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**INCIDENCE OF HOOKWORM INFECTION AMONG SELECTED  
PRIMARY SCHOOL CHILDREN IN OKO, ORUMBA NORTH LGA,  
ANAMBRA STATE.**

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***Abstract***

*This project work investigated the incidence of hookworm infection among selected primary school children in Oko, Orumba North L.G.A of Anambra State. The project was undertaken between the months of June to July, 2021. A total of 9 fecal samples were randomly collected from 2 different primary schools in Oko. The fecal sample were processed and analyzed. Out of 9 faecal samples examined 4 (44.4%) were found positive. The incidence of hookworm was mainly due to non adherence to personal hygiene, working on bare foot among the school children. Occasional deworming of school children as an effective means of control, is recommended.*

***Keywords:*** *Incidence, Hookworm, Infection, Primary School, Children.*

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**INTRODUCTION**

Hookworm is an intestinal parasite that tends to be found in areas with high population density and poor sanitation, according to (Adenusi, 2003). Hookworm is a common helminth infection that is predominantly caused by the nematode that live in the small intestine of most mammal as its host. There are two types of hookworm that can cause infection in humans. These are *Necator americanus* and *Ancylostoma duodenale*. According to Albonico (2014), *Necator americanus* predominates in the Americas; sub Sahara African, South East Asia, China and Indonesia. While *Ancylostoma duodenale* predominate in the Middle East, North Africa, India and firmly in Southern Europe. They are voracious blood thirsty worms in the nematode world. Hookworms are thought to infect 800 million people worldwide, (Bundy *et al.*, 1998). The *Ancylostoma*

*brassiliense* and *tubaeform* infect cats while *Ancylostoma canium* infects dogs and *Hucinari steanocephala* infects both dogs and cats.

Hookworm infection also known as hookworm disease is an infection by a parasitic blood sucking round worm. Hookworm infection causes *Ancylostomiasis* and *Necatoriasis*. These worm lives in the small intestine of their host which may be a bird or a mammal such as cat, dog and human, (Cheesebrough, 1998), the high risk group of people suffering from hookworm disease are mainly children and pregnant women, infected persons who have chronic intestinal blood loss could further develop iron deficiency anemia and Hypoalbuminemia. Hookworm infection in pregnancy can cause retarded growth of foetus, premature birth and low birth weight. Heavily infection of hookworm in children causes stunted growth and impairment of intellectual and cognitive development.

### **PATHOLOGICAL PHASES OF HOOKWORM**

There are three pathological phase of hookworm infection

**Cutaneous or Invasive Phase:** when larvae initially penetrate the skin, they can cause irritation and itching and if they fail to locate a blood capillary, they can wander through the skin causing a condition known as Cutaneous larval migraine.

**Pulmonary Phase:** this occurs during the period when the larvae are bursting out of the capillary in the lungs into the alveolar spaces. This cause local hemorrhaging at the site. This is rarely symptomatic except when there is a heavy infection when it can result in pneumonitis and can also cause a cough and a sore throat.

**Intestinal Phase:** in this phase, adult worm are usually restricted to the anterior part of the small intestine, but where infection are heavy they can occupy the whole length of the small intestine. Proteolytic enzymes from the dorsal pharyngeal gland are released into the buccal cavity which aid digestion.

### **EFFECT OF HOOKWORM**

The most common effect of hookworm infection is the varying degree of anemia depending on the level of the infection and the nutritional state of the

patient. A long lasting hookworm infection has been known to be very fatal or deadly.

Cheesebrough (1998), reported that one *Necator americanus* ingest about 80ml (0.3ml) of blood per day while *Ancylostoma duodenale* ingest about 150ml (0.15ml) of blood per day.

## **SIGNS AND SYMPTOMS**

There are no specific symptoms or signs of hookworm infection but they give rise to a combination of intestinal inflammation and progressive iron deficiency, anemia and protein deficiency. Coughing, chest pain, wheezing and fever may sometimes result from severe infection, (Coreale *et al.*, 2007), epigastric pain, indigestion, nausea, vomiting, constipation and diarrhea can occur early or in later stages as well, although gastro intestinal symptom tend to improve with time.

