Research article

Seasonal Variations in the Prevalence of Intestinal Parasites in Pediatric Patients at Sacré Cœur Pediatric Center in Guinea-Conakry

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Background. **Intestinal parasites are a major cause of illness and death among children worldwide, especially from resource-poor areas. However, limited pediatric data from these regions make the true prevalence unknown. The goal of this study was to determine the current rate of intestinal parasites in pediatric patients with a high likelihood of infection seen at Sacré Cœur Pediatric Center in Guinea-Conakry, West Africa, during wet and dry season (2024-2025).**

Materials and Methods. **The laboratory used direct microscopy to examine stool samples for parasites and a lateral flow device (Operon, Inc., Spain) to detect the three most common intestinal protozoa reported in the region: *Cryptosporidium* spp., *Entamoeba histolytica*, and *Giardia duodenalis*.**

Results. **Microscopy consistently showed low levels of *Schistosoma mansoni* (4-7%), hookworms (0. 0.7-1%), and *Ascaris* spp. (1-4%) in both seasons. The prevalence of Ascaris *lumbricoides* was higher during the dry season ($p = 0.04$). The incidence of intestinal protozoa in the seasons was as follows: *G. duodenalis* (28. 7% during rainy vs. 14. 1% during dry), *E. histolytica* (10. 2% vs. 1. 5%), and *Cryptosporidium* spp. (14. 6% vs. 3. 0%). The prevalence of all protozoa was greater during the rainy season ($p < 0.001$). Eight percent of samples contained multiple protozoa.**

Conclusion. **This study highlights a significant burden and seasonality of parasitic infections among pediatric patients. These findings will help improve clinical care in the region and aim to enhance children's health and preventable deaths.**

Keywords: *Guinea-Conakry, protozoal infections, Cryptosporidium, Entamoeba; Giardia*

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Introduction

Intestinal parasitic infections are a widespread issue globally, mainly affecting school-aged children. In some areas, prevalence can surpass 50%.[1] According to the World Health Organization, over 1.5 billion people worldwide are infected with intestinal parasites, with 450 million experiencing severe illness and approximately 155,000 deaths annually attributed to these infections.[2]In subtropical and tropical regions, these infections are endemic and are leading causes of disease and death.[3,4] Among children under five years of age, diarrheal diseases are linked to poor growth, impaired cognitive development, and mortality.[5-12] Low- and middle-income countries, especially in sub-Saharan Africa, South and Central America, China, and East Asia, are most impacted by these infections.[1,12] While soil-transmitted helminths such as *Ascaris lumbricoides, Ancylostoma duodenale*, and *Trichuris trichiura* are responsible for many cases, protozoa also significantly contribute.[12] Notable intestinal protozoans include *Entamoeba histolytica, Giardia duodenalis, Blastocystis* spp., and *Cryptosporidium* spp.

Throughout much of Africa, reliable epidemiological data on parasitic intestinal infections is limited, mainly due to underreporting. However, some studies show a high prevalence of intestinal parasites with regional differences. For example, an overall positivity rate of 84.7% was reported in a study from Burkina Faso[13], 15.8% in Senegal[14], and 55.2% in Côte d'Ivoire[15]. Other African countries also report prevalence above 40%, such as Mozambique, where the most common parasites were *A. lumbricoides* (65.8%), *T. trichiura* (54.0%), hookworms (38.7%), *Entamoeba* spp. (31.2%), *Giardia duodenalis*(19.0%), *Taenia* spp. (5.8%), and *Hymenolepis nana* (5.2%). A study by Adoubryn and colleagues in Côte d'Ivoire found a high prevalence of helminths, including *Schistosoma mansoni* (35.5%), *Necator Americanus* (25.9%), and *A. lumbricoides* (5.2%).[15]

The main goal of this study was to determine the point prevalence of intestinal parasites in pediatric patients with a high pre-test probability of parasitic infection seen Sacré Cœur Pediatric Center in Guinea-Conakry (The Republic of Guinea), West Africa, during two periods: June–August 2024 (rainy season) and November 2024–February 2025 (dry season).

