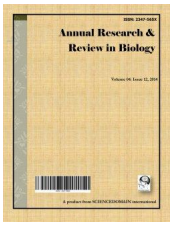

Annual Research & Review in Biology

28(1): 1-6, 2018; Article no.ARRB.42195
ISSN: 2347-565X, NLM ID: 101632869

Prevalence and Pattern of Soil Transmitted Helminths (Sths) among Primary School Children at Nnewi, Nnewi- North Local Government Area, Anambra State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author SNU designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors NRU and ACOO managed the analyses of the study. Author MOI managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/ARRB/2018/42195
Editor(s):
(1) Jimenez Cardoso Enedina, Parasitology Research Hospital Infantil de Mexico Federico Gomez, Mexico.
(2) George Perry, Dean and Professor of Biology, University of Texas at San Antonio, USA.
Reviewers:
(1) Daniel Griffin, Columbia University, USA.
(2) Tebit Kwenti Emmanuel, University of Buea, Cameroon.
(3) Terry Nzeakor, University of Nigeria, Nigeria.
(4) Bismark Sarfo, University of Ghana, Ghana.
Complete Peer review History: http://www.sciencedomain.org/review-history/25846

Original Research Article

Received 4th May 2018
Accepted 8th July 2018
Published 9th August 2018

ABSTRACT

Soil Transmitted Helminths (STHs) are of great Public Health importance. The present study was designed to evaluate the prevalence and pattern of STHs among Primary School Children at Nnewi, Nnewi North Local Government Area of Anambra State, Nigeria. 250 school children aged 1-12

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years were randomly recruited from 5 major primary schools at Nnewi between January and June 2017. 95 (38%) were males while 155 (62%) were females. Stool samples were collected using universal sterile containers and examined microscopically using saline floatation method. Out of the 250 pupils examined, 105 (42%) were positive for at least one STH. 40 (42.1%) of the males examined were positive while 65 (41.9%) of the females were positive. There was no significant difference between sexes (P > 0.05). Children aged 1-5 years had the highest prevalence (62.2%), followed by those aged 6-8 years (33.3). Children aged 9-12 years had the least prevalence. Prevalence was significantly different between the different age groups (P < 0.05). Among the STHs isolated, Ascaris lumbricoides was the most prevalent (22%), followed by Hookworm (14%). The least prevalent was Trichuris trichiura (6%). No case of mixed infection was detected. The study concludes that STHs are of immense public Health importance in primary School children at Nnewi and efforts should be intensified to promote health education, personal hygiene and sanitation and regular deworming of school children.

Keywords: Soil transmitted helminthes; school children; Nnewi; Nigeria.

1. INTRODUCTION

Parasitic diseases have been generally acknowledged as diseases of poverty. In developing countries, including Nigeria, the populace is still ravaged by mass poverty, thereby leading to lack or scarcity of portable water, poor sewage disposal, unhygienic environments, and proliferation of parasitic diseases including soil transmitted helminthes (STHs). Among the most frequently isolated STHs, include *Ascaris lumbricoides, Trichuris trichiura* and *hookworm*. Most recent studies on prevalence of STHs were conducted on school children and reported values ranging from 25.6% in Enugu, Nigeria [1], 44.4% in Jimma, Ethiopia [2] and 75.7% in Nkpor and Mgbodohia, Rivers state, Nigeria [3]. Earlier studies conducted in different parts of Nigeria in both children and the general population reported various rates from 17.8% to 87% [4-8].

Helminthic infection has several health implications on growing children. For instance it contributes to malnutrition [9,10], anaemia and stunted growth [11]. Secondly, it may lead to poor school performance due to its high morbidity [12]. Furthermore, *Ascaris lumbricoides* has been associated with intestinal obstruction or even pancreatitis in children [13].

Although helminthic infections have a Worldwide distribution, they are more prevalent in developing countries of sub-Saharan Africa, Asia, and the Americas where people are infected with one or more of the STHs [14,15]

With the worsening economic conditions in Nigeria today, the level of poverty has escalated thereby compounding the problem of poor environmental sanitation. Consequently there seems to be a surge in the prevalence of parasitic infections including STHs. The present study was therefore designed to evaluate the prevalence and pattern of STHs in primary school children in Nnewi, Nnewi North Local Government Area of Anambra State, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted at Nnewi, one of the three major urban cities that make up Anambra State Southeast Nigeria. Nnewi is a commercial city with a population of about 300,000 people [16]. There are many primary schools both public and private located at various areas in the town. The indigenes are mostly traders and civil servants with a good population of local farmers.

2.2 Study Design

This was cross sectional epidemiological study conducted between January and June 2017.

2.3 Study Population

A total of 250 children were recruited from five randomly selected primary schools in the study area using minimum sample size formula for descriptive study in a population > 10,000. The schools selected were:

1. Unizik Primary School Okofia
2. Environ Nursary Primary School
3. Umuaraba Primary School
4. Teach Them Young Primary School
5. Okofia Community Primary School Nnewi

Map 1. Map of Nnewi Anambra State, Nigeria

50 children were recruited from each school using systemic random sampling and from the various levels.

Initial visits were paid to the Headmasters/Head mistresses/Teachers of the various schools explaining the purpose of the study and to obtain their permissions. Informed consent was also obtained from their parents through the teachers.

2.4 Sample Collection

Sterile universal containers were given to the children through their teachers to collect stool samples. The teachers helped to collect samples from those in the nursery section aged 1-5 years. These samples were properly labeled and transported to the Parasitology Laboratory of Nnamdi Azikiwe University Teaching Hospital Nnewi for examination. The stool samples were wrapped in a sealed plastic bag and stored in a refrigerator if not immediately examined. This did not last for more than 24 hours.

