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PREVALENCE OF GASTROINTESTINAL AND URINARY TRACT PARASITES AMONG STUDENTS OF ISAAC JASPER BORO COLLEGE OF EDUCATION SAGBAMA, BAYELSA STATE, NIGERIA

[1]*LeBari Barine Gboeloh, [2] Ayibadinipre Jennis Gbeghebo

[1]Ignatius Ajuru University of Education, P.M.B 5047, Rumuolumeni, Port Harcourt, Nigeria.
[2]Isaac Jasper Boro College of Education, P.M.B 74, Sagbama, Bayelsa State.

ABSTRACT

The prevalence of gastrointestinal and urinary tract parasites among students of Isaac Jasper Boro College of Education (IJBCOE), Bayelsa State was investiagted. Faecal and urine samples were collected from 273 presumably healthy students of the college. The samples were analyzed in the laboratory using sedimentation method for urine and formol-ether concentration method for the stool samples. A self-structured questionnaire was used to obtain some risk factors associated with the transmission of the parasites. Out of the 273 students investigated, 60 (22.0%), 31(11.4%) and 12(4.4%) were positive for gastrointestinal parasites, urinary tract parasites and coinfection of gastrointestinal and urinary tract parasites respectively. *Entamoeba histolytica* recorded the highest prevalence among the gastrointestinal parasites identified (62%), followed by *Entamoeba coli* (18.3%), *Giardia lamblia* (11.7%), *Blastccytis homonis* (5%), and *Enterobius vermicularis* (3.3%). Among the two urinary tract parasites identified, *Trichomonas vaginalis* was more prevalent (90.3%) while *Schistosoma haematobium* had 9.7%. More Female students (37.8%) were infected than males (25.7%) by gastrointestinal parasites. The age range prevalence for gastrointestinal parasites recorded 45%, 37.3%, 28.3% and 25% for 26 - 30 years, 16 – 20 years, 21 – 25 years, and 31 – 35 years respectively. Lack of awareness, consumption of faecal matter-contaminated food and water, poor sanitation, defaecation into drinking water sources were identified as risk factors for gastrointestinal parasites while engagement in unprotected sex and multiple sexual partners were recorded as risk factors for the transmission of *Trichomonas vaginalis*. Increased personal hygiene and sanitation, provision of toilet facilities and health education will mitigate the prevalence of the parasites in the study area.

Keywords: Prevalence, Gastrointestinal Parasites, Urinary tract parasites, IJBCOE, Bayelsa State.

***Correspondence to Author:**
LeBari Barine Gboeloh
Ignatius Ajuru University of Education, P.M.B 5047, Rumuolumeni, Port Harcourt, Nigeria.

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INTRODUCTION

Gastrointestinal parasites are mainly parasites of the gastrointestinal tract, they are typically protozoa and helminthes [1]. Records indicated that an estimated 65,000 species of protozoa occur in water and on land with over 100,000 species adopting the parasitic or symbiotic mode of interaction [2]. Gastrointestinal parasitic infections have widespread distribution and are prevalent occur in the poor regions of America, Asia and sub-Saharan Africa, where there is inadequate supply of potable water, personal hygiene and environmental cleanliness [3] . The most common gastrointestinal parasites include *Taenia* spp*, Ascaris lumbricoides, Strongyloides stercoralis* hookworms and *Schistosoma* spp*,* while protozoa include *Toxoplasma gondii, Giardia lamblia, Entamoeba histolytica* and *cryptosporidium parvum* [4]. These gastrointestinal parasites are serious public health concern and they constitute a leading cause of morbidity [5,6,7]. In 2010, about 438.9 million people were reportedly at risk of hookworm, 819.0 million and 464.6 million were also at risk of *Ascaris lumbricoides* and *Trichuris trichiura* respectively [8,9]. [3] reported that about 1.5 billion people globally are disease-ridden with soil-transmitted helminthes and that at least 218 million people need preventive treatment for schistosomiasis in 2015.

Gastrointestinal parasitic infections have been implicated in causing increased ill health among children in school and adult females during child bearing [10]. Children are commonly affected due to their susceptibility to poor nutrition. Apart from causing morbidity and mortality, gastrointestinal parasitic infections especially helminthes have been associated with a higher threat of nutritional anaemia [11], undernourishment, development deficits and poor educational achievements, change in resistance and immune impotence and poor cognitive skill [12, 13, 14].

In Nigeria, most human and animal waste are disposed into the soil and water bodies, environments that are suitable for the development of the parasites. This influences the transmission of the infective stages of these gastrointestinal parasites [15].

