



Research Article

# Evaluation of Helminth Infection among Infants in Umunakanu Ama Autonomous Community Imo State Nigeria

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The prevalence of intestinal helminth infection in Umunakanu Ama autonomous community in Imo State was assayed by macroscopic examination followed by microscopic examination of the stool sample using both direct smear method and saturated sodium chloride floatation technique. Out of 30 samples collected and examined, 20 were positive for intestinal helminth infections. The results showed that the parasitic infestation rates were 76.67%, and the helminthes observed include *Enterobius vermicularis* (6.67%), *Schistosoma interclatum* (13.33%), *Trichuris trichuria* (10.00%), *Strongyloides stercoralis* (6.67%), *Ascaris lumbricoides* (16.67%) and *Ancylostoma duodenale* (23.33%). The 7 – 12-months age group has the highest prevalence rate which increases as the infant grow. The females had the highest prevalence rate (75%) in terms of gender evaluation, infants whose parents/guardian are farmers held the highest prevalence rate (90%). This was a result of constant exposure to soil and close contact to animals like goats, sheep, etc.

**Keyword:** helminthes, infection, parasitic, prevalence, infestation

## INTRODUCTION

Intestinal helminth infections are widespread among children in the tropics and subtropics. These infections are rarely fatal but they may impair growth, physical fitness, cognition, and reduce school attendance and performance. (Bethony *et al*; 2006; Nokes *et al*; 1992). Children between 5–14 years of age in developing countries are especially at risk of soil-transmitted helminth (STH) infections. World development report 1993 More than 500 million people are infected with trichuriasis, ascariasis, or hookworm infections globally. These infections are classified among the seven of the most common neglected tropical infectious diseases that afflict the bottom billion because of their high prevalence and amenability to control. (Hotez *et al* 2009)

Helminths infection also known as worm infection or helminthiasis is a macroparasitic disease of humans and other animals in which part of the body is infected with parasitic worms known as helminthes. There are numerous species of these parasites which are broadly

classified into tapeworms, flukes and round worms. (Mbanugo, 2011). They often live in the gastrointestinal tract of their hosts but may also burrow into other organs, where they induce physiological damage.

Soil transmitted helminthiasis and Schistosomiasis are the most important helminthiasis. Helminths infections are common in developing countries and are major hazard because of their high prevalent rate and their different effect on both nutritional and immune status of the population (Alli *et al* 2011).

The health of infants in developing countries is a concern that has received increasing attention in the recent past following high morbidity has been attributed to parasitic helminth infections. (Bethony *et al* 2006).

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It has been estimated by different researchers that about 15 million Nigerians are suffering from ascariasis (or *Ascaris* infection) alone while there are several thousands with hookworm, trichuriasis, enterobiasis, strongyloides, (Umeuche and Ndifon, 2009; Oomeh, 2013; Ejezie, 2011) tapeworm infections and others. The prevalence of these helminthes varies not only from one locality to the other but also among infants of parents in low income group, standard of sanitation, age. (Gilles, 2010; Cowper, 2006) The public health and socio-economic consequence of helminthiasis are of considerable global concerns particularly in the rural communities of the developing countries where malnutrition and other factors complicate the impact of the infection (Churchill, 2009).

Factually, many studies on helminths infections among infants have been carried out in many parts of the country. It is still important to carry similar studies in different other parts of the country at different times in view of changing patterns of parasitic infections.

The present study aims at the identification of various intestinal helminth parasites, in infants to determine the overall prevalence of infection and the pattern of infestation in relation to age and sex of the infants and to report the results of the investigation on intestinal helminthiasis among infants in Umunakanu ama autonomous community in Ehime Mbano, Imo State.

### Study Area

The study was carried out in Umunakanu. Thirty infants aged 0 – 12 months were investigated for their intestinal helminthic infections. Umunakanu had a warm humid climate condition with sometimes high temperature and heavy rain distributed almost all the year round. The inhabitants of Umunakanu are people from different states. Majority of people are civil servants, traders and mostly agricultural workers. Most houses lack toilet facilities and as such defecation was done in the bush though some of them have pit toilets and some have hygienic toilet system (water closet systems). (Gilles, 2010)

### Sample Collection

A clean sterile wide-mouthed specimen bottle was given randomly to some selected parents/guardians who were asked to collect stool sample from their infant, child/ward into the bottle given to them, also, educating them on the collection method, to avoid contamination. The name (optional), age and sex of each child was labeled on the respective bottles. The specimen was collected the next morning. On collection of the faecal samples from the parents, each parent was interviewed on some of the following points; occupation, child foot wear habit, domestic animal reared and type of toilet facility, etc.

