INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND ANALYSIS

ISSN(print): 2643-9840, ISSN(online): 2643-9875

Volume 05 Issue 01 January 2022

DOI: 10.47191/ijmra/v5-i1-24, Impact Factor: 6.072

Page No.- 194-204

Prevalence of *Enterobius vermicularis* Infections Among The Inhabitants of Okordia, Biseni and Zarama Communities in Yenagoa Local Government Area, Bayelsa State, Nigeria

Oluwayemisi A. Olorode[1], Promise O. Suama[2], Ahakior Patrick[3]

[1,3]Department of Medical Laboratory Science, Niger Delta University, Wilberforce Island, Bayelsa State.

[2] Department of Medical Laboratory Science, College of Health Technology, Otuogidi-Ogbia, Bayelsa State

ABSTRACT: *Enterobius vermicularis* (pinworm) is one of the helminthic worms belonging to the class nematode. It causes Enterobiasis which is a known public health problem in tropical and subtropical countries. This study was carried out between November 2020 and August 2021, and aimed to evaluate the prevalence of E. *vermicularis* infections among the inhabitants of Okordia, Beseni and Zarama communities in Yenagoa Local Government Area of Bayelsa State. A cross sectional survey was adopted and a total of two hundred (200) stool samples were randomly collected from the inhabitants in these communities. Wet preparations (saline and lugol's iodine), and formol ether concentration technique were used to analyzed the stool samples. The preparations were examined microscopically with 10× and 40× objective lens respectively. Overall results revealed a prevalence of 6(27.2%) *Enterobius vermicularis* infections among the inhabitants in the communities of which, males 4(66.7%) and females 2(33.3%). Among the inhabitants in the three communities, people within the ages of 5-15 years had the highest prevalence rate of about 50%. Our study demonstrated a high prevalence of E. *vermicularis* among the inhabitants in Okordia, Beseni and Zarama communities in Yenagoa Local Government Area, Bayelsa State. This parasite is common among the people living in these communities; hence more epidemiological survey should be carried out in the studied area.

KEY WORDS: *Enterobius vermicularis*, Inhabitants, Okordia, Beseni, Zarama Community

INTRODUCTION

Enterobius (E.) *vermicularis* is generally known as pinworms. It is one of the helminthic worms belonging to the class nematode. This helminthic worm caused an infection called Enterobiasis is a public health problem, especially among school children in tropical and subtropical countries [1, 2]. Several researchers estimated that over 1 billion persons suffers from infections caused by *Enterobius vermicularis*. These intestinal parasites are mostly found in the rural areas in the developing countries such as Africa, Sub-Sahara Africa, Asia and Central America. These continents are often linked with enterobiasis due to poverty, other social problems like poor environmental sanitation, lack of portable water, and inadequate education [3, 4, 5, 6]. The lack of basic social amenities, and poor sanitary condition, inability to use latrines is indicators that increase the spread of these worms [7].

In Nigeria, infection with helminth is a major cause of morbidity and mortality among individual with comorbidities [8, 7, 9]. In Bayelsa state, a prevalence about 19.0% intestinal parasites among school children were reported in Amakalakala community, Ogbia Local Government area, Bayelsa State, Niger Delta in the Southern parts of Nigeria [10].

However, individuals suffering from enterobiasis are asymptomatic. Although, common symptoms of Enyerobius *vermicularis* infections include itching, irritation of the perianal region, and vaginal pruritus in females [11]. In complicated cases, the symptoms may include insomnia, weight loss, vomiting, abdominal pain and as well appendicitis [2, 12]. However, this parasite undergoes a simple life cycle, where it is transmitted through a contaminated finger, inhalation or reinfection [1, 13]. In various regions of the world, the prevalence of E. *vermicularis* infections differs between 0.21–54.86% [2, 14, 15, 16]. In Thailand, there is divergence prevalence of E. *vermicularis* infections of 0–50.90% [17, 18, 19, 20]. Although various studies have been conducted on the distribution and prevalence of E. *vermicularis* infections. Information on enterobiasis is lacking for several remote regions, especially. It is on record that people living in crowded environments with low personal hygiene are mostly infected with this infection [21]. This infection greatly and largely depends on the contamination of the environment with human faeces containing

helminthic larvae or egg (22) Among other commonly encountered helminths include *Ascaris lumbricoides, Stronyloids stercolaris, Trichuris trichiura, Necator americanus, Teania saginata, Teania solium* [23].

The World Health Organization in 198-1990 declared a programme called Sanitation Decade with the sole goal of improving the sanitary condition in a country, where the Nigerian government adopted this approach by means of observing Monthly National Sanitation Programmes with the viewpoint of combating the burden of diseases including parasitic infections. In Bayelsa state, Government had also declared Steady Monthly Sanitation Policy and empowered processes of Regular Inspection of Public Utilities. Thus, even with all these efforts, there is still concern is helminthic infection, as exercise is seen to be not effective especially in the rural settlement in the state. Consequently, this study aimed to evaluate the prevalence of *E.vermicularis* infections among the inhabitant of Okordia, Beseni and Zarama communities in Yenagoa Local Government Area of Bayelsa State.