The most common urinary tract parasites infecting humans include *S. haematobium, T. vaginalis* and *W. bancrofti* [16]. The health problems generated by their presence in human systems range from discomfort to serious and debilitating conditions [17]. Trichomoniasis, the disease caused by *T. vaginalis* is a pluralistic disease [18], mostly transmitted through unprotected sexual intercourse and it is the third most common cause of vaginal symptoms behind bacterial vaginosis and candidiasis [19]. It could also be non-sexually transmitted through contact with formites and surfaces harbouring fluids from infected individuals including sharing of pants and other underwears with infected persons [18, 20]. The disease is one of the commonest treatable sexually transmitted infections affecting public health [21], it could cause secondary diseases such as pelvic inflammatory disease in women, defective and low sperm count in men and preterm labour [22, 23, 24]. The most cases, the presentation is asymptomatic in both males and females, hence it is not usually and easily diagnosed [18]. Women are however, more vulnerable than men and an estimated 180 million females are infected globally [25].

Although numerous researches have been directed towards the determination of the prevalence of gastrointestinal and urinary tract parasites in various regions of the Nigeria [26, 27, 28,29], there is presently no published evidence on the prevalence of gastrointestinal parasites among students in Isaac Jasper Boro College of Education, Sagbama. This study therefore, will provide a published evidence to guide gastrointestinal parasites control programme officers and policy makers in the area of study.

MATERIALS AND METHODS

Study Area

This study was carried out among students of Isaac Jasper Boro College of Education, Sagbama. Sagbama lies between latitude

5.1522°N and longitude 6.1925°E. It is the headquarters of Sagbama Local Government Area of Bayelsa State with a population of about 187,146 [30] and has an area of 945km^2 (365sqm). The major occupation of the people includes fishing, farming with few civil servants. The college lies on and it is located in a swampy area and is prone to perennial flooding and lacks good toilet sanitary facilities, the only source of water within the school is a bore hole from which the entire population obtain water for various activities. Hence, most staff and students resort to open defecation in nearby bushes. Presently, students are living in temporary hostel accommodation.

Study Population

Data obtained from the admission office as at the time of this research indicated that the college has a population of eight hundred and sixty-five (865) students. The students are spread within six faculties.

Sample size

Determination of the size of sample was done according to the formula of [31]:

$n=N/[1 +N (e)^2]$

Where:

n = Size of sample

N= Studied population (865)

$e= \frac{N}{\{1+ N(e)2\}}$

$n= \frac{865}{\{1+ 865\{0.05\}2\}}$

$n= \frac{865}{\{1+865 \text{ x } 0.0025\}}$

$n= \frac{865}{\{1+2.163\}}$

$n=\frac{865}{3.163}$

n= 273

Sample collection

Well labeled sterile bottles (1 each) were distributed to presumably healthy students of the college alongside a self-structured questionnaire to obtain data on age, sex, marital status, occupation, nature of toilet system, sanitation, personal hygiene and other risk factors and were trained collection their faeces. The retrieved samples were immediately conveyed to the General Hospital Laboratory Sagbama, for laboratory analysis.

Stool and urine analysis

The stool and urine samples were examined both macroscopically and microscopically.

Macroscopy: The stool samples were examined for colour, odour, texture, consistency (formed, soft, semi-soft and watery), presence of mucus or blood stains as well as the presence of segments or adult helminthes. While the urine samples were examined for their colour, clarity, turbidity and presence of blood cells.

Microscopic examination of stool samples: Parasitological investigation of stool samples was done using formol-ether concentration technique [32].

Microscopic examination of urine samples: Centrifugal sedimentation method by [32] was adopted to concentrate the parasites in the urine samples for microscopic investigation.

Ethical clearance

The ethical clearance for this work was approved by the Ministry of Health, Bayelsa State and the management of Isaac Jasper Boro College of Education, Sagbama, Bayelsa State. Each participant also gave a verbal/written consent.

RESULTS

Overall prevalence of gastrointestinal (GP) and urinary tract parasites (UTP), and coinfection of gastrointestinal and urinary tract parasites

The results indicated that out of the 273 students investigated for the presence of gastrointestinal and urinary parasites, 60 (22.0%), 31 (11.4%) and 12 (4.4%) were positive for gastrointestinal parasites, urinary tract parasites and coinfection of gastrointestinal and urinary tract parasites respectively. (Table 1).

Prevalence in relation to species of gastrointestinal and urinary tract parasites

The results of the examination of faecal samples revealed the presence of three genera of protozoa (*Entamoeba , Giardia, Blastocytis)* and a genus of nematode (*Enterobius*) while the urine test revealed the presence of two genera (*Schistosoma* and *Trichomonas*). The most prevalent among the gastrointestinal parasites was *Entamoeba histolytica* (62. %), followed by *Entamoeba coli* (18.3%), *Giardia lamblia* (11.7%), *Blastccytis hominis* (5%) and *Enterobius vernicularis* (3.3%). The prevalence of *E. histolytica* was statistically significance ($p<0.05$) compared to other parasites. The results further revealed that 31(11.4%) students were infected with either of two species of urinary tract parasites. *Trichomonas vaginalis* recorded a statistically prevalence ($p<0.05$) of 90.3% among the urinary tract parasites while *Schistosoma haematobium* recorded a prevalence of 9.7% among the urinary parasites identified (Table 2).

