**THE OCCURRENCE OF INTESTINAL PARASITES AMONG CHILDREN WITHIN SOUTH EASTERN NIGERIA (A CASE STUDY OF ABIA, IMO AND EBONYI STATE)**

**Maduagwu Q. C1, Sangari J. S2, Toma M. A1, Lawrence, W.B1, Wuyep, C. Yiltok1**

**1Department of Biology, Federal University of Education, Pankshin, Plateau State, Nigeria**

**2Department of Biology, College of Education, Akwanga, Nasarawa State, Nigeria**

**ABSTRACT**

*This study evaluates the Occurrence of Intestinal Parasites Among Children within South Eastern Nigeria (A Case Study of Abia, Imo and Ebonyi State). The study population consisted of pre-school and school children of ages between 1 to 15 years using a random sampling method. A questionnaire was administered to survey the pupil’s data such as age, type of toilet available, sex, hand washing habit, water sources, and occupation of parents or guardians. Children were provided with universal containers and requested to bring stool specimen on or before 8:00am in the morning. The specimens were appropriately labeled with identification numbers and placed in a cold box with ice packs, immediately after collection and transported to the microbiology laboratory of Abia State University. The Samples were immediately examined for visible haematuria and turbidity. Prevalence was calculated and expressed as percentage of positive cases over the number examined. Data from questionnaire were coded and ranked and analyzed using SPSS version 13.0. Chi-square was used to compare significant differences in prevalence between the states visited, male and female infection of the parasites, ages and risk factors. The results indicated that the age and gender distribution of 300 subjects revealed that there were more males 162 than females 138. Out of the 300 stool specimen, watery stool specimen were (46), semi formed (55), formed (164) and mucoid stool specimen (35) (Table 1). The intestinal parasites identified in stool specimen includes Hookworm (12.7%), Strongylodies stearcoralis (3.3), Ascaris lumbricoides (20.7%), Taenia sp. (2.7), Trichuris trichiura (1.7%), and Entamoeba histolytica (4.0%) (Table 2). The prevalence of intestinal parasites was 49.7% and higher infection was observed in males (60%) than in females (47%) (Table 3) helminthes were found more in formed stools specimens than in watery stool while cysts were more in watery specimens. (Table 4) The age group 6 to 10 years was the most affected (54.7%) while the age group 11 to 15 years was the least affected (43.2%) (Table 5) The highest infection rate of (68%) occurred in Ebonyi State (figure 2). The researchers concluded that intestinal parasitemia are common among preschool and school children in south east states of Nigeria. Males of the age group 6-10 were mostly affected. We therefore recommend reintroduction of health education and sanitary inspection in the south eastern states of Nigeria.*

**KEYWORDS: Intestinal Parasites, Children, South Eastern Nigeria, Occurrence, Health Education**

**INTRODUCTION**

Intestinal parasites are tiny organisms, usually worms that feed on the host nutrition e.g protozoa and helminths (Abdullahi & Adullhazeez, 2020). The four species of intestinal helminthic parasites, also known as geohelminths and soil-transmitted helminths: *Ascaris lumbricoides* (roundworm), *Trichiuris trichiuria* (whipworm), *Ancylostoma duodenale*, and *Necator americanicus* (hookworms) (Ali *et al.*, 2023). The burden of diseases associated with intestinal parasitic infections is enormous. About two billion people are affected worldwide, of whom 300 million suffer from associated severe morbidity (Brooker *et al*., 2012). Indirect morbidity is particularly important in children with parasitic infections, ranging from malnutrition, anaemia, growth retardation, irritability and cognitive impairment to increased susceptibility to other infections and acute complication (Mengstu & Mekdes, 2014). Because parasites come in so many different shapes and sizes, they can cause a very wide range of problems (Brooker *et al*., 2012). Some consume food, leaving the host hungry after every meal and unable to gain weight. Others feed on red blood cells, causing anemia. Some lay eggs that can cause itching, irritability, and even insomnia.