MATERIALS AND METHODS

Study Area: This study was carried out in the following communities: Biseni, Zarama and Okordia. These are communities in Okordoa-Biseni-Zarama clan, Yenagoa Local Government Area of Bayelsa State. The inhabitants of these communities are majorly fisher men, peasant farmers, petty traders and civil servants. Yenagoa as their Local Government Head Quarters is the capital of Bayelsa State. Yenagoa local Government where these communities are domiciled is one of the oil rich regions in Nigeria, yet no attention from the oil exploration companies, government and as well needed basic social amenities. It covered an area of 706km^2 and a population of 352,285 at the 2006 census.

Study Design: A cross sectional survey was adopted for this work.

Ethical Clearance and Sample collection: Ethical clearance was obtained from the Department of Medical Laboratory Science; Faculty of Basic Medical Science and the subjects consents were sought and consciously approved by them before given sample container for collection.

Sample size calculation: The sample size was determined using Cochran formula as stated:

$n = [Z^2pq]/d^2$; where $q = 1-p$

$n = [Z^2\ p\ (1-p)]/d^2$

n = sample size,

Z = level confidence at 95% (Z = 1.96)

P = proportion; of which p = 19.0% (P =0.19)

d = precision at 5%

Sampling and Sample Collection: A simple random technique was used in this study. A total of 236 stool samples was collected from the inhabitants of the three communities. The people were educated on how to collect the fresh stool samples. They were instructed to put a small portion of their early morning stool sample in the labeled universal container using the spatula attached to the sample container. On retrieval, only 200 respondents complied and the samples were immediately transported to the Laboratory, Medical Laboratory Science, and Niger Delta University for parasitological examination. A well-structured questionnaire was also administered on each subject prior to the samples collection so as to obtain socio-demographic data such as: age, gender, type of latrines used, source of drinking water, and toilet system.

Stool analysis

Macroscopy: Each stool sample was carefully examined macroscopically for its consistency, colour, and presence or absent of blood/mucoid stain, and presence of adult worm or segment of worm. The results of the outcome were noted.

Microscopy: The stools samples were examined microscopically for parasites. A direct wet saline and ludol's iodine method was used adopting the protocols of. [5]. Samples not processed on same day was preserved by will be storing in the refrigerator for not more 48 hours in accordance with the protocol of. [23]. A small proportion of the well mixed of each stool sample were collected with the aid of separate clean applicator stick and placed on one side of a clean glass slide. Each containing a drop of 0.85% normal saline. It was thoroughly mixed to obtain a smear. This procedure was repeated using a drop of 1% lugol's iodine solution on the opposite side of the same glass slide. A clean cover slip will be placed on each smear. The smears were thin enough that print was read through. Preparations were examined thoroughly and systemically under Olympic microscope for the presence of larva, eggs or ova of helminths using ×10 and ×40 objective lens respectively. Formol ether concentration technique was used. 1ml of well mixed of each stool sample were put into separate test tube containing 4ml of 10% formalin. 3ml of the 10% formalin was added and mixed by shaking. The supernatants were sieved using a coffee strainer into a clean centrifuge test tube. 3ml

diethyl ether was added and stoppered accordingly. They were mixed by shaken for 1min. The stopper was removed and each suspension centrifuged for 1min at 400rpm. The entire column of the fluid below the fecal debris and ether was carefully removed using a Pasteur pipette and transferred into fresh and clean centrifuge test tubes. 10% formalin was added to each suspension to make up to 10ml. They were re-centrifuged for 10min at 1000rpm. Each supernatant was decanted and bottom of the tube taped to re-suspend the deposit. The deposits were examined microscopically using ×10 and
×40 objective lens respectively as recommended by Cheesbrough [24].

STATISTICAL ANALYSIS

Data collected was analyzed in percentages and presented on tables and graphs.

RESULTS

Out of the 200 stool samples analyzed, 22(11.0%) parasites were detected, of which 6(27.2%) were *Enterobius vermicularis*, and 4(66.7%) were found in males while 2(33.3%) were from females as shown in (Table 1-3). Out of the 60 stool samples examined in Beseni community, 6(10.0%) different parasites were detected. Of which 3(50.0%) parasites each were detected from males and females respectively. The parasites detected were 2(33.3%) *Enterobius vermicularis*, 3(50.0%) *Ascaris lumbricoides* and 1(16.7%) *Fasciola hepatica*. Of these parasites detected, males in age 5-15 years had 1(33.3%) *Enterobius vermicularis*, age 21-29 years had 1(33.3%) *Ascaris lumbricoides* and *Fasciola hepatica* respectively, while females in age 5-15 years had 1(33.3%) *Enterobius vermicularis* and *Ascaris lumbricoides* each (Table 1).

