Original Research Article

The Prevalence of Intestinal Parasitic Infections among students of Eastern Technical University in Kenema, Eastern Sierra Leone.

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| **Aims:** This study aim to assess the prevalence of intestinal parasites among students attending the Eastern Technical University in Sierra Leone.  **Study design:** This study adopt a cross sectional descriptive epidemiological research design integrating both quantitative and qualitative approaches  **Place and Duration of Study:** This study was conducted at the Eastern Technical University located in Kenema, Eastern Sierra Leone. Between July and August 2024.laboratory investigation on the prevalence of intestinal parasites among students was carried at the laboratory of the Department of Medical laboratory technology.  **Methodology:** A total of 2OO students from five faculties in university participated in the study. Stool samples were collected and analyzed microscopically for parasitic ova, cyst and trophozoites using direct wet mount smear and formol ether concentration technique. All data obtained were analyzed using Microsoft excel for windows version 16.0 for descriptive statistics with level of significance set at P<0.05.  **Results:** Out of the 200 examined stool samples, 106 (53.0%) were found to be infected with six species of intestinal parasites. The identified parasites and their respective prevalence are as follows: *Ascaris lumbricoides* (42.0%), Hookworm (26.0%), *Schistosoma mansoni* (9.0%), *Trichuris trichiura* (12.0%), *Strongyloides* *stercoralis* (4%) and *Entamoeba histolytica* (6.0%).  **Conclusion:** Results from the study shows a high prevalence of intestinal parasites among students attending the Eastern Technical University.  This study clearly shows the extent of the burden of intestinal parasitic infections in students hence reducing their academic performances resulting from complications. In order to combat the spread of the disease in the student population, university authorities should develop an effective preventive and control strategy aimed at eliminating the parasites in student population through health education, improvement in WASH facilities, regular deworming and screening of students . |

*Keywords: [Public health, gastrointestinal, Eastern Technical University, protozoan}*

1. INTRODUCTION

The human race has long been battling with diseases since its creation on earth. Among these are parasitic infections which remain to be the main cause of human illness and mortality (Nisha et al., 2019, Ghorbani &Garedaghi 2023).

Intestinal parasitic infections (IPIs) are neglected tropical diseases (NTDs) caused by the habitation of helminths (cestodes, trematodes, nematodes) and protozoans in the gastrointestinal tract of human and other animals (Khanna et al., 2014, Periago et al., 2018, Mekonnen &Ekubagewargies 2019, Zeme et al., 2022, Okafor-Elenwo et al., 2020, Ghorbani & Garedaghi 2024) and can cause illnesses such as Ascariasis, hookworm infection, amoebiasis and trichuriasis (Kiani et al., 2016, Eyayu et al., 2021).

Intestinal parasitic infections are reported to be among the most widespread infections in the world and pose significant public health and socioeconomic problem in tropical regions causing significant morbidity and mortality in people especially those from underdeveloped and developing countries (Dada & Aruwa 2015, Fulgence et al., 2023, Tapia-Veloz et al., 2023).

Although it occur worldwide, its prevalence vary from region to region depending on the socioeconomic, environmental and geographic conditions (Mehraj et al., 2008, Isibo et al., 2013, Mekonnen & Ekubagewargies 2019, Eyayu et al., 2021

According to recent global estimate, around 3.5 billion people are infected with intestinal parasites causing approximately 200,000 deaths (Hailegebriel 2017, Tigabu et al., 2019; Menjetta et al., 2019; Hajare et al., 2021; Rega et al., 2022, Shahrani et al., 2023, Gautam et al., 2024).

Intestinal parasitic infections can be transmitted via skin penetration, ingestion of water, food, and soil contaminated with faeces containing the effective stage of the pathogen (Feleke et al., 2019, Riaz et al., 2020, Derso et al., 2021, Wale & Gedefaw 2022) and can cause complications ranging from abdominal pain, constipation, vomiting, diarrhea, loss of appetite, itching of skin (anal), weight loss , skin rashes, muscle and joint aches iron deficiency anemia, bloody mucous stool, stunted growth, sleep disorder and fatigue (WHO 1987, Kocahan et al., 2019, Feleke et al., 2019, Okafor et al 2023).

Several epidemiological studies have been conducted in different part of the world including Sierra Leone and have all reported high prevalence of intestinal parasitic infections especially in school children and university students (Ohaeri & Orji 2013, Afolabi et al. 2013; Dada & Aruwa 2015, Kiani et al., 2016, Tapia-Velo et al., 2023).

