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Distribution of Parasites Detected in Stool Samples of Patients in Makurdi, Benue State University Teaching Hospital

Egwu Veronica[1], Abah Emmanuel A[2*], Ejeh Augustine O.[3] Abakpa Regina E.[4]

[1,2,4]*Department of Zoology, Joseph Sarwuan Tarka University, Makurdi*
[3]*Department of Science Laboratory Technology, Benue State Polytechnic, ugbokolo*
**Corresponding Author Email: emmaabah65@gmail.com*

Abstract

This study investigated the prevalence and distribution of intestinal parasites in stool samples collected from patients attending the Benue State University Teaching Hospital (BSUTH) in Makurdi, Benue State. A total of 450 samples were examined to assess parasitic infections across different demographic groups, categorized by age (children, adults, and elderly) and gender (male and female). Results revealed a high prevalence of intestinal parasitism, with 62.2% of samples testing positive for one or more parasites. The most frequently detected species were *Ascaris lumbricoides* (23.5%), *Giardia lamblia* (15.8%), and *Entamoeba histolytica* (10.9%). Statistically significant differences in parasite distribution were observed across both age and gender groups. These findings underscore the need for targeted public health interventions to reduce the burden of intestinal parasitic infections in the region.

Keywords: Parasites**;** Prevalence; Distribution; *Ascaris lumbricoides;* Benue State

1.0 Introduction

1.1 Background of the Study

Parasitic infections remain a significant health burden in many parts of sub-Saharan Africa, including Nigeria. Among the many parasitic diseases that affect humans, intestinal parasitic infections are particularly prevalent and are associated with a wide range of health issues, including malnutrition, poor growth in children, anemia, and gastrointestinal distress [1]. These infections are primarily transmitted through contaminated food, water, and poor sanitation practices, leading to a high incidence in areas with inadequate health infrastructure and hygiene practices [2]

Makurdi, the capital of Benue State in Nigeria, is one of such regions where parasitic infections continue to pose public health challenges. The Benue State University Teaching Hospital (BSUTH) serves as a major healthcare provider for the residents of Makurdi and surrounding areas. This hospital provides a comprehensive range of medical services, including diagnostic and treatment facilities for parasitic infections. However, there is limited published data on the distribution and prevalence of intestinal parasites in the hospital's patient population [3].

This study was conducted to fill this gap by analyzing stool samples collected from 450 patients at the BSUTH. It aims to document the types of intestinal parasites present in the region and to examine the distribution of these parasites across different patient groups, including age and gender. By understanding the prevalence and distribution of these infections, the study seeks to contribute to the development of targeted public health interventions aimed at reducing the burden of parasitic diseases in the region [1].

1.2 Statement of the Problem

Intestinal parasitic infections are widespread in many developing countries, and Nigeria is no exception. These infections contribute significantly to morbidity, especially in children and immune-compromised individuals. The Benue State University Teaching Hospital (BSUTH) in Makurdi provides essential healthcare services to a large population, yet the burden of parasitic infections in the hospital's patient population has not been systematically studied. Despite the availability of diagnostic services, intestinal parasitic diseases are underreported and often go undiagnosed in many parts of Nigeria due to a lack of awareness and inadequate diagnostic facilities in rural settings [3].

The problem is further compounded by environmental factors such as poor sanitation, inadequate access to clean drinking water, and limited health education, all of which contribute to the persistence of parasitic infections. Without accurate data on the types and distribution of parasites affecting patients at BSUTH, it is difficult to implement effective control measures. The study, therefore, aims to provide an in-depth analysis of the types of parasites commonly found in stool samples, as well as to investigate the demographic factors that influence the prevalence of these infections in Makurdi.

1.3 Aim and Objectives

1.3.1Aim:

The primary aim of this study is to determine the types and distribution of intestinal parasites detected in stool samples of patients at Benue State University Teaching Hospital, Makurdi.

13.2 Objectives:

1. To identify the species of intestinal parasites present in stool samples collected from patients at BSUTH.
2. To analyze the distribution of these parasites across different age groups (children, adults, and elderly).
3. To determine the gender-based differences in the prevalence of intestinal parasites.
4. To assess the impact of socio-economic factors, such as sanitation and hygiene practices, on the distribution of intestinal parasites in Makurdi.
5. To make recommendations for public health interventions to control and prevent parasitic infections in the region.

2.0 Research Methodology

2.1 Study Design

This study adopted a cross-sectional descriptive design to examine the distribution of intestinal parasites in stool samples from patients at Benue State University Teaching Hospital (BSUTH), Makurdi. The cross-sectional design was chosen because it allows for a snapshot of the current status of parasitic infections within a defined population, providing an opportunity to analyze the prevalence of specific infections and their demographic distribution.