Table 1: Showing Distribution of Parasite Seen Using Age Range for Beseni Community

Male	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
5-15	1	1	0	0	0	0
16-20	0	0	0	0	0	0
21-29	0	1	0	0	0	1
30-35	0	0	0	0	0	0

Female	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
5-15	1	1	0	0	0	0
16-20	0	0	0	0	0	0
21-29	0	0	0	0	0	0
30-35	0	0	0	0	0	0

Total	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
	2	3	0	0	0	1

In Okordia community 60 stool samples examined, of which 9(15.0%) different parasites were seen. Of these parasites 7(77.8%) were detected from males and 2(22.2%) females. Of which 3(33.3%) *Enterobius vermicularis*, 5(55.6%) *Ascaris lumbricoides* and 1(11.1%) *Trichuria trichuris*. Of which, males in age 5-15 years had 1(14.3%) *Enterobius vermicularis* and *Ascaris lumbricoides* each, age 30-35 years had 1(14.3%) *Enterobius vermicularis*, 1(14.3%) *Trichuria trichuris* each, and 3(42.9%) Ascaris lumbricoides while females in age 5-15 years had *Ascaris lumbricoides* and 30-35 years had 1(50.0%) *Enterobius vermicularis* (Table 2).

Table 2: Showing The Distribution of Parasite Seen Using Age Range for Okodia Community

Male	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
5-15	1	1	0	0	0	0
16-20	0	0	0	0	0	0
21-29	0	0	0	0	0	0
30-35	1	3	1	0	0	0

Female	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
5-15	0	1	0	0	0	0
16-20	0	0	0	0	0	0
21-29	0	0	0	0	0	0
30-35	1	0	0	0	0	0

Total	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
	3	5	1	0	0	

Out of the 80 stool samples examined in Zarama community, 7(8.8%) different parasites were detected. Of these, 3(42.9%) parasites each were detected from males and 4 (57.1%) from females. The parasites detected were 1(14.3%) *Enterobius vermicularis*, 4(57.1%) *Ascaris lumbricoides*, 1(14.3%) *Trichuris trichuria* and 1(14.3%) *Schistosoma haematobium*. Of these parasites detected, males in age 16-20 years had 1(33.3%) *Trichuris trichuria* and *Schistosoma haematobium* each, age 30-35 years had 1(33.3%) *Trichuris trichuria* while females in age 5-15 years had 4(100.0%) *Ascaris lumbricoides* each (Table 3).

Table 3: Showing Distribution of Parasite Seen Using Age Range for Zarama Community.

Male	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
5-15	0	0	0	0	0	0
16-20	0	0	1	1	0	0
21-29	0	0	0	0	0	0
30-35	1	0	1	0	0	0

Female	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
5-15	0	4	0	0	0	0
16-20	0	0	0	0	0	0
21-29	0	0	0	0	0	0
30-35	0	0	0	0	0	0

Total	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
	1	4	1	1	0	0

Table 4 showed occupation specific prevalence of *Enterobius verrmicularis* among the inhabitants of Beseni, Zarama and Okordia communities in Yenagoa Local Government Area of Bayelsa State. A total of 200 respondents were recruited for this work, of which 60(30.0%) respondents each were from Beseni and Okordia communities, while 80(40.0%) respondents were from Zarama community. Out of the 60 stool samples examined in Beseni community were 13(21.7%)farming and trading each, 21(35.0%) student, 5(8.3%) fishing while 4(6.7%) transporter and hair stylist each respectively. The number of samples infected by occupation community were student (4.7%) and fishing (20%). Out of the 60 samples examined in Okordia community were 18(30.0%) farming, 4(6.7%) trading, 19(31.7%) student, 9(15.0%) fishing, 7(11.7%) transporter and 3(5.0%) hair stylist. The number of samples infected by occupation were (5.6%) farming, (22.0%) trading and (5.2%) student. Out of the 80 stool samples examined in Zarama community were12(15.0%) farming, 13(16.3%) trading, 30(37.5%) student, 5(6.3%) fishing, 10(12.5%) transporter and hair stylist each. The number of samples infected by occupation were (8.3%) farming.

Table 4: Showing Occupation Specific Prevalence Of *Entrobius Vermicularis* Among Inhabitants Of Beseni, Zarama And Okodia Communities All In Yenagoa Metropolis, Bayelsa State.