Intestinal parasitic infections are not only known to cause morbidity and mortality but also extend to impaired cognitive abilities and intellectual deficits contributing to the variation in cognitive performance within and between student populations (Abate et al., 2024)

Sierra Leone is low income country with poor health indicators. The life expectancy at birth is 54.3 %. The under-fives mortality rate is 122 per 1,000 live births and maternal mortality rate is 443 per 100 000 births (WHO 2022). The access to safe drinking water and safe sanitation is a major problem making the entire population at risk of contracting intestinal parasites. There is no existing information on the prevalence of intestinal parasites infections in higher learning institutions in Sierra Leone.

Considering the burden of the disease on academic institutions, there is a need for a quantitative study documenting the prevalence of the diseases in universities across the country. This study is therefore seeking to investigate the prevalence of intestinal parasitic infections in students attending the Eastern Technical University of Sierra Leone.

2. material and methods

**2.1Study area**

The study was conducted at the Eastern Technical University of Sierra Leone main campus located in Kenema, eastern Sierra Leone. Kenema is the third largest city in Sierra Leone with a population of 255,110 (Statistic Sierra Leone, 2022). Established by the 2021 University Act of Sierra Lone, the Eastern Technical University is the first university in the eastern province and is ranked as the fifth public university in the country (University Act 2021). The university consists of seven faculties, one institute and twenty-seven departments.

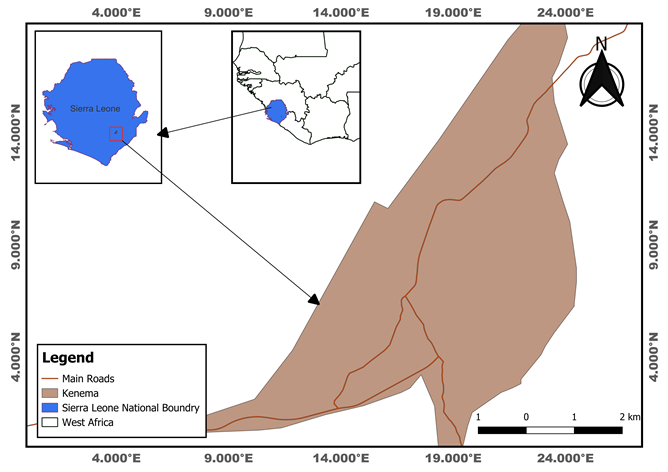


Figure 1. Map of studying area.

**2.2 Consent and ethical approval**

Prior to the commencement of survey, ethical clearance was obtained from the Research Directorate of the Eastern Technical University. Informed consent was obtained from the students after clear explanation on the purpose for which the study was conducted. Students were also informed that data generated during study was only used for academic purposes and will be kept confidential and their identify will not be divulged.

**2.3Study design**

A cross-sectional study was conducted to determine the prevalence of intestinal parasitic infections among university students of Eastern Technical University. Before admitting participants into the study, the purpose of the study was read to them and those who voluntarily showed up for the study were selected.

**2.4 Sample size**

The sample size comprises of 200 students drawn from five faculties in the university. These include: Faculty of Basic and Applied Sciences, Faculty of Engineering and Innovation, Faculty of Health and Disaster Management, Faculty of Education and Faculty of Business and Entrepreneurship Studies.

**2.5 Sample collection**

Sample collection follows the procedure of Adekola et al., (2018). All participating students were given a labelled sterile wide mounted plastic bottle, a sheet of paper and a wooden spatula. The students were instructed to pass their faces on the sheet of paper provided and to use wooden spatula to transfer about 5g of early morning faeces to the bottle and ensure the bottle was tightly screwed.

**2.6 Macroscopic examination**

Visual examination of collected stool samples was done to ascertain the color, shape, consistency (watery, soft, and formed), mucus, pus, smell and presence of blood (Aliyu et al 2024)

**2.7 Microscopic Examination of faecal samples**

Samples collected from students were accurately labelled and taken to the laboratory of the Eastern Technical University in tightly closed bottles. Stool specimen were examined microscopically for the presence of intestinal parasites using both direct wet mount in fresh normal saline and formol ether concentration techniques. These methods allow for the detection of a wide range of intestinal parasites including helminthic and protozoans.

**2.8 Statistical Analysis**

All data obtained were analyzed using Microsoft excel for windows version 16.0 for descriptive statistics with level of significance set at P<0.05.

