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# Improper Cooking and Its Association with Intestinal Helminthiasis Among People in Wamakko Local Government, Sokoto Nigeria

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**Abstract:** This study was conducted on the road side people (those without houses), who used aluminum pots and cooking stones kiln/firewood for cooking their food. A total of 30 stool samples were analyzed for intestinal parasites, out of which, 26 samples were found positive for intestinal parasites presenting a prevalence rate of (88.66%). Among the parasites recovered, the incidence of *Tania saginata* (36.66%) was the highest followed by *Schistosoma mansoni* (26.66%), *Fasciola hepatica* (16.66%) and least *Strongloides stercoralis* (6.66%), and the result showed that there was high prevalence of helminthes parasites among the sampled people and it is needed that the government (at all levels) implement effective programs to help such kind of people and create and sustain good hygienic environment.

**Keywords**: Intestinal parasites, improper cooking, personal hygiene

## INTRODUCTION

A parasitic disease is an infectious disease caused or transmitted by a parasite (Hotez et al., 2011). Most parasites cause damage to the host body that they live which result in various kind of illness to the host body (Hooper, 1989).

Intestinal parasites normally survive due to factors like poor personal hygiene, unhealthy conditions of living, improper cooking/processing and handling of food and water and all of these contributed in the survival and transmission of parasites. Poverty is the main cause of improper cooking practices such as use of inefficient cooking utensils and insufficient cooking fuel (firewood, stalks and charcoal); such conditions force people to eat undercooked food.

Food-borne infection is endemic in Nigeria. Local Government Health System profile for Nigeria, reported that the diseases that are leading cause of deaths in different zones in Nigeria are diarrhea; which accounted for 25% of mortality followed by malaria (21.0%) and accidents (9.8%) (FAO/WHO).
From January to December, 2008, there were 2575 cases of gastrointestinal Infections recorded at Specialist Hospital Sokoto, out of which, 28 reported cases were of Taeniasis, 10 cases of Cholera and 373 cases of Amoebiasis, all as a result of contamination and eaten raw or improperly cooked food (Mukhopadhyay et al., 2008). The Federal Ministry of Health reported 90,000 cases of food poisoning in 2007, which certainly was a gross underestimate. The World Health Organization estimates 200,000 deaths from diarrhea each year in

Nigeria [5], as many as 70% of which may be attributable to contaminated food and water; animal-source foods were probably responsible for most of these cases of food-borne disease (WHO, 2009).
Therefore, this study emphasized on the relationship between the parasitic diseases and improperly cooked food, with a broader aim to create awareness on association of parasitic diseases and improper cooking.

## MATERIALS AND METHODS

### POPULATION SAMPLED

For this study, road side people were sampled. These people were normally living on the roadsides, they were homeless; have very small store house made by themselves using polythene and wood, where they keep their assets. They used aluminum pots and cooking stones kiln for cooking their food. Their common types of food were Rice, Vegetables, Fish and Meat. These people do not have enough food to eat every meal as well as fuel to cook sufficiently, so they cook food only until it is soft and quickly eat. They sometimes even eat small fish without cooking.

### COLLECTION OF STOOL SAMPLES

The stool samples were collected using universal containers and stool collection kit. Each container was labeled properly and transported to the laboratory for identification. The stool samples were examined and identified by using formal ether concentration technique.

### METHOD OF STOOL ANALISIS

#### Formal ether concentration technique

The stool samples were analyzed using the formal ether concentration techniques as described by. 1.0 gram of the stool was picked using a clean clinical stick, and emulsified in a screw-caped universal bottle containing 4 ml of 10 % formaline. Another 3 ml of 10% formaline was further added. The bottle was then capped and the contents mixed well by gentle shaking. The emulsified sample was then sieved using sieve of 2.5 mm. The sieved filtrate was collected in a beaker (250 ml) then transferred in to a centrifuge tube. Three milliliters (3 ml) of diethyl ether was added to it and mixed well by gentle shaking. This was then centrifuged immediately at approximately 3000 r.p.m. for 5 minutes. The ether, faecal debris, supernatant and formal water were discarded and the sediment was then allowed to settle to the bottom. A drop or two of sediment was then transferred onto a clean slide (using a sterilized wire loop). After making a thin smear, it was then covered with a coverslip and examined microscopically using x 10 and x 40 objective. Parasite eggs were identified based on external morphology and anatomy of eggs and confirmed by chart provided by (Cheesbrough, 1998) and recorded.