### Macroscopic Examination

This describes the appearance of the stool i.e the physical appearance such as colour, to know whether the stool is in solid, semi-solid formed, uniformed or watery, presence of blood/mucus. And also when a stool sample is uniformed that is contains pus and mucus.

### Microscopic Examination of the faecal sample (Wet Mount Preparation)

A drop of freshly prepared physiological saline was placed on one end of a glass slide and a drop of iodine on the other end. Small amount of the faecal sample about 2 mg was emulsified on the part of slide containing saline and iodine respectively using an applicator stick. Each preparation was covered with coverslip and was examined microscopically using x10 and x40 objectives. (Ochei, and Kolhatkar, 2007)

### Saturated Sodium Chloride Floatation Technique

A saturated solution of sodium chloride was prepared by stirring sodium chloride into hot clean water until no more can be dissolved, few more grams of the salt were added so that a layer of the undissolved salt remains in the bottom of the stock container. (Cheesbrough, 2006; Luka *et al*; 2014.)

After this preparation about 0.5g of faeces were emulsified in 2ml of saturated NaCl in a test-tube having about 15mm internal diameter. The test tube was filled with the NaCl solution mixed well and the tube was placed in a vertical position on a flat surface. NaCl solution was added slowly to full the tube completely up to the brim. A clean coverslip was carefully placed on the top of the tube so that its undersurface touches the solution. After about 45mins the coverslip was carefully lifted by a straight pull upwards and was placed on a slide facing downwards. This was examined microscopically using x10 and x40 Objectives. (Luka *et al*; 2014; Reinthaler *et al* 2008 )

### Result Analysis

Out of the 30 samples 23 were positive for intestinal helminthes with the prevalence rate of 76.67%. The helminthes include; *Ascaris lumbricoides* (16.67%), *Strongyloides stercoralis* (6.67%), *Enterobius vermicularis* (6.67%), *Schistosoma intercalatum* (13.33%), *Trichuris trichuria* (10%), Hookworm (23.33%).

**Table 1 Morphological Features of Helminth Eggs**

Parasite	Size	Shape	Colour	Other features
<i>T. trichuria</i>	50 - 54µm by 22 - 23µm	Typical barrel	Yellow-brown	Embryonated egg, Thick quick shell
<i>A. duodenale</i>	8 – 13mm (f) 6 – 10mm (m)	Cylindrical	Greyish white	The males have a broad translucent membranous bursa with rib-like rays.
<i>S. intercalatum</i>	Approximately 130 x 75µm	Terminal spine	Red	Surface has a much lower amount of integument elevations or bosses.
<i>S. stercoralis</i>	50 x 30µm	Oval	Colourless	
<i>A. lumbricoides</i>	60 x 40µm (fertilized egg) 90 x 45µm (unfertilized)	Oval, round more oval	Yellow-brown darker-brown	The fertilized egg is covered by an outer mammillated thick albuminous covering. The unfertilized egg has a thinner shell with an irregular coating of albumin.
<i>E. vermicularis</i>	55 x 40µm	Oval planoconvex	and Colourless	Each egg contains a coiled larva.

(Identification reference Ochei and Kolhatkar, 2007; Cheesbrough, 2006 *A. duodenale*

Table 3.2; Shows the prevalence of the listed helminthes, table 3.3 shows the prevalence of the helminthes with respect to age, table 3.4 and table 3.5 shows the prevalence of helminthes with respect to sex and parents' occupation respectively.