3. results and discussion

3.1. Results

**3.1.1 Intestinal parasites identify in the study**

Out of the 200 students who participated in the study, 106 (53%) were infected with six species intestinal parasites of which five were classified as helminthic parasites and one was classified as protozoan parasite (Table1). *Ascaris lumbricoides*, *Hook worm*, *Trichuris* *trichiura*, *Strongyloides stercoralis* and *Schistosoma mansoni* (Helminthic parasites), and *Entamoeba histolytica* (Protozoan parasites).

Among the parasite species identified, *Ascaris lumbricoides* was the most prevalent (22.5%) intestinal parasite in the study while *Strongyloides stercoralis* was the least prevalent (2%) (Figure2).

**Table 1: Intestinal parasites identify in the study participants**

|  |  |  |
| --- | --- | --- |
| Parasite identified | Number of students infected | Prevalence (%) |
| *Ascaris lumbricoides* | 45 | 22.5 |
| *Hook worm* | 28 | 14.0 |
| *Trichuris trichiura* | 13 | 6.5 |
| *Strogyloides stercoralis* | 4 | 2 |
| *Schistosoma mansoni* | 10 | 5 |
| *Entamoeba histolytica* | 6 | 3 |
| Total | 106 | 53.0 |

Figure 2. Prevalence of intestinal parasites in study population

**3.1.2 Prevalence of intestinal parasite in relation to gender of study participants**

Out of the 200 students who participated in the study, 103 (51.5%) were females while 97(48.5%) were males (Table 2).

With regards to the prevalence of intestinal parasite, male were more infected (52.83%) with intestinal parasites than females (47.17%). Results from the study shows that there is no significant difference between the prevalence of intestinal parasites in relation to gender (p˃0.05). This means that both genders are equally exposed in the same unhygienic environment condition which directly favors the spread of these intestinal parasites.

**Table 2.Prevalence of intestinal parasites in relation to gender**

|  |  |  |  |
| --- | --- | --- | --- |
| Gender | Number examined | Number infected | Prevalence (%) |
| Male | 97 | 56 | 52.83 |
| Female | 103 | 50 | 47.17 |
| Total | 200 | 106 | 100 |

3**.1.3 Prevalence of intestinal parasites in relation age of study participants**

Table 3 below illustrates the prevalence of intestinal parasites in relation to the age of study participant. All age group who participated in the study were infected with intestinal parasites but of varying prevalence. However, the highest infection rate was recorded in students within the age group of 16 – 20 years (23.5%), while the least infection rate was recorded in the age group of 36 – 40 years (0.5%). The prevalence of intestinal parasites decreases with increase in the age group of study participants. This might be associated to a more conscious and responsible attitude of people within these age cohort towards the prevention and control of intestinal parasites.

**Table3. Prevalence of intestinal parasites in relation age**

|  |  |  |  |
| --- | --- | --- | --- |
| Age group | Number examined | Number infected | Prevalence (%) |
| 16-20 | 79 | 47 | 23.5 |
| 21-25 | 61 | 33 | 16.5 |
| 26-30 | 38 | 18 | 9 |
| 31-35 | 18 | 7 | 3.5 |
| 36-40 | 4 | 1 | 0.5 |
| Total | 200 | 106 | 53.0 |

**3.1.4 Prevalence of intestinal parasites in relation to faculty of study participants**

All faculties in the study were infected with intestinal parasites but with varying prevalence (Table 4). However the infection was highest (22.5%) in students from the Faculty of Pure and Applied Sciences followed by the Faculty of Health and Disaster management (13%). The Faculties of Business and Entrepreneurship Studies, Engineering and Innovation and Education all had infection rates of 4.5%, 6% and 7% respectively.

**Table 4. Prevalence of Intestinal parasites in relation to faculty of study**

|  |  |  |  |
| --- | --- | --- | --- |
| Faculty | Number examined | Number of infected | Prevalence (%) |
| Pure and applied Sciences | 70 | 45 | 22.5 |
| Education | 30 | 14 | 7 |
| Engineering and Innovation | 22 | 12 | 6 |
| Business and Entrepreneurship Studies | 20 | 9 | 4.5 |
| Health and Disaster Management | 58 | 26 | 13 |
| Total | 200 | 106 | 53 |

**3.1.5 Prevalence of intestinal parasites in relation to level of study**

Intestinal parasitic infection followed a consistent pattern based on the level of study of students (Table 5). Infection rate was highest (26%) in students in year one and lowest (3.5%) in students in year four.

