EAS Journal of Parasitology and Infectious Diseases
Abbreviated Key Title: EAS J Parasitol Infect Dis
ISSN: 2663-0982 (Print) & ISSN: 2663-6727 (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-2 | Issue-3 |May-June 2020 | DOI: 10.36349/EASJPID.2020.v02i03.001

Review Article

Intestinal Parasitic Infestation and Associated Factors among Children in Urban Slum Schools in Nakuru, Kenya

Ms. Jane Mugwe

Laikipia University P.O. Box 1100-20300, Nyahururu, Kenya

Article History
Received: 14.04.2020
Accepted: 10.05.2020
Published: 13.05.2020

Journal homepage:
https://www.easpublisher.com/easjpid

Quick Response Code

Abstract: The study was conducted in school going children in an urban slum of Nakuru Municipality of Nakuru County, Kenya. The main objective of this study was to estimate the levels and identify the factors associated with intestinal parasitic infections among school going children residing in an urban slum. A cross-sectional study design was used to select subjects from whom stool specimens were obtained. Two primary schools were randomly selected and used to select 20 pupils from each class (Class 4 to 8). A total of 200 children were randomly selected from the age between 9-17 years. Direct microscopy and concentration methods were used to examine stool samples to detect cysts of protozoa, and larvae and ova of helminthes. 27 stool specimens out of 100 specimens collected from one study site were found to contain cysts or ova of some intestinal parasites while 22 out of 100 stool specimens collected from the other study site were found to contain cysts or ova of some intestinal parasites; no adult worms, neither proglottids of Taenia species were seen in stool specimens from both study sites. Anthropometric measurements were also determined. There were high levels of parasitic infestations that could be attributed to unhygienic conditions, improper disposal of sewage and the non-availability of potable water supplies in the urban slum areas. The study recommends further studies on children in other schools within the slum areas, additional studies in other children attending schools out of the slum areas and regular de-worming programs introduced and enhanced in the affected areas.

Keywords: School going children, Intestinal parasites, Urban Slum, Body Mass Index, Percentiles.

INTRODUCTION

Intestinal parasitic infections deprive the poorest of the poor of health, contributing to economic instability and social marginalization. The poor people of under developed nations experience a cycle where under nutrition and repeated infections lead to excess morbidity that can continue from generation to generation. People of all ages are affected by this cycle of prevalent parasitic infections; however, children are the worst affected (Steketee, 2003; Garzon, 2003).

Malnutrition and intestinal parasitic infections are common public health problems of children in developing countries (Ajayi and Akinyinka, 1999). It is not unusual to find poverty and poor sanitation within the urban slums of Nakuru. Helminthic infestations and parasitic infections may put a severe strain on the nutrition of children in particular who live in these areas. As a result of this morbidity, they are at an increased risk for detrimental effects like poor cognitive performance and physical growth (Bisht, *et al.*, 2011). Malnutrition is typically caused by a combination of inadequate food intake and infection which impairs the body's ability to absorb or assimilate food. It is well recognized worldwide that anthropometric measurements are indispensable in diagnosing malnutrition (Amuta *et al.*, 2013). However, there is scanty information on the relationship of intestinal parasites and nutritional status of children in the urban slums of Nakuru. Thus, the present study was undertaken to find out the prevalence of intestinal parasites among school children and the relationship between intestinal parasites and malnutrition among these children in the urban slums.

This study helped assess the prevalence of intestinal parasitic infestations among the school going children among the study population. Most importantly, the study helped to identify multi-parasitic infestations and the risks associated with these infections.