**Table 2: Prevalence of the listed helminthes.**

Parasites	Number of infected	Prevalence rate
<i>Enterobius vermicularis</i>	2	6.67%
<i>Schistosoma intercalatum</i>	4	13.33%
<i>Trichuris trichuria</i>	3	10.00%
<i>Strongyloides stercoralis</i>	2	6.67%
<i>Ascaris lumbricoides</i>	7	16.67%
<i>Ancylostoma duodenale</i>	5	23.33%
Total	23	76.67%

The age groups 7 – 12months and 0 – 6months had occurrence rate of 77.78% and 61.90% respectively. The highest occurrence was observed in the 0 – 6months age group with the occurrence rate of 77.78%.

From Table 4, the highest occurrence rate was observed in the females with the observed rate of 75% while males had an occurrence rate of 50%

The tale 4 above shows the prevalence rate of helminthiasis with respect to parents/guardian's occupation with farmers having the highest prevalence rate of 90% in other words, infants whose parents/guardian are farmers are more infected than the others.

**Table 3: Helminths infestation occurrence with respect to age.**

Age (months)	Total examined	no Total and %	Total no of +ve E.V and %	S.I +ve and %	T.t +ve and %	S.s +ve and %	A.I +ve and %	+ve and % A. d
0-6	21	16(76.19)	1(4.76)	3(14.29)	0	1(4.76)	5(23.81)	4(19.05)
7-12	9	7(77.78)	1(10)	1(11.11)	1(11.11)	0	2(22.22)	3(33.33)
Total	30	23(76.67)	1(33.33)	4(13.33)	3(10)	1(33.33)	7(23.33)	7(23.33)

**Table 4: Helminth infestation with respect to gender**

Sex	Total examined	no Total +ve and %	Total number of E.v +ve and %	S.I +ve and %	T.t +ve and %	S.s +ve and %	A.I +ve and %	A.d +ve and %
Male	10	8(80)	1(10)	2(20)	1(10)	0	3(30)	1(10)
Female	20	15(75)	3(15)	1(5)	1(5)	2(10)	5(25)	3(15)
Total	30	23(76.67)	4(13.33)	3(10)	2(6.67)	2(6.67)	8(26.67)	4(13.33)

**Table 5: Helminths infestation in relation to parent/guardian's occupation.**

Occupation	Total number Examined	Total number of +ve and %	E.v +ve and %	S.i +ve and %	T.t +ve and %	S.s +ve and %	A.I +ve and %	Hookworm +ve and %
Traders	13	10(76.92)	1(7.69)	2(15.38)	2(15.38)	1(7.69)	2(15.38)	3(23.08)
Civil Servant	7	4(57.14)	0	0	1(14.29)	1(14.29)	0	2(28.57)
Farmers	10	9(90)	2(20)	3(30)	1(10)	0	0	2(20)
Total	30	23(76.67)	3(10)	5(16.67)	4(13.33)	2(6.67)	2(6.67)	7(23.33)

**Key:** E.v – *Enterobius vermicularis* S.i – *Schistosoma intercalatum* T.t – *Trichuris trichuria* A.I – *Ascaris lumbricoides* S.s – *Strongyloides stercoralis* Hw – Hookworm

## DISCUSSION

The study showed an overall prevalence rate of 76.67% of intestinal helminth infestation among infants in umunakanu with *A. duodenale* and *Ascaris lumbricoide* showing the highest prevalence rate of 23.33% followed by *Ascaris lumbricoide* (16.67%), *Schistosoma intercalatum* (13.33%) and *Trichuris trichuria* (10.00%) followed by *Enterobius vermicularis* and *Strongyloides stercoralis* showing the lowest prevalence rate (6.67%).

Table 1 shows the various features (i.e size, shape and colour) of identifying the helminth parasites eggs under the microscope, *Trichuris trichuria* having the shape of typical barrel, 50 – 54µm size and yellow-brown colour, *A. duodenale* 8 – 13mm (f), 6 – 10mm (m) size cylindrical shape and grayish white colour, *S.intercalatum* having the size approximately 130 x 75µm, terminal spine shape and red colour, *S.stercoralis* has a size 50 x 30µm, oval in shape and colourless, *A.lumbricoide*s 60 x 40µm (fertilized egg), 90 x 45µm (unfertilized egg) with an oval shape and yellow-brown colour and finally the *E.vermicularis* 50 x 40µm size, oval and planoconvex shape and colourless.

