

Trichomoniasis and associated factors in Rugarama hospital, a peri-urban health facility in south western Uganda

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ABSTRACT

Trichomoniasis is one of the neglected sexually transmitted infections caused by *Trichomonas vaginalis*. A cross-sectional study to determine the prevalence and factors associated with trichomoniasis among patients seeking medical services at Rugarama hospital, Uganda was done between February – March 2023. 150 study participants were recruited, and a semi-structured questionnaire was used to collect qualitative data. Vaginal and urethral swabs were collected aseptically, wet preparations were made for motility, and permanent slides were made, stained using the Giemsa staining technique and examined microscopically to identify *Trichomonas vaginalis* trophozoites morphologically. The data was analyzed using Excel and SPSS. A chi-square was used to determine variables related to trichomoniasis. Multivariate logistic regression was performed to determine factors associated with trichomoniasis. A p-value of less than 0.05 was considered statistically significant.

The majority of the participants 78.7% (118/150) were female, had a primary level of education 55.3% (83/150), rural residence 65.3% (98/150), and married 55.3% (83/150). 6.7% (10/150) had trichomoniasis and were all female. Being married/ cohabiting (P- 0.022, 95% CI 0.067-8.350, OR 0.995) and cleaning private parts less than 3 days a week (P- 0.017, 95% CI 0.029-0.672, OR 0.0014) had a statistically significant association with trichomoniasis.

The prevalence of trichomoniasis was 6.7%. Factors associated with the *T. vaginalis* infection were being married or cohabiting and cleaning the house less than 3 days a week. Routine screening for *T. vaginalis* is vital for early diagnosis and disease management. Health education and sensitization of the masses about personal hygiene, protected sex, and avoiding multiple sexual partners.

Keywords: Associated factors, *Trichomonas vaginalis*, Trichomoniasis, sexually transmitted disease, Uganda

INTRODUCTION

With an estimated incidence of 156 million cases yearly, trichomoniasis is one of the most common curable, non-viral sexually transmitted infections (STIs) in the world (Rigo et al., 2022). The protozoan parasite *Trichomonas vaginalis* (*T. vaginalis*) is the cause of trichomoniasis, which affects men and women between the ages of 15 and 49 where the prevalence ranges from 1.9% to 7.8% and asymptomatic in 85% of women (Oyeyemi et al., 2016, Wiliam et al., 2022, Meites et al., 2015). In Uganda, the prevalence of trichomoniasis varies from one place to another; 31% in Rakai district (Nabweyambo et al., 2017), 17% in Kampala (Mayanja et al., 2016), 10.5% in Southern Uganda (Kiyingi et al., 2022). Signs and symptoms include vaginal itching, dysuria, and abdominal pain; changes in vaginal discharge; or vaginal blood loss during or after sexual intercourse (Rao and Mahmood, 2020). Multiple sexual patterners, gender, age group, un protected sex with infected people, history of infections, use of contraceptives, sharing toilets and douching are factors associated with increased risk (Wiliam et al., 2022).

The disease increases the risk of infection with several other STIs, including gonorrhea, human papillomavirus (HPV), herpes simplex virus (HSV), and, most importantly, HIV (Mwatelah et al., 2019, Feleke and Yemanebhrhane, 2022). Trichomoniasis also increases women's risk of pelvic inflammatory disease (PID) and tubal pathology by a factor of 4.7 (Mwatelah et al., 2019, Feleke and Yemanebhrhane, 2022) and a 1.3-fold rise in the chance of contracting HIV and having premature labor if exposed (Kissinger, 2015). Despite the estimated large burden of *T. vaginalis* infection in Uganda, data on prevalence and factors associated with the infection are relatively limited. Preventing associated issues, especially during pregnancy, requires prompt and accurate diagnosis of *Trichomonas vaginalis* infection in both symptomatic and asymptomatic women as well as effective treatment (Workowski and Bolan, 2015)

In Ugandan health facilities Rugarama hospital inclusive, the diagnosis of trichomoniasis relies on clinical symptoms, yet these are non-specific as they cut across a number of other STDs and are therefore poor indicators of the infection; yet it is not routinely screened for among patients suspected to be having urinary tract infections in Rugarama hospital inclusive. Undiagnosed and untreated *T. vaginalis* infection risks development of pelvic inflammatory disease and other associated complications and transmission. The information about trichomoniasis is not well documented at Rugarama Hospital affecting decision making process. The aim of this study was to determine the prevalence and factors associated with *Trichomonas vaginalis* among women and men aged 18-45 years seeking medical services at outpatient department at Rugarama Hospital, western Uganda.