The result obtained were statistically analyzed by simple percentage and using chi-square ($X^2$). To show out similarities and differences between parameters.

### IDENTIFICATION PROCEDURE:

Eggs can be easily detected and identified in saline mounts due to their sizes and characteristic features of their morphology, it is not necessary to stain them. Most of the eggs were large enough to be identified with the low power (10x) objective and were identified as described Cheesbrough (Cheesbrough, 1998).

#### Criteria for Identification of Eggs of Helminths

There are three groups of medically important helminth: nematodes (round worms), cestodes (tapeworms) and trematodes (flukes). Generally, the diagnosis was made by the detection of eggs and larvae, and occasionally by the adult worms or their segments in faeces. In majority of cases, the eggs were used for identification based on the following criteria:

**Size** the length and the width of eggs are generally within a specific range.

**Shape** the egg shell is rigid and each species has its own characteristic shape.

**Thickness of the Egg-Shell** some species had eggs with thick shell while some have thin shells (e.g. hookworm).

**Presence of special characteristics feature** such as operculum (lid), suckers, spine, hooklets, polar filaments, mammillated outer coat help in identification of the parasite (Monica, 1981).

**Result**

The results of the study revealed that faecal sample collected in Sokoto state from different areas of Wamakko local government, was found positive with encysted metacerceria or cysticercus of helminthes species, out of 30 faecal sample examined, 26 were positive. These represent 86.66% prevalence.

Table 1- Prevalence of helminth parasite in studied people.

| Helminthes Parasites | No. Examined | No. Positive | Prevalence(%) |
|---|---|---|---|
| Helminthes species | 30 | 26 | 86.66 |

The table 1. The prevalence of helminth parasite in the studied people, showed that 86.66% of the examined people were positive with helminth species.

Table 2- Occurrence of different species of helminthes parasite among studied samples

| Species of helminthes | No. Examined | No. positive | Prevalence(%) |
|---|---|---|---|
| *Taania Saginata* | 30 | 11 | 36.66 |
| *Fasciola hepatica* | 30 | 5 | 16.66 |
| *Strongloides stercoralis* | 30 | 2 | 6.66 |
| *Schistosoma monsoni* | 30 | 8 | 26.66 |
| Total | | 26 | 86.66 |

Chi-square = 506.05, df = 2, $p<0.05$

The table 2, showed the prevalence of helminthes species among collected sample in which *Taenia saginata* had the highest prevalence with 36.66%, *Schistosoma monsoni* (26.66%), *Fasciola hepatica* (16.66%) and *Strongloidea stercuraris* had the least prevalence with 6.66%.

Table 3: Sex related prevalence of helminth parasite in the studied samples

| Sex | No. Examined | No. Positive | Prevalence (%) |
|---|---|---|---|
| Male | 22 | 18 | 81.81 |
| Female | 8 | 8 | 100.0 |
| | 30 | 26 | 86.66 |

Chi-square = 39.73, df = 2, p<0.05

Based on the collected sample among gender, 18male (81.81%) were positive out of 22 sample examined and 8(100%) females were positive out of 8 examined sample, showing the highest prevalence.

Table 4: Age related prevalence of helminth parasite among people in the area

| Age group (year) | Examined | Positive | Prevalence (%) |
|---|---|---|---|
| 8-15 | 26 | 23 | 88.46 |
| 15-above | 4 | 3 | 75.00 |
| Total | 30 | 36 | 88.66 |

Chi-square = 36.63, df = 2, p<0.05.