2.5 Stool Analysis

This was done at the Parasitology Lab of Nnamdi Azikiwe University Teaching Hospital, Nnewi. One drop of 0.85% NaCl was placed on the slide. With an applicator stick, a small amount of the faecal material was placed on the slide and thoroughly emulsified in the saline. A 22-mm cover slip was placed on the suspension and the slide was systematically examined under the low power of the microscope.

2.6 Data Analysis

Data collected was analyzed using SPSS Version 18. Chi-square was used to measure significant differences. The level of significance was chosen as $P \leq 0.05$.

2.7 Ethical Consideration

The Ethical Committee of the Faculty of Health Sciences and Technology, Nnamdi Azikiwe University approved the study. (Ethical Approval Ref no: ERC/FHST/NAU/2017/049)

3. RESULTS

Out of the 250 pupils examined, 105 (42%) were positive for at least one STH. Out of the 95 males examined (Table 2), 40 (42.1%) were positive while out of the 155 females examined 65 (41.9%) were positive. There was no significant difference between sexes ($P > 0.05$). Children aged 1-5 years (Table 1) had the highest prevalence (62.2%), followed by those aged 6-8 years (33.3%). Children aged 9-12 years had the least prevalence. Prevalence was significantly different between the different age groups studied ($P < 0.05$). Among the STHs isolated, Ascaris lumbricoides was the most prevalent (22%), followed by *Hookworm* (14%). The least

prevalent was Trichuris trichiura (6%). No case of mixed infection was detected (Table 3).

Table 1. Age distribution of STHs in primary school children, Nnewi, Anambra State, Nigeria

Age group (Years)	Total no examined	No positive	Percentage
1-5 (Nursery)	95	60	62.2%
6-8	105	35	33.3%
9-12	50	10	20%
Total	250	105	42%
	X^2= 9.12	P = 0.031	

Table 2. Gender distribution of STHs in primary school children, at Nnewi, Anambra State, Nigeria

Gender	Total no examined	No infected	percentage
Male	95	40	42.1%
Female	155	65	41.9%
Total	250	105	42%
	X^2 = 0.481	P = 0.065	

Table 3. Species of STHs prevalent in primary school children in Nnewi, Anambra State, Nigeria

Total No examined = 250

Species identified	Frequency	Percentage
Ascaris lumbricoides	55	22%
Hookworm	35	14%
Trichuris trichiura	15	6%
Total	105	42%

4. DISCUSSION

The present study reported the overall prevalence rate of STHs to be 42%.This is comparable to previous reports from Enugu in Enugu state and Ijoun in Ogun state, Nigeria [1,17]. This finding is also comparable with reports from two previous similar studies conducted in Ethiopia [2,18]. Higher prevalence rates have been reported in other geographical areas of Nigeria such as Nkpor and Mgbodohia in Rivers state [3], Lagos in Lagos state [19], Ibadan in Oyo state [20], and Ile-Ife in Osun state [21] respectively. Although the prevalence of STHs in Nigeria especially *Ascariasis* has been said to be stable over the years [22], the worsening economic conditions and mass poverty has made it impossible to eradicate or bring to the barest minimum the menace of these often neglected parasitic infections. In most communities in Nigeria today, there is lack or inadequate portable water. This makes it impossible to maintain personal hygiene and environmental sanitation. Refuse dumps are often found on major roads and there may be inadequate or poor sewage disposal system. All these result to high prevalence and endemicity of parasitic infections including STHs.

The study also revealed that children aged 5years and below (Nursery section), had the highest prevalence of STHs followed by children aged 6-8years. Some previous reports suggest that the prevalence of helminthic infections decrease with increasing age [3,23,24]. This is probably because the older the child the more likely he or she can maintain personal hygiene if other factors remain constant. Generally, infections have been reported to be highest in school age children [18,25]. This is probably because these vulnerable groups become more exposed to school environments that are often poorly maintained.

In the present study also, there was no significant difference in prevalence of STHs between male and female participants (table 2). This is consistent with some previous reports [3,17]. However, a study in Southwest Ethiopia reported that females were two times more infected than males [2]. This is particularly the case with hookworm in agrarian communities where poor women and children engage in farming much more than their male counterparts. This may not be the case in the study area where most people including children wear shoes and may not engage in farming as an occupation.

Furthermore, this study revealed that *Ascaris lumbricoides* was the most prevalent STH in the study area. This is consistent with most previous studies conducted in other parts of Nigeria [19,20,21,24,26]. *Ascariasis* is transmitted through the faeco-oral route. This makes it easy to be transmitted through food and water thereby affecting both adults and children especially in areas with poor environmental sanitation, *Ascaris lumbricoides* was followed closely by Hookworm infection. The later thrives where people work barefooted especially farmers. The level of hookworm infection in the study area was low (14%) when compared with reports from two previous studies conducted at communities in Enugu state, Nigeria [27,28]. These communities probably were agrarian in nature and were more exposed to the disease.

The present study did not use concentration technique in stool analysis due to some logistic problems during the study. This must have accounted for the low prevalent rates reported in this study. This is a major limitation of this study. However there is room for further investigations in the study area when concentration method will be used to increase the sensitivity of the microscopy. Furthermore, ongoing deworming excercises can influence the detection of helminthic eggs in stool thereby affecting the result. In the study area also, some mothers refused to allow their children to produce stool samples due to their cultural believes.

5. CONCLUSION

In conclusion, STHs have remained endemic in the study area in particular and Nigeria in general and is a major source of public health concern. Strict environmental sanitation, provision of adequate water supply, good housing, coupled with health education will go a long way towards its eradication. This should be the target of all governments in Nigeria.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history/25846