Prevalence of Urinary Tract Infections and Associated Factors among Female Students at Africa Renewal University, Uganda

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Abstract

Research shows that women are more prone to developing UTIs compared to men due to women`s reproductive physiology and anatomy, poor hygiene, sexual intercourse and use of contraceptives. UTIs have become a challenge in Uganda. This study determined the prevalence of UTIs and associated factors among female students at Africa Renewal University. A cross-sectional study was adopted. Data was collected by the use of Self-administered questionnaires and by examination of urine specimens collected from each participant. The female student's population at AfRU, as of April 2019 was 137 but only 106 were enrolled in the study. Of the 106 respondents, 22 (20.7%) had UTIs, 84 (79.3%) female students were negative. Numerically, the factors associated that showed a relationship with UTIs were age (20.0%), water consumption, using antibiotics taking caffeinated beverages, material of underwear, leaking urine before reaching toilet and feeling strong urge to urinate but statistically there was no significance Statistical analysis did not show significant relationship between UTI and knowledge of UTI prevention/treatment/causes and hygiene practices. Statically, only one factor (water consumption) had significant relationship with UTIs (P-value 0.002). Compared to national average and other studies done by scientific scholars, the prevalence of Urinary Tract Infection among students of Africa Renewal University was found to be high (20.7%). This high prevalence highlights the epidemiological and clinical significance of Urinary Tract Infections within this context and calls for the need to provide diagnostic and treatment services for students. There is need for health education programs on UTIs in Universities and further research is required in a bigger university setting targeting both males and females.

Keywords: Urinary Tract Infection

1.0 INTRODUCTION

Globally, UTIs contribute to an estimated 8.3 million visits to outpatient clinics and about 100,000 hospitalizations annually (Naber et al 2008). Urinary Tract Infections (UTIs) is a bacterial infection that affects elements of the urinary system (Annuli et al 2016). The urinary system comprises of the kidneys, ureter, urinary bladder and urethra. The lower urinary tract encompasses the bladder and urethra while the upper urinary tract encompasses the kidneys and the ureters. Urinary tract infection usually develops in the lower urinary tract and if not properly treated they move to the upper urinary tract causing severe damage to the kidneys.

Research shows that women are more prone to developing UTIs compared to men due women`s reproductive physiology and anatomy, poor hygiene, sexual intercourse and use of contraceptives (Hooton et al 2010). An estimated 80% of UTIs are caused by the E. coli organism which enters the bladder through the urethra after a bowel movement. After gaining entrance, E. coli attaches to the bladder wall and form a biofilm that resists the body`s immune response (Salvatore et al 2011). According to Cheesebrough, 2006, diagnosis of UTIs involves the collection of midstream urine specimens, urinalysis, microscopic examination and urine culture. Management of UTIs involves drug therapy and health education to prevent recurrent infections (Annuli et al 2016).

Urinary tract infection affects people of all age groups and sexes. Urinary tract infection refers to the presence of microbial pathogens within the urinary tract classified as complicated or uncomplicated. The urinary system is naturally designed to ward assist in warding off infections. The ureters and bladder are meant to prevent urine from moving towards the kidneys. The flow of urine from the bladder is designed to wash bacterial out of the body. However, despite this, infections still occur due to some predisposing factors such as alterations to the host`s natural defence mechanisms, anatomical and physiological factors, premenopausal/menopausal factors, age and hospitalisations. The host natural flora may be altered due to actions such as excessive use of antimicrobial agent, use of contraceptives like spermicides and obstruction of urine flow (Naber et al 2008; Popescu et al 2009). In addition, illnesses such as diabetes mellitus and sickle cell disease may alter the host`s natural defence mechanisms (Gould et al 2010). Bacteria that live in the digestive tract, in the vagina or the entrance of the urinary tract may cause a urinary tract infection. The infection is usually ascending by urethral passage of the offending bacteria following colonisation of per urethral area (Orenstein and Wong 1999).

