ABSTRACT

Introduction: Sexually Transmitted Infections (STIs) are among the most common cause of concern among sexually-active people. The risk factors for STIs such as multiple sexual partner's infection with HIV render increase in the prevalence of STIs in a given population.

Objectives: To determine the prevalence of STIs at wet preparation among patients at the STD clinic of Mulago Hospital in Uganda.

Methods: This was a retrospective study involving data review of patients, whose urine samples were processed at the STD laboratory, using the wet prep technique. Records from July 2015 to December 2015. Macroscopic, biochemical and microscopic properties of urine were recorded.

Results: Findings from macroscopic, biochemical and microscopic properties of urine were recorded, and were compared with the normal properties of urine. Urine samples had the following colors: 80.3% were pale yellow (n=122), 15.1% were yellow (n=23), 2.0% were deep brown (n=3), 2.0% were colorless (n=3) and 0.7% was dark yellow (n=1). Of all the urine samples processed, 68.4% (n=104) were turbid, 9.2% (n=14) were slightly turbid, and 22.4% (n=34) were clear. Of the preparations examined, 30.9% had less than 5 epithelial cells / hpf :, 21.7% had 6 to 20 epithelial cells /hpf:, 4.0% had 21 to40 epithelial cells/ hpf , and 43.4% were negative. The preparations had pus cells as follows: 21.7% had less than 5 pus cells/ hpf, 15.8% had 6-20 pus cells/ hpf, 5.9% had 21-40pus cells/ hpf and 56.6% were negative for pus cells. Red blood cells were seen as less than 5 RBCs/ hpf in 2.0% of the preparations, 6-20 RBCs/hpf in 2.6% of the preparations, and negative in 95.4% of the preparations.

Conclusion: Urine wet prep is a rapid and easy to-use technique used in routine urinalysis.

INTRODUCTION

Sexually Transmitted Infections (STIs) are among the top ten causes of diseases in young males in developing countries; while for the young adult women, it is the second commonest major cause of unpleasant diseases (Da Ros, 2008).STIs is a major worldwide concern, with a steady increase in new infections annually. Over one million people around the world acquire an STI daily (CDC, 2011). This is attributed to increased promiscuity and, various forms of unprotected sexual contact. The impact of STIs varies widely, depending on whether the infection is curable, or not. Also, early diagnosis of the initial stages of the infection contributes to a reduction of the burden of disease. STIs are broadly classified into the curable and the incurable categories by WHO. The curable category consists of infections caused by bacteria and protozoa, such as gonorrhea, chlamydial infection, syphilis, chancroid and trichomoniasis. The incurable category includes viral infections such as genital herpes, genital warts, cervical carcinoma, HIV disease and AIDS. Worldwide, 60% of the new HIV infections occur among young people. 25% of the sexually active population is made up of adolescents and young adults, aged between 15-24 years, who also account for 50% of all new cases of STIs (Da Ros, 2008). There is a confirmed relationship between infection with HIV and STI; HIV seropositive individuals are more prone to STIs than their seronegative counterparts. STI screening is usually reserved for symptomatic patients, but with the increase in STI prevalence, measures have been undertaken to screen populations at a high risk of contracting the infections. Possible complications of STIs include pelvic pain, pregnancy complications, eye inflammation, arthritis, pelvic inflammatory disease, infertility, heart disease, and certain cancers such as HPV-associated rectal and cervical cancers. Urine cytology is one of the examples of exfoliative cytology, as it contains cells that are shed in the course of its movement to the body's outside. Accurate laboratory diagnosis of STIs is achieved by direct detection of causative organisms, or the cells' response to the infection by the organisms.

1.0 Problem statement

STIs are global challenge causing noticeable challenges in areas of low-income earning populations. Uganda's population mainly consists of the youth, which is the most productive age in life. This age group is also highly sexually active, hence more prone to infection with STIs. The onset of most STIs is never taken note of, or if so, the signs and symptoms are ignored, in

fear of talking about the ordeal. Therefore, most patients present with late stages of the disease, which results in increased expenditure on treatment. In addition, STIs among pregnant women if left untreated, they can result in still births, miscarriages, and producing children with increased risk of morbidity and mortality.

