

**PREVALENCE OF INTESTINAL PARASITIC INFECTIONS AMONG UNDER FIVE CHILDREN IN ABAKALIKI LOCAL GOVERNMENT AREA OF EBONYI STATE.**E.C. Achi<sup>1</sup>, O.O. Njoku<sup>1</sup>, A.U. Nnachi<sup>2\*</sup>, A.M. Efunshile<sup>3</sup>, J.O. Mbah<sup>1</sup>, I.N. Aghanya<sup>4</sup>, P.O Nnemelu<sup>4</sup><sup>1</sup>Department of Biological Science, Faculty of Science, Ebonyi State University, Abakaliki, Nigeria.<sup>2</sup>Department of Immunology, Faculty of Medicine, Nnamdi Azikiwe University, Nnewi Campus, Nnewi, Nigeria.<sup>3</sup>Department of Medical Microbiology and Parasitology, Faculty of Medicine, Federal Teaching Hospital, Abakaliki, Nigeria.<sup>4</sup>Department of Medical Microbiology and Parasitology, Faculty of Medicine, Nnamdi Azikiwe University, Nnewi Campus, Nnewi, Nigeria.**\*Corresponding Author: A.U. Nnachi**

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**ABSTRACT**

The range of infections caused by intestinal parasites constitutes a major health problem among children in developing countries such as Nigeria. In this study, we investigated the prevalence of intestinal parasitic infections among under five children in Abakaliki Local Government Area of Ebonyi State. Stool samples were collected from 553 children comprising of 282 males and 271 females attending some selected health centres in the local government area and analyzed using standard parasitological techniques. Out of the 553 children sampled, 76 were infected with intestinal parasites giving the overall prevalence of 13.7%. Among this number, 37 were males while 39 were females. Prevalence of intestinal parasites was higher in females (n=39/271; 14.4%) than in males (n=37/282; 13.5%). This difference in the rate of infection with respect to sex was not significant, statistically ( $\chi^2 = 0.1882$ ;  $p = 0.664$ ). The range of parasites seen included tapeworm (5.3%), *Ascaris lumbricoides* (7.9%), *Strongyloides stercoralis* (7.9%), hookworm (19.7%), *Giardia lamblia* (19.7%) and *Entamoeba histolytica* (39.5%) in their order of occurrence. Based on the health centres, highest prevalence was recorded in Enyida Health Centre I (18.6%) followed by Akpe-Amachi Health Centre (17.3%) and Okpitumo Health Centre (14.5%), while Maternal and Child Health recorded least (7.2%). There was no significance difference in prevalence of intestinal parasites with respect to health centres ( $\chi^2 = 8.0797$ ;  $p = 0.88701$ ) as well as distribution of the individual parasites across the different health centres (F-ratio = 0.25327;  $P = 0.90492$ ). Intestinal parasites were prevalent among under five children in Abakaliki Local Government Area and this depicts the possible state of under five children in other rural communities in Ebonyi State, given that such level of prevalence was observed in the capital city of Ebonyi State.

**KEYWORDS:** Prevalence, intestinal parasites, children, helminthes, infection.**1. INTRODUCTION**

Globally, intestinal parasitic infections are major health problems with obvious socioeconomic and medical health consequences. It is estimated that 3.5 billion people are affected, and 450 million are ill because of these infections, the majority being children (Brooker *et al.*, 2009). In developing countries, the difficulty to implement control measures due to unsafe water supply, poverty, poor personal hygiene, wrong waste management and limited access to health education/awareness have made them resilient significant health problems (Adamu *et al.*, 2006; Noor-Azian *et al.*, 2007; Akinbo *et al.*, 2011; Lorina, 2013). In Africa, soil-transmitted helminthes (STHs), to which majority of intestinal parasitic infections are attributed as more than 2 billion people are infected (WHO, 2012), are the leading cause of death in under five children (WHO,

