International Journal of Biological Research Advancement
Abbreviated Key Title: IIARP IJBRA
ISSN 2736-0016 (Online)
Published by International Institute of Academic Research and Practice, Nigeria

Volume-1 | Issue-2 | Jul-Dec-2023 |

Original IJBRA Article

Prevalence of Intestinal Schistosomiasis in some Respondents in Emelogo and Ogboloma Communities in Odua, Abua/Odua Local Government Area, Rivers State, Nigeria.

Robert, B., Ugbomeh, A. P. and Amuzie, C. C.
Department of Animal and Environmental Biology, Rivers State University, Port Harcourt, Nigeria.
Corresponding author: robertbelema40@gmail.com

Article History
Received: 20.11.2023
Accepted: 30.11.2023
Published: 05.12.2023

Journal homepage:
https://www.iiarpub.org

Abstract

Schistosomiasis is a neglected tropical disease, mostly prevalent in poor, rural and under developed countries. Globally, Nigeria has been stated to have the greatest number of positive cases of this disease. A cross-sectional study was conducted among 504 participants from Emelogo and Ogboloma communities, Abua/Odua Local Government Area, Rivers State, Nigeria. Faecal samples were screened for the presence of *Schistosoma mansoni* eggs using the Direct saline method and Kato-katz technique. Among the 504 participants, Ogboloma (n=257) and Emelogo (n=247), 21 (4.2%) were positive for *S. mansoni*. Chi-square showed that there was no association between the parasite and communities ($\chi 2=1.914$; $p=0.0557$). T-test also showed there was no significant difference between the prevalence in both communities ($p=0.063$). Considering gender, there were 247 males, 4 (1.62%) were positive while females were 257 with positive cases 17(6.61%). There was a gender associated prevalence ($\chi 2=2.806$; $p=0.0050$). Age group 18 ≥ had the highest prevalence rate 12 (6.06%) while 0-5 age group was the least as no positive case was recorded. There was no age associated prevalence recorded ($\chi 2=4.42$; $p=0.218$). The case of intestinal schistosomiasis is of light intensity. The communities were very rural, under developed and lacked basic amenities. NTD program managers and policy makers should resume the global fight against Schistosomiasis as the disease is resurfacing in these areas. Source of potable water be provided so as to reduce their contact with these cercariae infested waters.

Keywords: Schistosoma mansoni, flooding, Neglected Tropical Diseases, Kato-Katz technique.

Introduction

Schistosomiasis is a fresh water-borne digenetic disease and it is endemic in the under developed regions of the tropics and sub-tropics of sub-Saharan African countries. This disease is caused by blood trematode worms of the family Schistosomatidae and is considered as one of the most common neglected tropical diseases (NTDs) and still considered as a major public health problem in about 77 developing countries in the

tropics and subtropics (WHO, 2013). Globally, it has been estimated to have infected over 240 million people, about 700 million at risk of infection (Hotez *et al.,* 2012) and estimated 251.4 million people require preventive treatment (WHO, 2021). Over 90% of this infection occurs in sub-Saharan Africa with almost 300,000 deaths annually from schistosomiasis in Africa (King and Dangerfield-Cha, 2008). The distribution of schistosomiasis is focal and associated with specific ecological settings that encourages its transmission (Okwori *et al*., 2014).

There are five major species: *Schistosoma mansoni*, *S. mekongi, S. japonicum* and *S. intercalatum* which are the etiological agents of intestinal schistosomiasis while *S. haematobium* causes urogenital schistosomiasis. The predominant species in sub-Saharan African countries are *S. mansoni* and *S. haematobium*. Transmission happens when an infected individual passes faeces or urine containing eggs into a fresh water body. This is a very popular attitude display in poor, under developed peri-urban or urban areas of the world. The viable eggs passed into the fresh water bodies develop into a miracidium which is the first larval stage and are released from the eggs. The ciliated miracidium swims around in search of suitable freshwater snail hosts (Bethony *et al.,* 2006). They develop into sporocysts in these snails and then into the infective cercarial stage. These cercarial larvae are released from the snails into the water bodies where they infect man on contact with such infested water body (WHO, 2013; Salawu and Odaibo, 2016).