Stool specimens were collected in wide mouth containers and transported to the laboratory within an hour. The stool specimens were subjected to macroscopic and microscopic examination. Naked eye examination and the use of hand lenses were done for colour, consistency and the presence of blood, mucus or parasites. Various microscopic examinations were done

***Corresponding Author:** Ms. Jane Mugwe Email: janyamugwe@yahoo.com

as follows: **Direct microscopic examination using saline and iodine preparation:** on a 1mm thick microscopic slide, a small amount of stool sample was emulsified in 1-2 drops of saline or iodine. A cover slip was placed on it, ensuring it was free of air bubbles and macroscopic debris. It was then observed under a microscopic. **Simple salt floatation method:** About 1gm of feces was emulsified with 3-4ml of saturated salt solution in a 20ml conical glass test tube. It was stirred well and n\more salt solution was added until the container was nearly full, while still being stirred. Any coarse matter which floated was removed and the tube was placed on a leveled surface with a glass slide placed over the top of the tube, and in contact with the fluids. It was allowed to stand for 30 minutes, later removed and observed for the presence of eggs or cysts. **Zinc sulphate centrifugal floatation:** 1gm of stool specimen was emulsified in 10 part of tap water and it was strained through wire gauze. The filtrate was collected in a Wassermann tubes and centrifuged at 2,500 rpm. The supernatant and the sediment were discarded. 3-4 ml of 33% zinc sulphate solution was added, mixed well, till about the rim. Several loopfuls of the supernatant fluid were removed with bacteriological loops and they were observed for parasites. Formal ether concentration: 1gm of stool was emulsified on 7ml of 10% formal saline and it was kept for 10 minutes for fixation. It was then strained through wire gauze. The filtrate was added to 3ml of ether and it was centrifuged at 2000rpm for 2 minutes, then allowed to settle. The supernatant was removed and a wet mount was made of the deposit for the observation of parasites under the microscope.

Anthropometric measurements consisted of weighing children. The weight and height of the children was measured using a weighing machine combined with height measurements.

RESULTS AND DISCUSSION

A) Parasitic Investigation

One hundred stool specimens were collected from one study site. Twenty seven specimens (27% of the study population) were found to contain cysts or ova of some intestinal parasites. Cysts of *Entamoeba histolytica* and *Entamoeba coli* were found and ova of *Ascaris lumbricoides*, Taenia species, hookworms and *Hymenolepsis nana* were also found. All stool samples containing these parasites had pus cells.

Out of the 27 stool samples, 5 (18.52%) contained cysts of *Entamoeba histolytica*, 8 (29.62%) had ova of *Hymenolepsis nana*, 6 (22.22%) had ova of *Ascaris lumbricoides*, 4 (14.82%) had cysts of *Entamoeba coli*, 2 (7.41%) had ova of *Taenia* species and 2 (7.41%) had ova of hookworms. The following figure shows a summary of parasites identified from stool specimens collected from this school.

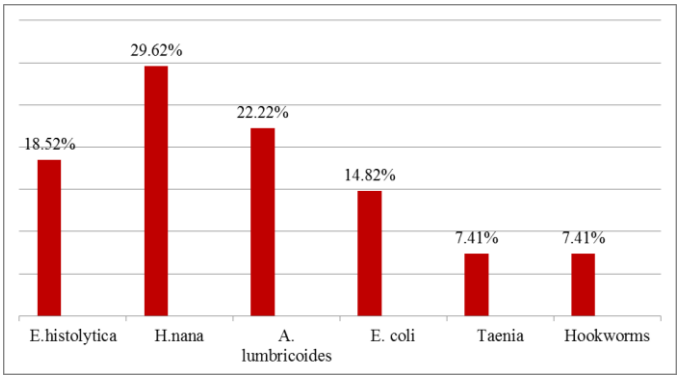

Figure 1: Types of parasites identified in specimens

Figure 1 show that the prevalence of *Hymenolepsis nana* was highest at 29.62% of all the infections, while *Taenia* and hookworm infestations were the lowest at 7.41% of the total infections.

The parasites were observed in children of 10 to16 years, both male and females. The parasites identified in various age groups and gender were further analyzed and shown in the following figure (Figure 2).

