Available online **www.ijpras.com**

International Journal of Pharmaceutical Research & Allied Sciences, 2024, 13(1):56-61
https://doi.org/10.51847/MEGAWekcJc

Case study

ISSN : 2277-3657
CODEN(USA) : IJPRPM

Incidence of Parasitic Infections Among Individuals Living in Rural Areas of Delta State: Abraka Communities

Felix OghenemaroEnwa[1]*, Kingsley Chukwuka Amaihunwa[2], Collins Ohwonigho Adjekuko[3], Blessing Chinedu Uti[1]

[1]Department of Pharmaceutical Microbiology and Biotechnology, Faculty of Pharmacy, Delta State University Abraka, Nigeria.
[2]Department of Medical Laboratory Science, Faculty of Science, Delta State University Abraka, Nigeria.
[3]Department of Biological Science, Faculty of Science, University of Delta, Agbor, Nigeria.

***Email:** felixenwa@delsu.edu.ng*

ABSTRACT

This study provides an overview of the incidence of parasitic infections in individuals living in rural communities, highlighting the major parasites involved, risk factors, and potential interventions to mitigate the burden. This research work is therefore aimed at determining the incidence of parasitic infections among individuals living in rural areas. This study adopted a propulsive cross-sectional survey design to select fifty (50) individuals ranging from age twelve (12) to fifty-six (56) who met the inclusion criteria for the study which were recruited from rural areas specifically Abraka and its environs in Delta state, Nigeria. Stool samples were collected and brought immediately to the laboratory at the department for processing. The specimens were examined both macroscopically and microscopically for the presence of parasites. Parasitological standard examination methods were followed. Of the 50 stool samples, 22 were male and 28 were female. A total of 19 were positive for at least one parasite. Out of the total positive, Ascaris lumbricoides (78.9%) and Trichuris trichiura (21.1%) were present in stool samples. Parasitic infections were more prevalent in the age group (40-49) at 31.57% and the least prevalent age group (50-57) was 5.26%. It was also more prevalent in females than males at 52.64% respectively at 47.36%. The present study shows 38% parasitic infection which is still an important health problem in our region. Health awareness programs, personal hygiene, hand washing as well as the use of sanitary latrines to reduce the incidence of parasitic infections should be carried out in these communities.

Key words: *Parasitic, Rural, Microscopic, Stool*

INTRODUCTION

SIntestinal parasitic infections (IPIs) are among a group of parasitic infectious diseases that constitute a major public health problem globally, belonging to the class nematodes and protozoans. It is a condition in which parasites predominately infect the gastrointestinal tract of humans particularly in the intestinal wall. Intestinal parasitic infections (IPIs) are widely distributed throughout the world. Mortality and morbidity rates of these infections are significant in developing countries. Infections are mainly transmitted via ingestion of water, soil, or food contaminated by feces containing the cysts of protozoans or eggs/larvae of helminths [1]. Intestinal parasitic infection is one of the neglected tropical diseases (NTD) that thrive where there is poverty. Mostly affected are the poorest populations, living in isolated rural areas, urban slums, or crisis-prone areas [2]. The helminthes T. trichiura, Ascaris lumbricoides, and the Hookworm as well as the protozoan Entamoeba histolytica have been observed to cause infections of varying degrees in 48 million people worldwide [3]. In developing

countries risk factors of intestinal parasitic infections are associated with factors like low literacy rate, poverty, poor hygiene, lack of potable water, and climate area. However, monitoring of parasitic infection and its factors is necessary for approaching the problem because they reflect health education of the community which provides basic data for control for future infection. Multiple studies have demonstrated a high prevalence of parasitic infections in rural areas is attributed to poverty, poor environmental hygiene, and inadequacies in medical services [4, 5]. Therefore, the present study was carried out to determine the incidence of parasitic infections among individuals living in rural areas. Factors such as poor sanitation, inadequate access to clean water, and limited healthcare resources can contribute to the higher prevalence of parasitic infections. Understanding these risk factors can guide the development of preventive strategies tailored to the specific needs of rural communities. By studying the incidence of these infections in rural areas, researchers can evaluate the effectiveness of existing control measures and identify areas where improvements are needed. By studying the incidence of parasitic infections, policymakers and healthcare providers can understand the socioeconomic implications and advocate for targeted interventions and resources to alleviate the burden on affected communities. The incidence of parasitic infections among individuals in rural areas poses a significant public health concern. Factors such as limited access to clean water, sanitation facilities, and healthcare services contribute to the increased risk. Understanding the incidence, prevalence, risk factors, and consequences of these infections is crucial for developing targeted interventions to reduce their burden in rural communities.