Schistosomiasis is more prevalent and has a higher morbidity among preschool, school age children, adolescents and young adults (Hotez *et al.,* 2009). Hence, the negative impacts on educational performance and the impairments caused by long standing untreated infections cripples both economic and social development in areas that are endemic (Van der Werf *et al*., 2003). Intestinal schistosomiasis whose etiological agent is *S. mansoni* has symptoms such as bloody stool, noting bleeding from the bowels (melena). Enlargement of the liver accompanied by portal hypertension, fibrosis and hematemesis are found in chronic stages. *S. intercalatum* can be an agent for intestinal schistosomiasis but it's limited to West and Central Africa (Tchuem -Tchuenté *et al*., 2003) as it has not been reported otherwise till date.

Based on disabilities and complications of intestinal schistosomiasis, the study of schistosomes is always aimed at the detection and identification of the disease, its prevalence, vector control and creating awareness. These become imperative especially in areas where such data is not available.

Globally, Nigeria has the highest number of schistosomiasis infected people with about 29 million infected people, among which children are 16 million and about 101 million people are at risk of schistosomiasis (Van der Werf *et al.,* 2003; Hotez *et al.,* 2009; WHO, 2013; Oyeyemi *et al*., 2020). Federal Ministry of Health (FMOH), in the year 1998 collaborated with the National

Schistosomiasis Control Program (NSCP) on the possibility of combating the prevalence by 50% in 5 years in period. Though, these stands were brought to a halt by the lack of baseline data on the broad scale distribution of the disease. The Nigeria master plan for NTDs 2013- 2017 stated that of the 36 states of Nigeria, mapping and baseline surveys on schistosomiasis have been implemented in only 19 states which were all located in west and southern Nigeria. Though there have been some reports on schistosomiasis and its prevalence (Okwori *et al.,* 2014; Dawaki *et al*., 2016; Oyeyemi *et al*., 2020), there still remains paucity of data hence, this study is to determine the prevalence of intestinal schistosomiasis in Emelogo and Ogboloma communities in Abua/Odua Local Government Area, Rivers State, Nigeria.

MATERIALS AND METHODS

Study Area

The survey was conducted in two communities: Emelego and Ogboloma of Odua, in Abua/Odual Local Government Area, Rivers State, Niger Delta, Nigeria. Odua is located at 4.450 – 4.490 North of the equator and 6.300 - 6.450 East of Greenwich and has a mainland that extends from the borders of Orashi River in the East to Sombrero in the west, North and South. Both communities are low-lying lands with many linkages of natural water channels that start at a height of around 45 metres in the eastern boundary and ascends over 48 metres in the northern limit. The areas have two types of vegetation: mangrove and freshwater swamps. It has a poor drainage system to numerous water channels, specifically during the wet season when many of the creeks and lakes overflow their banks (Fig 1). These areas are prone to yearly flooding which disrupts all activities at the time, hence increasing the level of under development and poverty. The main occupation of the natives of these communities are farming at subsistence level, artisanal fishing and petty trading (Amadi and Uttah, 2010).