Women are disproportionately affected by UTIs compared to men and the risk of UTIs are further increased during pregnancy. Pregnant women are at increased risk of bacterial ascension to the kidneys due partly to dilation of the renal pelvis and ureters in the eighth week of pregnancy. UTIs in pregnancy is associated with poor outcomes for both the mother and baby namely; maternal sepsis, anaemia and preterm birth (Nicole et al 2013). In addition, bladder infection during pregnancy is associated with increased risk of maternal hypertension and premature labor (Schnarr and Smaill 2008)

Urinary Tract Infections are one of the major causes of morbidity in Uganda (MoH, 2010). The prevalence of UTI in selected hospitals of Bushenyi district has been found to be 32.2% with females having majority compared to males (Odoki et al, 2019). UTIs have the potential for serious life-threatening consequences if left untreated or under treated as they may cause permanent renal damage and failure (Anuli et al 2016). Records at Cornerstone Medical Center (CMC) show that UTIs are a common reason for female students, compared to males, to seek medical attention but no systematic information is available on prevalence of UTI and associated factors among the students. The clinic receives 5 – 15 students on a daily basis; 10 of the 15 are female students and of the 10 female students and according to records at the clinic, UTI is a very common reason for female students to come to the clinic. Determining the prevalence of UTI and associated factors among the female students will provide systematic information to inform the planning and growth of the health care system for AfRU and also for developing and dissemination of health protection and promotion messages for the students. Thus, this study is underpinned by two questions: (i) What is the prevalence of Urinary Tract Infections among female students at Africa Renewal University?

and (ii) What factors are associated with Urinary Tract Infections among female students at Africa Renewal University

2.0 LITERATURE REVIEW

2.2. The anatomy of the urinary tract system

The urinary system is the body`s drainage system for removing wastes and water. The urinary tract includes two kidneys, two ureters, a bladder and a urethra. The kidneys are a pair of bean-shaped organs about the size of a fist and located below the ribs, one on each side of the spine toward the middle of the back (Ranganathan, 2014). Every minute, the kidneys filter about 3 ounces of blood, removing wastes and extra water. The wastes and extra water make up 1 to 2 units of urine that a person produces each day. The urine travels from the kidneys down two narrow tubes called the ureters. The urine is then stored in a balloon-like organ called the bladder and emptied through the urethra, a tube at the bottom of the bladder. When the bladder empties, a muscle called the sphincter relaxes and urine flows out of the body through the urethra (The National Institute of Diabetes and digestive kidney diseases). The opening of the urethra is at the end of the penis in males and in front of the vagina in females. This is illustrated in figure 1 below
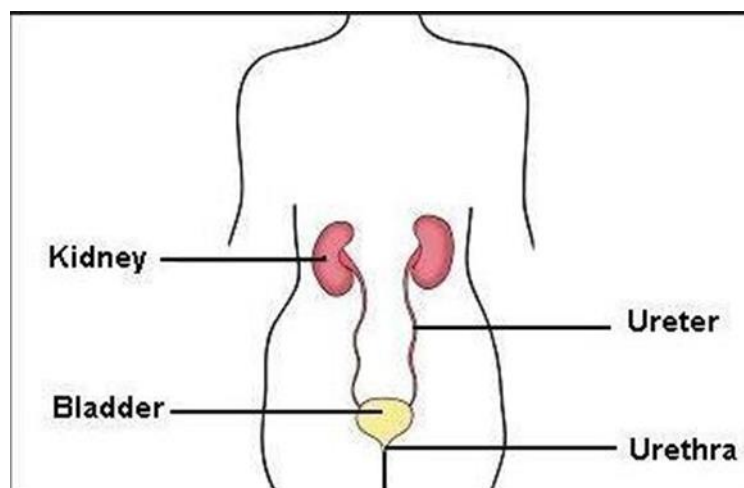
The Urinary Tract

Figure 1: Adapted from Virtual Medical Centre, 2019

2.3. Aetiology of Urinary Tract Infections

The etiology (causes) of urinary tract infections (UTIs) can vary depending on factors such as age, gender, and location. In general, most UTIs are caused by bacteria, but other factors such as fungal or viral infections, structural abnormalities of the urinary tract, or catheterization can also contribute to the development of UTIs (Flores-Mireles, et al 2015). Urinary tract infection refers to the presence of microbial pathogens within the urinary tract. According to Pushparatha (2008), there are different microorganisms that can infect the urinary tract and cause infections but the most common agents are the enterobacteriaceae. E.coli is the most prevalent organism responsible for UTIs accounting for 80-85% of the total isolates. According to Ranganathan (2014), the incidences of UTIs as a result of viral or fungal infections are considered to be very minimal. Research studies have also shown that UTIs are the most common form of bacterial infection (Demilie, 2012; Parveen, 2011).