Occupation	Beseni		Okodia		Zarama		Total no of infected in all 3	Total no of samples examined in all 3	Prevalence in percentage rate (%)		
	NE	NI	NE	NI	NE	NI			Beseni	Okodia	Zarama
Farming	13	0	18	1	12	1	2	43	0%	5.6%	8.3%
Trader	13	0	4	1	13	0	1	30	0%	25%	0%
Student	21	1	19	1	30	0	2	70	4.7%	5.2%	0%
Fishing	5	1	9	0	5	0	1	19	20%	0%%	0%
Transporters	4	0	7	0	10	0	0	21	0%	0%	0%
Hair stylist	4	0	3	0	10	0	0	17	0%	0%	0%
Total	60	2	60	3	80	1	6	200			

Key

NE – Number of samples examined

NI – Number of samples infected

The most infected occupational group was trader (25%) followed by fishermen (20%).

FIGURE 4.2-4.6 showed the frequency distribution of *Enterobius vermicularis*

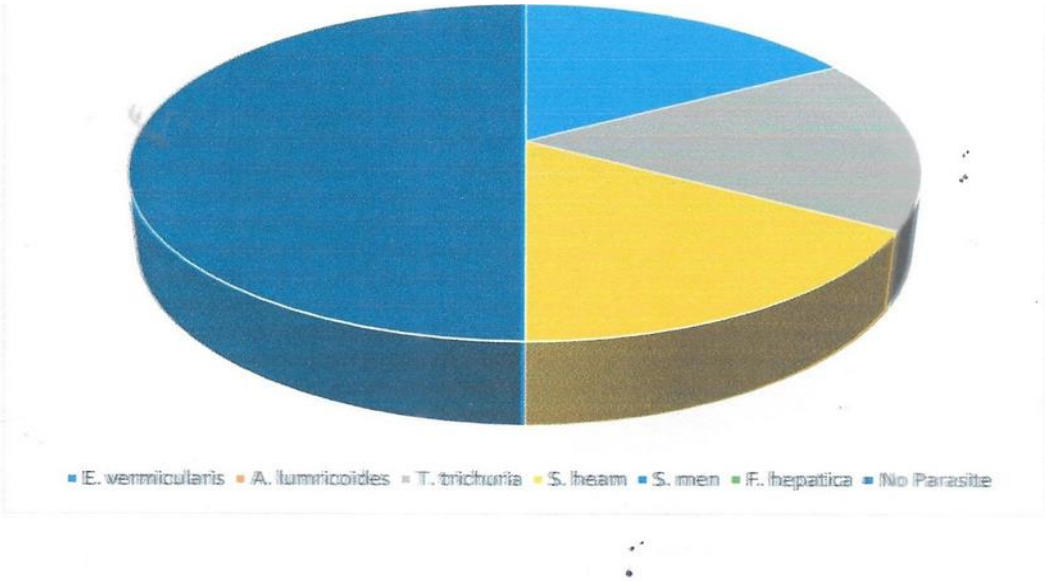

Figure 4.1: Pie chart illustrating frequency of parasites seen in males of Zarama community

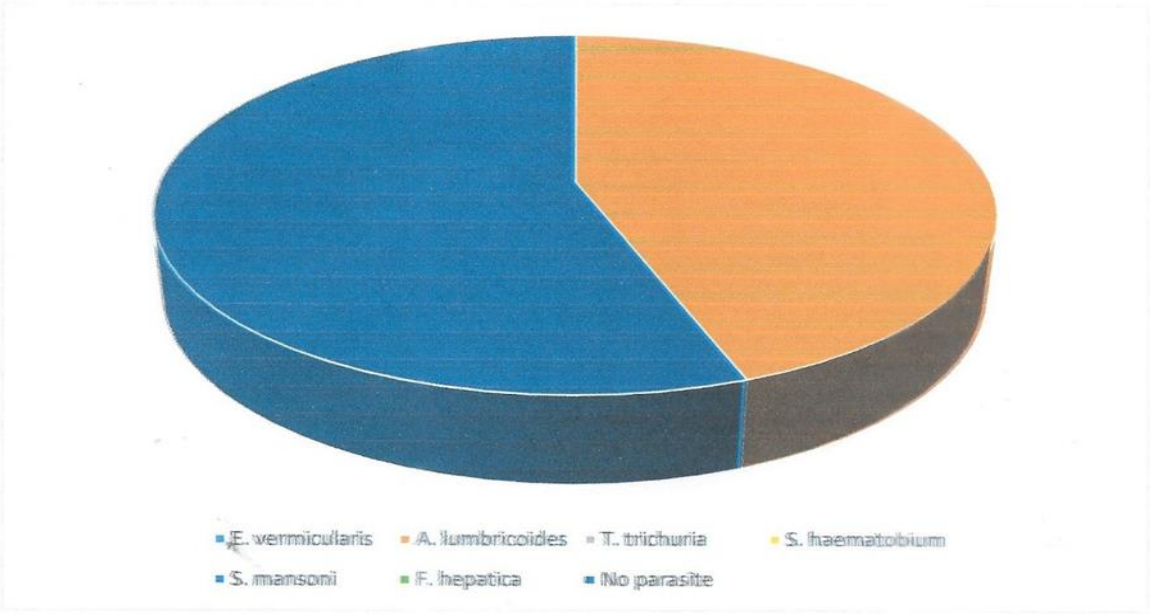

Figure 4.2: Pie chart illustrating frequency of parasites seen in females of Zarama community