Material and Methods

For this study, the Sacré Cœur laboratory used a) direct microscopy to examine stool for ova and parasites and b) a lateral flow device to detect the three most common intestinal protozoa previously reported in the region: *Cryptosporidium* spp., *E. histolytica, and G. duodenalis.*

Study environment

Dubréka is an urban community situated in Lower Guinea within the Dubréka prefecture of the Kindia region. It lies about 50 miles north of Conakry, the capital of Guinea. Located between the Kogon River to the east and the Fouta Djallon mountains to the west, Dubréka spans roughly 3,350 square kilometers. The area includes urban, rural, and semi-rural zones, with landscapes that range from coastlines to mountains and forests. The population is estimated at 100,000 to 120,000 people, representing various ethnic groups such as the Malinké, Peulh, and Soussous. The city features densely populated neighborhoods as well as nearby rural areas involved in activities like rice farming and logging.

Sample collection

If indicated by a clinical order, a small amount (10-15 g) of fresh stool was collected from each patient in a labeled sterile container. Direct microscopy was the standard of care for patients with a clinical concern for parasitic infection. Samples with sufficient material were anonymized and included in the lateral flow testing part of the research protocol.

Microscopy

Approximately 1-2 g of fresh stool was mixed with a Lugol iodine solution on a microscope slide. The stool samples were then observed at 100 and 400x for cysts, trophozoites, oocysts, and helminth eggs.

Lateral Flow Assay

The Simple Crypto-Giardia-Entamoeba 4R test (Operon, Inc., Zaragoza, Spain) was performed following the package insert. In brief, the included test vial collection stick was used to pick up approximately 75 mg of stool. The sample was added to the dilution buffer vial and shaken vigorously to ensure homogenization. The top seal was broken on the vial, and four drops of sample were added to the reaction zones of each of the two strips. Results were read and recorded at 15 minutes.

Statistical analysis

Demographic information was assessed and mean age of patients as well as sex ratio were calculated. Chi-square analysis was used to evaluate the significance of difference in the point prevalence of each parasite between wet and dry seasons. Statistical significance was defined as a p-value of <0.05.

Results

Demographics

The patient age in this study ranged from one month to 29 years. The mean and median age were 7.2 and 6 years, respectively, with a standard deviation of 5.2 years. The patients tested were 55% (n = 223) male and 45% (n = 180) female.

Microscopy Results

A total of 507 microscopic samples were analyzed over two seasons: the rainy season (June 10, 2024 – August 5, 2024) and the dry season (December 10, 2024 – February 4, 2025). During the rainy season, 306 samples were examined microscopically, with 21 (6.9%) testing positive for parasites (Table 1). In this period, 12 samples (3.9%) were positive for *S. mansoni*, three for *A. lumbricoides*, two each for *S. stercoralis*, hookworms, or *Balantioides coli*, and none for *H. nana*.

During the dry season, 198 samples were examined using microscopy with 26 (13.1%) testing positive for parasites (Table 1). Of these, 14 samples (7.1%) contained *S. mansoni*, 8 (4.0%) had *A. lumbricoides*, and two were positive for hookworms or *H. nana*. *S. stercoralis* and *B. coli* were not detected.

Using microscopy, *S. mansoni* and *A. lumbricoides* were more prevalent in dry seasons. The point prevalence of *A. lumbricoides* was significantly higher in the dry season than the rainy season (p = 0.04). For more detailed results from the stool analyses, see Table 1.

Table 1. Percentage of samples positive by microscopy (n=507)

Parasite	Rainy Season (n=306)	Dry Season (n=198)	p-value
Schistosoma mansoni	12 (3.9%)	14 (7.1%)	0.175
Strongyloides stercoralis	2 (0.7%)	0	0.679
Hookworm	2 (0.7%)	2 (1.0%)	1
Balantioides coli	2 (0.7%)	0	0.679
Ascaris lumbricoides	3 (1.0%)	8 (4.0%)	0.047
Hymenolepis nana	0	2 (0.1%)	0.3
Total	21 (6.9%)	26 (13.1%)	

Lateral Flow Results

403 lateral flow assays were evaluated across two seasons: the rainy season (June 10, 2024 – August 5, 2024) and the dry season (December 10, 2024 – February 4, 2025). During the rainy season, 65 specimens (31.7%) tested positive by lateral flow assay (Table 2). Of these, 59 (28.7%) were positive for *G. duodenalis*, 21 (10.2%) were positive for *E. histolytica*, and 30 (14.6%) were positive for *Cryptosporidium* spp. Notably, 15 specimens were positive for all three parasites, and 10 were positive for two parasites.