2010; G/hiwot *et al.*, 2014). It is often presented with anaemia, malabsorption, diarrhoea, malnutrition, physical and mental impairments, delayed growth in children, weight loss, fatigue and itching or rash around the anus and vulva (WHO, 1998; Buchini *et al.*, 2007; Ashtiani *et al.*, 2011; Nnachi *et al.*, 2015; Kebede *et al.*, 2016; Sarkari *et al.*, 2016; Tyoalumun *et al.*, 2016; Daryani *et al.*, 2017). The human intestinal protozoa may be pathogenic or non-pathogenic parasites. Although the pathogenic group may cause overt disease in infected individuals, the nonpathogenic parasites still occupy an important position as they serve as indicators of fecal-oral transmission in infected people and their overall health conditions in a given area (Sarkari *et al.*, 2016).

Intestinal parasites of importance to humans include *Ascaris lumbricoides*, *Trichuris trichiura*, *Necator*

*americanus*, *Giardia lamblia*, *Entamoeba* species, *Schistosoma* species, *Cryptosporidium* species, *Strongyloides stercoralis*, hookworms and *Ancylostoma duodenale* (Abate et al., 2013; Dhanabal et al., 2014; G/hiwot et al., 2014; Doni et al., 2015; Hosseini et al., 2015; Nnachi et al., 2015; Sharif et al., 2015; Al-Harazi, 2016; Alemu et al., 2016). Due to their low iron status, environmental factors and immature immunity, pre-school children are the most vulnerable to this infection (Nematian et al., 2008; Harhay et al., 2010; G/hiwot et al., 2014; Nnachi et al., 2015) and may continue to serve as the reservoirs for continues transmission of intestinal parasitic infections across the community. Statistics have shown that treating infected children reduces the disease burden in the general population by 30%, which is quite significant (Lai, 1992; Ashtiani et al., 2011). Appropriate data on the prevalence of infection in each community in the developing countries will help prevention plans. However, most studies previously carried out in the state were among school children and adults; therefore, set forth to determine the prevalence of intestinal parasitic infections among under five children in Abakaliki local government area of Ebonyi State, Nigeria.

## 2. MATERIALS AND METHODS

This population-based cross-sectional observational study was conducted among randomly selected 553 under five children who attended any of five randomly selected health centres in Abakaliki Local Government Area of Ebonyi State, Nigeria for immunization in 2014 (between January and June). Ebonyi State is mainly agrarian in nature and lies within the co-ordinates, 6°22'N and 8°66'E with an estimated total population of 2,710,845. Of this number, under five children were estimated to be 37,845 (NPC, 2006). Participation in the study was voluntary and only children whose parents gave their consents were recruited. All parents were duly informed of the purpose of the study and their consents sought before their children were sampled. Inclusion was based on age  $\leq 5$  years, willingness of parents to allow their children's participation and absence of life-threatening disease conditions. Children older than 5 years and under fives whose parents refused consents or who had life-threatening disease conditions were excluded. Ebonyi State Ministry of Health and the Research and Ethics Committee of Ebonyi State University, Abakaliki approved the study, while

permissions were sought and obtained from the head of each health centre used before commencement. Pre-tested structured questionnaire were used to obtain basic demographic information of each child.

Five hundred and fifty-three (553) stool samples were collected, one from each subject, appropriately labelled and transported to the Department of Biological Science Laboratory for immediate analysis using a combination of direct smear microscopy (Cheesbrough, 1998) and formol-ether concentration technique (Ozumba and Ozumba, 2002). All microscopic examinations were made using 10x and 40x objectives to observe for ova and/or cysts. Observations were compared with standard parasites charts (Arora and Arora, 2010). Data were analyzed using statistical package for social sciences (SPSS) version 20.0 for chi-square and analysis of variance (ANOVA).