Signs of advanced severe infection are those of anemia and protein deficiency including emaciation, cardiac failure and abdominal distention with ascites, (Albanese *et al.*, 2001), skin rash, with red spot, itching, weight loss, fever, stomach pain, extreme tiredness and weakness are other symptom of the diseases.

## **DIAGNOSIS**

Diagnosis depends on finding characteristic hookworm eggs on microscopic examination of the stool, although this is not possible in early infection. As the eggs of both *Ancylostoma* and *Necator* (and most other hookworm species) are indistinguishable, to identify the genus they must be cultured in the lab to allow larvae to hatch out. If the fecal sample is left for a day or more under tropical conditions, the larvae will hatch out, so eggs might no longer be evident, (Gutierrez, 2000).

The larvae of the two hookworm species can also be distinguished microscopically; this would not be done routinely but usually for research purpose. Adult worm are rarely seen (except via: Endoscopy, Surgery or Autopsy) but if found would allow definitive identification of the species, (Coreale and Farez, 2007).

## TREATMENT

The most common treatment for hookworm are benzimidazoles specifically albendazoles and mebendazole. Hookworm can be treated with local Cryotherapy when it is still in the skin, (Albanese *et al.*, 2001) Albendazole is effective both in the intestinal stage and during the stage the parasite is still migrating under the skin in case of anemia. Iron supplementation can relieve symptom of iron deficiency anemia.

However as red blood cells levels are restored, shortage of other essentials such as folic acid and vitamin B12, may develop, so these may also be supplemented.

## PREVENTION

Infective larvae develop and survive in an environment of damp, dirt, particularly sandy and loamy soil, they cannot survive in dry or much soil. To avoid being infected by hookworm, one has to abide by the following precaution.

Do not walk barefooted in areas where the hookworm is common and where they may be fecal contamination of the soil, these occur when people defecate outdoor or use human feaces as fertilizer.

Avoid skin to soil contact and avoid ingesting such soil, especially children.

There are certain preventives measures to avoid contact with hookworm infection

Wearing of shoes especially in soiled area with high risk of contamination.

Covering children sandbox.

Taking of safety precaution like wearing gloves and shoes when gardening.

Human hookworm suck blood voraciously and damage the intestinal mucosa, however the blood loss in the stool is occult blood loss (not visibly apparent).

Despite considerable advancement in chemotherapy, hookworm rank amongst the most widespread of soil transmitted intestinal helminth parasites, affecting approximate 900 million people mainly in the tropic and sub tropic (Bundy *et al.*, 1991). Adult hookworms attached to the mucosa of the small intestine, feed on blood and are the main cause of anemia.

*Ancylostoma duodenale* and *Necator americanus* are the two major species of human hookworm and despite significant differences in their life histories, the two species have traditionally been considered to be identical for treatment and

control strategies (Ferreira and Marcel, 1997). Failure to consider these differences is probably responsible for report of failed drug treatment.

### **Objectives of the study**

The objective of this research work was to find the incidence of hookworm among some selected primary schools in Oko, Orumba North Local Government Area of Anambra State.

### **Significance of study**

It is assumed that this work will benefit the following classes of people:

- i. Medical practitioners
- ii. School students
- iii. Community in which the project was done

### **Scope of the Study**

The scope of this study was within schools in Oko.

## **MATERIALS AND METHODS**

### **MATERIALS**

Sterilized specimen bottle, slides, cover slides, beaker, applicator stick, microscopy, spatula, stool sample, test tube, test tube rack, hand gloves, incubator, disposable bin and Petri dish plate.

### **REAGENT**

Normal Saline, Sodium Chloride (NaCl), Distilled water

### **COLLECTION OF SPECIMEN SAMPLES**

Fecal samples was collected randomly form the pupils of various primary schools from different classes (1 – 6) with the cooperation of the school heads and teachers, the selection of pupils was done by systematic sampling in which the pupil that fall with 1<sup>st</sup> – 5<sup>th</sup> position was selected from their classes irrespective of their sex.

Sterile specimen bottle was given to the selected pupil with their names, age and sex noted for easy identification. They were instructed on how to collect

the specimens aseptically with spatula. The stool samples were collected from the pupil the following morning at their schools. In all a total of 9 stool samples were collected from various primary school distributed and was taken to the lab. Then 10% formalin was added to the stool sample to preserve the morphology of the egg before examination.

