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Risk Factors Associated with Urinary Tract Parasitic Infections among Students of Rivers State College of Health Science and Tecnology, Port Harcourt, Rivers State, Nigeria

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Abstract: *Urinary tract infections are common non-viral diseases mostly transmitted through sexual activities. Our study investigated the prevalence and risk factors associated with these infections among students of Rivers State college of Health Sciences and Technology, Port Harcourt, Rivers State. A cross sectional study was conducted in which urine specimens from 353 students (89males, 253females) were collected. The samples were prepared for microscopic examination using wet mount method for observation of motile organisms and sedimentation technique for observation of eggs and cysts. Out of the 353 samples investigated, 107(30.3%) were infected. The parasites identified included Trichomonas vaginalis, Schistosoma haematobium and Enterobius Vermicularis. Of all the parasite species identified, T. vaginalis showed a statistically significant prevalence ($p<0.05$). Although there was no significance relationship between age and prevalence of the parasites, the most infected age group was 21-25yrs (29%) followed by 16-20yrs (27%) while the least infection was found among students above the age of 40years (6%). More females (86.9%) were infected than males (13.1%) and this was statistically significant ($p<0.05$). Similarly, more single women (92.5%) were infected than married women (7.5%). There was no significance relationship ($p>0.05$) between nature of toilet used and prevalence of the parasites. The students that used bucket/ semi water system at home, water closet system at home and pit toilet at home had 54.2%, 25.5% and 22.4% respectively. The high prevalence rate observed in the study is a source of great concern. Health education, regular screening and treatment of infected persons will reduce the trend.*

Keywords: *Urinary Tract Infections, Risk factor, Prevalence, T. vaginalis, E. vemicularis, S. haematobium*

INTRODUCTION

Trichomonas vaginalis is a flagellate protozoan. It is one of the few parasites that inhabit the urogenital system of both males and females (Jatau *et al.*, 2006) and it has been isolated from nearly all parts of the

urogenital system including the uterus of infected individuals (Ijeoma *et al.,* 2018). Trichomoniasis, the disease caused by *T. vaginalis* is a pluralistic disease (Akinbo *et al.,* 2017) mostly transmitted through unprotected sexual intercourse and it is the third most common cause of vaginal symptoms behind bacterial vaginosis and candidiasis (Toth, 2013). It could also be transmitted non-sexually through contact with formites and surfaces harbouring fluids from infected individuals (Nester *et al*., 2001; Ijeoma *et al.,* 2018) including sharing of pants and other underwears with infected persons (Akinbo *et al*., 2017).

The disease affects an estimated 180 million people worldwide (Bowden and Garnett, 2000; Uproft and Uproft, 2001). WHO (2012) reported that globally, an estimated 276.4 million new cases of the infection are recorded annually. In America alone, an estimated 3million people are infected yearly (WHO, 2001) and in Africa, an estimated 42.8million people are at risk of the infection (de Waaiji *et al*., 2017; WHO, 2012). According to WHO (2002), women are more vulnerable to trichomoniasis than men, prevalence rate of 41.4%, 34%, 10.7%, 10.2% and 9.9% have been recorded among pregnant women in South Africa, Tanzania, Gabon, Congo and Central African Republic respectively.

In Nigeria, although the record is scanty, various degree of prevalence of the infection have been recorded in different part of the country (Ijeoma *el tal*., 2018; Ijasan *et al*., 2018, Olusola i., 2010; Akinbo *et al*., 2017, Sam-Wobo *et al*., 2012).

Although the disease is one of the commonest treatable sexually transmitted infections affecting public health (Hirt *et al.,* 2011; von Glehn *et al*, 2017), it could cause secondary diseases such as pelvic inflammatory disease in women (Moodley *et al*., 2002), lower birth weight in children of infected mothers (Cotch *et al.,* 1997), defective and low sperm count in men (Ryu *et al*., 2015) and preterm labour (Mann *et al.,* 2010). Trichomoniasis has also been implicated as one of the high-risk factors in aggravation of HIV infection and transmission (Van de pol, 2007; Kissenger, 2013). Trichomoniasis is reportedly implicated in reduced immune activation, replication and cytokine production resulting increased viral load of people living with HIV (Quinlivian *et al*., 2012). Other health implication of trichomoniasis include urethritis, vaginitis, cervicitis, prostatitis particularly in HIV infected individuals (Mahmoud *et al*., 2015) and infertility (Fichorava, 2009; Goodkin *et al*., 2005).

In most cases, the disease is asymptomatic in both males and females (Fouts and Kraus, 1980), hence it is not usually and easily diagnosed (Akinbo *et al*., 2017). However, women are more vulnerable than men and an estimated 180 million females are infected globally (Swygard *et al*., 2004).

