INTESTINAL PARASITES, ANAEMIA AND MALNUTRITION AMONG SCHOOL PUPILS (5-12) YEARS IN OHAFIA LOCAL GOVERNMENT AREA OF ABIA STATE, NIGERIA.

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ABSTRACT

Intestinal parasites are considered to be a public health problem of global importance by the World Health Organization. The study investigated the prevalence, risk factors and consequences of pathogenic intestinal parasitic infection on the growth and nutrition of 100 Ohafia school children aged 5-12 years. The study data were obtained by means of anthropometry and laboratory analysis of blood and faecal samples. A community based cross-sectional study was conducted from July to September, 2015 in Ohafia Local Government area of Abia state, Nigeria. Socio-demographic data of the pupils were obtained from their head master. Haemoglobin concentration was determined by using Hemo Cue Hb 201+ photometer analyzer. Hemoglobin values below 11.5g/dl were considered as anaemic for the age ranges of 5-12 years. Body Mass Index (BMI) was used to determine malnutrition. Those with body mass index less than 14.5 was considered malnourished while from 14.5 – 22 were not considered malnourished. Stool examination was done for intestinal parasites. Data were analyzed using chi – square (X^2). The result revealed that 6(30%) of the pupils were infected with intestinal parasites while 14(70%) were not infected. The most common intestinal parasites detected were *Ascaris lumbricoides* (8%), *trichuris trichiura* (6%), hookworm (5%) and *Taenia spp.* (2%). In this study the number anaemic was 6(30%) while not anaemic was 14(70%) and for malnutrition status, 18(90%) was malnourished while 2(10%) was not. Health education and promotion messages can be incorporated into other types of program already in place in local schools and by the Abia state ministries of public health education

Keywords: intestinal parasites, malnutrition, anaemia, ohafia, school children.

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INTRODUCTION

Intestinal parasitic infection (IPIs) caused by pathogenic helminthes and protozoan species are endemic throughout the world. They affect an estimated 3.5 billion persons and cause clinical morbidity in approximately 450 million (WHO, 2000). Developing countries are reported to be the most affected and within these, the majority of the cases occur among school age children (Montreso, *et al., 2008)*. The distribution of intestinal parasitic infection depends on many factors. These include socio-demographic variables associated with poverty such as reduced access to adequate sanitation, potable water and health care as well as prevailing climate and environmental conditions (Mata, 2010). The economic burden caused by hookworm, roundworm and whipworm infection is high.

Young children are reported to be disproportionately affected by intestinal parasitic infection compared to adult due to their increased nutritional requirement and less developed immune system (Scrimshaw, 2009). Intestinal parasitic infections in this age group have been linked with significant reduced growth (Stepheson, *et al., 2003)* and an increased risk for protein – energy malnutrition including stunting growth, iron deficiency anaemia and reduced cognitive/psychomotor development.

The global prevalence of the soil – transmitted helminthes is high. Recent estimate indicated that approximately 1472 million people have roundworm infection, 1298 million have hookworm infection and 1049 million have whipworm infection (Crompton, 2011). The nutritional consequences of intestinal infection caused by helminthic species are substantial. For example, *ascariasis* has been linked with decreased fat, protein and vitamin A absorption (O'Iorcain and Holland, 2000), iron deficiency anaemia and in the case of severe infection, intestinal obstruction (de Silva, *et al.,* 2007). *Trichuriasis* often occurs in tandem with *ascariasis*. It is estimated to caused morbidity in 87-133millionpersons worldwide (Chan, *et al.,* 2004). Heavy *Trichuriais* burdens have been linked with iron deficiency anaemia, growth retardation and reduced cognitive development in children (Chan, 2004). Morbidity caused by hookworm infection affects 159million persons per year (Chan, *et al.,* 2004). The major health consequences of hookworm infection is anaemia. It is also a major cause of anaemia in pregnant women (Stephenson, *et al.,* 2000b).

MATERIALS AND METHODS

STUDY AREA

The study was carried out in Interkince Nursery and Primary School, Amaekpu in Ohafia Local Government Area of Abia State, Nigeria. The areas lies between latitude $5^{0}36^{1}$ and 52 North and longitude $7^{0}48^{1}$ and 42 east. It is characterized by humid tropical and climate condition with high temperature and annual rainfall reaching 23,000mm per annum. The state has two distinct seasons; the rainy season from May to October, and dry season from

November to April. Pit latrine is common, while open air defecation is freely practiced. The farms are often situated near their houses and subsequently contaminated water may run into farms. Occasionally, the town becomes flooded after heavy rain fall as a result of poor drainage system. The condition of environmental pollution is still very poor as some streets still contain some excreta deposits. The school pupils are mostly of the average class. Most of them, their parents are civil servants, farmers, traders and business men.