2.4. Bacteriology of Urinary Tract Infections

The most common bacteria causing urinary tract infections (UTIs) are Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, and Staphylococcus saprophyticus. Other less common pathogens include Enterococcus faecalis, Pseudomonas aeruginosa, and Enterobacter spp. (Gupta et al 2011).

Ascending route of Infection is the way one acquires a UTI through the rectal flora. It enters the Urinary Tract through the urethra and ascends to the bladder. A study conducted by the school of Chemical and biotechnology, SASTRA University, India 2014 expressed that reproductive physiology of females makes them more vulnerable to the infection and can occur through congenital sites like the Urethra, vaginal opening, perineum, anus which are known to dwell their own microbial flora. They further emphasize that the bowel movements are the primary sources of these microbes to invade the urinary system, colonize and cause infections later. When Urinary Tract Infection affects part of the lower urinary tract, it is known as bladder infection and when it affects the upper urinary tract, it is known as kidney infection. The urinary bladder is a muscular sac in the pelvis, just above and behind the pubic bone. The commonly known condition that makes a bladder malfunction is Cystitis which is an inflammation or infection of the bladder causing pain and discomfort, urinary frequency or hesitancy. Other conditions include but not limited to Urinary stones, Bladder cancer, urinary retention and bed- wetting. The kidney infection is common and it is usually painful and unpleasant. It's also a common infection of the bladder. It happens when the bacteria travels through a tube that carries urine out of the urethra. It travels up the bladder and causes cystitis then further to the kidney. This infection is symptomized with fever, shivering and back or side pain.

2.5. Classification and Clinical presentation of UTIs

Urinary tract infections (UTIs) can be classified based on their location in the urinary tract (e.g., bladder, urethra, kidneys), as well as their severity (e.g., uncomplicated, complicated). The clinical presentation of UTIs can also vary depending on the location and severity of the infection (Gupta & Hooton, 2015; Talan et al 2016) . There are two types of UTIs namely lower urinary tract infections and upper urinary tract infections. Research shows that UTIs largely develop in the lower urinary tract namely the urethra and bladder (Anuli, 2016). Symptoms for the lower urinary tract infection (Cystitis) include; painful urination, frequent urination and the lower pelvis pain (Ranganathan, 2014). In addition, once UTIs are not properly treated, they ascend to the upper urinary tract (Ureters and kidneys). The symptoms of upper urinary tract infections include fever and pain in addition to symptoms seen in lower urinary tract infections

2.6. Risk factors of UTI

There are many risk factors that can increase the likelihood of developing urinary tract infections (UTIs), including factors such as age, gender, sexual activity, underlying medical conditions, and urinary tract abnormalities (Flores-Mireles et al 2015). The prevalence of UTIs is higher in females compared to males. Study estimates show that one third of adult women are diagnosed with UTIs before 24 years of age (Foster, 2008). Women are more prone to developing UTIs due to anatomical factors that allow bacteria quick access to the bladder (Anuli, et al 2016). The urethra is shorter in women (about 1.5 to 2 inches) compared to men (8 inches). The shorter length of the urethra in women enhances the scope for the pathogen to invade the bladder which results in bladder infection (Ranganathan, 2014). A study conducted by Kabugo et al 2016 showed that UTIs were significantly higher amongst females compared to men.

Research shows that rates of bacteriuria increase with age from 2% to 7% in women of child bearing age and to an estimated 50% in elderly women (Dielubanza and Schaeffer, 2011). Perineal hygiene and toilet habits may play a role in transmission and spread of UTIs. Wiping from back to front after urinating or defecation facilitates the bacteria around the perineal area to enter the urethra in females hence increasing the risk of UTIs