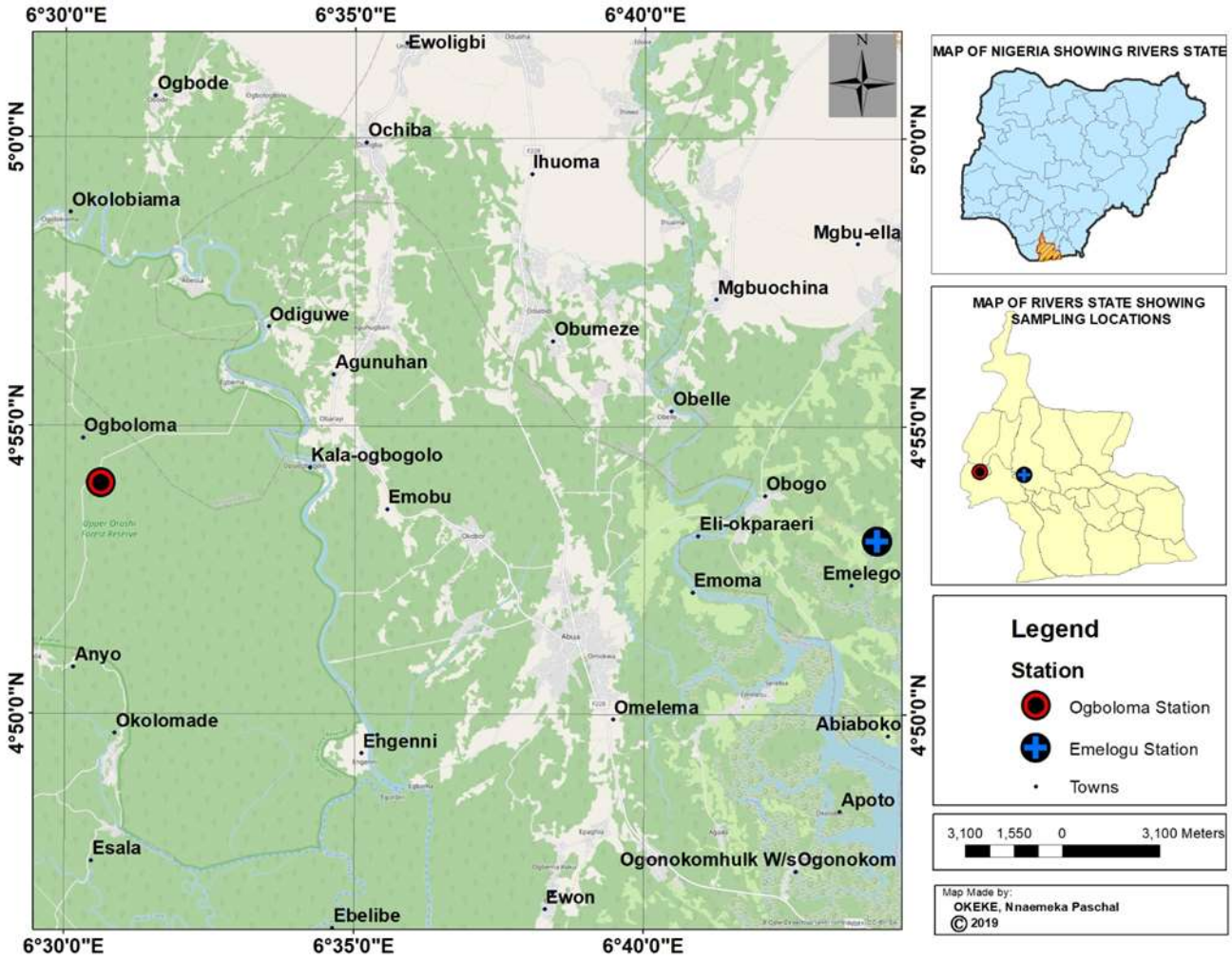

Fig. 1: Map showing Emelogo and Ogboloma Communities, Abua/Odual LGA, Rivers State, Nigeria

Ethical Clearance for the Study

Clearance was obtained from Rivers State University Teaching Hospital. Following the presentation of a bottle of wine as custom demands, permission was granted from the Chairmen of Community Development Committees to proceed with the study. Regular visits to the community included an explanation of the significance of the study. The community leaders then gathered their constituents and described the situation to them. Unfortunately, some people were upset and claimed the stool, soil and vegetable samples would be utilised in rituals against their total well-being and harvests. Sample collection for the study was significantly hampered by unwillingness to compromise, despite receiving permission.