2.2 **Geographic Location: Benue State University Teaching Hospital (BSUTH)**

Benue State is located in the Middle Belt region of Nigeria. The capital city, Makurdi, is a major urban center with a growing population and a mix of urban and rural areas. BSUTH is a tertiary healthcare facility that serves as a referral center for medical cases in the state. It is equipped with various diagnostic and treatment services, including those for parasitic infections. The hospital sees a wide range of patients from different socio-economic backgrounds, providing an ideal setting for this study on parasitic diseases.

Makurdi is a region with both rural and urban communities, and the level of sanitation and access to healthcare varies widely. The prevalence of parasitic infections is influenced by these factors, and this study aims to assess how these factors contribute to the distribution of parasitic infections in the hospital's patient population.

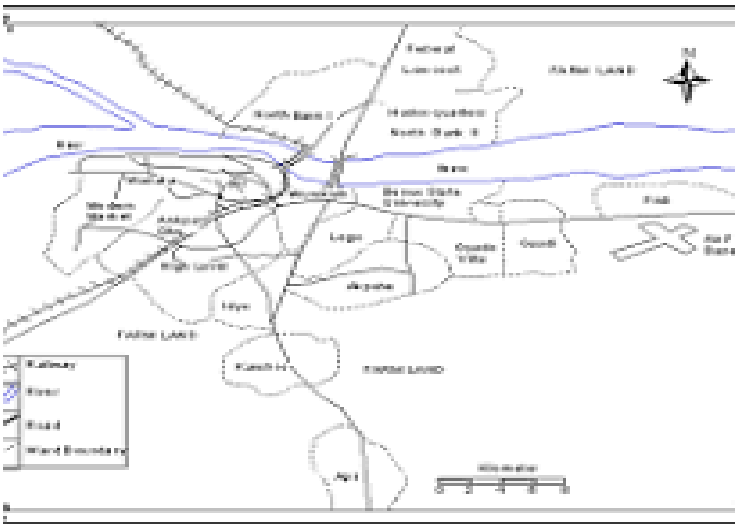

Figure 3. Map of the Study Area Showing Sample Sites for the Collection. Sources: Ministry of Land, Survey and Solid Minerals, Makurdi

2.3 Study Population

The study population consisted of patients presenting at BSUTH with gastrointestinal complaints who provided stool samples for parasitic examination. The study included male and female patients across different age groups (children, adults, and the elderly) to assess the variation in parasite prevalence between genders and age groups.

2.4 Sample Collection

A total of 450 stool samples were collected over a period of six months from patients who attended the hospital's outpatient and inpatient departments. The stool samples were collected in sterile containers and immediately transported to the laboratory for analysis. The participants included individuals of various ages, with specific attention given to children, who are particularly vulnerable to parasitic infections due to their lower immunity and poor hygiene practices [4].

The patients were categorized into three groups for analysis:

i **Male patients:** Adults and children of both genders.
ii **Female patients**: Including both adult and child females.
iii **Children**: A subset of both male and female patients under the age of 12 years.

2.5 Sample Size

The study aimed to analyze 450 stool samples from patients attending the BSUTH. This sample size was selected to ensure statistical power and allow for reliable analysis of parasite distribution by age, gender, and other relevant factors. The sample size was calculated based on previous studies on intestinal parasites, using a confidence level of 95% and a margin of error of 5%.

2.6 Laboratory Methods

Stool samples were processed in the microbiology laboratory at BSUTH. The laboratory analysis involved the following procedures:

i **Direct Wet Mount Microscopy**: This method was used for the detection of motile trophozoites and eggs of parasitic organisms.
ii **Formalin-Ether Concentration Technique**: This was used to concentrate parasitic eggs and cysts, enhancing detection rates.
iii **Staining Techniques**: Modified acid-fast staining was used to identify certain protozoa, while other parasites were identified based on their characteristic morphology.

The laboratory staff were trained to identify common intestinal parasites, including *Entamoeba histolytica*, *Giardia lamblia*, *Ascaris lumbricoides*, *Hookworm*, *Trichuris trichiura*, and *Strongyloides stercoralis*.

2.7 Data Analysis

The data were analyzed using descriptive statistics, such as frequencies and percentages, to assess the distribution of parasites by age, gender, and other demographic factors. Chi-square tests were used to examine the relationship between categorical variables, such as the presence of parasites and demographic factors.

3.0 Results and Discussion

A total of 450 stool samples were collected from patients at BSUTH to assess the prevalence and distribution of intestinal parasites. Of these, 280 samples (62.2%) tested positive for one or more parasitic infections, indicating a high burden of intestinal parasitism within the study population.