According to Fishbane 2003, Urinary Tract Infections amongst young people is caused by Urethra Trauma from sexual activities. The anatomical relationship of the female urethra to the vagina makes it liable to trauma during sexual intercourse. Sexual activity increases the chances of bacterial contamination of female urethra as having sexual intercourse may cause bacteria to be pushed into the urethra. In a study conducted in Ethiopia showed that women who had sexual intercourse, three or more times per week were more likely to develop UTIs than women who had not had sexual intercourse (Emiru et al 2013). This may suggest that Urinary Tract Infections are not necessarily sexually transmitted infections. The bladder is a muscle that stretches to hold urine and contracts when urine is released. Waiting too long past the time one feels the need to urinate causes the bladder to stretch beyond its capacity. Over time, the bladder muscle is weakened when this happens, the bladder may not empty completely. This thus increases the risk of infection as it provides a conducive environment for bacteria to multiply. Dehydration and incomplete emptying of the urinary bladder increases the risk of urinary tract infections. Bacterial eradication from the urinary tract is partially dependent on urine flow and voiding frequency. Recurrent UTIs can be defined as two uncomplicated infections with in a six month time frame or three infections within a year (Barber et al 2013).

2.7. Management of Urinary Tract Infections

Urinary tract infections (UTIs) can be managed with a variety of treatment options, including antibiotics, pain relief medication, and hydration (Gupta & Hooton, 2019). Urinary tract infections being managed with antibiotics and the choice of the drugs and duration of treatment largely depends on patient's history, physical state and test results that may identify the offending organisms (Barber et al 2013). The patient's age, degree of toxicity, state of hydration, ability to take drugs orally or not will help in deciding between outpatient therapy and hospitalization. Patients usually get symptomatic relief after three days of treatment but it is recommended that 5 – 7 day course of antibiotics is completed to ensure that the infection is cleared thereby avoiding bacterial resistance

2.8. Urinary Tract Infections/ asymptomatic and Pregnancy

Urinary tract infections (UTIs) are a common medical condition affecting many individuals. Pregnant women and those with asymptomatic bacteriuria are particularly at risk for UTIs (Wing & Hendershott, 2018). Studies show that UTIs are a common bacterial infection encountered during pregnancy (Mayanja et al 2016; Cunningham et al 2016). The prevalence of asymptomatic bacteriuria in pregnancy is estimated at 7% (Cunningham et al 2016). Asymptomatic bacteriuria is the presence of at least 105 colony-forming units per ml of 1 or 2 bacterial species in clean voided midstream urine sample from an individual without symptoms of urinary tract infection. (Manish et al 2015). Gilbert et al (2013) argues that pregnant women are at an increased risk of bacterial ascension to the kidneys and pyelonephritis due to dilation of the renal pelvis and ureters. Urinary Tract Infections in pregnancy have been associated with adverse health effects for both the mother and the baby (Khalesi et al 2014). Studies conducted in Pakstan and Egypt showed

that pregnant women who had low social economic status were more likely to develop UTIs compared to pregnant women who had high social economic status (Haider et al 2010; Dimetry 2007). Low social economic status is linked to poor nutrition and immunity in pregnant women. UTIs in pregnancy can lead to adverse health effects if untreated. The prevention and treatment of UTIs in pregnancy are critical in promotion of safe motherhood.

2.9.   Prevalence of Urinary Tract Infections

Amali et al (2008) states that Urinary Tract Infections are usually not treated because they present little or no symptoms. He further emphasized that the symptoms generally depend on the age of the person infected and the location of the Urinary Tract Infected. The high rate of bacteriuria (78%) in the study carried out by Christiana AO (2016) is of great public health concern. It does not only pose a threat to health but also poses economic and social burden on the populace.The predominance of E.coli could be attributed to the fact that it is a commensal of the bowel and that infection is mostly by faecal contamination due to poor hygiene (Njoku CO et al 2001). In this study, the prevalence of UTI was high and the females were at the peak of their sexually active years making them prone to infection than the young ones. This revealed that Bacterial infection is still an issue of serious public health. According to Olanipekun et al (2021) the overall prevalence of urinary tract infections (UTIs) in Africa was found to be 31.2%. The study analyzed 65 articles that reported UTI prevalence in 26 African countries between 2000 and 2020. One of the highest prevalence rates was found in Ethiopia, where the overall prevalence of UTIs was reported to be 54.4%. Other countries with high UTI prevalence rates included Ghana (44.4%), Nigeria (43.4%), and South Africa (40.4%).