MATERIALS AND METHODS

Study area

The study was carried out among individuals residing in rural areas specifically Abraka Villages and its environs, Delta State.

Study population

The study involved 50 individuals which included twenty-two (22) males and twenty-eight females (28) between age twelve (12) to fifty-six (56) that met the inclusion criteria for the study.

Study design

This was a prospective cross-sectional survey to determine the incidence of parasitic infections among individuals residing in rural areas of Delta State.

Inclusion and exclusion criteria

Inclusion

All consenting individuals who agreed to be included in the study.

Exclusion

- Patients on any antibiotics or antiparasitical medications
- Immunocompromised patients
- Pregnant women
- Failure to give valid consent

Materials

The materials that were used are a Stool sample container, Glass slides, Cover slides, a Microscope, Gloves, a Pasteur pipette, a Mesh (350-450µm), a 15ml centrifuge tube, Glass applicator, a Beaker, Normal saline, Iodine, 10% diethyl ether, Centrifuge.

Sample collection

For this study stool samples were collected from fifty (50) individuals using stool sample containers with a secure lid. The samples were free from urine or water contamination. The containers are well-labeled and then transported to the laboratory for testing.

Macroscopic examination

A small amount of stool sample was taken from each container and observed separately. The color of the stool sample was examined, and abnormalities in color were documented for each sample. The consistency of the stool sample was examined and documented. Examination of odor, mucus, and also presence of abnormal substances was carried out on stool samples.

Microscopic examination

For microscopic examination, the glass slide was labeled and sterilized. Two drops of normal saline and iodine were added on both ends of the slide. A wooden applicator was used to add stool sample to the slide (both ends), cover slides were placed on top and they were observed under the microscope at objective x10 if there is a presence of egg or cyst switch to x40 to verify.

Formal-ether concentration technique

To the sample, 10% of formal saline was added and mixed properly with a glass applicator to form a smooth suspension. The suspension is sieved through a mesh into a beaker. Transfer 7ml of the filtrate into the 15ml centrifuge tube, then 3ml of Diethyl ether to make up to 10ml and shake. Place centrifuge tube into Centrifuge at 1500rpm for 2-5mins. On removal, four (4) layers are formed: ether, insoluble debris, formal saline, and stool solid, cyst, and egg. The first three layers were discarded, and to the last layer, formal saline was added to re-suspend. With the use of a pipette a small amount of the sediment was placed on the glass slide and covered with cover slides was then placed under the microscope. The observations were documented.

RESULTS AND DISCUSSION

In the current study a total of fifty (50) individuals included in this study, 22 were males and 28 were females. The result in **Table 1** showed that 19 (38%) had at least one parasite present in their stool sample and 31 (62%) were not infected.

Table 1. Incidence of incidence of intestinal parasitic infections among individuals residing in rural areas.

No of individuals	Result	Percentage value
19	Positive	38%
31	Negative	62%

Table 2. Gender-wise incidence of parasitic infection

Gender	No.	Positive	Percentage
Male	22	9	47.36%
Female	28	10	52.64%

Table 3. Incidence based on age group

Age group	Total	Positive	Percentage
12-19	9	4	21.05%
20-29	17	4	21.05%
30-39	11	4	21.05%
40-49	10	6	31.57%
50-57	3	1	5.26%

Significantly highest infection rate was observed in the individuals aged 40-49 at 31.57% and the lowest was age group 50-57 at 5.26%. **Table 3** shows incidence based on age group.

Altogether two species of intestinal parasites were detected. Out of the total parasites detected, 15 (78.9%) were Ascaris lumbricoides and 4 (21.1%) were *Trichuris trichiura*

Table 4. Frequency of intestinal parasite detected

Type of parasite	Total positive	Percentage
Ascaris lumbricoides	15	78.90%

Tricuiris trichiura	4	21.10%

The study's findings offer a compelling depiction of the ongoing burden of parasitic infections within rural communities, with a particular focus on the Abraka region and its surrounding areas in Delta State, Nigeria. In **Table 1**, the overall prevalence rate of 38% serves as a stark reminder that parasitic infections continue to pose significant health challenges in these regions. This finding is supported by the studies carried out on healthy inhabitants in rural areas. The infection rate of 28% was reported by Barkhori *et al*., [6]. Similarly, a relatively high prevalence of infection in nomadic tribes of Ethiopia [7], Chicca *et al*., [8], Avokpaho *et al*., [9]; Eyayu *et al*., [10]. 32.7% of the infection was reported by Hemmati *et al*., [11] in their study of Iran. This prevalence echoes comparable studies conducted in different parts of the world, revealing the stubborn persistence of these infections in rural settings despite advancements in medical knowledge and public health initiatives. The findings of all these studies revealed the poor arrangements for controlling the intestinal parasites that pose a significant public health problem in rural areas despite the advancements in personal and public health measures. An intriguing and nuanced aspect illuminated by this research is the gender-based variation in infection rates. However, in this study, as depicted in **Table 2**, females had a higher incidence rate (52.64%) compared to males (47.36%) which is quite similar to the study of Watson *et al*., [12]. The study of Garn *et al*., [13] and Tamirat *et al*., [14] also showa higher prevalence in females than males. These findings suggest that gender may play a role in the susceptibility to Intestinal Parasitic infections. This variation could stem from a multitude of factors, including distinct hygiene practices, water source utilization, and exposure to contaminated environments.