STUDY POPULATION

A total of one hundred (100) consented school children (50 girls and 50boys) from the private nursery and primary school were recruited for this study. The age, range from 5-12 years. All the children sampled were going about with their normal activities and were apparently in healthy conditions. The study was carried out between July to September, 2015. The study employed stratified random sampling to select the study subjects.

ETHICAL CLEARANCE

Permission was sought and obtained from the head teacher of the school and parents/guardians of the children.

ANTHROPOMETRIC MEASUREMENT

This refers to the comparative measurement of the body. Those that are used to assess the growth and development in infants, children and adolescents include; age, height, weight etc. The anthropometric data collected include weight and height. The weight was measured with portable scale and the height with a meter rule. The weight was measured in kilogram (kg) while the height in centimeter (cm). The body mass index (BMI) that was considered as normal was 14.5-22.

SAMPLE COLLECTED

A total of 100 stool and blood samples were collected from the children attending the Interkince Nursery and Primary school in Ohafia Local Government Area of Abia Sate, Nigeria. The samples were collected in sterile containers and transported to the laboratory for processing and to be analyzed. Information such as sex, age, occupation of parent/guardians was collected from the school and also the type of toilet used at home and the environmental conditions of where they reside were collected.

BLOOD EXAMINATION

Haemoglobin (Hgb) concentration was determined using Hemo Cue Hb analyzer. Capillary blood was collected by finger pricking after rubbing the tip with sterile cotton wool immersed in 70% alcohol, and pricking it with sterile disposable lancets. A drop of blood was allowed to enter the optical window of the microcuvette through capillary action after discharging the first drop of blood. Then the microcuvett was placed into the cuvette holder for photometric determination of haemoglobin level.

School-age children with haemoglobin level lower than 11.5g/dl were considered as anaemic for the age range of 5-12 years old. Mild anaemia was considered as haemoglobin concentration of 10-11.4g/dl and 7-9.9g/dl was defined as moderate anaemia while haemoglobin concentration less than 7g/dl was considered severe (Cheesbrough, 2007).

STOOL EXAMINATION

Two methods were used for the examination of the stool samples, they include; macroscopic and microscopic (direct wet mount and formol ether concentration techniques).

MACROSCOPIC EXAMINATION OF STOOL SAMPLES

This describe the appearance of stool i.e. the physical appearances such as colour, to know whether the stool is formed, semi-formed, unformed or watery, presence of blood/mucus or pus. When a stool is unformed, containing pus and mucus the possible cause is Shigella (*Shigellosis)*. When a stool sample is semi-formed and black, hookworm disease is suspected. Unformed with blood and mucus stool possible cause is *schistomiasis.* A normal stool sample appears brown and formed or semi-formed. While for infant, are yellowish-green and semi-formed. In this work the samples analyzed were without mucus or blood (Cheesbrough, 2007).

DIRECT WET MOUNT

A drop of physiological saline was placed on one end of a clean slide and a drop of iodine lugol's solution on the other end. Then a wire loop was used to mix about 2mg of the stool sample with the physiological saline and lugol's solution. The preparation was then covered with a cover slip and was placed on the microscope. It was examine using 10X and 40X objective lens respectively (Cheesbrough, 2007).

FORMOL-ETHER CONCENTRATION TECHNIQUE (MICROSCOPY)

The entire stool samples were also examined using this method. 2ml of the stool samples was placed in a well labeled centrifuge tube using plastic pipette. 7ml of 10% formaline and 3ml of ethyl acetate was added in the same tube, it was well mix and open to let the vapour out, then cooled quickly and mixed again. The tube was centrifuge at 750-1000g (approximately 3000rpm) for 1 minute, after which wooden stick was used to loosen the layer of faecal debris from the slide tube and invert the tube discarding the supernatant leaving the sediment or deposit in the tube. The sediment is then transferred to a slide and covered with cover slip. It was then vied using 10X and 40X objective lens respectively (Cheesbrough, 2007).

DATA ANALYSIS

All statistical analysis was done using Chi-square (X^2).

RESULTS

Table 4.1; Prevalence of Intestinal Parasites in the School Pupils with Respect to Age

Age	Number Examined	Number Infected (%)	Number not Infected (%)
5 – 6	20	3 (15%)	17 (85%)
7 - 8	40	9 (22.5%)	31 (77.5%)
9 – 10	20	3 (20%)	17 (85%)
11 – 12	20	6 (30%)	14 (70%)
Total	**100**	**21 (21%)**	**79 (79%)**

X^2_{cal} =2.0, Df. = 6, p = 0.05, X^2_{tab} = 12.833

Table 4.2; Prevalence of anaemia in the School Pupils in Respect to Age

Age(yrs)	Number Examined	Number Amaemic (%)	Number not Anaemic (%)
5 – 6	20	6 (30%)	14 (70%)
7 – 8	40	11 (27.5%)	29 (72.5%)
9 – 10	20	5 (25%)	15 (75%)
11 – 12	20	4 (20%)	16 (80%)
Total	**100**	**26 (26%)**	**74 (74%)**