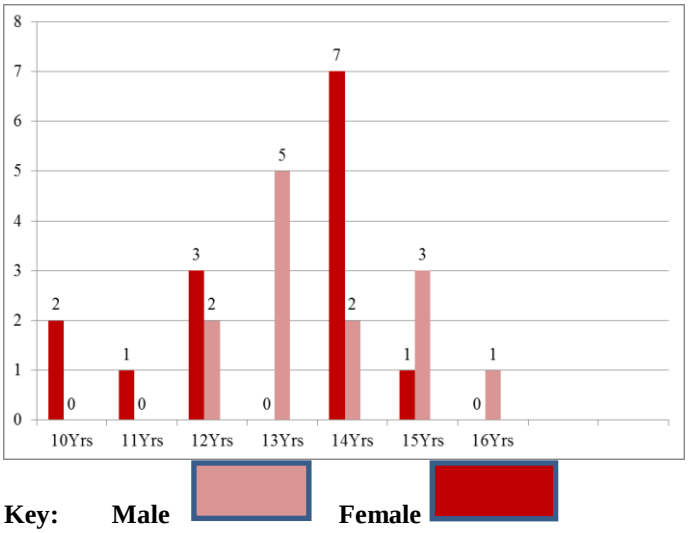

Figure 2: Age and gender of infested children

Figure 2 shows that 27 parasites were identified from the stool samples; there were no parasites found in 9 year old and 17year old children. 2 parasites were identified in stool samples of 10 year old girls, none from boys; 1 parasite was identified from 11 year old girl, none from a boy. 5 parasites were found in 12 year old children, 3 from girls and 2 from boys; 5 parasites were also found in 13 years old children, all in the boys' stool samples and 1 had co-infection. 9 parasites were found in 14 year old children, 6 in girls; 1 girl had co-infection, and 2 in boys. 4 parasites were found in the stool samples of 15 year old children, 1 from a girl and 3 from boys, and 1 parasite was found from a 16 year old boy's stool specimen and none from a girl. A total of 27 parasites were found in the stool specimens.

One hundred stool specimens were collected from the second study site. Twenty two specimens (22% of the study group) were found to contain cysts or ova of some intestinal parasites. Cysts of *Entamoeba histolytica* were the only ones found; ova of *Taenia* species, hookworms and *Hymenolepsis nana* were found. All stool samples containing these parasites had pus cells. Out of the 22 stool sample, 6 had ova of *Hymenolepsis nana*, 4 had *Taenia* species, 9 had *Entamoeba histolytica* and 3 had ova of hookworms (Figure 3).

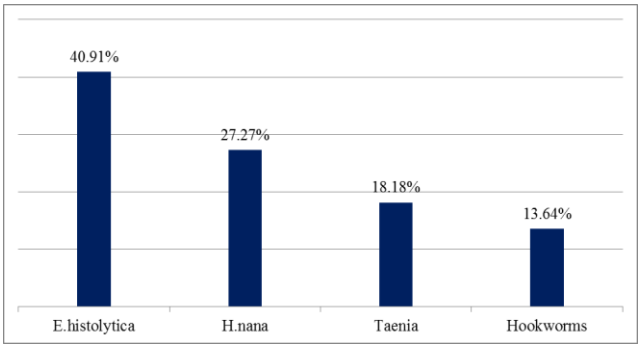

Figure 3: Types of parasites identified in stool specimens

Figure 3 shows that in this study site, the prevalence of *Entamoeba histolytica* was the highest (40.91%) while infection with hookworms was the lowest (13.64%). These parasites were identified from specimens from children aged between 9 and 17 years of different genders. The parasites identified, age and gender of the affected children is summarized (Figure 4).