Materials and Methods

Study Area

Rivers State College of Health Sciences and Technology is one of the tertiary institutions in Rivers State. It is sited in Obio/Akpor Local Government Area and lies on latitude $4^{0}49$'N and longitude $6^{0}59$'E. The college share the same climatic conditions similar to establishments within Obio/Akpor Local Government Area. The Local Government Area is characterised by unpredictable rainfall throughout the year with intermittent dry season.

Study Design and Study Population

The study was a cross sectional research carried out among students of the college. The study was conducted within July, 2018 and January, 2019. The study population included admitted and registered students of the school residence in the hostel accommodation provided by the school. Official record from the registrar's office indicated that the population of students in the school was 3000 as at the time of the study.

Sample Size

The sample size for this study was 353 students. This was determined using the method of Taro (1967): $n=N/(1+(e)^2)$.

Where: n = sample size

N = population of study group (3000)
e = margin error (0.05)
$n = N/(1+(e)^2)$
$n = 3000/(1+3000(0.05)^2)$
n =3000/ (1+ 3000 X 0.0025)
n = 3000/ (1+7.5)
n = 3000 / 8.5
n= 353

Questionnaire: A simple self-structured questionnaire was administered to all the sampled participants. The questionnaire was used to collect demographic data on age, sex, marital status and nature of toilet facility used.

Sample Collection

Well labelled sterile sample bottles were distributed to the students and were allowed to go home with it having been instructed to collect their mid-stream early morning urine. They were advised to return the bottles within few hours after collection.

Laboratory Analysis

The samples were transported to the research laboratory, Department of Biology, Ignatius Ajuru University of Education, Port Harcourt for parasitological examination.

Wet mount test: Wet mounts preparation was made by placing few drops of the urine on a sterile and clean glass slide, covered with a cover slip and examined under the microscope for motile flagellates of *Trichomonas vaginalis* using the X10 and X40 objectives.

Sedimentation method: To enhance accuracy, about 5mls of each of the fresh urine was mixed with equal volume of physiological saline. The mixture was properly shaken for harmonization and centrifuged at 3500rmp for 5minutes. The supernatant was discarded leaving the sediment at the bottom of the tube. A drop of the sediment was placed on a clean glass slide, covered with a cover slip and observed under the microscope for *T. vaginalis.*

Data Analysis

Data generated was analyzed using One way analysis of variance (ANOVA) to determine the significant difference between variables at 0.05 significant level of prevalence.

Ethical Clearance

The ethical clearance for this study was obtained from the Ethical Committee and Dean of Student Affairs of the college. The consent of the subjects was also sought and obtained.

Results

The overall prevalence of urinary tract parasitic infection among the study group indicated that out of the 353 students examined, 107 (30.3%) were positive for at least one urinary tract parasitic disease (Fig.1). The urinary tract parasites isolated and identified from urine samples of the students investigated included *Trichomonas vaginalis* (Plate 1), Eggs of *Schistosoma haematobium* (Plate 2) and Egg of *Enteriobius Vermicularis* (Plate 3). The results indicated a statistically significance ($P< 0.05$) prevalence of the infection among the students investigated. Out of the 107 infected students, 27(25.3%), 31(29.0%), 21(19.6%), 15(14.0), 7(6.5%) and 6(5.6%) belonged to the age range of 16-20yrs, 21-25yrs, 26-30yrs, 31-35yrs, 36-40yrs and 41yrs and above respectively (Table 1). The most infected age group was 21-25yrs (29%) followed by 16-20yrs while the least infection was found among students above the age of 40years. Age has no statistically significant ($p>0.05$) impact on the prevalence of the infections. More females 93(86.9%) were infected than males 14(13.1%). This shows a significance difference ($p<0.05$) suggesting that sex is an important factor in the prevalence of the infections.

The students that used bucket/ semi water system at home were more infected 58(54.2%) than those that use water closet system at home and in school 27(25.5%) while the students that use pit toilet at home had 24(22.4%). No significance difference ($p>0.05$) exists in the prevalence of urinary parasitic infections in relation to the types of toilet system used.