X^2_{cal} = 0.67, Df. = 6, p = 0.05, X^2_{tab} = 7.815

Table 4.3; Prevalence of Malnutrition in the School Pupils with Respect to Age

Age(yrs)	Number Examined	Number Infected (%)	Number not Infected (%)
5 – 6	20	3 (15%)	17 (85%)
7 – 8	40	4 (10%)	36 (90%)
9 – 10	20	3 (15%)	17 (85%)
11 – 12	20	18 (90%)	2 (10%)
Total	**100**	**28 (28%)**	**72 (72%)**

X^2_{cal} = 44.7, Df. = 6, p = 0.05, X^2_{tab} = 12.833

Table 4.4; Frequency of Intestinal Parasites in the Study

Parasites	Number Examined	Number Infected	Percentage Prevalence
Hookworm	100	5	5%
Ascaris lumbricoides	100	8	8%
Trichuris trichiura	100	6	6%
Taenia spp.	100	2	2%

DISCUSSION

The high prevalence of intestinal parasites recorded in this study area could be attributed to exposure of the pupils to predisposing factors to parasitic infection; poor sewage disposal system, unsafe sources of water, poor sanitary condition, poor housing and lack of awareness on the part of the parents and pupils (Mordi, *etal.,* 2011).

The study revealed that *Ascaris lumbricoids* (8%), hookworm (5%), *Trichuris trichiura* (6%) and *Taenia spp.* (2%) were common in the sampled groups. This suggests unsanitary habits especially in handling of foods and drinks.

The reports of this study clearly showed that there was a significant difference in infection rates of the age groups sampled. The prevalence of infection in the age group 5 – 6 years for the number infected was (15%). The 7 – 8 years group record a high rate of infection (22.5%), the 9 – 10 years have (20%) infected while in the 11 – 12 years a higher infected rate was recorded (30%). This may be as a result of pupils paying little or no attention to personal and general hygiene.

The overall prevalence of anaemia among the school –age pupils was 26%, suggesting that anaemia is a public health problem among the school – age pupils in Ohafia Local Government Area of Abia State, Nigeria. The report of this study clearly showed that there was a difference in the prevalence of anaemia between the aged groups sampled.

The prevalence of anaemia in the age group 5 – 6 years for the number anaemic was 6(30%) while for the number not anaemic was 14(70%). The 7 – 8 years group records 11(27.5%) for the number anaemic while 29(72.5%) is for the number not anaemic. For the 9 – 10 years the prevalence of anaemia was 5(25%) while for the number not anaemic was 15(75%) and for the 11 -112 years the number

anaemic was 4(20%) while 16(80%) was not anaemic.

The result showed that the 5 – 6 years had the highest number of anemic pupils 6(30%) for 20 pupils examined followed by 7 – 8 years pupils 11(27.5%) for 40 pupils examined, then the 9 – 10 years pupils was 5(25) for 20 pupils examined and the 11 – 12 years has the least 4(20%) for 20 pupils examined.

Anaemia which is a condition resulting from the reduction in haemoglobin concentration or reduction in red blood cell number or both resulting in lower ability of oxygen delivery to support the body's activity (Gutema, *et al*., 2014) has a range for children between 5 – 12 years. The range between 11.5g/dl – 12.0g/dl is considered normal, 10g/dl – 11.4g/dl is mild, 7g/dl – 9.9g/dl is moderate and 7g/dl is severe. The unit is in g/dl.

This study also records a high prevalence of malnutrition among the school pupils investigated for intestinal parasitic infections. The high rate of stunting and underweight recorded in this study might be due to high prevalence of hookworm, *Ascaris* and *Trichuris.*

The overall prevalence of malnourished children was 28%. The report of this study also clearly showed that there was a difference in the malnutrition status between the age group sampled. The result showed that the prevalence of malnutrition for the number malnourished between 5 – 6 years for 20 pupils examined was 3(15%) while for not malnourished it was 17(85%). The prevalence of malnutrition for the number malnourished in the age group 7 – 8 years for 40 pupils examined was 4(10%) for number examined while for not malnourished it was 36(90%). The 9 -10 years has 3(15%) for number malnourished and 17(85%) for not malnourished, for 20 pupils examined. For the 11 – 12years, 20 pupils was also examined and the number malnourished was 18(90%) while number not malnourished was 2(10%).

Malnutrition is a condition that results from lack of proper nutrition, caused by not having enough to eat, not eating enough of the right nutrients or not being able to use the food that one does eat. Malnutrition can be measured using body mass index (BMI), which is the measure of the body fat based on height and weight. It can also be defined as the body mass divided by the square of the body height. It is universally express in unit of kg/m^2. It has a range for children. Body mass index below 14.5 is considered underweight; 14.5 – 22 is considered normal and above 22 is considered over weight.

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