MATERIALS AND METHODS

Study area

The study was conducted at Rugarama mission hospital, located in Kabale district south western Uganda. The Hospital operates as a charity, Not-for-Profit Health institution as of the ministry of Christ's Church. In its operations, the Hospital is committed to and implements the policies of the Ministry of Health of Uganda. Rugarama it offers a wide range of specialized medical, surgical and diagnostic services. It has professional clinical

and laboratory team that use an interdisciplinary approach to ensure comprehensive care of each patient. It was most suitable for this study because of the wide coverage as most patients within Kigezi region seek health services from this hospital.

Study population and design

This was a laboratory-based cross-sectional study design that recruited men and women aged 18–45 who sought medical care from outpatient department at Rugarama Hospital with symptoms suggestive of trichomoniasis between February and March 2023 and were willing to consent voluntarily. The key symptoms were reports of abnormal discharge, painful sexual intercourse, dysuria, genital itching, and lower abdominal pain, and we excluded women who were in menstruation period and those who had a history of taking Tinidazole and/or Metronidazole within the past 2 weeks.

Sample size determination

Using Kish and Leslie (1965) formula at confidence level of 95%, $Z=1.96$ $p=10.5\%$, $e=5\%$

$$n = \frac{Z^2 p(1-p)}{e^2}$$

$$n = \frac{1.96^2 \times 0.105(0.895)}{0.05^2} = 144$$

Where **n** is Sample size

Z is value corresponding to a 95% level of significance = 1.96

P is proportion of patients with *T. vaginalis* infection in Uganda 10.5% (Kiyingi et al., 2022)

e is the maximum error researchers were likely to encounter which is 5%.

This study recruited a sample size of 150 respondents.

Sampling Technique

A purposeful sampling technique was employed to enroll respondents in the study. Respondents meeting the inclusion criteria were recruited within the clinical rooms as they saw the clinicians. Those meeting the criteria were identified while in the clinician's room in the outpatient department. They were then asked to consent, and recruitment continued until the required sample size was achieved.

Data collection tool

A semi-structured questionnaire was used to collect data from respondents. Questions were both closed and open-ended to enable researchers to get information from respondents. It contained questions about sociodemographic characteristics such as age, gender, education level, and predisposing factors.

Data collection procedure

After informed consent, demographic characteristics, medical history, and details of sexual behavior were collected using a semi-structured questionnaire. Researchers collected

genital swabs from men and women and were instructed on how to collect vaginal swabs for testing of *T. vaginalis*.

Laboratory procedures

Wet mount microscopy

High vaginal and male urethral swabs were emulsified in three drops of 0.9% saline on a glass slide in order to keep *Trichomonas vaginalis* alive and to ease its identification, and then covered with a cover slip. This preparation was immediately examined without delay under a light microscope at x100 and x400 total magnifications for the flapping and wobbly movement of *Trichomonas vaginalis* trophozoites at average temperature of 29°C/84°F. The presence of motile trichomonads, pear-shaped motile flagellates, moving with characteristic jerky, wobbling, and rotating motions, indicated a positive test result for trichomoniasis.

Giemsa stained mount microscopy

Smears were prepared from the swabs and were fixed by immersion in absolute methanol for one minute and allowed to air dry. The concentration of stain used was 10%, the staining time was 10 minutes, and the buffered water was pH 7.2. Both the internal and external structures of the organism were clearly visualized under the microscope using high magnification. The former was stained dark blue with a red nucleus, and the latter was sharply outlined, clearly showing the flagella and the undulating membrane.