During the dry season, 37 specimens (18.7%) tested positive with the lateral flow assay. Of these, 28 (14.1%) were positive for *G. lamblia*, 3 (1.5%) for *E. histolytica*, and 6 (3.0%) for *Cryptosporidium spp*. Four specimens tested positive for all three parasites, and two were positive for two parasites.

When comparing prevalence between the wet and dry seasons using the lateral flow assay, all three parasites showed significant differences in occurrence, as determined by chi-square analysis. *G. duodenalis*, *E. histolytica*, and *Cryptosporidium spp.*, with p-values less than 0.001, indicated a consistently higher occurrence of these parasites during the rainy season.

Table 2. Percentage of samples positive by lateral flow assay (n=403)

Parasite	Rainy Season (n=205)	Dry Season (n=198)	p-value
Giardia duodenalis	59 (28.7%)	28 (14.1%)	<0.001
Entamoeba histolytica	21 (10.2%)	3 (1.5%)	<0.001
Cryptosporidium parvum	30 (14.6%)	6 (3.0%)	<0.001
Total	65 (31.7%)	37 (18.7%)	

Discussion

This is the first modern study to describe seasonal differences in intestinal parasitic infections in children of Guinea, West Africa. Findings from this study also support previous reports on the burden of intestinal parasites of children in West Africa. These results are notable in the context that although temperatures vary by region in Guinea, there is little variation throughout the year, with temperatures between 28-32°C. The seasons are divided into the dry season, which lasts approximately from December through May each year, and the rainy season, which lasts approximately from June through November. At the height of the rainy season, precipitation can exceed 30 inches of rainfall per month in some areas.[16,17]

There is a risk of acquiring intestinal parasites during both the rainy and dry seasons. During the rainy season, increased precipitation can cause flooding and runoff, which carry sewage, chemicals, and other agents that cause enteric diseases into contact with humans.[18] The prevalence of diarrheal diseases often peaks during rainy seasons in tropical and subtropical climates.[19-23] However, during the dry season, drought may concentrate enteric pathogens in limited water sources, and high temperatures may cause people to seek out and consume water from these sources.[18] In this study, the parasites *G. duodenalis*, *E. histolytica*, and *Cryptosporidium spp.* were found at significantly higher rates during the rainy season than during the dry season, while *A. lumbricoides* was detected at significantly higher rates during the dry season.

Efforts to reduce rates of communicable diseases, including diarrheal illnesses, have included programs such as Safe Water, Sanitation, and/or Hand Washing (safe WASH) interventions.[24-25] In 2019, it was estimated that approximately 1.4 million people die each year due to unsafe drinking water, inadequate sanitation, and poor hygiene practices.[26] The 2030 Agenda for Sustainable Development Goal 6 aims to 'ensure availability and sustainable management of water and sanitation for all' and includes targets for universal access to safe drinking water, sanitation, and hygiene.[27] As of 2023, although there has been progress with global efforts in safe drinking water, sanitation, and hygiene, achieving Sustainable Development Goal 6 universally will require a six-fold increase in current rates of progress.[25,27]

The limitations of this study include small sample sizes collected for analysis. Further research is needed to strengthen these findings and make them applicable across the region. Since different areas in Guinea experience varying seasonal rainfall, additional studies are necessary to identify any regional differences in intestinal parasite prevalence. Understanding local epidemiology is essential for guiding healthcare providers in managing patients effectively, thereby reducing morbidity and mortality from diarrheal diseases. Another limitation is the absence of clinical data regarding outcomes. Although each sample was taken from a symptomatic child, it was not recorded whether the child survived, died, or lived with comorbidities.

This study was designed, conducted, analyzed, and written up in collaboration with local partners at the field site, where the idea for the work was inspired by the need to understand the local epidemiology of diarrheal illnesses in children. To the authors' knowledge, this study is the first to describe seasonal variation in intestinal parasite prevalence in Guinea, which will help local providers and patients improve management and recovery.

Conclusion

Diarrheal disease is a leading cause worldwide of illness and death among children under the age of five years. The burden mainly affects children in low- and middle-income countries. This study reports the local prevalence of intestinal parasites in children with diarrhea who visited a pediatric clinic in Guinea. Results show seasonal variation, with some parasites being more common during the rainy season. Further research is needed to confirm these epidemiological findings and to improve prevention strategies through safe WASH initiatives. Diarrheal illnesses are preventable, and increased efforts are essential to reduce the yearly morbidity and mortality, especially among the most vulnerable.

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