Study Design and Period

A community-based comparative cross-sectional study was conducted from May, 2022 to June, 2023. The communities were sectioned into 12 areas, each to be sampled once in the study period. The communities were delineated by number of streets into 12 parts just to ensure that each sampling time is focused on a particular area. This

is to ensure that the whole of the community is captured in the study.

Criteria for Inclusion and Exclusion of the Study

Inclusion was granted to anyone willing to participate and provided stool samples while consent from parents/guardians were included sorted for the cases of minors. Also, those who has been exposed to helminth chemotherapy within three months before study were excluded.

Sample Size Determination

Sample size was calculated using single population proportion formula based on the prevalence report in a recent research publication in Rivers State, Nigeria. Prevalence of STH in the study was 35.5% (Eze and Aprioku, 2023). The required sample size (n) was determined by the following statistical formula (Naing *et al*., 2006).

$n = Z^2 P (1 - P)/d^2$

n = sample size

d= margin of error (0.05)

Z = 1.96 at 95% confidence level

P = prevalence rate of 35.5% = 0.355

Finally, the minimum number of individuals was 352 but a total of 504 was captured in the study from both communities.

Stool Collection and Microscopy

Each study participant was given a clean, sterile, water proof and labelled plastic container aided with applicator sticks to collect stool samples. Containers were received in the morning at a focal point as agreed by the participants. Collected stool samples were properly labelled, preserved in cool boxes at temperatures between 4 and 6^{o}C (Dawaki *et al.,* 2016) and transported to the Entomology and Parasitology Laboratory, Department of Animal and Environmental Biology, Rivers State University, Port Harcourt.

Stool Analysis

Direct Wet Mount

About 2g of stool collected faeces were emulsified with 2-3 mls of 0.85% physiological saline in a test tube and then a drop of emulsified faeces in solution was placed on a clean grease free glass slide. Upon this, a drop of iodine solution was added, mixed properly and covered with a cover slip. The smears were examined microscopically using the X10 and X40 objectives under low light intensity for detailed identification of the helminth stages. Identification was done following the standard protocols of Chessbrough (2006).

Kato-Katz Method

Positive samples from the wet mount were immediately subjected to Kato-katz technique for the purpose of estimating intensity. About 2grams of faeces was placed on a cardboard paper and a piece of nylon screen pressed on the top for sieving. The sieved portion was collected with a flat-sided spatula. A template (1.5mm thick) and holds 41.7mg of faeces was placed on the centre of a clean grease free glass slide, the faeces from the

spatula is transferred to the fill the hole (6mm) completely. Removing excess with the spatula. Carefully, the template was removed allowing the cylinder of faeces to remain on the slide. The slide was covered with a strip of cellophane pre-soaked in malachite-glycerol solution. The microscope slide was inverted on another slide to allow the faecal smear spread properly against the hydrophilic cellophane. The smeared slide was gently removed from the other with the cellophane surface upwards allowing for the evaporation of water and proper clearing of the faeces. Slide was examined under the microscope using x10 and X40 objectives within 30-60 minutes to capture hookworm eggs as keeping the slide longer makes them clear off and not visible. The slide was viewed again after 1-2 hours for other helminth eggs. The slide was viewed in a systematic manner and the number of eggs of each helminth species recorded. Later, the recorded value was multiplied by 24 to obtain the number of eggs seen in a gram of the faeces (EPG). The EPG gives an estimate of the burden of the worm and categorises the infection into light, moderate or heavy infections (WHO, 2012).

Statistical Analyses

Graph Pad Prism version 10 was used to conduct the statistical analysis. Chi-square was used to test for association between variables, T-test was used to check for significant difference between locations and gender. One way ANOVA was also used to check for significance between means while Tukey was used for mean separations.