## 3. RESULTS

Out of the 553 (282 males and 271 females) under five children sampled in Abakaliki Local Government Area of Ebonyi State, 76 were infected with at least one intestinal parasite giving rise to the overall prevalence of 13.7% (Tables 1 - 3). Among this number, 37 were males while 39 were females, showing that prevalence of the parasites was higher in females (n=39/271; 14.4%) than in males (n=37/282; 13.5%) (Table 1). This difference in rate of infection with respect to sex was not significant, statistically ( $\chi^2 = 0.1882$ ;  $p = 0.664$ ). The range of parasites seen included tapeworm (5.3%), *Ascaris lumbricoides* (7.9%), *Strongyloides stercoralis* (7.9%), hookworm (19.7%), *Giardia lamblia* (19.7%) and *Entamoeba histolytica* (39.5%). This showed that the intestinal protozoan, *Entamoeba histolytica* was most prevalent followed by hookworm and *Giardia lamblia*, while the least observed was tapeworm (Table 2). Based on the health centres highest prevalence was recorded in Enyida Health Centre I (18.6%) followed by Akpe-Amachi Health Centre (17.3%) and Okpitumo Health Centre (14.5%), while Maternal and Child Health recorded least (7.2%) (Table 3). However, There was no significance difference in prevalence of intestinal parasites with respect to health centres ( $\chi^2 = 8.0797$ ;  $p = 0.88701$ ) as well as distribution of the individual parasites across the different health centres (F-ratio = 0.25327;  $P = 0.90492$ ). (Table 2).

**Table: 1. Sex Distribution of intestinal parasites among under five children in Abakaliki Local Government Area of Ebonyi State.**

Sex	No. Examined	No. Uninfected	No. Infected n(%)
Male	282	245	37 (13.5)
Female	271	232	39 (14.4)
<b>Total</b>	<b>553</b>	<b>477</b>	<b>76(13.7)</b>

No significant difference in prevalence of intestinal parasites with respect to sex ( $\chi^2 = 0.1882$ ;  $p = 0.664$ ).

**Table: 2. Range of intestinal parasites seen among under five children in Abakaliki Local Government Area of Ebonyi State in relation to Health Centres.**

Parasite	Health Centre (n = 553)					Total n(%)
	Akpe-Amachi	Mother and Child	Enyida I	Enyida II	Okpitemo	
Hookworm	7 (36.8)	4 (44.4)	0 (0.0)	2 (16.7)	2 (12.5)	15 (19.7)
<i>Ascaris lumbricoides</i>	4 (21.1)	0 (0.0)	2 (10.0)	0 (0.0)	0 (0.0)	6 (7.9)
<i>Strongyloides stercoralis</i>	0 (0.0)	0 (0.0)	0 (0.0)	6 (50.0)	0 (0.0)	6 (7.9)
Tapeworm	4 (21.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (5.3)
<i>Giardia lamblia</i>	2 (10.5)	0 (0.0)	12 (60.0)	1 (8.3)	0 (0.0)	15 (19.7)
<i>Entamoeba histolytica</i>	2 (10.5)	5 (55.6)	6 (30.0)	3 (25.0)	14 (87.5)	30 (39.5)
<b>Total</b>	<b>19 (25)</b>	<b>9 (11.8)</b>	<b>20 (26.3)</b>	<b>12 (15.8)</b>	<b>16 (21.1)</b>	<b>76(13.7)</b>

No significant difference in the geographical distribution of individual parasites (F-ratio = 0.25327; P = 0.90492)

**Table: 3. Overall geographical distribution of intestinal parasites among under five children in Abakaliki Local Government Area of Ebonyi State.**

Location	No. examined	No. Uninfected	No. Infected (%)
Akpe-Amachi Health Centre	110	91	19 (17.3)
Maternal and Child Health	110	102	8(7.2)
Enyida Health Centre I	113	92	21(18.6)
Enyida Health Centre II	110	98	12 (10.9)
Okpitemo Health Centre	110	94	16 (14.5)
Total	553	477	76 (13.7)

No significance difference in prevalence of intestinal parasites with respect to health centres ( $\chi^2 = 8.0797$ ;  $p = 0.88701$ ).