Table 3 shows the prevalence of helminth infestation with respect to age with 7 – 12months age group showing the highest prevalence rate (77.78%) followed by 0 – 6 months age group (76.19%). This shows that the infection rate increases as the infants grow and this could be attributed to less care by parents/guardians.

Infants between 7 – 12 months of age probably spend more time playing and they are often in contact with the soil. They are also found eating indiscriminately with unwashed hands, hence the high prevalence rate observed in this group. The prevalence of helminth infestation with respect to sex shows that females are more infected than the males (Table 4).

The prevalence of helminthiasis in relation to parental occupation show that farmers have the highest prevalence rate (90%). This can be explained by their increased exposure to contaminated soil and close contact with animals such as rabbits, goats, sheeps etc which are domestically reared and their faeces used as manure in domestic gardens. Low prevalence of infestation (57.14%) recorded by civil servants could be due to increased exposure to health programmes.

The presence of these intestinal helminthes on food materials is suggestive of faecal contamination. The trend of helminthes infection in our society as reported through routine diagnosis is partly a factor of food materials being sources of transmission. The following factors have contributed to the prevalence of helminthes infection which is also a confirmed discovery by Al-Binali in 2006. The use of irrigation source which receives raw effluent from human and animal dung food materials adequately harbouring infective forms of the parasites, hygienic status

of the consumers and producers and behavioral attitude of producers. (Umeuche and Ndifon 2009)

The presence of *Ascaris* egg in food material mostly vegetables indicates that animal manure was used as fertilizer and animals were allowed to wander where the vegetables were cultivated (Gupta *et al.*, 2008). It can also indicate that the vegetable handlers may be infected with the parasite or it may be the vegetables were stored in poor sanitation environments (Al-Binali; 2011). However, consumption of these contaminated food materials by individuals, result to the individual developing a disease condition known as Ascariasis, which presents the following symptoms in human; Abdominal pain, vomiting, nausea, diarrhoea, malnutrition, intestinal obstruction, cough, bronchial asthma and urticaria (Castro *et al.*, 2012). *Ascaris* eggs are extremely resistant to chemical dessication and low temperature but could be treated using mebendazole.

The presence of *Trichuris trichuria* which causes trichuriasis in human indicates poor sanitation in the environment and the use of animal dung as fertilizers. However, some major outbreaks of trichuriasis have been traced to contaminated food materials due to presumed contamination of the soil (Adegbola, 2010). Trichuriasis is transmitted through food and water with the following symptoms, diarrhoea with blood in the faeces, weight loss, anaemia (Adegbola, 2010).

Hookworm infection is acquired through penetration of the skin by filariform larva from the soil, usually between the toes or the dorsum of the foot. The initial symptoms are skin reaction at the site of penetration known as ground itch.

*Strongyloides stercoralis* causes a disease condition known as strongyloidiasis. When penetrating the skin, *Strongyloides stercoralis* larva can cause an itchy dermatitis and rash. During migration of the larva, allergy and respiratory symptoms may occur. Most infections are without serious symptoms. Heavy infection especially in infants can cause dysentery, malabsorption, dehydration with electrolytic disturbance. Abdominal pain is common and occasionally finger clubbing (Luka *et al.*, 2014).

*Schistosoma intercalatum* cause a disease condition generally termed schistosomiasis, the commonest symptoms are dysentery and lower abdominal pain. *Enterobius vermicularis* mostly occur in children, this comes with itching around the anus.

However, the spread of the helminth infections can be prevented by interrupting the transmission routes of the parasites by using certain control measures which includes good personal hygiene, provision of pipe borne water, wearing of protective clothing and shoes during farming and washing of hands after going to toilets and before eating (Daryani *et al* 2012).

## CONCLUSION

Intestinal helminthes are highly prevalent among infants in Nigeria and a major cause of morbidity in this age group. Efforts should be made in the promotion of better environmental conditions and placing emphasis on health education with respect to personal hygiene and eating habits, as this will enhance the prospects for the control of helminthes infection in the community.

Also, efforts should be made by government to treat water supplies, destroying snail intermediate hosts as in the case of schistosomiasis infection. Provision of safe water supplies in different villages in Umunakanu community should be made, provision of safe recreational bathing site, especially for the infants should be made and finally individuals who have infected should be treated and well taken care of by parents/guardians to avoid re-infection.

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