Allen, Y.Y.H.A. and Bakheit, A. (2008). "Food safety knowledge and practices of street food vendors in Khartoum city", Sudanese journal of veterinary science & animal husbandry; 47(182), 123-136, 2008.
2. Akinyele, I.O. (1998). Street food and their contribution to the food security and

nutritional status of Nigerians, West Africa food Nutr (1998) 6-20.

3. Arora, D.R. and Arora B.B. (2010). Flagellates, Trematodes of flukes and Nematodes. In: medical parasitology 3rd Edition pp. 43-46, 151-152, 197. By CBS publishers and Distributors PVT. Ltd., New.
4. Barron, N. Ouattara, C.A.T. Nikiema, P. Outaattara, A.C. Tracre A.S. (2002a). Evaluation de la quatemicrobiologie, de quelques aliments deruedans la ville de onagadugon an Burkina faso 12: 3369-374.
5. Canet, C. N'Diaye, C. (1996). L'alimentation de-rue en Afrique FNA/ANA 17118 4-13.
6. Chakravathy, I. (2003). Street foods, safety, risk and nutrition potential, nutrition goals for Asia vision 2020. Nutrition foundation of India 2003; 660-662.
7. Donko, E.S., Kayang B.B., Quoye, J. and Akyeh, M.L. (2009). Application of the WHO keys of safer food to improve food handling practices of food vendors in a poor resources, community in Ghana. *International Journal of Environmental Research and Public health* 6, 2833-2847. Retrieved February 22nd, 2013 from www.mdpi.com/journal/ijerph.
8. Food and Agricultural Organization (FAO) street foods, A summary of FAO studies and other activities relating to street foods; Rome: FAO, 1997.
9. World Health Organization, Health Surveillance and Management Procedures of food handling personnel. Geneva; World Health Organization 1989, pp.7-36. Technical Report Series No.785.
10. World Bank (2018). Food borne illness cost US \$110 billion per year in low and middle income countries <https://www.worldbank.org/en/news/press-release/2018/10/23>, Washington D.C. World Bank (Accessed on May 1, 2020), World bank 2001.