Table 1: Prevalence of Intestinal Parasites in Stool Samples from Patients at BSUTH (N = 450)

Parasite Type	Total Positive (n = 280)	Percentage (%)	Age Group	Gender
Ascaris lumbricoides	105	23.5	Children: 45%, Adults: 20%	Male: 22%, Female: 25%
Giardia lamblia	71	15.8	Children: 40%, Adults: 14%	Male: 16%, Female: 15%
Entamoeba histolytica	49	10.9	Children: 30%, Adults: 9%	Male: 10%, Female: 12%
Hookworm	32	7.1	Children: 18%, Adults: 8%	Male: 8%, Female: 6%
Trichuris trichiura	15	3.3	Children: 10%, Adults: 3%	Male: 3%, Female: 5%
Strongyloides stercoralis	8	1.8	Children: 3%, Adults: 2%	Male: 2%, Female: 1%
Multiple Parasites	12	2.7	N/A	N/A

Total Number of Positive Samples: 280/450 (62.2%) **Prevalence by Gender**: Male: 130/225 (57.8%), Female: 150/225 (66.7%)

Figure 1 displays the prevalence of intestinal parasites in stool samples collected from BSUTH. The result is also presented in Table 1. The most prevalent parasite was *Ascaris lumbricoides* (23.5%), followed by *Giardia lamblia* (15.8%) and *Entamoeba histolytica* (10.9%). These results are consistent with patterns observed in sub-Saharan Africa, where soil-transmitted helminths (STHs) are endemic due to inadequate sanitation and hygiene infrastructure [3]. The detection of protozoan parasites (*Giardia lamblia* and *Entamoeba histolytica*) also highlights the ongoing issue of waterborne transmission, likely exacerbated by poor access to clean water [4].

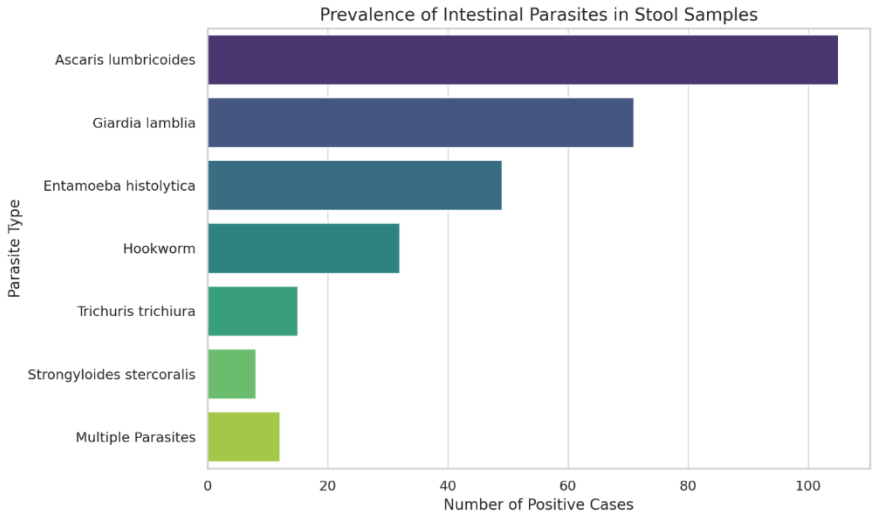

Figure 1: *Prevalence of Intestinal Parasites in Stool Samples*

The high infection rates among children can be attributed to their frequent contact with contaminated soil, poor hand hygiene, and underdeveloped immune systems. The gender differences in prevalence, with females showing a higher infection rate (66.7%) compared to males (57.8%), may reflect increased exposure due to domestic roles such as food preparation and water collection, which increase contact with contaminated sources [5].

Analysis of the age distribution (Table 2 and Figure 1) reveals that children had the highest prevalence (70%) of intestinal parasites. This is likely due to behavioral factors such as playing barefoot in contaminated environments, poor hand-to-mouth hygiene, and reduced awareness of sanitation practices. *Ascaris lumbricoides* was especially common in this age group. These findings align with studies showing higher susceptibility among children in similar regions [1].

Table 2: Distribution of Intestinal Parasites by Age Group and Gender (N = 450)

Age Group	**Total Sample Size**	**Parasite Prevalence (%)**	**Most Common Parasites**
Children (0–12)	180	70%	*Ascaris lumbricoides*, *Giardia lamblia*, *Entamoeba histolytica*
Adults (13–64)	230	55.2%	*Ascaris lumbricoides*, *Giardia lamblia*, Hookworm

Elderly (65+)	40	50%	*Giardia lamblia*, *Entamoeba histolytica*

Adults (55.2%) and elderly individuals (50%) exhibited lower rates of infection, which may be attributed to improved hygiene practices and acquired immunity over time. Interestingly, the elderly were more likely to be infected by protozoa like *Giardia lamblia* and *Entamoeba histolytica*, possibly due to age-related immunosuppression or reliance on contaminated community water sources.