3.0   METHODOLOGY

This was a quantitative analytical cross sectional study design that used self-administered questionnaires as a method of data collection. Urine tests were done using the dipstick method to screen Urinary Tract Infections amongst female students. The study was conducted at Africa Renewal University (AfRU), located in Buloba Parish; Busiro County, Wakiso district. The study population was female students studying at Africa Renewal University. The targeted population was all female students. The university reports show that majority of the students population is within the age group of 20 – 30 years. Women are more prone to developing UTIs due to anatomical factors that allow bacteria quick access to the bladder (Anuli, et al 2016). Africa Renewal University has a total number of 325 registered students (By March 2019) of these, 137 students are females (University report 2019- Academic Registrar's department).

Clean – voided, mid-stream urine (MSU) specimens were collected from study participants. Macroscopically, the appearance of the specimens was described based on urine sample colour and found positive by the uristick method. Only uristix which were not expired were used. The Uri stick was dipped in urine, placed on a rack and waited for 60 seconds for Blood, proteins and 120 seconds for leucocytes to observe colour changes. Microscopy was done to confirm positives tests (UTI) by the presence of Pus cells/Dead leucocytes, haemolysed and non-haemolysed Red blood cells, and granular casts. Questionnaires were entered into excel sheet software and exported to STATA version 14 for analysis.

4.0 FINDINGS

4.1 Response rate

A total number of the female students that were targeted for the study were 137 but only 106 responded.

4.2 Social Demographics of respondents

The median age of the study population was 22 years. The interquartile range was 21 -24 years. The Pentecostal female students were the majority 67% while the Muslims were the minority 23/106 (2.8%) and the bigger proportion of a single tribe were Baganda. Ugandan students dominated the sample, 63% followed by South Sudanese 22% of 106 respondents, the majority were single equivalent to (91.5%) and 8.5% were married.

4.3 Prevalence of Urinary Tract Infection among female students of Africa Renewal University

Out of 106 respondents, 84 (79.3%) female students were negative and 22 (20.7%) were positive for Urinary Tract Infections.

Table 2: Factors associated with Urinary tract infection among female students of Africa Renewal University.

Variable	Urinary tract infection		cOR	95% CI	P-Value
Age in years n (%)	Positive (n= 22)	Negative (n=84)			
≤24	13(20.0)	52 (80.0)	1.00	-	-
25-29	3(15.0)	9(75)	1.33	0.32-5.63	0.70
30-35	0(0.0)	3(100.0)	-	-	-
>35	1(50.0)	1(50.0)	4.0	0.23-68.30	0.34
Religion n (%)					
Pentecostal	15(21.1)	56(78.9)	1.00	-	-
Anglican	3(23.08)	10(76.92)	1.12	0.27-4.50	0.88
Catholic	1(11.11)	8(88.9)	0.47	0.05-4.03	0.49
Muslim	1(33.33)	2(66.67)	1.87	0.5-22.01	0.62
Others	2(20.0)	8(80.0)	0.93	0.18-4.86	0.94
Nationality (%)					
South Sudanese	2(8.7)	21(91.3)	1.00	-	-
Rwanda	1(10.0)	9(90.0)	1.17	0.09-14.56	0.91
Ugandans	16(23.88)	51(76.1)	3.29	0.70-15.60	0.133

Others	3(50.0)	3(50.0)	10.5	1.21-91.03	0.033
Tribe n (%)					
Baganda	8(26.67)	22(73.3)	1.00	-	-
Banyankole	4(28.6)	10(17.4)	1.10	0.27-4.52	0.90
Zande	0(0.0)	13(100.0)	-	-	-
Others	9(27.3)	24(72.7)	1.03	0.34-3.14	0.96

The table shows the distribution of urinary tract infections (UTI) based on four categorical variables: age in years, religion, nationality, and tribe. For each variable, the number and percentage of participants with UTI and without UTI are presented. Additionally, the table provides the crude odds ratios (cOR) with 95% confidence intervals (CI) and p-values for each variable.