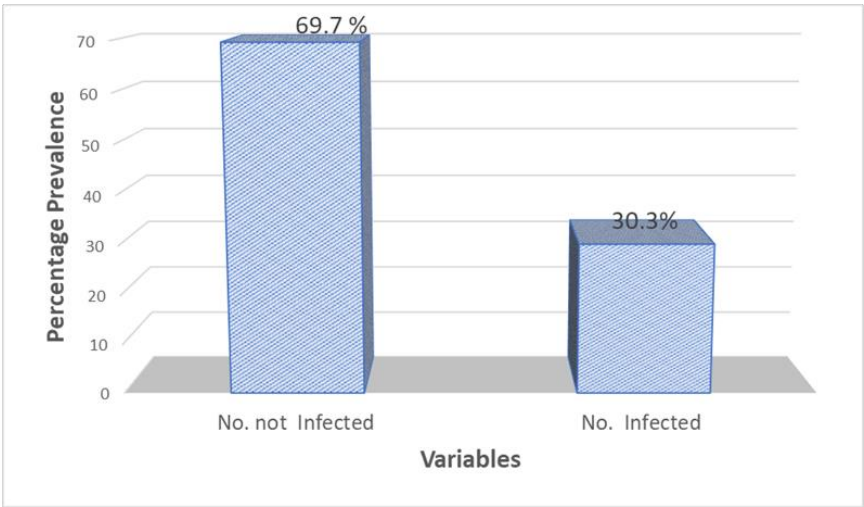

Figure 1: overall prevalence of urinary tract parasitic infection

Table 1: Risk factors associated with urinary tract parasitic infections among students of Rivers State College of Health Sciences and Technology.

Risk Factors	No. Examined	No. Infected						
Species of Parasites								
AGE (yr)		T. *Vaginalis*	S. *haematobium*	E. *vemicularis*	Total (%)	Df	F	Sig.
16 - 20	97	25	0	2	27(25.2)	5	.597	.703
21 – 25	107	29	1	1	31(29.0)			
26 – 30	63	20	1	0	21 (19.6)			
31- 35	48	15	0	0	15 (14.0)			
36-40	26	3	3	1	7(5.6)			
Above 41	12	5	1	0	6(5.6)			
Sex								
Male	89	11	3	0	14(13.1)	1	12.328	.001
Female	253	86	3	4	93(86.9)			
Marital Status								
Single	256	89	6	4	99(92.5)	1	33.524	.000
Married	97	8	0	0	8(7.5)			
Nature Of Toilet								
Bucket system at home	353	52	3	3	58(54.2)	2	.033	.967
Water closet at school	353	25	1	1	27(25.5)			
Pit toilet at home	353	20	2	0	24(22.4)			
Total	**353**							

Discussion

Urinary tract parasitic infections have gradually become a major health concern among primary health practitioners especially in developing countries of the world. The infections have been implicated in the

emergence of several secondary diseases associated with the productive capacity of both males and females (Swygard *et al*., 2004; Patel *et al*., 2018).

In this study, the prevalence and risk factors associated with urinary tract parasitic infections among the study group were investigated. The parasites isolated and identified included *T. vaginalis*, *E. vemicularis* and *S. haematobium.*

The high prevalence rate (30.3%) recorded in our study is of great concern. *T. vaginalis* recorded the highest prevalence of 90.7% compared to the prevalence of other parasites identified. This was also significantly higher than other identified parasites in the study. *S, haematobium* and *E. vemicularis* recorded 5.6% and 3.7% prevalence rate respectively. The observation is worrisome because it falls out of range of the report of Cameron and Pedian (1990). The researchers reported that the prevalence of *T. vaginalis* could be as low as 5% in healthy women and as high as 50% in prostitutes. The high prevalence of *T. vaginalis* reported in this study is however higher than the results recorded in other parts of Nigeria. Akinbo *et al* (2017) reported 2.8% among pregnant women in Benin city, Ijeoma *et al* (2018) observed 40% prevalence among adult in Oru-East local government area of Imo state, Ijasan *et al* (2018) recorded 10% and 8.1% prevalence among HIV-positive and HIV-negative pregnant women in Lagos respectively while Olusola *et al* (2010) recorded 20% among pregnant women in Abeokuta. The result was also higher than 16% reported among women of reproductive age in Brazil (von Glehn *et al*., 2017) and the 33.3% recorded among Egyptian women by Mahmoud *et al* (2015) and the 34.0% recorded in Nairobi (Mirza *et al.,* 1983).

The variation in observed prevalence could be attributed to the setting (Bowden & Garnett, 2000), the location (Akinbo *et al.,* 2017), socio-economic practices in the study area, laboratory investigative method used, type of specimen and numbers of sexual partners (Fernando *et al*., 2012; Hussein *et al*. 2015; Hamdy and Hamdy, 2018).

In this study, more females 86/97(88.7%) were infected than males 11/97(11.3%). This may be attributed to the large numbers of females examined and the presence of risk factors in females that promote the striving of the parasite. Factors such as menstruation, sexual activities, pregnancy, vaginal pH value of between 5.0 to 6.0 tend to influence the growth of the parasite (Jirovec & Petru, 1968; Cameron & Garnett, 2000; Agboola, 2006; Swygard *et al*., 2004).