They are particularly more prevalent in rural communities and are closely associated with poverty, each of these parasites can infect the digestive tract, and sometimes two or more can cause infection at the same time (Babatunde *et al.,* 2019). Parasites can get into the intestine by going through the mouth from uncooked or unwashed food, contaminated water or hands, or by skin contact with larva infected soil; they can also be transferred by the sexual act of anilingus in some cases. When the organisms are swallowed, they move into the intestine, where they can reproduce and cause symptoms. Children are particularly susceptible if they are not thoroughly cleaned after coming into contact with infected soil that is present in environments that they may frequently visit such as sandboxes and school playgrounds (WHO, 2013). People in developing countries are also at particular risk due to drinking water from sources that may be contaminated with parasites that colonize the gastrointestinal tract. These have become the most common parasitic infection of humans worldwide. Approximately two billion people (about a third of global population) are infected as of the latest estimate, and four billion at risk, surpassing even the all-time most prevalent parasitic disease, malaria (WHO, 2013). The largest numbers of cases occur in impoverished rural areas of Sub-Saharan Africa, Latin America, Southeast Asia, and China (WHO, 2014). It is regarded as one of the world's most important causes of intellectual and physical retardation (Dahal *et al*., 2019).

The disease is most prevalent in warm and moist climates where sanitation and hygiene are poor and waters are unsafe, including the temperate zones during warmer months. STH is categorised among Neglected Tropical Diseases because it inflicts tremendous disability and suffering, which can be clinically treated, yet negligible attention has been given for many years (Edema *et al*., 2022).

Epidemiological studies carried out in different countries have shown that the socio-economic level of the society may affect the incidence of intestinal parasites; control strategies of local managements involving improved infra-structure for both drinking water and sewage system, education of the society to improve personal hygiene and sanitation have been related to reduced incidence of intestinal parasites (Brooker *et al*., 2012).However, monitoring changes in prevalence are an important tool for evaluation of mass-drug administration programs, and are used as an indicator to measure the impact of preventive chemotherapy interventions on morbidity and transmission (Hotez and Kamath, 2009a).

This research will provide a baseline information on intestinal parasite in pre- school and school children in Abia, Imo and Ebonyi state, Eastern Nigeria from which the magnitude of the infection will be defined towards prompt intervention to save the lives of pre-school and school children of Abia, Imo and Ebonyi state, Nigeria thereby reducing the rate of transmission.

**MATERIALS AND METHODS**

**Study Area**

The study was carried out at Isiala mbano, owerri and mbaise of imo State, uturu, Isiala Ngwa, and umuahia of Abia state and Abakaliki, Ezzi and isiagu Ebonyi State. These states are located in the eastern part of Nigeria.

**Study population**

The study population consisted of pre-school and school children of ages between 1 to 15 years because they form most accessible age group and most vulnerable to STH infection community. A questionnaire was administered to survey the pupil’s data such as age, type of toilet available, sex, hand washing habit, water sources, and occupation of parents or guardians. Ethical approval for the study was granted by the Parents. Those who refused to give consent were excluded from the study.

**Selection of pre-schools and school children.**

A random sampling method was used to select the pre-school and school children. Communities surrounding the selected schools are mainly involved in subsistence farming of maize, rice, cassava and vegetables. They also practice small scale animal husbandry (cattle, goat, sheep and chicken). Few people have small scale businesses.

**STOOL COLLECTION**

Children were provided with universal containers and requested to bring stool specimen on or before 8:00am in the morning.

The specimens were appropriately labeled with identification numbers and placed in a cold box with ice packs, immediately after collection and transported to the microbiology laboratory of Abia State University. The Samples were immediately examined for visible haematuria and turbidity.

**EXAMINATON OF STOOL SPECIMEN FOR INTESTINAL PARASITES USING WET MOUNT MICROSCOPY**

**AIM:** To examine stool specimen for eggs, cyst, larvae, ova of parasites.

**PROCEDURE:**

A drop of saline was placed on slides and a small amount of faeces was placed on the microscopic slide using applicator stick, and mixed in the drop and covered with cover slip as described by Maurice king 1965. Finally, the samples were examined microscopically at high power magnification.

**Data Analysis** Prevalence was calculated and expressed as percentage of positive cases over the number examined. Data from questionnaire were coded and ranked and analyzed using SPSS version 13.0. Chi-square was used to compare significant differences in prevalence between the states visited, male and female infection of the parasites, ages and risk factors.