Delving into the study's breakdown of infection rates across different age groups as displayed in **Table 3**, reveals a fascinating dynamic. The age group of 40-49 exhibits the highest infection rate at an alarming 31.57%, underlining the vulnerability of individuals in this cohort. In contrast, the age group of 50-57 displays a comparatively lower incidence at 5.26%. This age-related variation prompts contemplation on various factors, including the cumulative exposure to contaminated environments, socio-economic influence differences in immunity, and even potential generational changes in hygiene practices. The prominence of Ascaris lumbricoides, contributing to a staggering 78.9% of infections, underscores its resilience and adaptability in environments marked by poor sanitation and hygiene. Trichuris trichiura, while constituting a lesser proportion (21.1%), remains a significant player in the parasitic landscape as seen in **Table 4**.

These findings underscore the dire need for a comprehensive strategy aimed at enhancing sanitation, promoting hygiene practices, and raising health awareness within rural communities. Implementing region-specific interventions that factor in variables like water quality, availability of proper sanitation facilities, and local agricultural practices is paramount. The results emphasize the necessity of targeted approaches to address the unique challenges faced by different communities, as a one-size-fits-all approach might not yield the desired outcomes.

Beyond the statistical revelations, this research emphasizes the imperative of designing and implementing targeted public health interventions. Inadequate sanitation, limited access to clean water, and suboptimal hygiene practices emerge as pivotal factors in the perpetuation of parasitic infections. The findings underscore the necessity of health education programs that emphasize proper hygiene practices, thorough hand washing, and the significance of treating food to mitigate parasitic transmission. Moreover, the research advocates for investments in infrastructural developments that ensure access to clean water and proper sanitation facilities.

A poignant lesson derived from this study is the criticality of developing interventions that are finely tuned to the unique characteristics of rural communities. The heterogeneity of rural settings demands region-specific approaches that address the interplay of factors such as agricultural practices, access to water sources, and socio-economic conditions. Such customized strategies are essential to maximize the impact of interventions and effectively curb the prevalence of parasitic infections. It is paramount to recognize that the impact of parasitic infections transcends mere health concerns. The prevalence of these infections can catalyze a cycle of malnutrition, reduced productivity, and impaired cognitive development. This research underscores the need for comprehensive programs that encompass health, education, and socio-economic development, recognizing the intricate interconnections between these facets of community well-being.

In conclusion, this research paints a vivid picture of the multifaceted challenges posed by parasitic infections in rural communities. By meticulously examining prevalence rates, gender disparities, age-related trends, and the dominance of specific species, this study provides a robust foundation for informed interventions. These insights empower policymakers, healthcare professionals, and community leaders to adopt a holistic approach that combats the burden of parasitic infections and paves the way for healthier and thriving rural populations.

In conclusion, this research project has shed light on the incidence of parasitic infections among individuals living in rural areas. Through our study, we have gained valuable insights into the prevalence, distribution, and impact of parasitic infections in these communities.

Our findings indicate that parasitic infections remain a significant public health concern in rural areas. The high incidence rates we observed highlight the need for targeted interventions and improved healthcare services to mitigate the burden of these infections. Factors such as poor sanitation, limited access to clean water, inadequate hygiene practices, and close contact with animals contribute to the increased risk of parasitic infections in rural settings.

Furthermore, our research underscores the importance of education and awareness programs to promote preventive measures and early detection of parasitic infections. By empowering individuals with knowledge about proper hygiene practices, sanitation, and the importance of seeking medical attention, we can work towards reducing the incidence of these infections and improving overall community health.

Additionally, our study has identified Ascaris lumbricoides and trichuris trichiura that are prevalent in rural areas, providing valuable information for healthcare providers and policymakers to develop targeted treatment and control strategies. It is crucial to implement comprehensive surveillance systems and regular screening programs to identify and treat infected individuals promptly.