For the age variable, the youngest age group (≤24 years) is used as the reference category. Participants aged 25-29 years had a slightly higher odds of UTI, although the result was not statistically significant (cOR=1.33, 95% CI=0.32-5.63, p=0.70). No UTI cases were observed in the 30-35 age group. Participants older than 35 years had a higher odds of UTI, with a cOR of 4.0 (95% CI=0.23-68.30, p=0.34), although the result was not statistically significant.

For the religion variable, the Pentecostal denomination is used as the reference category. No significant differences in the odds of UTI were observed for the other religious denominations.

For the nationality variable, South Sudanese nationality is used as the reference category. Participants from Uganda had a higher odds of UTI, with a cOR of 3.29 (95% CI=0.70-15.60, p=0.133), although the result was not statistically significant. Participants from other nationalities had a significantly higher odds of UTI, with a cOR of 10.5 (95% CI=1.21-91.03, p=0.033).

For the tribe variable, the Baganda tribe is used as the reference category. No significant differences in the odds of UTI were observed for the other tribes.

It is important to note that the p-values in this table should be interpreted with caution, as they do not take into account multiple comparisons. A p-value of 0.05 or less is commonly used to indicate statistical significance, but in this table, several variables have p-values slightly above this threshold that may warrant further investigation in future studies.

The majority of the people that had UTIs were 24 year and below. But in this study, findings did not show association of UTI with age, religion, nationality and tribe. The crude odds ratios were (COR=0.00; CI=0, COR=3.29; CI=0.70-15.60).

Table 3: Clinical factors associated with UTI among female students of Africa Renewal University

Variable	Urinary tract infection		cOR	95% CI	P-Value
Strong urge to urinate	Positive	Negative			
Never	36(81.8)	8(18.2)	1.0	-	-
Some times	48(77.4)	14(22.6)	1.31	0.50-3.46	0.58
Leaking urine before reaching toilet					
Never	12(16.7)	60(83.3)	1.00	-	-
Sometimes	9(30.0)	21(70.0)	2.14	0.79-5.81	0.13
Most of the time	1(25.0)	3(75.0)	1.67	0.16-17.41	0.67
Difficulty while urinating					
No	20(21.05)	75(78.95)	1.00	-	
Yes	2(18.18)	9(81.8)	0.83	0.17-9.17	0.82
Take caffeine containing beverages					
None	2(15.38)	11(84.62)	1.00	-	-
1-3 times	5(19.23)	21(80.17)	1.31	0.22-7.88	0.77
4-6 times	13(20.0)	52(80.0)	1.38	0.27-6.98	0.7
>6 times	2(100.0)	0(0.0)	-	-	-
Smoking					
No	22(21.4)	81(78.6)	1.00	-	-
Yes	0(0.0)	3(100.0)	-	-	-
Water consumption					

No	0(0.0)		1(100.0)	1.00	-	-
Yes	22(20.95)		83(79.1)	-	-	-

77.4% of those who felt a strong urge to urinate had UTIs than those who never (81.8%). The odds ation were (COR=1.31; CI=0.50-3.46). 30% of those who leaked urine sometimes before reaching the toilet had UTIs compared to those who never (COR=2.14; CI=0.79-5.81).

Female students who had no difficulties while urinating had less chances of getting UTI s (COR=0.83; CI=0.17-9.17) compared to those who had difficulties (COR=1.00; CI=0.00- 0.00).Students who took caffeinated beverages 4-6 times had higher chances of having UTIs compared to those who took none (COR=1.38; CI=0.27-6.98). However, all clinical factors were not statistically significant (They included feeling a strong urge to urinate, leaking urine before reaching the toilet, feeling difficulty while urinating,

taking caffeinated beverages, smoking and drinking water.

Table 4: Hygiene practices associated with UTI among female students of Africa Renewal University

Variable	Urinary tract infection		cOR	95% CI	P-Value
Times you bathe everyday (%)	**Positive**	**Negative**			
1-2 times	20(22.47)	69(77.5)	1.00	-	-
3-5 time	1(8.33)	11(91.7)	0.31	0.04-2.58	0.28
>5 times	0(0.0)	1(100.0)	-	-	-
Use of virginal douching					
No	10(23.3)	33(76.7)	1.00	-	-
Yes	12(19.05)	51(80.95)	0.78	0.301-2.0	0.60
Drying yourself after urination					
No	6(83.3)	30(83.3)	1.00	-	-
Yes	16(11.9)	54(77.1)	1.48	0.52-4.19	0.46
What was used to dry one's self					
Disposable towels	15(21.1)	56(78.9)	1.00	-	-