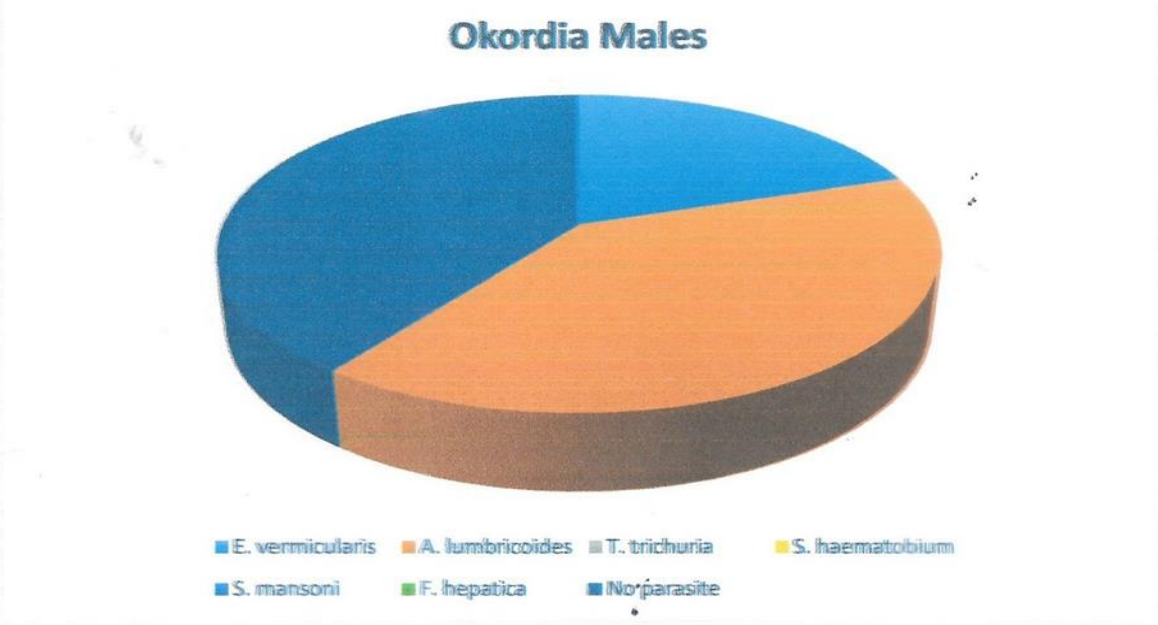

Figure 4.3: Pie chart illustrating frequency of parasites seen in males of Okordia community

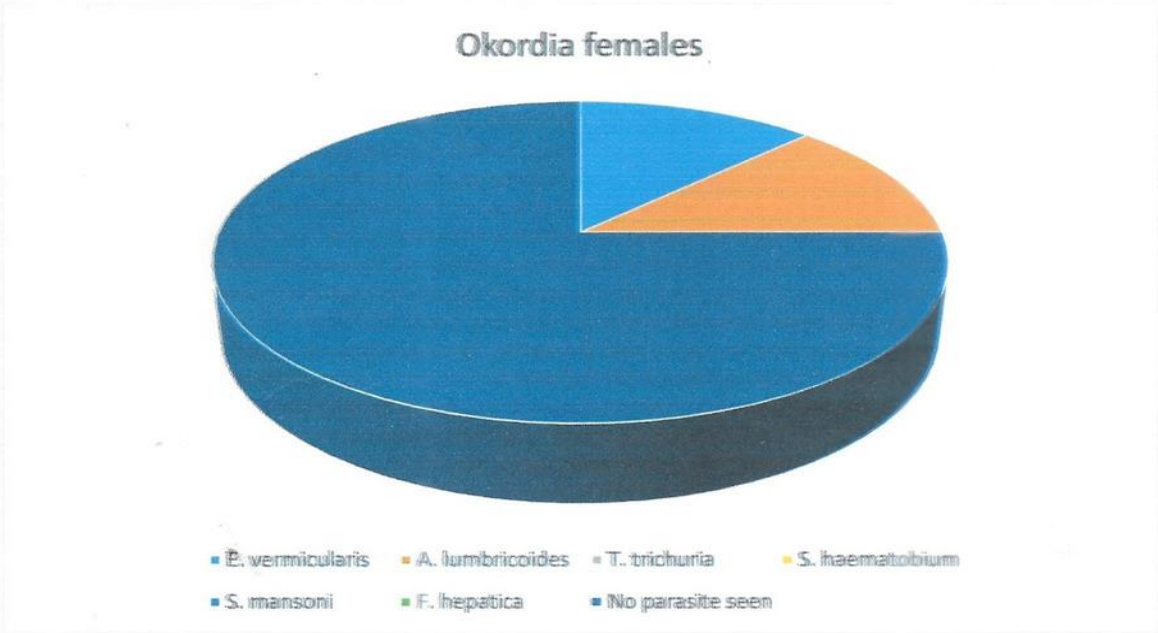

Figure 4.4: Pie chart illustrating frequency of parasites seen in females of Okordia community