**RESULTS AND DISCUSSIONS**

**RESULTS**

Age and gender distribution of 300 subjects revealed that there were more males 162 than females 138. Out of the 300 stool specimen, watery stool specimen were (46), semi formed (55), formed (164) and mucoid stool specimen (35) (Table 1. The intestinal parasites identified in stool specimen includes Hookworm (12.7%), *Strongylodies* *stearcoralis* (3.3), *Ascaris lumbricoides* (20.7%), *Taenia sp*. (2.7), *Trichuris trichiura* (1.7%), and *Entamoeba histolytica* (4.0%) (Table 2). The prevalence of intestinal parasites was 49.7% and higher infection was observed in males (60%) than in females (47%) (Table 3) helminthes were found more in formed stools specimens than in watery stool while cysts were more in watery specimens. (Table 4) The age group 6 to 10 years was the most affected (54.7%) while the age group 11 to 15 years was the least affected (43.2%) (Table 5) The highest infection rate of (68%) occurred in Ebonyi State (figure 2)

**TABLE 1: Nature of the stool specimen examined**

|  |  |
| --- | --- |
| Appearance | No of stool samples |
| Watery | 46 (15.3) |
| Semi formed | 55 (18.3) |
| Formed | 164 (54.7) |
| Mucoid | 35 (11.7) |
|  |  |
| Total | 300 (100) |

**TABLE 2: INTESTINAL PARASITES OBSERVED IN STOOL SPECIMENS**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PARASITES | CYST | OVA | LARVAE | ADULT | FLAGELLATES | T0TAL |
| *Entamoeba* *histolytica* | 12 | - | - | - | - | 12 |
| *Giardia* *lamblia* | 8 | - | - | - | 6 | 14 |
| *Ascaris lumbricoides* | - | 62 | - | - | - | 62 |
| Hook Worm | - | 38 | - | - | - | 38 |
| *Trichuris trichuria* | - | 5 | - | - | - | 5 |
| *Taenia* Spp | - | 8 | - | - | - | 8 |
| *Strongyloides* *stercoralis* | - | - | 10 | - | - | 10 |

Total 20 113 10 - 6 149

|  |
| --- |
|  |

**TABLE 3: DISTRIBUTION OF INTESTINAL PARASITES ACCORDING TO GENDER**

|  |  |  |  |
| --- | --- | --- | --- |
| PARASITES | MALES  (%) | FEMALES  (%) | TOTAL  (%) |
| *Entamoeba* *histolytica* | 8 (6.2) | 4 (4.3) | 12(4.0) |
| *Giardia* *lamblia* | 8 (6.2) | 6(7.2) | 14(4.7) |
| *Ascaris* *lumbricoides* | 36 (22.2) | 26(18.8) | 62(20.7) |
| Hook Worm | 26 (16.0) | 10(7.2) | 38(12.0) |
| *Trichuris trichuria* | 5 (3.1) | 0 | 5(1.7) |
| *Taenia* Spp | 5 (3.1) | 3(2.2) | 8(2.7) |
| *Strongyloides* *stercoralis* | 6 (3.7) | 4(2.9) | 10(3.3) |
| Total | 94 (58.0) | 55(39.9) | 149(49.7) |

NOTE: No of males examined =162, No of females examined =138

**TABLE 4: DISTRIBUTION OF INTESTINAL PARASITES ACCORDING TO APPEARANCE OF STOOL SPECIMEN COLLECTED FROM THE STATES (IMO, ABIA AND EBONYI)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PARASITES | FORMED | SEMI FORMED | WATERY | MUCOID | TOTAL |
| *Entamoeba*  *Histolytica* | - | 2 | 10 | - | 12 |
| *Giardia* *lamblia* | - | - | 14 | - | 14 |
| *Ascaris* *lumbricoides* | 56 | 4 | - | 2 | 62 |
| Hook Worm | 34 | 4 | - |  | 38 |
| *Trichuris trichuria* | 5 | - | - | - | 5 |
| *Taenia* Spp | 8 | - | - |  | 8 |
| *Strongyloides* *stercoralis* | 6 | - | - | 4 | 10 |

**TABLE 5: DISTRIBUTION OF INTESTINAL PARASITES ACCORDING TO AGE GROUP AND GENDER OF THE STUDY POPULATION**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| AGE GROUP  (YRS) | MALE INFECTED  (%) | FEMALE  INFECTED  (%) | TOTAL NO EXAMINED | TOTAL  INFECTED  (%) | NO UNINFECTED  (%) |
| 1-5 | 28(58.3) | 9(28.0) | 80 | 37(46.2) | 43(53.8) |
| 6-10 | 50(59.5) | 30(48.4) | 146 | 80(54.7) | 66(45.2) |
| 11-15 | 18(60.0) | 14(31.8) | 74 | 32(43.2) | 42(56.8) |
|  |  |  |  |  |  |
| T0TAL | 96(59.2) | 53(38.4) | 300 | 149(49.7) | 151(50.3) |

FIGURE 1: PREVALENCE OF SINGLE AND MULTIPLE PARASITIC INFECTIONS BY AGE GROUPS IN THE STUDY POPULATION

FIGURE 2: PREVALENCE OF INTESTINAL PARASITES IN THE THREE STATES (ABIA, EBONYI AND IMO).