#### **Distribution of Sample sizes.**

<b>Class/Primary</b>	<b>No. of sample selected in central primary school Oko</b>	<b>No. of sample selected in Ezeme Primary</b>
3	2	1
4	1	3
6	1	1

Total = 9 samples

#### **ANALYSIS**

Parasitological analysis of the stool sample using three methods viz the direct fecal smear method, brine floatation concentration method and the Harada - Mori culture method.

#### **THE DIRECT SMEAR METHOD**

2 to 3 drops of normal saline was placed on a clean slide a pint size of the stool sample was added and mixed thoroughly with the help of applicator stick in each of the solutions on the slide. The slide was covered immediately with cover slip. The specimen was carefully observed under the microscope using x10 and x40 objectives with the condenser inst of the microscope sufficiently closed to give a good contrast for the identification of hookworm ova. The samples that were positive were immediately cultured.

#### **BRINE FLOATATION CONCENTRATION METHOD**

A saturated solution of sodium chloride was first produced by mixing salt and water until the salt could no more be dissolved. A portion of the faeces specimens to be examined was put in a tube with flat bottom and small solution of the sodium chloride was added, the tube was corked tightly and shaken vigorously shaken until the faeces was completely emulsified. More solution of

the saturated sodium chloride was added to the mixture until the three quarter full. The tube was again shaken vigorously and placed on the bench. More salt solution was added carefully until the meniscus of the fluid became level with the mouth of the tube. It was then left to stand for about 5 minutes.

A slide was held horizontally over the tube so that the surface touches the meniscus of the fluid, the slide was then rapidly lifted and a cover slip was placed over the slide for microscopic examination of the eggs using x10 and 40 objectives.

### EXAMINATION OF FECAL SAMPLE

Fecal (stool) sample was examined macroscopically and microscopically

**Macroscopic Stool Examination:** here the following was investigated using the ordinary eye

1. Consistency: whether the stool was formed uniformed or liquid i.e. solid, liquid or semi solid
2. Colour: whether the stool was brown, black or green
3. Texture: whether the stool has blood, pus or mucus
4. Worm: presence of adult worms or segments

**Microscopic Stool Examination:** that was done with the aid of a binocular microscope the method used was:

Direct Smear method

Brine Flootation concentration method

### RESULTS

Out of 9 samples examined, 4 were found to be positive with hookworm eggs. In the table below, the result shows an overall prevalence of the different pupils for the presence of hookworm infection.

**Table 1: Distribution of Hookworm**

Name	Age	Class	Parasite (Micro)	Appearance	Texture
Nzekwe Chidubem	12	6	Hookworm eggs present	Brown and not mucoid, No blood	Soft tool
Udo Godwin	8	4	Hookworm eggs present	Brown and not mucoid	Semi soft

Eze chinenye	11	6	Hookworm eggs present	Dark brown, not mucoid and no blood	Hard stool
Ojimba Austin	6	3	No hookworm egg	Brown and mucoid	Soft stool
Ihimba Morian	8	4	Hookworm eggs present	Brown and not mucoid and no blood	Semi soft stool
Adanne Chioma	12	6	No hookworm eggs	Dark brown and not mucoid and no blood	Semi hard stool
Odinamkpa Oluchi	7	3	No Hookworm eggs	Brown and not mucoid and no blood	Soft stool
Ezeobi Michael	11	6	No Hookworm eggs	Brown and not mucoid and no blood	Soft stool
Obi Chinenye	9	4	No Hookworm eggs	Brown and not mucoid and no blood	Semi soft stool

## DISCUSSION

The incidence of hookworm infection among primary school children in Oko Orumba North L.G.A was undertaken between the month of April to June, 2021, the evidence from this work shows a prevalence of hookworm infection (44.4) in this area. This figure is based on the 9 samples examined, out of which 4 positive samples was recorded.

The overall distribution of hookworm infection in the two primary school used in Oko which include Ezeme primary school and Central Primary school Oko, shows that the highest number of infection is from male while the females has the least prevalence of infection. This rate of infection is because of the environment, boys can easily get infected from hookworm while playing ball so the environment is favorable for the hookworm or filariform to thrive.