Quality control

Sterile swabs were used to collect the samples. Laboratory SOPs for genital swab collection and examination were followed accordingly, and positive and negative controls were stained and analyzed alongside the patients' samples. All results were reviewed by senior laboratory technologist.

Data management and analysis

The collected data was cleaned and examined for accuracy, consistency, and completeness. It was then analyzed using Excel and SPSS version 20 for descriptive data analysis, with the results displayed in frequency tables and graphs. A chi-square was used to determine variables related to trichomoniasis. Multivariate logistic regression was performed to determine factors associated with trichomoniasis. A p-value of less than 0.05 was considered statistically significant. The number of positive cases divided by the entire sample size (150) yielded the prevalence of trichomoniasis, which was then displayed in frequency, percentages, and table form.

RESULTS

Socio-demographic characteristics

Socio-demographic characteristics of study participants were collected with the aid of the questionnaire, and findings are shown in Table 1. Most participants 54% (81/150) were aged 30-39 years and 78.7% (118/150) were females.

Table 1. Socio-demographic characteristics of study participants

Variable	Categories	Frequency (n=150)	Percentage (%)
Age (years)	18-29	41	27.3
	30-39	81	54.0
	40-45	28	18.7
Gender	Male	32	21.3
	Female	118	78.7
Level of education	No formal education	4	2.7
	Primary	83	55.3
	Secondary	51	34.0
	College/university	12	8.0
Residence	Urban	52	34.7
	Rural	98	65.3
Marital status	Married	83	55.3
	Single	54	36.0
	Divorced	3	2.0
	Widowed	10	6.7
Religion	Protestant	94	62.7
	Catholic	29	19.3
	Pentecostal	18	12.0
	Adventist	9	6.0
Occupation	Un employed	6	4.0
	Casual laborer	53	35.3
	Self-employed	63	42.0
	Salaried job	28	18.7
Monthly income	0-50,000	35	23.3
	50,001-100,000	86	57.3
	>100,000	29	19.3

Laboratory findings

Wet mount microscopic findings

Out of 150 study respondents sampled and examined for *T. vaginalis* trophozoites, 07/150 (4.67%) had motile *T. vaginalis* trophozoites detected in wet smear preparations while 143/150 (95.33%) had no *T. vaginalis* trophozoites detected in the smears examined. All the positive (07) cases were female, of whom majority 71.43% (5/7) were in the age group of 30-39 years as shown in Table 2. Therefore, the prevalence of trichomoniasis by wet preparation was 4.67%.

Table 2. Detection and distribution of *Trichomonas vaginalis* cases by gender and age group using wet smear microscopy

Variable		Lab-results		Total
		No <i>T. vaginalis</i> trophozoites seen	<i>T. vaginalis</i> trophozoites seen	
Gender	Female	111	07	118
	Male	32	0	32
Total		143	07	150
Age group (years)				
	18 – 29	40	01	41
	30 – 39	76	05	81
	40 – 45	27	01	28
Total		143	07	150

Giemsa smear microscopic findings

Out of 150 study respondents sampled and examined for *T. vaginalis*, 10/150 (6.7%) had *T. vaginalis* trophozoites detected in Giemsa stained smears while 140/150 no *T. vaginalis* trophozoites were detected in the smears examined. All the positive (10) cases were female, of whom majority of positive cases 71.43% (5/7) were in the age group of 30-39 years as shown in Table 3. Therefore, the prevalence of trichomoniasis was 6.7%.

Table 3. Detection and distribution of *Trichomonas vaginalis* cases by gender and age group using the Giemsa staining technique

Variable		Lab-results		Total
		No <i>T. vaginalis</i> trophozoites seen	<i>T. vaginalis</i> trophozoites seen	
Gender	Female	108	10	118
	Male	32	0	32
Total		140	10	150
Age group (years)				
	18 – 29	38	3	41
	30 – 39	75	6	81
	40 – 45	27	1	28
Total		140	10	150