**DISCUSSIONS**

Intestinal parasites infection is among the most important parasitic infection in Sub- Sahara Africa. Various studies have established an association between them. In this study, the overall prevalence for Intestinal parasites among the three states in south eastern Nigeria (Abia, Ebonyi, Imo) was 44%, 68% and 37% respectively. This implies intestinal parasites infections are endemic among preschool and school children which could leads to high mortality among them if not treated. Out of the 300 children examined, a total of 149 individuals were infected. This could be due to lack of good hygiene, poverty and lack of awareness on the intestinal parasites and its route of transmission as these children visited were in rural areas (Edema *et al*., 2022).

Out of the 3 states visited, the highest prevalence recorded was 68% from Ebonyi. This could be due to the fact that the people there defecate indiscriminately in the nearby bushes in this area. This indicated that lack of personal hygiene triggers the rate of infection of intestinal parasites. This was similar to the studies of (Ali *et al.,* 2023) whose high prevalence was attributed to poor environment, low sanitary standard, personal hygiene, shortage of portable water and indiscriminate defecation. Similarly, Dahal *et al*., (2019) recorded a prevalence rate of 89.5% for intestinal parasites in Lagos state, Nigeria while Awogun (1984) observed a prevalence rate of 70.8% in Ilorin, Nigeria. The high infection rate recorded in this study contradicts that of 16.9% observed by Chigozie *et al.,* (2007) in South Eastern Nigeria. Based on species of parasites, seven Intestinal parasites; Hookworm (12.7%), *Strongylodies* *stearcoralis* (3.3), *Ascaris lumbricoides* (20.7%), *Taenia sp*. (2.7), *Trichuris trichiura* (1.7%), and *Entamoeba histolytica* (4.0%) were identified in this study. This was in conformity with a number of previous studies (Kelechi *et al*., 2015; Asuogu *et al*., 2013). In this study, the age group 6 to 10 years was the most affected (54.7%) while the age group 11 to 15 years was the least affected (43.2%), this could be because of high level of soil contact activity and low personal hygiene in this age group. This finding is supported by a previous report from Ebonyi and Imo (Kelechi *et al*., 2017). The result revealed a decrease in infection rate among the older children. High prevalence of 59.2% was observed among the males compared to the 38.4% in females. This could be as a result of the facts that male children plays outside than females children who help their mothers with house chores. This agreed with the work by Timothy *et al.* (2020). It was observed that those that defecate indiscriminately in the bush recorded highest rate (72.9%) infection than those that used pit toilet (68%) and modern toilet (26.5%) respectively. this could be that bush method of toileting, encourages the development of eggs and larvae of these intestinal parasites in the soil. This agrees with Babatunde *et al.* (2019) which observed that children constantly are infected hence they come in close contact with soil and use unwashed hands to eat, thus there is oral feacal contamination. Furthermore, the prevalence based on occupation of parents indicated that pupils whose parents were farmers’ recorded highest rate (68.8%) of infection than those whose parents were civil servants (31.6%) and business people (45.7%).

This study also showed overlapping distribution of intestinal parasites infection. This is in line with the work of Joan *et al.* (2022). In many regions of Sub-Saharan Africa, helminthes particularly hookworm disease overlaps geographically with falciparium malaria (Edema *et al*., 2022). In most tropical regions, hookworm has high co-infection with malaria (Owaka *et al.*, 2016). The bases for this were explained by Zemichael *et al.* (2019) who hold that hookworm has a terminal tolerance adapting them to temperatures that increases the chances of co-infection with malaria.

**CONCLUSION**

Intestinal parasitemia are common among preschool and school children in south east states of Nigeria. Males of the age group 6-10 were mostly affected.

**RECOMENDATION**

1. School authorities and parents of the participants should improve and prioritize good hygiene conditions such as hand-washing with soap after defecation, providing clean drinking water, disposing of human waste and sewage properly, and educating their wards about public health.
2. There is also a need to educate food vendors in schools to ensure that their food is prepared and served under hygienic conditions so that they would not serve as secondary transmitters of parasitic infections.
3. The government should prioritize enrolling all primary and secondary schools in the eastern states of Nigeria in school health programs, including at least once a year deworming, and also improve health education to constantly raise awareness about the dangers posed by these parasites, their mode of transmission, and the need for helminthic parasite prevention to reduce the persistence of parasites transmission among school-age children in schools.