Non disposable towels	7(20.6)	27(79.4)	0.97	0.35-2.65	0.95
Times of changing underwear per day					
No change required	4(22.2)	14(77.8)	1.00	-	-
1 time	9(19.6)	32(80.4)	0.85	0.23-3.21	0.81
2-3 times	8(21.6)	29(78.4)	0.97	0.25-3.76	0.96
4-5 times	1(20.0)	4(80.0)	0.88	0.07-10.21	0.92
Underwear Material n (%)					
Cotton	1(9.1)	10(90.9)	1.00	-	-
Nylon	20(23)	67(77.0)	2.99	0.36-24.76	0.31
Change of pads during menstruation					

No change required	2(40.0)	3(60.0)	1.00	0.03-1.84	0.17
1 time	4(13.3)	26(86.7)	0.23	0.07-3.13	0.44
2-3 times	16(24.2)	50(75.8)	0.48	-	-
4-5 times	0(0.0)	3(100.0)	-	-	-
More than 5 times	0(0.0)	2(100.0)	-	-	-

Female students who bathed fewer times (1-2 times) had UTIs compared to those who bathed more times (22.47%, COR=1.00, 8.33%, COR=0.31; CI=0.04-2.58). Majority of those who were using virginal douching had UTIs (19.05% COR=0.78; CI: 0.301-2.0,) compared to those who were not. Majority who dried themselves after urination had UTIs (COR=1.48; CI: 0.52-4.19).

Of the positive students, those who used non-disposable towels had less chances of having UTIs compared to those who used disposable towels (COR=0.97; CI: 0.35-2.65). Majority of the participants that were using Nylon underwear had UTIs compared to those who were using cotton (COR=2.99; CI=0.36-24.76). All the above factors were not statistically significant.

Table 5: Knowledge factors associated with Urinary Tract Infections among female students of Africa Renewal University.

Variable	Urinary tract infection		cOR	95% CI	P-Value
Aware of UTI prevention	**Positive**	**Negative**			
Wipe from back to front after using toilet	6(16.7)	30(83.3)	1.00	-	-
Urinate when you feel the need	8(22.9)	27(77.1)	1.48	0.46-4.82	0.51
Others	8(22.9)	27(77.1)	1.48	0.46-4.82	0.51
Aware of UTI treatment					
Bed rest					
No	22(22.7)	75(77.3)	1.00	-	-
Yes	0.(0.00)	9(100.0)	-	-	-
Water consumption					
No	11(14.9)	63(85.1)	1.00	-	
Yes	11(34.4)	21(65.6)	3	1.14-7.92	0.027
Surgery					
No	22(100.0)	78(78)	1.00	-	-
Yes	0(0.0)	6(100.0)	-	-	-
Taking antibiotics					
No	16(30.77)	36(69.23)	1.00	-	-
Yes	6(11.32)	47(88.68)	0.29	0.10-0.81	0.02
Aware of causes of UTI s					
Bacteria	5(17.24)	24(82.8)	1.00	-	-
Virus	17(22.67)	58(77.33)	1.41	0.47-4.25	0.54

*No response

The table shows the results of a study on the relationship between various factors and urinary tract infection (UTI). The cOR is the crude odds ratio, and the 95% CI is the 95% confidence interval for the odds ratio. The P-value is the statistical significance of the odds ratio.

In the first part of the table, the association between UTI and several demographic factors, such as age, religion, nationality, and tribe, is examined. The odds ratios are generally close to 1, indicating no

significant association between these factors and UTI.

The second part of the table examines the association between awareness of UTI prevention and treatment and UTI. The odds ratios for wiping from back to front after using the toilet and urinating when feeling the need are close to 1, indicating no significant association. However, the odds ratio for water consumption is 3, with a statistically significant P-value of 0.027, suggesting that those who are aware of the importance of drinking water may have a higher chance of avoiding UTI.

Similarly, the odds ratio for taking antibiotics is 0.29, with a statistically significant P-value of 0.02, indicating that those who take antibiotics may have a lower chance of getting UTI. In contrast, the odds ratio for bed rest is undefined due to the lack of cases where participants were aware of this treatment.