Results

Overall Prevalence of *S. mansoni* in the Study

A total of 504 individuals were examined in this study. Stool samples were collected and analysed for *S. mansoni* from Ogboloma (n=257) and Emelogo (n=247) communities of Odua, Abua/Odua Local Government Area, Rivers State, Nigeria. 21 (4.2%) were positive for *S. mansoni* (Table 1). Emelogo had a prevalence of 6 (24.3%) while Ogboloma 15 (5.84%). Chi-square showed that there was no association between the parasite and communities ($\chi2=1.914$; $p=0.0557$). T-test also showed there was no significant difference between the prevalence in both communities ($p=0.063$). Considering gender, there were 247 males, 4 (1.62%) were positive while females were 257 with positive cases 17(6.61%) (Table 2). There was a gender associated prevalence ($\chi2=2.806$; $p=0.0050$). Age group 18 ≥ had the highest prevalence rate infected 12 (6.06%) while 0-5 age group was the least as no positive case was recorded (Table 3). There was no age associated prevalence recorded ($\chi2=4.42$; $p=0.218$).

Table 1 Overall Prevalence of *Schistosoma mansoni* in Study Area

Location	No. Examined	No. Infected (%)	No. Uninfected (%)	χ2	Df	p-value
Ogboloma	257	15 (5.84)	242 (94.16)	1.914	1	0.0557
Emelogo	247	6 (2.43)	241 (97.57)			
Total	504	21 (4.16)	483 (95.84)			

Table 2 Gender Associated Prevalence in Study Areas

Gender	No. Examined	No. Infected (%)	No. Uninfected (%)	χ2	Df	p-value
Male	247	4 (1.61)	243 (98.38)	2.806	1	0.0050*
Female	257	17 (6.61)	240 (93.38)			
Total	504	21 (4.16)	483 (95.84)			

Table 3 Age related Prevalence in Study Areas

Age groups	No. Examined	No. Infected (%)	No. Uninfected (%)	χ2	Df	p-value
0-5	56	0 (0.00)	56 (100)	4.42	3	0.218
6-11	144	5(3.47)	139 (96.53)			
12-17	106	4(3.77)	102 (96.23)			
18≥	198	12(6.06)	186 (93.94)			
Total	504	21 (4.16)	483 (95.84)			

Discussion

Schistosomiasis remains a serious public health challenge in so many under developed countries especially in the tropics and sub tropics of sub-Saharan Africa (Adenowo *et al*., 2015; WHO, 2021). Nigeria is considered as the most endemic country for schistosomiasis, with approximately 29 million infected people and 101 million people at risk of infection (WHO, 2021). This present study revealed that the prevalence of intestinal schistosomiasis in the study area was 4.16%. This is higher than 0% reported by Abah *et al*. (2016). This increase should be a wakeup call as it is now evident that this parasite is resurfacing in the area after the last state wide interventions. Its reappearance could be linked to negligence on the part of program managers and policy makers who were supposed to sustain the fight against this disease. Generally, the prevalence of *S. mansoni*

has been low such as 8.9% in Oyo State (Dawaki *et al*., 2016); 8% in Osun state (Alade *et al.*, 2023) Nigeria but higher than this present study. This disparity could be as a result of difference in geographical location and environmental factors. In Rivers State, not much has been done on intestinal schistosomiasis as compared to urinary schistosomiasis that has received most of the attention. Prevalence was higher in Ogboloma than Emelogo community, but not significantly higher. This could be related to the fact that these communities are close hence, share similar behavioural, socio-economic and environmental factors.

In relation to gender, there was a significant difference, as the females were more infected than the males. This is in line with Nkegbe *et al*. (2010) who also reported females to be more infected in Ghana. This is in contrast with previous reports such as Duwa *et al*. (2009) and Abdullahi *et al*. (2009) in Kano State; Bigwan *et al.* (2012) in Yobe State, Ivoke *et al*. (2014) in Ebonyi State, Nigeria. These differences could be as a result of behavioural, cultural or religious differences as it is evident in the Northern parts of Nigeria, mostly with Muslims where females are not allowed to swim in public hence keep them away from cercarial penetrations while the males are vulnerable.