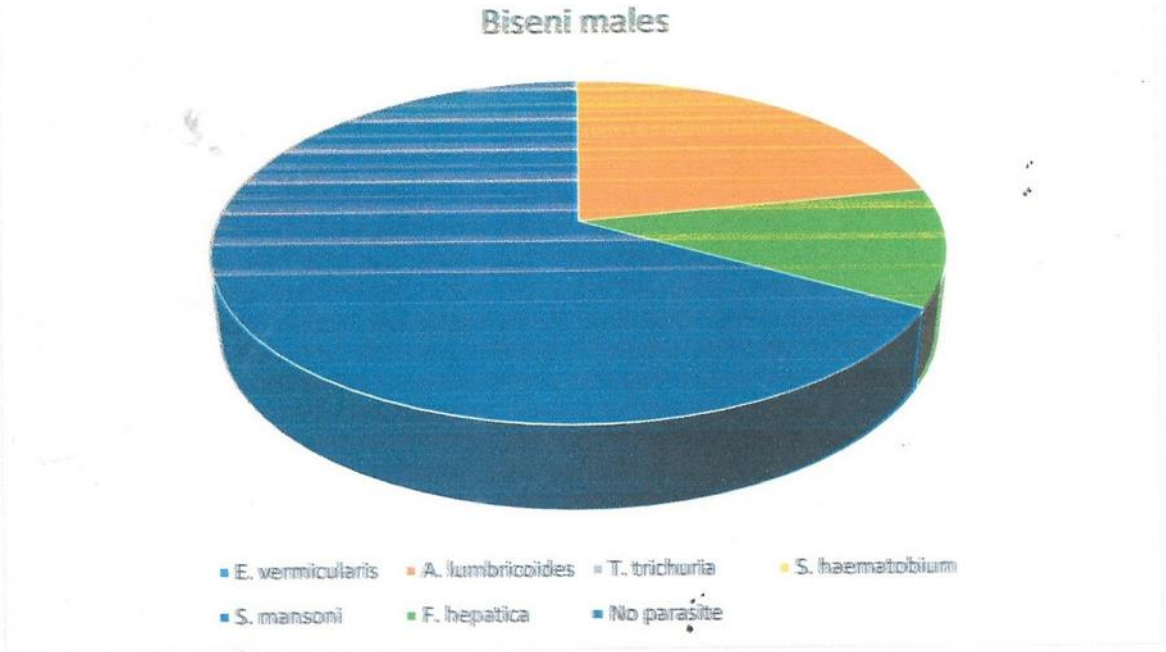

Figure 4.5: Pie chart illustrating frequency of parasites seen in males of Biseni community