Table 4 showed the prevalence of helimnths parasite in relation to age group; 8-15 years old had the highest prevalence of 88.46% and 15-above years old had lower prevalence of 75.00%.

## Discussion

From the results obtained, it was clear that the sampled people had very high prevalence of intestinal disease. It was found that the species of *Teania* (*Teania saginata)* had the highest prevalence with 36.66%, *Schitosoma mansoni* 26.66%, *Fasciola hefatica* 16.66% and the *Strongloides stercuraris* had the lest prevalence with 6.66%. The highest prevalence of *T. saginata* could be related to beef eating habit of people as beef is the cheap meat in this country and intestine is the cheapest available meat. Water and its source of availability in the area can also play a role in helminthes infection (Singh et al., 2016).

Occurrences of *Schistosoma mansoni* which was 26.66% among all the groups comprising of both sexes indicated that there was the association between some factors and the incidence rate of parasites, such as ignorance: i.e. the low level of awareness of the people in the society in respect to parasitic infection, also hunger and starvation which forced the poor people to eat low quality, improperly cooked food and live in unhygienic conditions due to insufficient utility of living. Eaten undercooked foodstuff, e.g. vegetable, meat and fish can predispose one to intestinal parasitic infection. Here in this environment use of fertilizers for agricultural practices is almost nil, rather poor people use night soil (human untreated feces) to fertilizer their crops; in such cases if it is vegetable, the chances are there that it will contain eggs of the parasites and washing vegetable with enough and potable water is not possible for the people we sampled for this study as it will cause extra money to them. All these factors can explain the high prevalence of parasites among the studied people.

Also water contact activities in the area observed can be attributed to helminthes infection (Singh et al., 2016). Environmental condition (dirty environments) of living can equally predispose people to the infections, in turn these factors can reduce their immunity against infection. The contamination through inadequate water supplies, unhygienic processing, handling and hawking of food are the major routes of exposure to parasitic infections (Agi et al., 2005; Pukuma et al., 2007).

*Taenia saginata* (synonym *Taeniarhynchus saginata*), commonly known as the beef tapeworm, is a zoonotic tape worm, is relatively common in Africa, some parts of Eastern Europe and Southeast Asia. Humans are generally infected as a result of poor hygiene. The infective larvae, called cysticerci, are transmitted from the consumption of raw or undercooked beef (Chatterjee, 2009). The adult parasite *T. saginata* being hermaphrodites, each body segment called proglottid contains complete sets of both male and female reproductive systems. Thus, reproduction is highly successful and efficient. From humans, embryonated eggs,

called oncospheres, are released with faeces and are transmitted to cattle through contaminated fodder. Oncospheres develop inside muscle, liver and lungs of cattle into infective cysticerci (Eckert,2005).

*Fasciola hepatica* (the common liver fluke) cause disease Fasciolosis also known as fascioliasis, fasciolasis, distomatosis and liver rot. In addition, fasciolosis is now recognized as an emerging human disease: the World Health Organization (WHO, 2005) has estimated that 2.4 million people are infected with *Fasciola*, and a further 180 million are at risk of infection. Studies carried out in recent years have shown human fasciolosis to be an important public health problem and it distributed in 51 countries of the five continents including Africa (Mas, 2005).

*Strongyloides stercoralis* which is transmitted through the soil and causes strongyloidiasis has the unique ability to multiply both outside the body, sexually, and within the human intestine (auto-infective cycle) asexually; thus the infection can propagate itself indefinitely(Safdar et al, 2004).

Conclusively, it can be said that there was a high prevalence of helminthes parasites among the sampled people, there for understanding the importance of proper cooking process and practicing good personal hygiene is very necessary as well as, food safety education and training are the most effective method that government can take.

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