Table 1: Overall prevalence of gastrointestinal, urinary tract parasites and co-infection of gastrointestinal & urinary tract parasites (n = 273)

Nature of Infection	No. Infected (%)
Gastrointestinal Parasites	60 (22.0)
Urinary tract parasites	31 (11.4)
Co-infection of gastrointestinal & urinary tract parasites	12 (4.4)
Total	**103(37.7%)**

Table 2: Prevalence in relation to species of gastrointestinal and urinary tract parasites

Gastrointestinal Parasites	*Prevalence (%)*	Urinary Tract Parasites	*Prevalnece (%)*
Protozoa			
Entaemoeba histolytioca	37 (62)	*Trichomonas vaginalis*	28(90.3)
Entamoeba coli	11(18.3)	*Schistosoma haematobium*	3(9.7)
Blastocytis hominis	3(5)		
Gardia lamblia	7(11.7)		
Nematode			
Enterobius vermicularis			
Total	2(3.3)		
	60()		**31()**

Coinfection of gastrointestinal and urinary tract parasites among students of IJBCOE

The result of the examination of faecal and urine samples further indicated that 12(4.4%) students had co-infection of gastrointestinal and urinary tract parasites. Out of the 12 co-infected students, 5(1.8%) were co-infected with *E. histolytica* and *T. vaginalis*, 2(0.7%) were co-infected with *G. lamblia* and *T. vaginalis*, 1(0.4%), 1(0.4%), 3(1.1%) were co-infected with *E. histolytica* and *S. haematobium*, *B. hominis* and *T. vaginalis* and *E. coli* and *T. vaginalis* respectively(Table 3.

Table 3: Co-infection of gastrointestinal and urinary tract parasites among students of IJBCOE

Species of parasite	No. infected (%)
E. histolytica +T. vaginalis	5(1.8)
E. histolytica + S. haematobium	1(0.4)
G. lamblia + T. vaginalis	2(0.7)
B. hominis + T. vaginalis	1(0.4)
E. coli + T. vaginalis	3(1.1)
Total	**12(4.4)**

Risk factors associated with the transmission of gastrointestinal and urinary tract infections

The results of the study indicated that out of 273 students (male 101, female 172), 26 (25.7)% male and 65(37.8%) females were infected with at least one gastrointestinal or urinary tract parasite. Students within the age range of 26 – 30years had the highest infection (45%), followed by 16-20years (37.3%), 21-25years (28.3%) and 31-35years (25%). Again, more single (unmarried students) were significantly ($p<0.05$) infected (34.1%)than married students (23.4%) (Table 4).

Table 4: Risk factors associated with the transmission of gastrointestinal and urinary tract infections

Variables	No. examined	No. infected (%)
Sex		
Male	101	26 (25.7)
Female	172	65 (37.8)
Age		
16 – 20	118	44 (37.1)
21 – 25	127	36 (28.3)
26 – 30	20	9 (45.0)
30 -35	8	2 (25.0)
Marital status		
Single	252	86 (34.1)
Married	21	5 (23.8)

DISCUSSION

Studies on the prevalence of gastrointestinal and urinary tract parasites among students of Isaac Jasper Boro College of Education Sagbama was undertaken within March 2019 and February 2020. The study recorded an overall prevalence (22%) of gastrointestinal parasites among students in the study area. The 22% recorded in this study is lower than the

44.2% reported among abattoir workers in Port Harcourt by [28] and the 43.3% reported by [33] among students of a tertiary institution in Jos, Nigeria. It is also lower than the 63.5% and 40.0% recorded by [34] among rural and urban school children respectively in Benue State. The comparatively low prevalence reported in this study might be credited to the fact that only few of the students were exposed to risk factors such as contact with and consumption of contaminated food and water, lack of awareness, poor sanitary conditions, engagement in unprotected sex and multiple sexual relationships (for *T. vaginalis*) which could transmit these parasites.