CONCLUSION

This research highlights the urgent need for comprehensive public health interventions to address parasitic infections among individuals living in rural areas. By implementing preventive measures, enhancing healthcare infrastructure, and promoting community engagement, we can strive towards reducing the burden of parasitic infections and improving the overall well-being of these vulnerable populations.

ACKNOWLEDGMENTS : We wish to express our profound gratitude to the loving people of the Abraka community for their willingness to participate in this study. We also acknowledge all the authors whose research was cited.

CONFLICT OF INTEREST : None

FINANCIAL SUPPORT : None

ETHICS STATEMENT : All ethical considerations of this research were observed and followed accordingly.

REFERENCES

1. Packi K, Rudek A, Matysiak J, Klimczak S, Matuszewska E, Rzetecka N, et al. Food Allergies and Parasites in Children. Foods. 2023;12(13):2465. doi:10.3390/foods12132465
2. World Health Organization. Soil-transmitted helminth infections. Geneva, Switzerland: World Health Organization; 2018, [updated 2022; cited 4th Nov 2020]. Available from: https://www.int/news-room/fact-sheets/details/soil-tansmittedhelminth.
3. Ugochi UJ, Ifenyinwa MC, Ijeoma EN, Godson UM, Nwaku AI. Prevalence of intestinal parasites among primary school children in three geopolitical zones of imo state, Nigeria. Sci JPublic Health. 2015;3(5-1):25-8.
4. Veesenmeyer AF. Important Nematodes in Children. Pediatr Clin North Am. 2022;69(1):129-39. doi:10.1016/j.pcl.2021.08.005
5. Mukutmoni M, Liza FT, Parvin RA, Nath TC. Perceptions and practices of urban slum-dwelling women concerning soil-transmitted helminths infections in Bangladesh: A cross-sectional study. Parasite Epidemiol Control. 2023;21:e00291. doi:10.1016/j.parepi.2023.e00291
6. Mahni MB, Rezaeian M, Kia EB, Raeisi A, Khanaliha K, Tarighi F, et al. Prevalence of intestinal parasitic infections in Jiroft, Kerman Province, Iran. Iran J Parasitol. 2016;11(2):232-8.
7. Adjobimey T, Meyer J, Hennenfent A, Bara AJ, Lagnika L, Kocou B, et al. Negative association between ascaris lumbricoides seropositivity and Covid-19 severity: insights from a study in Benin. Front Immunol. 2023;14:1233082. doi:10.3389/fimmu.2023.1233082

8. Chicca J, Cazeault NR, Rus F, Abraham A, Garceau C, Li H, et al. Efficient and Scalable Process to Produce Novel and Highly Bioactive Purified Cytosolic Crystals from Bacillus thuringiensis. Microbiol Spectr. 2022;10(4):e02356-22. doi:10.1128/spectrum.02356-22
9. Avokpaho EF, Houngbégnon P, Accrombessi M, Atindégla E, Yard E, Rubin Means A, et al. Factors associated with soil-transmitted helminths infection in Benin: Findings from the DeWorm3 study. PLoS Negl Trop Dis. 2021;15(8):e0009646. doi:10.1371/journal.pntd.0009646
10. Eyayu T, Yimer G, Workineh L, Tiruneh T, Sema M, Legese B, et al. Prevalence, intensity of infection and associated risk factors of soil-transmitted helminth infections among school children at Tachgayint woreda, Northcentral Ethiopia. Plos One. 2022;17(4):e0266333. doi:10.1371/journal.pone.0266333
11. Hemmati N, Razmjou E, Hashemi-Hafshejani S, Motevalian A, Akhlaghi L, Meamar AR. Prevalence and risk factors of human intestinal parasites in Roudehen, Tehran province, Iran. Iran J Parasitol. 2017;12(3):364.
12. Watson J, Osman IM, Amon-Tanoh M, Deola C, MacDougall A, Cumming O. A cluster-randomised controlled equivalence trial of the Surprise Soap handwashing intervention among older children living in a refugee settlement in Sudan. BMJ Glob Health. 2023;8(10):e012633. doi:10.1136/bmjgh-2023-012633
13. Garn JV, Wilkers JL, Meehan AA, Pfadenhauer LM, Burns J, Imtiaz R, et al. Interventions to improve water, sanitation, and hygiene for preventing soil-transmitted helminth infection. Cochrane Database Syst Rev. 2022;6(6):CD012199. doi:10.1002/14651858.CD012199.pub2
14. Hailegebriel T. Prevalence of intestinal parasitic infections and associated risk factors among students at Dona Berber primary school, Bahir Dar, Ethiopia. BMC Infect Dis. 2017;17(1):1-8.