**REFERENCES**

Abdullahi, I. O. & Adullhazeez, A. J. (2020). Prevalence of intestinal Parasites in some human patients in Zaria. *Nigeria Journal of Parasitology.* 21:125-130

Ali, A. A; Pam, V. A; Uzoigwe, N. R; Ombugadu, A. & Maikenti, J. I. (2023). Prevalence of Gastrointestinal Infections Among Human Population in Some Communities in Akwanga Local Government Area, Nasarawa State, Nigeria. *Trends in Technical Science Research*. 5(5): 555674. DOI: 10.19080/TTSR.2023.05.555674

Babatunde, S. K., Kolawole, D. O., Majekodunmi, R. A., Ajiboye, A. E., Ojo S., Ajao, A. T. & Ajuwon, B. I. (2019). Profile of intestinal parasites among nomadic Fulani in Kwara State, Nigeria. *Nigeria Journal of Parasitology*. 40(1):56-60.

Bethony, J., Brooker, S., Albonico, M., Geiger, S. M., Loukas, A., Diemert, D. & Hotez, P. J. (2006). "Soil-transmitted helminth infections: ascariasis, trichuriasis, and hookworm". *The Lancet* 367(9521): 1521–1532.

Brooker, S., Akhwale, W., Pullan, R., Estambale, B. & Clarke, S.E. (2007). Epidemiology of plasmodium-helminth co-infection in africa: populations at risk, potential impact on anemia, and prospects for combining control. *Am J Trop Med Hyg* 77: 88–98.

Brooker, S., Pullan, R., Gitonga, C.W., Ashton, R. & Kolaczinski, J.H. (2012). Plasmodium– helminth coinfection and its sources of heterogeneity across east africa. *J Infect Diseases* 205: 841–852.

Cappello, M. (2004) Global health impact of soil-transmitted nematodes. *Pediatr Infect Dis J*.23:663–664.

Dahal, A. S., Francis, E. O., Francis, J. E., % Wamtas, F. I. (2019). Soil‑transmitted Helminths and Associated Risk Factors Among Elementary School Pupils in Dadin Kowa, Jos. *Niger Medical Journal*. 60:181-5.

Edema, E. I., Ekanem, I. B., Ubleni, E. E., Emmanuel, O. E., & Anok, U. U. (2022). Soil- Transmitted Helminth Infection Among School-Age Children in Ogoja, Nigeria: Implication for Control. *Research Square*. 1-23. DOI: <https://doi.org/10.21203/rs.3.rs-> 2104583/v1

Joan, G., Austin, E. A. & Grace, A. (2022). Prevalence of Intestinal Parasitic Infection and Associated Risk Factors Among Primary School-Aged Children (5-15years) in Southern Nigeria. *International Journal of Infectious*. 9(3):e123721

Kelechi, J., Kelvin, O. E., Patrick, G. O., Nelsonm, C. A. & Emmanuel, A. (2017). Soil-transmitted Helminth infection in school children in Eastern Nigeria: the public health implication. *Int. J of Third World Med.*, (**4**)1.

Mengstu, D. C. & Mekdes, K. G. (2014) Malaria and Intestinal Parasite Infections and Co-Infections in Tach Gayint District,South Gondar Zone, Amhara Regional State. *Sci. J. of Pub. Health.* Vol. 2, pp. 546-553.

Owaka, E. E., Njoku, O. O., Uhuo, C. A. & Odikamnoro, O. O. (2016). Survey of Intestinal elminth Infection amongst School Children in Rural Communities of Ebonyi State Nigeria. International Journal of Scientific and Research Publications, 6(5): 2250-3153.

Timothy, A., Ezekiel, K. & Oricha, K. A. (2020). Studies on the Intestinal Helminths Infestation among Primary School Children in Gwagwada, Kaduna, North Western Nigeria. *Journal of Biology, Agriculture and Healthcare*. 3(7): 48-53

WHO. (2014). "Soil-transmitted helminth infections Fact sheet N°366". *World Health Organization*. June 2013. Retrieved 5 March 2014.

World Health Organization. (2013). Soil-transmitted helminth infections factsheet, Retrieved 2014-01-09.