Factors associated with Trichomoniasis infections

Data obtained was analyzed using both bivariate and multivariate analysis. On bivariate analysis, being married or cohabiting (P - 0.012, 95% CI 0.827–0.961, OR 0.892), widowed (P - 0.019, 95% CI 0.904–1.366, OR 1.11), having shared toilets or latrines (P = 0.001, 95% CI 1.970–46.49, OR 9.571), and cleaning private parts less than 3 times a week (P - 0.032, 95% CI 0.065–0.965, OR 0.250) had a statistically significant association with trichomoniasis, as shown in the table 4. On multivariate logistic regression analysis, being married or cohabiting (P - 0.022, 95% CI 0.067-8.350, OR 0.995) and cleaning private parts less than 3 days a week (P - 0.017, 95% CI 0.029-0.672, OR 0.0014) had a statistically significant association with trichomoniasis, as shown in table 5.

Table 4. Bivariate analysis of the factors associated with trichomoniasis

Variable	Categories	Has Trichomoniasis		OR (95% CI)	P value
		Frequency (n=10)	Percentage (%)		
Age (years)	18-29	3	30	1	
	30-39	6	60	0.987(0.234-4.164)	0.986
	40-45	1	10	2.132(0.210-21.61)	0.513
Level of education	No education	0	0	1	
	Primary	2	20	1.025(0.991-1.060)	0.753
	Secondary	6	60	1.133(1.025-1.253)	0.467
	College/university	2	20	1.200(0.932-1.546)	0.383
Marital status	Single	0	0	1	
	Married	9	90	0.892(0.827-0.961)	0.012*
	Widowed	1	10	1.11(0.904-1.366)	0.019*
Monthly income	0-50,000	3	30	1	
	50,001-100,000	4	40	1.922(0.407-9.070)	0.402
	>100,000	3	30	0.812(0.151-4.368)	0.809
Nature of toilet	Not shared	7	70	1	
	Shared	3	30	9.571(1.970-46.49)	0.001*
Type of toilet/ latrine	Water cistern	4	40	1	
	Pit	6	60	1.261(0.339-4.695)	0.729
	Both	0	0	0.920(0.848-0.998)	0.438
Douching	No	2	20	1	
	Yes	8	80	1.490(0.303-7.334)	0.622
Intimate partners	None	1	10	1	
	One	2	20	3.091(0.258-37.04)	0.351
	More than one	7	70	0.792(0.089-7.089)	0.835

Use protection	Yes	3	30	1	0.524(0.130-2.109)	0.356
	No	7	70			
Suffered from STIs	No	2	20	1	1.385(0.281-6.825)	0.688
	Yes	8	80			
Private part cleanliness	Daily	6	60	1	0.250(0.065-0.965)	0.032*
	<3 days/week	4	40			
Injection with drugs	No	7	70	1	2.429(0.581-10.14)	0.211
	Yes	3	30			

Data analysis * statistically significant, $P < 0.05$

Table. 5. Multivariate logistic regression analysis of factors associated with trichomoniasis

Variable	OR 95% CI	P value
Widowed	1	
Married/cohabiting	0.995 (0.067-8.350)	0.022*
Sharing toilet	0.088 (0.770-43.96)	0.111
Cleaning private part <3 days/week	0.014 (0.029-0.672)	0.017*

Data analysis * statistically significant, $P < 0.05$

DISCUSSION

The prevalence of trichomoniasis was 6.7% (10/150), Being married or cohabiting ($P = 0.022$, 95% CI 0.067-8.350, OR 0.995) and cleaning private parts less than 3 days a week ($P = 0.017$, 95% CI 0.029-0.672, OR 0.0014) had a statistically significant association with trichomoniasis infection.

Prevalence of Trichomoniasis

From the study findings, the prevalence of trichomoniasis was 6.7% and women were the most affected gender where all the positive cases were female. These finding is not in line with the findings from other studies including the study among sex workers (16%) (Mirzadeh et al., 2021), in South African women (20%) (De Waaij et al., 2017), among Ghanaian outpatients (42.6%) (Asmah et al., 2018), in Nigeria (57.1%) (Owowo et al., 2022), in Mwanza city, and in North-western Tanzania, 10.41% and 23.01% respectively (Mazigo et al., 2016). The differences in results can be explained by the fact that these studies were

carried out in different study populations with different characteristics like sex workers are more exposed and pregnant women immune compromised and this facilitates multiplication of the *vaginalis* and thus a higher prevalence (Mirzadeh et al., 2021). Additionally, more sensitive methods like culture and molecular techniques were used, resulting in higher sensitivity compared to the smear microscopy used in the current study (Mirzadeh et al., 2021).