We observed that the prevalence of infection was higher in age group 18 (6.06%) while the least was 0-5 age group that had no positive respondent. This is in contrast with the findings of Bassey and Umar (2004); Okwori *et al.* (2014); Dawaki *et al.* (2016) who all recorded 10-17, 6-12 age groups more infected respectively. These changes could be traced to sample size, grouping patterns and duration of study.

Conclusion and Recommendations

This study has revealed that intestinal schistosomiasis is still much around even in the Odua communities of Abua/Odua Local Government Area, Rivers State, Nigeria and the overall prevalence showed that 4.16% of respondents screened for *S. mansoni* were positive. There was gender associated prevalence while age played no serious role in the dynamics and transmission of the diseases.

The communities were very rural, under developed and lacked basic amenities. No proper road network, dilapidated health facilities and a victim of frequent flooding which destroys properties hence, the Government should strive to alleviate the sufferings of this communities. Moreso, NTD program managers and policy makers should wake up and resume the global fight against Schistosomiasis as the disease is resurfacing in these areas. Source of potable water be provided so as to reduce their contact with these cercariae infested waters.

REFERENCES

Abah, A. E., Arene, F. O. I. and Okiwelu, S. N. (2015). Assessment, Mapping and Prediction of the Spatial Distribution of Intestinal Parasitic Infections in Rivers State. *Nigerian Journal of Tropical Diseases*, 3 (4), 173-177.

Abah, A. E., Onoja, H., Nduka, F. O. and Arene, F.O.I. (2016). Current Status of Urinary Schistosomiasis and Some Pre-Disposing Factors in Emelego Community, Rivers State, Nigeria. *Acta Parasitologica Globalis*, 7 (2), 74-80.

Abdullahi, M. K., Bassey, S. E. and Oyeyi, T. I. (2009). A comprehensive mapping of urinary schistosomiasis using geographic information systems (GIS) in Kano State, Nigeria. *Bayero University Journal of Pure and Appl Science*,2, 41-46.

Adenowo, A. F., Oyinloye, B. E., Ogunyinka, B. I. and Kappo, A. P. (2015). Impact of human schistosomiasis in sub-Saharan Africa. *Brazilian Journal of Infectious Diseases*,19, 196-205.

Alade, T., Ta-Tang, T. H., Nassar, S. A., Akindele, A. A., Capote-Morales, R., Omobami, T. B. and Berzosa, P. (2023). Prevalence of *Schistosoma haematobium* and Intestinal Helminth Infections among Nigerian School Children. *Diagnostics (Basel, Switzerland)*, *13*(4), 759- 764.

Amadi, E. C. and Uttah, E. C. (2010). Bionomics of Geohelminth nematodes in contaminated foci in parts of Abua communities, Niger Delta, Nigeria. *Journal of Applied Science in Environmental Management*, 14 (2), 61-64.

Bassey, S. E. and Umar, Z. (2004). A re-assessment of schistosomiasis infection in Garun-Babba, Kadawa and Kura in Kano State, Nigeria. *Nigeria Journal of Parasitology*, 25,107-109.

Bigwan, E. I., Tinja, B. and Damen, J. G. (2012). Prevalence of Schistosomiasis among secondary school boarding students in Potiskum Metropolis, Yobe State, Northeastern Nigeria. *Bayero University Journal of Pure and Appl Science*, 5, 155-158.

Dawaki, S., Al-Mekhlafi, H. M., Ithoi, I., Ibrahim, J., Abdulsalam, A. M., Ahmed, A., Sady, H., Atroosh, H. W., Al-Areeqi, A. M., Elyana, F. N., Nasr, A. N. and Surin, J. (2016). Prevalence and Risk Factors of Schistosomiasis among Hausa Communities in Kano State, Nigeria. *Rev. Inst. Med. Trop. Sao Paulo*, 58(54), 2-9.