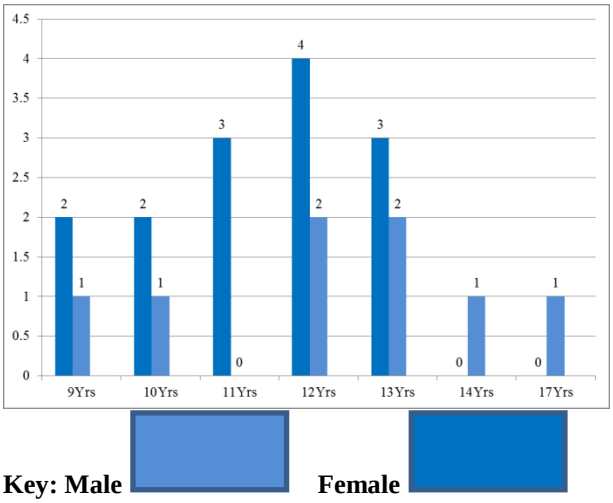

Figure 4: Age and gender of infested children

Figure 4 shows that 22 parasites were found in stool samples of the children aged between and 17 years. Out of 22 parasites, 3 were identified in children aged 9 years, 2 from the girls and 1 from a boy; 3 were identified from 10year old children, 2 from girls and 1 from a boy; 3 parasites were identified from 11 year old children, all from girls. 6 parasites were identified from 12 year old children, 4 from girls and 2 from boys; 5 parasites were identified from 13 year old children, 3 from girls and 2 from boys. 1 parasite was identified from a 14 year old and none from a girl and finally 1 parasite was identified from a 17 year old boy and none from girls. 1 girl aged 11 years had co-infection.

B. Body Mass Index (BMI)

The height and weight of all individuals of the study population were obtained and recorded. The body mass index of individuals and percentiles were calculated. The calculated BMI-for-age percentile and results were reviewed.

Using the Centers for Disease Control and Prevention (CDC) BMI-for-age growth charts for boys and girls, the weight status category for the calculated BMI-for-age percentile was obtained and interpreted as follows:

Weight status category	**Percentile range**
Underweight	Les than the 5th percentile
Healthy weight	5th percentile to less than the 85th percentile
Overweight	85th to less than the 95th percentile
Obese	Equal to or greater than the 95th percentile

The results showed that out of 25 (25% of the study group) children from school E.N. who were infested with intestinal parasites, 17 were categorized in the 3rd percentile, 4 in the 5th percentile and 4 in the 10th percentile. Out of the 21 (21% of the study group) children from school N.W. school who had been infested, 15 were categorized in the 3rd percentile, 4 in the 10th percentile, 1 in the 25th percentile and 1 in the 75th percentile.

The results indicate that 17 (68%) children from one. school were underweight while 15 (71.4%) from the other school were underweight.

High levels of parasitic infection were observed. This may be contributed to unhygienic conditions, improper disposal of sewage and the non-availability of potable water supplies in the urban slum areas.

Acknowledgement

I would like to thank Laikipia University for funding this study. I also thank Ben Kariuki of Dubai Medical Laboratory, Nakuru for all the help in collection and examination of stool specimens. I thank the education department plus the head teachers who allowed this study to be conducted.

REFERENCES

1. Ajayi, I. O., and O. O. Akinyinka. "Evaluation of the nutritional status of first year school children in Ibadan, Southwest Nigeria." *African journal of medicine and medical sciences* 28.1-2 (1999): 59-63.
2. Amuta, E., Olusi, T., & Houmsou, R. (2013). Relationship of intestinal parasitic infections and malnutrition among school children in Makurdi, Benue State, Nigeria. *The Internet Journal of Epidemiology*, *7*(1), 20–24.
3. Bisht, D., Verma A.K., & Bhardwaj, H.H.D. (2011). Intestinal parasitic infestation among children in a semi-urban Indian population. *Tropical Parasitology*, *1*(2),104–107.
4. Garzon, M. (2003). Capital University of integrated medicine. Parasites - A holistic approach. In: Associates NIH, editor.
5. Steketee, R. (2003). Pregnancy, nutrition and parasitic diseases. *Journal of Nutrition, 133*, 1661–1667.