#### 4. DISCUSSION

Infectious diarrhoea, caused by intestinal parasites is one of the leading causes of death among children in the developing countries (UNICEF/WHO, 2009; Tyoalumun *et al.*, 2016). In children, it causes huge morbidity and considerable mortality, and children are more likely to be infected than other groups due to many behavioral and environmental factors (Harhay *et al.*, 2010; Kunwar *et al.*, 2016). Adequate information about the prevailing state among a given population in any area is an important epidemiological tool in evaluating existing and strategizing new intervention programs. This study determined the prevalence of intestinal parasitic infections among under five children attending any of five selected health centres in Abakaliki Local Government Area of Ebonyi state. An overall prevalence rate of 13.7 % was observed in this study, which is similar to Chirdan *et al.* (2010) and Abdi *et al.* (2014) who observed 13.8% and 14% prevalence rates respectively, but much lower than the previous studies of G/hiwot *et al.* (2014) and Okpala *et al.* (2014) who observed 24.3% and 57.8% respectively. However, this study recorded more prevalence rate than Akinbo *et al.* (2011) who observed a 7.29% prevalence among under 10 patients in Benin, Nigeria. The lower prevalence of intestinal parasites observed in this study could be attributed to differences in the sanitary conditions of the different geographical areas studied and the fact that children within this age range rarely walk barefooted in the area; hence, the rate of penetration of skin by the larvae of soil-transmitted helminthes (STHs) is reduced. In addition, the massive de-worming exercise going on in the state among the age group could have reduced the overall burden in the area (Nnachi *et al.*, 2015). It is also

important to note that Abakaliki is the capital city of the state; so, access to safe drinking water supply, better waste management and overall better living conditions of the populace are expected when compared to the rural communities of even the same state. Also, the study was carried around the dry season (January to April) when transmission of geohelminthes is expected to be generally low and this could further explain the low prevalence.

The results also showed that female under fives were more infected with intestinal parasites than their male counterparts at the prevalence rates of 14.4% and 13.5% respectively. However, there was no significant difference in prevalence with respect to sex ( $\chi^2 = 0.1882$ ;  $P = 0.664$ ). This agrees with the reports of Sah *et al.* (2013), Udensi *et al.* (2015) and Daryani *et al.* (2017) who reported higher prevalence in female children than the males. However, Uwaezuoke *et al.* (2006) and Al-Megrin (2015) observed higher prevalence among males than females. Six species of intestinal parasites were observed among the under five children including tapeworm, *Ascaris lumbricoides*, *Strongyloides stercoralis*, hookworm, *Giardia lamblia* and *Entamoeba histolytica*. Other previous studies have recorded similar parasites among children (Uwaezuoke *et al.*, 2006; Canete *et al.*, 2012; Mbae *et al.*, 2013; Nxasana *et al.*, 2013; Al-Megrin 2015; Udensi *et al.*, 2015;). However, it is not consistent with Uwaezuoke *et al.* (2006) and Akinbo *et al.* (2011) who also observed *Trichuris trichiura*. The array of parasites observed in this study are mostly pathogenic groups and the presence of these six species of intestinal parasites in this study area suggests that the prevailing environmental conditions in

the study centres support a wide range of parasites. In Nigeria, for instance, a considerable amount of human and animal wastes are discharged into the soil daily leading to soil seepage with pathogenic organisms which include cysts, eggs and larvae of these intestinal parasites (Udensi *et al.*, 2011).

### CONCLUSION

This study has confirmed that intestinal parasitic infections were prevalent among under five children in Abakaliki Local Government Area of Ebonyi State, Nigeria. The prevalence rate observed in this study cannot be considered low, given the massive de-worming exercise going on among the age group studied and the fact that this study was carried out during dry season when transmission of soil-associated helminthes is expected to be low. Also, the array of parasites encountered in this study and their level of prevalence is a course for public health concern.

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