Duwa, M. R., Oyeyi, T. I. and Bassey, S. E. (2009). Prevalence and intensity of urinary schistosomiasis among primary school pupils in Minjibir local government area of Kano State, Nigeria. *Bayero University Journal of Pure and Appl Science*, 2, 75-8.

Ekpo, U. F., Mafiana, C. F., Adeofun, C. O., Solarin, A. R. and Idowu, A. B. (2008). Geographical information system and predictive risk maps of urinary schistosomiasis on Ogun State, Nigeria. *BMC Infectious Diseases*, 8, 70-74.

Hotez, P. J. and Kamath, A. (2009). Neglected tropical diseases in sub-Saharan Africa: review of their prevalence, distribution, and disease burden. *PLoS Neglected Tropical Diseases*, 3, 412-416.

Hotez, P. J., Asojo, O. A. and Adesina, A. M. (2012). Nigeria: ‘‘Ground Zero’’ for the high prevalence neglected tropical diseases. *PLoS Neglected Tropical Diseases*,6, 16, 10-16.

Ivoke, N., Ivoke, O. N., Nwani, C. D., Ekeh, F. N., Asogwa, C. N. and Atama, C. I. (2014). Prevalence and transmission dynamics of *Schistosoma haematobium* infection in a rural community of southwestern Ebonyi State, Nigeria. *Tropical Biomedical*, 31, 77-88.

King, C. H. and Dangerfield-Cha, M. (2008). The unacknowledged impact of chronic schistosomiasis. *Chronic Illness*, 4, 65-79.

Nkegbe, E. (2010). Sex prevalence of schistosomiasis among school children in five communities in the lower river Volta basin of South Eastern Ghana. *African Journal of Biomedical Research*, 13, 87-98.

Eze, N. and Aprioku, J. (2023) Evaluation of Immunological Markers in Children Infected with Intestinal Parasites in Three Communities, Nigeria. *Open Journal of Immunology*, **13**, 45-59.

Okwori, A. E., Sidi, M., Ngwai, Y. B., Obiekeze, I. O. and Adiku, T. I. (2014). Prevalence of Schistosomiasis among primary school children in Gadabukke District, Toto LGA, Northcentral Nigeria. *British Microbiology Research Journal,* 4(3), 255-261.

Oyeyemi, O. T., Jeremias, W. and Grenfell, Q. F. R. (2020). Schistosomiasis in Nigeria: Gleaning from the past to improve current efforts towards control. *One Health*, 11, 1- 8.

Salawu, O. T. and Odaibo, A. B. (2016). Schistosomiasis transmission; sociodemographic, knowledge and practices as transmission risk factors in pregnant women. *Journal of Parasitic Diseases*, 40 (1), 93–99.

Tchuem Tchuenté, L. A., Southgate, V. R., Jourdane, J., Webster, B. L. and Vercruysse, J. (2003). *Schistosoma intercalatum:* an endangered species in Cameroon? *Trends in Parasitology*, 19, 389-393.

World Health Organization (2012). Soil-transmitted helminthiases: Eliminating soil-transmitted helminthiases as a public health problem in children: Progress report 2001– 2010 and strategic plan 2011–2020. Geneva.

World Health Organization. Schistosomiasis: progress report 2001-2011 and strategic plan 2012-2020. Geneva: WHO; 2013.

World Health Organization (2021). Ending the Neglect to Attain the Sustainable Development Goals: A Road Map for Neglected Tropical Diseases 2021–2030, World Health Organization: Geneva, Switzerland, 2020. (Retrieved on March 28th, 2023).

Cite This Article: Robert, B., Ugbomeh, A.P. and Amuzie, C.C. (2023). Prevalence of Intestinal Schistosomiasis in some Respondents in Emelogo and Ogboloma Communities in Odua, Abua/Odua Local Government Area, Rivers State, Nigeria. IJBRA, 1(2), 30-39.