According to the study results, Giemsa staining detected the highest number of positives (6.7%), followed by Gram staining (5.3%) and wet preparation (4.7%). This is because the Giemsa staining technique is more sensitive than wet-mount microscopy (Kissinger et al., 2022).

According to the study results, the highest positive cases were among those aged 18-39 years. Similar findings were revealed in the United States where the prevalence of *Trichomonas vaginalis* (Flagg et al., 2019), in Al-Hamza city-Iraq (Al-Ardi, 2021), in Cameroon (Wiliam et al., 2022), and in Nigeria (Ijeoma et al., 2018). This could be due to the fact that it is a sexually active and reproductive age group (Barbosa et al., 2020), which is a predisposing factor for infection, and women at this specific childbearing age may have a higher coital frequency and are more likely to have unprotected sex with their husbands to meet the demands of having children, exposing them to infections (Shabnam, 2017, Leon et al., 2009).

Factors associated with Trichomoniasis

In this study, being married or cohabiting was associated with trichomoniasis. This can be explained by the fact that these are sexually active people who can get trichomoniasis by having sex without a condom with a partner who has trichomoniasis. During sex, the parasite usually spreads from the penis to the vagina, or vice versa (Zhu et al., 2022). This was in agreement with other studies that showed that the risk of acquiring Trichomoniasis infection increased in women who are sexually active (Barbosa et al., 2020, Leon et al., 2009).

The study results revealed that cleaning private parts less than 3 days a week had a statistically significant association with trichomoniasis. This could be explained by the fact that female genitalia are close to the anal orifice, and therefore poor hygienic practices regarding reproductive organs increase the incidence of *T. vaginal* colonization through contamination of the vagina under poor hygienic conditions (Asmah et al., 2018). Similar findings were revealed in the survey done in the Tibetan area, China, a low level of vaginal cleanliness was associated with the infection (Zhu et al., 2022). Since trichomoniasis prevalence depends on many factors such as age, gender, sexual activity, and genital hygienic practices, a better understanding of the epidemiology of this infection is needed to foster disease control programs in populations at risk.

CONCLUSION AND RECOMMENDATIONS

The prevalence of trichomoniasis was 6.7%, and all were female; the most affected age group was 18–39 years. The factors associated with trichomoniasis being married, cohabiting, and cleaning a private part less than 3 days a week were significantly associated with trichomoniasis.

The hospitals and health facilities should include routine screening for *Trichomonas vaginalis* infection among those suspected of urinary tract infections for early diagnosis, need to sensitize and health education about personal hygiene, protected sex, and avoiding multiple sexual partners.

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ETHICAL CONSIDERATIONS

The proposal was first approved by the Mbarara University of Science and Technology Faculty of Medicine Research Committee (FRC). Confidentiality was ensured by using codes to cover identity instead of respondents' names.

Data collected was kept in a locked cupboard for the period of the study to ensure privacy and archived after data analysis and presentation. Soft copies were in password-protected folders on a computer. Respondents who were diagnosed with *T. vaginalis* infection and other significant organisms were linked to clinicians for further management.

LIMITATIONS OF THE STUDY

This study used wet preparation and Geimsa staining methods, which are less sensitive compared to other methods like culture and molecular techniques like PCR. This could have missed some cases of trichomoniasis.

CONFLICT OF INTEREST

The authors declare no competing interests.

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The authors received no funding for this study.

SUBMISSION DECLARATION AND VERIFICATION

This work has not been published previously, and has not been submitted elsewhere. All authors have approved the submission of this manuscript to this journal; If accepted, it will not be published elsewhere in the same form, or in any other language without the written consent of the copyright holder.

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