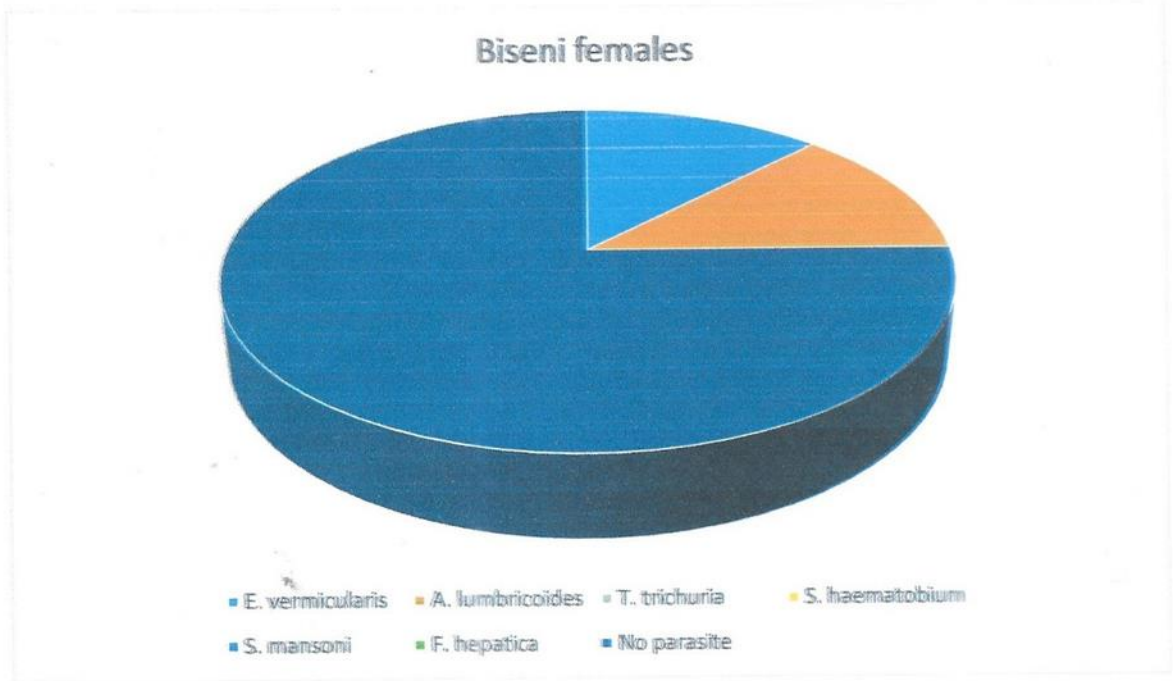

Figure 4.6: Pie chart illustrating frequency of parasites seen in females of Biseni community

DISCUSSION

This was the first study carried out in Okordia, Beseni and Zarama communities in Yenagoa Local Government Area of Bayelsa State on the prevalence of *Enterobius vermicularis* infections. The overall results of this study revealed that *Enterobius vermicularis* infections has a prevalence of 27.2% among the inhabitants of the three communities. This finding is higher than the one done by Abah and Irene [10] which showed a lower prevalence of in *Enterobius* infections.

The study revealed that male was more infected with E. *vermicularis* than their female counterparts with a prevalence of 66.7%. The high rate of Enterobiosis in males may be attributed to the facts that males much more involved in strenuous activities, tends to be in closer contact with females' counterparts. Males also seems to be indulged in poor personal hygiene practice than their

female counterparts. These findings are also in agreement with the work done in previous studies by Park et al. [14] and Gunawardena et al. [15].

Among the inhabitants in the three communities, people within the ages of 5-15 years were observed to be more at risk of Enterobiasis. This could be because these age brackets have more group activities which bring them together with closer proximities. This could also be an indication as a significant independent predictor promoting the transmission of *Enterobius vermicularis* infection as a result of the peoples' habit like trading in an untidy environment, poor personal hygiene and health illiteracy. Observation showed consistency with previous studies carried out by Li et al. [16], Laoraksawong et al. [19] and Taylor eta al. [20].

CONCLUSION

This study demonstrated that the high prevalence of *E.vermicularis* infections among the inhabitant in Okordia, Beseni and Zarama communities in Yenagoa Local Government Area of Bayelsa State was a significant independent predictor. The transmission of *Enterobius vermicularis* may occur as a result of the peoples trading habit as mostly traded in an untidy environment. Hand washing habits and keeping fingernails short should be an important preventive measure against the infection. Moreover, health literacy or health education, especially for parents should be implemented to reduce E. *vermicularis* infections. Therefore, policy makers and public health providers should be encouraging to design and implement programmes that would be geared toward health promotion and controlling pinworm infections.

ACKNOWLEDGEMENT

The faecal specimens were obtained from the health centres in the various communities and was collected by Daniel Samuel, Amos agidi and Ovie Favour respectively. The officers in charge in these health facilities are acknowledged in the role they played towards the successful collection of the specimens.