On the other hand, urinary tract parasites recorded an overall prevalence of 11.4%. This is at variance with the 30.3% reported by [29] among students of Rivers State College of Health Science and Technology, Port Harcourt, Rivers State, Nigeria. Two species of urinary tract parasites (*T. vaginalis* and *S. haematobium)* were identified from the urine samples. *T. vaginalis* had the highest prevalence of 90.3% and was identified from female urine samples only. The 90.3% recorded in this study is at variance with the 11.3% reported by [35] and is in consonance with the 90.7% reported by [29]. While *T. vaginalis* recorded 90.3% prevalence rate, *S. haematobium* recorded a prevalence of 9.7% and was identified from male urine samples only. The 9.7% prevalence recorded in this study is greatly lower than the 44.84% reported by [36] among primary school pupils in Awgu Local Governement Area of Enugu State. It is also lower than the 21.6% reported by [37] among school-aged children in some parts of Benue State, Nigeria. But it is higher than the 2.0% reported by [38]. The prevalence of *T. vaginalis* among the affected females may be attributed to poor personal personal hygiene, and sexual promiscuity [35]. The low prevalence of *S. haematobium* may be due to reduction in water contact activities and absence or presence of few intermediate host of the parasite [37].

The study further recorded a coinfection of 4.4%. This is slightly higher than the 3.6% coinfection recorded by [39] among school-aged children in Kurmi Local Government Area of Taraba State. Co-infection was higher between *E. histolytica* and *T. vaginalis* (1.8%) and was least between *E. histolytica* and *S. haematobium, B. hominis* and *T. vaginalis* which recorded a co-infection of 0.4% each. This is at variance with the report of [17] who recorded 3.3% co-infection of *E. histolytica, T. trichiura* and *A. lumbricoides* and 16.7% coinfection of *T. trichiura* and *A. lumbricoides* which were all gastrointestinal parasites. The co-infection observed in this study could be due to unhygienic life style, poor environmental health and other epidemiological influences that could encourage the spread of both gastrointestinal and urinary tract parasites [28].

Several gastrointestinal parasites were identified from faecal samples of the participants. *E. histolytica* (62%) was higher compared to other gastrointestinal parasites. This observation contradicts previous study by [28], in which *A. lumbricoides* showed higher prevalence of 45.6%. The result however agreed with the report of [40] in which *E. histolytica* had the highest prevalent rate of 20.6% among children belwo 5 years in Agasha, Benue State, Nigeria. *E. coli* recorded a prevalence of 18.3%. Its slightly high prevalence may be attributed to contact with faecal-contaminated food or drinks [28]. *G. lamblia* recorded a prevalence of 11.7%. This is higher than the 0.5% recorded by [41], and is lower than the 16% recorded by [42].

The low prevalence of *G. lamblia* recorded in this study may be owing to the fact that the prevalence of the parasite peaks at about age 11 years and there after decline in later life. Hence, few adults pass cysts of the parasite [43]. *B. horminis* and *E. vermicularis* recorded a prevalence of 5% and 3.3% respectively. *B. horminis* is a protozoan parasite which resides in the human intestine. Its infection is through contamination of faecally contaminated food or water [1].

The 3.3% prevalence of *E. vermicularis* recorded in this study is higher than the results reported by [44] who recorded 0.3% prevalence in their study. The slightly high prevalence of gastrointestinal parasites recorded in this study might be due to ignorance, poverty, consumption of contaminated food/water, poor environmental and poor hygiene, scarcity of drinkable water and unselective defaecation into sources of drinking water [34].

T. vaginalis recorded a prevalence of 90.3%. This is at variance with the 11.3% recorded by [35]among pregnant women in three Local Government Areas of Lagos State. The 90.3% prevalence of *T. vaginalis* is again higher than the report of [17] who recorded 10% prevalence among food handlers in Ilisha-Remo Ogun State, Nigeria. This high prevalence may be attributed to low personal hygiene and high frequency of sexual activity amongst the students, especially the females [35]. *S. haematobium* recorded a prevalence of 9.7% among the urinary tract parasites identified among the participants. This is greatly lower than the 21.6% recorded by [37] and higher than the 5.6% reported by [29]. The low prevalence of *S. haematobium* recorded in this study may be due to the absence the intermediate host of the parasite in the area of study.

Sex-related prevalence revealed a higher percentage in females (37.8%) than in males (25.6%). The high percentage in female is however lower than the 42.40% and 57.60% recorded by [45] in females and males respectively. The 37.8% in females recorded in this study is slightly higher than the 35.4% recorded by [44] among community school children in Khana Local Government Area of Rivers State, while the 25.6% in males recorded in this study is lower than the 34.5% recorded in their study. The slightly high prevalent rate noted in this study may be ascribed to unsanitary life style, poor socio-economic status, contact with soil, consumption of unwashed vegetables and fruits, drinking of contaminated water, contact with faeces [44]. In addition to the above, sexual activeness/multiple sexual partners could be related to the slightly high prevalence in females as in the transmission of *T. vaginalis* [46].

Conclusion

The results of the study established a moderately high prevalence of gastrointestinal and urinary tract parasites among students of Isaac Jasper Boro College of Education, Sagbama. There need for health orientation of the students, provision of sanitary facilities and potable water in the study area.

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Conflict of interest

The authors have no conflict of interest with regard to publication of this study.

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