## CONCLUSION

The result have successfully indicated that there is low prevalence of hookworm infection in Oko primary schools mentioned above in Orumba north L.G.A Anambra state.

## RECOMMENDATIONS

**Adequate Sanitation:** Proper provision should be made for the disposal of faeces, this can be done by providing toilet in school and homes, and this will help in preventing children going to defecate in the bush around homes.

**Mass treatment of Infected children:** Mass treatment of infected, individuals should be encouraged in endemic areas. Where mass treatment is not feasible, children within the age group with high prevalence should be given priority attention.

## REFERENCES

- Adenusi, A.A. and Ogunyomi N., (2003) the distribution of *Necator americanus* and *Ancylostoma duodenale* among school children in Lagos Nigeria *Tropical medical hygiene* (3); 270 – 271.
- Agi P.I., (1995). Pattern of information of intestinal parasites in Sagbama community of Niger Delta Nigeria West. *Afric. JnL.Med* 14(1): 39 – 42.
- Albanese, A., Venturi, C. and Galbiati. A., (2001) Treatment of Larva migraines cutanea (creeping eruption): a comparison between Albendazoles and traditional therapy *Int.J.* 11: 77-96
- Albonico, *et al.*, (1998) Epidemiological evidence for a differential effect of hookworm species *Ancylostoma* in children. *Int.J epid*, 27:530-537.
- Booth M., *et al.*, (1998) Association among multiple geohelminthic species infection in school children in Pemba Island *parasitology*, 16 (1): 85-93.
- Bundy, D.A. *et al.*, (1991) the epidemiological implication to the multiple infection approach to the control of human helminth infection *Trans.Roy.Soc.Trop.Med.hygiene* 885:274 – 276.
- Cheesebrough M., (1998). *District Laboratory practice in tropical Countries* (1<sup>st</sup> edition) London Cambridge University Press
- Connor, J.B and Connor, E.W., (1991) *Medical Parasitology*. New York: Edward Arnold
- Cheng C.T., (1999) *General parasitology* (2<sup>nd</sup> edition) London Oxford university press
- Coreale J. and Farez M., (2007) Association between parasitic Infection and immune response in multiple sclerosis *Ann. Neurol*, 61 (2): 97-108
- Cowper S.A., (1999) A review of helminthiasis in the western region of Nigeria with special reference to Ibadan West African medical journal 16:3 – 11
- Despommier, D.D and Karape U. J.W., (2001) *Parasite life cycles* (1<sup>st</sup> edition). New York: Springer Verlag.

- Ferreria C.B., and Marcel, O., (1997). Enteroparasitoses in school Children in the district of Martinesia Uberlandia, minas gerad: A pilot study. *Revista Da Socedda brasilleivas De Medicine tropical* 30 (5): 373 – 37
- Gabey C.W., (1995) Intestinal parasite infection in rural Community, a focus for primary health care in Nigeria *African Medical Science* 18:289
- Gilles T.A., (1995) Hookworm infection in Man *advance Parasitology* (vol7)
- Gutierrez YE., (2000) (PDE) Diagnostic pathology of parasitic Infection with clinical correlation (second ed.) London Oxford University press pp354-366
- Gyorkos. J.W, Camara, B., Kokostein, E, Carabia, H and Pronty R., (1995) A parasitic prevalence survey in school aged children in guinea chasers d’ etudes et – de – recherché *Franco phoneante* 6 (6) 377 – 381
- Herbert, M.A., (2003). Center for disease control and prevention *American journal of parasitology* 10(3):15 – 21
- Smyth I.D., (1996) *Animal parasitology* (low precise edition) London Cambridge university press
- Ukoli, F.M.A., (1990) *introduction to parasitology in tropical African*. Ibadan Text flow ltd.
- Urbn C., Toure, A. and Hamed, A.O., (1997) intestinal parasitic Infection and schistomiasis in the Senegal River valley of the Islamic republic of Mauritania *medicine tropicate* 57 (2): 157 – 160
- WHO (2000) expert committee on helminthiasis soil transmitted Helminth technology reports services <http://whqlibdocwho.int/bulletin>
- William L.J., (1998) Soil transmitted helminths infection in school Children from code province republic of Panama *annual tropical medicine parasitology* 12: 187 – 292.