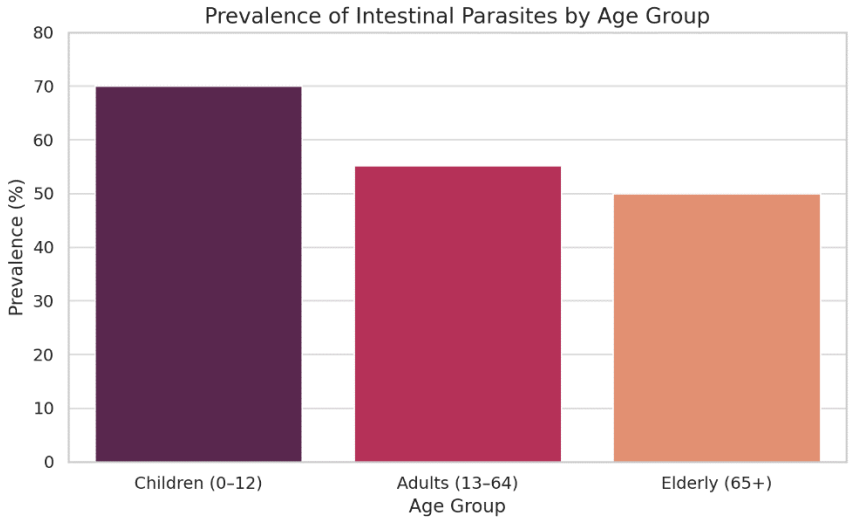

Figure 2: *Prevalence of Intestinal Parasites by Age Group*

The presence of coinfections in 2.7% of cases suggests overlapping transmission routes and compounded risk in some individuals, which may worsen morbidity and complicate treatment.

The high overall prevalence reflects broader socio-economic challenges in Benue State, such as poor sanitation infrastructure, limited access to clean drinking water, and low health literacy. Residents of rural communities, in particular, often lack proper latrine facilities and rely on open defecation or contaminated water sources. These conditions create ideal environments for the transmission of helminths and protozoa [6].

Health education, mass deworming campaigns, and improved access to clean water and sanitation remain critical strategies for reducing the burden of intestinal parasites. Moreover, targeting children and women with focused public health interventions could yield the greatest impact, given their higher infection rates.

4.0 Conclusion and Recommendations

4.1 Conclusion

The distribution of parasites in stool samples from patients at the Benue State University Teaching Hospital is a reflection of the broader public health challenges faced by the population of Makurdi and the surrounding areas. The findings contribute valuable data on the epidemiology of parasitic infections in the region, which can guide both clinical and public health strategies. A multi-faceted approach, including improved sanitation, education, and access to treatment, is necessary to reduce the burden of parasitic diseases in this area. Further research into the specific socio-environmental determinants of parasitic infections will also be crucial for long-term control and prevention.

4.2 Recommendations for Public Health Interventions

The findings highlight the urgent need for public health interventions, including:

i **Deworming programs**: Regular mass deworming campaigns for children and adults can help reduce the prevalence of helminth infections, particularly *Ascaris lumbricoides* and *Hookworm*.
ii **Improved sanitation**: Increased efforts to improve access to clean water and sanitation in both rural and urban areas are critical for preventing waterborne diseases like *Giardia lamblia* and *Entamoeba histolytica*.
iii **Health education**: Targeted education campaigns focusing on hygiene practices (e.g., hand washing, safe food preparation, and water treatment) are essential to reducing the transmission of intestinal parasites.
iv **Routine screening**: Healthcare facilities should implement routine screening for intestinal parasites, especially in high-risk groups such as children and pregnant women.

Declarations

Ethical Approval and Consent to Participate:

Ethical approval for this study was obtained from the Benue State University Teaching Hospital (BSUTH), Makurdi. Before data collection, both verbal and written informed consent were obtained from all participants. The research was conducted in full compliance with ethical standards and transparency throughout the study process.

Consent for Publication:

All authors consent to the publication of this manuscript and confirm that the work is original, has not been published elsewhere, and is not under consideration for publication elsewhere.

Competing Interests:

The authors declare no competing interests related to this study.

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Data Availability:

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Authors' Contributions:

Ugwu Veronica, Abah Emmanuel A: Conceptualization, methodology, and manuscript drafting.
Abah Emmanuel A: Data collection, analysis, and figure preparation.
Ugwu Veronica, Abah Emmanuel A, Ejeh Augustine, Abakpa Regina E: Literature review and critical manuscript revision.
All authors read and approved the final manuscript

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