Finally, the last part of the table examines the association between awareness of the causes of UTI and UTI. The odds ratio for bacteria is close to 1, indicating no significant association. The odds ratio for viruses is 1.41, also not statistically significant.

Table 2: Multivariate Logistic Regression

Variable	AOR	95% CI	P-Value
Age in years n (%)			
≤24	1.00	-	-
25-29	1.43	0.23-9.03	0.70
30-35	-	-	-
>35	5.21	0.20-134.3	0.32
Nationality (%)			
South Sudanese	1.00	-	-
Rwanda	0.49	0.03-7.73	0.61
Ugandans	0.10	0.01-0.96	0.046
Others	1.41	0.15-13.61	0.77
Taking antibiotics			
No	1.00	-	-
Yes	0.14	0.03-0.60	0.008
Water consumption			
No	1.00	-	-
Yes	4.23	1.05-17.08	0.043

In the Multivariable analysis, the statistically significant factors include; taking antibiotics and drinking water.

Age in years: The reference group is ≤24 years old. Those between 25-29 years have an adjusted odds ratio (AOR) of 1.43 (95% confidence interval [CI]: 0.23-9.03) for the outcome, but the p-value is not statistically significant (p=0.70). The other two age groups, 30-35 and >35, have missing values for AOR and 95% CI, and thus the results cannot be interpreted.

Nationality: The reference group is South Sudanese. Those who are Rwandan have an AOR of 0.49 (95% CI: 0.03-7.73) for the outcome, but the p-value is not statistically significant (p=0.61). Ugandans have an AOR of 0.10 (95% CI: 0.01-0.96) for the outcome, and the p-value is statistically significant (p=0.046). This suggests that being Ugandan is associated with a lower odds of the outcome compared to being South Sudanese. The AOR for the "Others" category is 1.41 (95% CI: 0.15-13.61), but the p-value is not statistically significant (p=0.77).

Taking antibiotics: The reference group is not taking antibiotics. Those taking antibiotics have an AOR of 0.14 (95% CI: 0.03-0.60) for the outcome, and the p-value is statistically significant (p=0.008). This suggests that taking antibiotics is associated with a lower odds of the outcome compared to not taking antibiotics.

Water consumption: The reference group is not drinking water. Those drinking water have an AOR of 4.23 (95% CI: 1.05-17.08) for the outcome, and the p-value is statistically significant (p=0.043). This suggests that drinking water is associated with a higher odds of the outcome compared to not drinking water.

5.0 Conclusions and Recommendations

The prevalence of Urinary Tract Infection among students of Africa Renewal University was found to be 22.7%. This high prevalence highlights the epidemiological and clinical importance of Urinary Tract Infections within this context and calls for the need to provide diagnostic and treatment services for students. The factors including the number of times girls bathe in a day, consumption of caffeine containing beverages, the type of underwear and age are important and in designing strategies for prevention of UTI, these should be considered. Statistically, only one factor (water consumption P.Value 0.002) was statistically significant/had a relationship with UTIs. The rest of the factors may not have shown associations because of the small sample size.

Based on the above study findings, the following recommendations can be made for the control of Urinary Tract Infections among female students of Africa Renewal University.
1. Health education programs aimed at reducing the prevalence of UTIs and improving the quality of life for students should be designed to increase students' knowledge and awareness of UTIs including risk factors associated with the infection. Information on UTIs can be availed to students through health talks, notices on boards and health campaigns to sensitize the student community.
2. Findings from the study will be disseminated to senior management of Africa Renewal University aimed at providing feedback on the prevalence of UTIs at the university and encourage measures to

be adopted to address the high UTI prevalence. Feedback will be spear headed by the department of community health in collaboration with Cornerstone Medical Center.

3. Provision of medical services including diagnostic facilities and treatment is critical in order to manage the high prevalence of UTI among students in coordination with cornerstone medical center where students access their medical services.

This study was conducted amongst a relatively small university population though it served to provide insight on the prevalence of UTIs and associated factors among female students at a higher institution of learning in Uganda. There is need to conduct a bigger study on Urinary Tract Infections among University students in a larger context and or bigger student population targeting both females and males.

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