REFERENCES

1) Chen, K.Y., Yen, C.M., Hwang, K.P., & Wang, L. C. *Enterobius vermicularis* infection and its risk factors among pre-school children in Taipei, Taiwan. J *Microbiol Immunol Infect.* 2018; 51(4), 559-564
2) Dudlova, A., Juris, P., Jarcuska, P., Vasilkova, Z., Vargova, V., Sumkova, M. The incidence of pinworm (*Enterobius vermicularis*) in pre-school and school aged children in the eastern Slovakia. *Helminthologia*. 2018; 55(4):275-280
3) WHO. Soil transmitted helminthes infections. Fact sheet 2017. http://www.who.int/mediacentre/factsheets/fs366/en/
4) Adefioye, O.A., Efunshile, A.M., Ojurongbe, O., Akindele, A. A., Adewuyi, I.K., Bolaji, O.S., Adedokun, S.A., Adeyeba, A.O. Intestinal Helminthiasis among School Children in Ilie, Osun State, Southwest, Nigeria. *Sierra Leone Journal of Biomedical Research*. 2011; 3(1): 36-42
5) Uneke, C., Eze, K., Oyibo, P., Azu, N., Ali, E. Soil Transmitted Helminth Infection in School Children in South-Eastern Nigeria: The Public Health Implication. *The Internet Journal of Third World Medicine.* 2006; 4: 1-3.
6) Edogiawerie, D., Turay, A.A., & Okpala, H.O. Prevalence of Intestinal Helminths among Primary School Children in Ihumudumu Community, Ekpoma, Edo State, Nigeria. *International Journal of Community Research.* 2016; 5(1): 12 – 21
7) Amaechi, E.C., Ohaeri, C.C., Ukpai, O.M. Prevalence of helminthiasis among school children in some rural communities of Abia state, Nigeria. *Animal Research International.* 2013; 10(3): 1817 –1825
8) Simarmata, N., Sembiring, T., Ali, M. Nutritional status of soil-transmitted helminthiasis-infected and uninfected children. *Paediatrica Indonesiana.* 2015; 55(3): 136 – 141
9) Awolaja, B.A., Morenikeji, O.A. Prevalence and Intensity of Intestinal Parasites in Five Communities in south-West Nigeria. *African Journal of Biotechnology.* 2009; 8(18): 4542-4546
10) Abah, A. E., Irene, F.I. "Status of Intestinal Parasitic Infections among Primary School Children in Rivers State, Nigeria", *Journal of Parasitology Research.* 2015; 7: 2-17
11) Burkhart, C.N., Burkhart, C.G. Assessment of frequency, transmission, and genitourinary complications of enterobiasis (pinworms). *International Journal Dermatology.* 2005; 44(10): 837-840
12) Hammood, Z.D., Salih, A.M., Mohammed, S.H., Kakamad, F.H., Salih, K.M., Omar, D.A. *Enterobius vermicularis* causing acute appendicitis, a case report with literature review. *International Journal Surgeon* Case Rep. 2019; 63: 153-156
13) Pezzan, B. C., Minvielle, M.C., de Luca, M.M., Córdoba, M.A., Apezteguía, M.C., Basualdo, J. A. *Enterobius vermicularis* infection among population of General Mansilla, Argentina. World J *Gastroenterol.* 2003; 10(17): 2535-2539

14) Park, J.H., Han, E.T., Kim, W.H., Shin, E.H., Guk, S.M., Kim, J.L. A survey of *Enterobius vermicularis* infection among children on western and southern coastal islands of the Republic of Korea. Korean J *Parasitol.* 2005; 43(4): 129-134
15) Gunawardena, N.K., Chandrasena, T.N., de Silva, N.R. Prevalence of enterobiasis among primary school children in Ragama, Sri Lanka. Ceylon Med Journal, 2003; 58(3): 106-110
16) Li, H.M., Zhou, C.H., Li, Z.S., Deng, Z.H., Ruan, C.W., Zhang, Q. M. Risk factors for *Enterobius vermicularis* infection in children in Gaozhou, Guangdong, China. 2015; Infect Dis Poverty. 4: 28
17) Saksirisampant, W., Prownebon, J., Kulkumthorn, M., Yenthakam, S., Janpla, S., Nuchprayoon, S. Prevalence of intestinal parasitic infections among school children in the central region of Thailand. *J Med Assoc Thailand.* 2006; 89(11): 1928-1933
18) Sagnuankiat, S., Wanichsuwan, M., Bhunnachet, E., Jungarat, N., Panraksa, K.. Komalamisra, C. Health status of immigrant children and environmental survey of child daycare centers in Samut Sakhon province, Thailand. *J Immigr Minor Health. 2016;* 18(1): 21-27
19) Laoraksawong, P., Pradidthaprecha, A., Kaladee, A. Prevalence of *Enterobius vermicularis* infection among students from elementary schools, Chaiyaphum Province, Thailand. *J Sci Technol Mahasarakham University*, 2018; 37(4): 486-493
20) Taylor, A., Saichua, P., Rhongbutsri, P., Tiengtip, R., Kitvatanachai, S., Taylor, W. R. A preliminary epidemiological study of pinworm infection in Thaklong Municipal Early Childhood Development Center and Rangsit Babies' Home, Pathum Thani, Thailand. BMC Res Notes. 2017, 11(1): 603-604
21) Salawu, S.A., Ughele, V. A. Prevalence of soil-transmitted helminths among school-age children in ife east local government area, Osun state, Nigeria. *FUTA Journal of Research in Sciences.* 2015; 1: 139-151
22) Chang, T.K., Liao, C.W., Huang, Y.C., Chang, C.C., Chou, C.M., Tsay, H.C. Prevalence of *Enterobius vermicularis* infection among preschool children in kindergartens of Taipei City, Taiwan in 2008. *Korean J Parasitology,* 2008; 47(2): 185-187
23) Arora, D., & Arora, B. Medical Parasitology. (3rd ed.): CBS Publishers and Distributors PVT LTD; 2010; 71-78
24) Cheesbrough, M. *District Laboratory Practice in Tropical Countries Part1.* (2nd ed.): Cambridge University Press Edinburgh; 2005; 239-242