Although our study indicated that statistically, age was not a risk factor in the prevalence of urinary tract parasitic infections, the parasites were numerically high in students within the age range of 21-25years old. This could be attributed to the fact that this age group are more sexually active (Akinbo *et al*., 2017). The result is in consonance with the reports of other investigators (Sobel, 2005; Olusala *et al*., 2010; Mahmoud *et al*., 2015) but at variance with the record of Akinbo *et al* (2017) that reported a high prevalence in age group of 30-40years old.

Again, the result of our study revealed that the prevalence of urinary tract parasitic infections and specifically *T. vaginalis* was high in single women than married ones. This result conforms with previous studies (DeWaaji *et al.,* 2017, Okpara *et al.,* 2009, Akinbo *et al.,* 2017). This trend may be as a result of the fact that single women tend to have more than one sexual partner (Usanga *et al*., 2009, Akinbo *et al*., 2017; De Waaji *et al*., 2017).

Although there was no statistical relationship between nature of toilet and prevalence of urinary tract parasitic infections, women that used bucket system at home had the highest prevalence (54.2%). This result agrees with the findings of Akinbo *et al* (2017).

E. vermicularis and *S. haematobium* had a prevalence rate of 3.7% and 5.6% respectively. *E. vermicularis* has been reportedly found in the urine of a female patient by Choudhury *et al* (2017). The parasite is a common gastrointestinal parasite, however, in women, it may be uncommonly found in the vagina, vulva, fallopian tube and uterus. The parasite has been implicated in causation of urinary tract infection especially in regions of high prevalence or endemicity (Ok *et al*., 1999). The parasite may migrate by ectopic movement from the rectum to the urinary tract.

Urinary infection caused by *E. vermicularis* may be asymptomatic, however, symptoms such as frequent urination, pruritis and itching have been observed in infected females (Choudhury *et al.*, 2017). The presence of the eggs of S. haematobium have been reported by many researchers, and the parasite has been mentioned as one of the major causes of urinary bladder carcinoma (Koonrungsesomboon, 2015; Mor *et al.*, 2016).

Conclusion

The high prevalence rate of urinary tract parasitic infections particularly T. vaginalis among the study group is a serious source of concern, and calls for more attention by relevant agencies. Health education, regular screening and treatment of infected persons will reduce the trend.

Acknowledgement

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Plate 1: *Trichomonas .vaginalis*

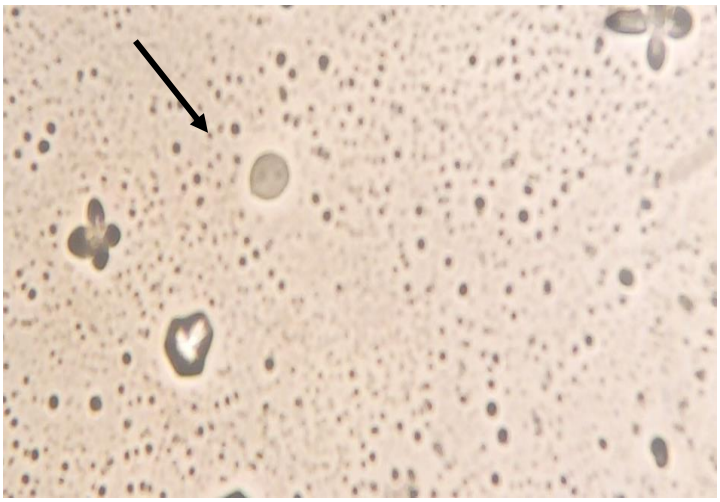

Plate 2: Egg of *S.haematobium*

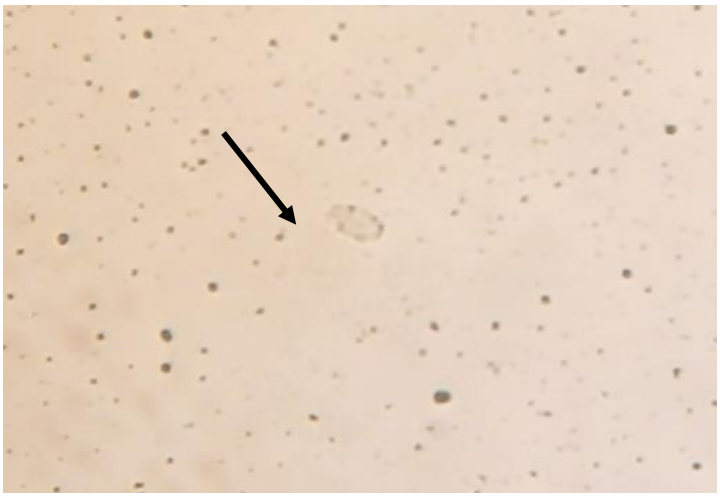

Plate 3: Egg of *Enteriobius Vermicularis*