**Table5. Prevalence of intestinal parasites in relation to level of study**

|  |  |  |  |
| --- | --- | --- | --- |
| Level of study | Number examined | Number of infected | Prevalence (%) |
| Year 1 | 85 | 52 | 26 |
| Year 2 | 65 | 33 | 16.5 |
| Year 3 | 31 | 14 | 7 |
| Year 4 | 19 | 7 | 3.5 |
| Total | 200 | 106 | 53 |

**3.2. Discussion**

Intestinal parasitic infections are the most widespread disease in the world causing significant problems in individuals and communities in developing countries like Sierra Leone. Previous research conducted in Sierra Leone asserted that intestinal parasitic infections remains to be a major burden in school going children and people living in rural communities.

The study shows a high (53%) prevalence of intestinal parasitic infection among students of the Eastern Technical University.

The overall prevalence in this study was however higher when compared with the findings of Dada et al (2015), Aliyu et al (2024), Ejinaka et al., (2019) who observed 44.5% , 18.84% and 43.3% prevalence of intestinal parasites in university students in Nigeria.

The high prevalence of intestinal parasitic infection among students in this study was similar to the findings of Ohaeri &Orji (2013).

The presence of intestinal parasite at high rates among study participants could be associated to poor sanitary disposal of faeces, inadequate water supply and the consumption of contaminated food.

The Prevalence of intestinal parasites; Ascaris lumbricoides, Hookworm Entamoeba histolytica, Strongyloides stercoralis, Trichuris trichiura and Schistosoma mansoni are in corroboration with Dada& Aruwa (2015) who stated that the occurrence these parasites might be due to some risk factors such as poverty, poor habits of eating, level of education and low level of sanitary practices.

Five species of helminthic parasites were identified as compared to one species of protozoan parasite in the study. Similar observations were also made by Ohaeri &Orji (2013)

The high prevalence of helminthic infection than protozoan infection is associated with the multiple routes of helminthes infection (oral and dermal) compared with the single route for protozoan infection (oral) (Aliyu et al., 2024).

The study also revealed Ascaris lumbricoides to be most wide spread intestinal parasite with a prevalence rate of 23.5%. Ohaeri &Orji (2013), Adekola et al., (2018), Ejinaka et al., (2019) and Aliyu et al (2024) also reported high prevalence Ascaris lumbricoides among university students in Nigeria. The prevalence of Ascaris infection in the study can be linked to exposure of study participants to contaminated water or food where the infective larvae live in and gain access to human body (Aliyu et al., 2024).

It was observed that intestinal parasitic infection was slightly higher in males than in females. Similar finding was also been reported by Aliyu et al., (2024). This result shows that there is no significant relationship between the prevalence of intestinal parasites and gender. This means that both genders are equally exposed in the same unhygienic environment condition which directly favors the spread of these intestinal parasites

The prevalence of intestinal parasites in relation to age of study participants showed that participants within the age group of 16-20 were the most infected than other age groups. In their study on the prevalence of intestinal parasites amongst selected age groups in Southern Nigeria, Okafor-Elenwo et al., (2020) also reported a high prevalence of intestinal parasites in people within the age 16-20 years. The high prevalence of intestinal parasites in this age group could be associated to their lackadaisical attitude to personal hygiene hence resulting to the spread of the parasites.

Results from the study also indicate a high prevalence of intestinal parasites in students from the Faculty of Pure and Applied Sciences. This finding contradicts those Adekola et al., (2018) who found high prevalence of intestinal parasites in students from the non-sciences faculties. The high prevalence of intestinal parasites in students from this faculty might be related to their exposure to the factors which leads to the transmission of the diseases. It was expected that students with science background would have the least record of intestinal parasites as they were supposed to be more knowledgeable about the disease, however, results from the study say otherwise.

4. Conclusion

Intestinal parasitic infection remains to be a great public health concern in Eastern Sierra Leone as it was highly prevalent (53%) in students of the Eastern Technical University. The proportions of infection were higher in helminths compared to protozoans. It is therefore recommended for the university authorities to develop effective preventive and control strategies in ensuring the elimination of the parasites from the student population. This can be achieved through health education, improvement of WASH facilities, regular deworming campaigns and regular screening of students.

Consent

Informed consent was obtained from the students after clear explanation on the purpose for which the study was conducted. Students were also informed that data generated during study was only used for academic purposes and will be kept confidential and their identify will not be divulged.

Ethical approval (where ever applicable)

Prior to the commencement of survey, ethical clearance was obtained from the Research Directorate of the Eastern Technical University.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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