1.2 Justification

Most people still stigmatize people with STIs, due to the norm of not talking about issues regarding one's private parts. Many people having STIs present in the late stages, when they are symptomatic. There is a great need to routinely screen groups of people at an increased risk of contracting STIs. Urine cytology, which is part of exfoliative cytology, is a rapid and convenient way of diagnosing diseases affecting the urogenital tract. The results of this study, will add to the scientific knowledge that already exists in this field of STIs, and will form a basis of further research.

1.3 Research questions

How common are STIs among patients attending the STD clinic of Mulago Hospital in Uganda?

What are the socio-demographic characteristics of the patients with STIs?

What are the biochemical and microscopic properties of the urine samples collected from the patients attending the STD clinic of Mulago Hospital?

1.4 Objectives

1.4.1 Main objective

To determine the prevalence of sexually transmitted infections at urine wet prep among patients at the sexually transmitted infection clinic at Mulago Hospital.

1.4.2 Specific objectives

To determine the prevalence of STIs at wet prep among patients at the STD clinic of Mulago Hospital in Uganda.

To determine the socio-demographic characteristics of the patients with sexually transmitted infections at the STI clinic of Mulago Hospital.

To describe the macroscopic, biochemical and microscopic properties of the urine samples collected from the patients attending the STI clinic of Mulago Hospital.

LITERATURE REVIEW

2.0 Prevalence

It is estimated that more than 12 million new cases of syphilis annually globally, of which, 100,000 cases are in the US, 140,000 cases in western Europe, 4 million cases in sub-Saharan Africa, 4 million cases in south and southeast Asia, and 3 million cases in the Caribbean and Latin America (WHO, 2016). Each year there are an estimated 357 million new infections with one in four STIs: chlamydia, gonorrhea, syphilis and trichomoniasis. Furthermore, 500 million people are estimated to have genital infection with herpes simplex virus, and more than 290 million women have HPV infection (WHO, 2015). The world-wide prevalence estimated 499 new infections of curable STIs in the general population is as follows; million cases of 106 chlamydial infection, 106 million cases of gonorrhea, million cases of syphilis and 276 million cases of trichomoniasis as of 2008 (WHO, 2008). More than 100 million new cases of chlamydia are reported annually (Louise, 2014).

In the US, the most common infectious diseases are the STIs, costing the nation an estimate of $16 billion in annual health care costs (Mark, 2015). New cases of STIs are estimated at 19.7 million annually in the USA. It is estimated that 3.7 million men and women in the USA are infected with Trichomonas vaginalis (Satterwhite, 2008). HPV infection is reported to be the most common cause of new STI infections in the USA by CDC. Half of the new STI infections in USA are attributed to the age group 15-24 years (Weinstock, 2000).

A 2015 report by CDC showed an estimate of 14 million people is infected with HPV annually. In the USA, a total of 350,062 cases of gonorrhea were reported, which resulted in an increase in the national gonorrhea rate; 110.7 cases per 100,000 population. A 2014 report by CDC total of 350,062 cases of gonorrhea were reported. The relationship between HIV and STIs was shown by a review of 37 studies, most of which were done in the US and Europe. STIs were found in 16.3% of the people living with HIV, with the prevalence of the individual STIs as shown: chlamydial infection 5%, gonorrhea 9.5%, trichomoniasis 18.8% and syphilis 9.5% (CATIE, 2011).

Forhan, 2009 showed in a study carried out in the US in 2003, STIs were confirmed on laboratory diagnosis of urine samples from female adolescent patients aged 14-19 years, and they were specified as HPV, chlamydia, gonorrhea, herpes infection, or trichomoniasis. Bacterial STI testing among sexually active HIV-infected study participants was low; especially those at an increased sexual risk. In Miami, Florida, USA, a study involving 251 participants had 163 individuals from high-risk populations; the prevalence of gonorrhea was 6% whereas that of trichomoniasis was 14% (Tookes, 2011).

10% of people with longstanding HIV infections had recent diagnosis of an STI, in comparison to 25%, who reported as recently infected with HIV at the time of diagnosis (Truong, 2015). Chlamydial infection is reported to be the most notifiable STI in the USA, as 1,441,789 cases were nationally reported in CDC, 2014). A report of 2010 in Canada estimated that women aged 20 and 24 years had the highest rate of chlamydial infection nation-wise (2005.5 cases per 100,000 population), and among the other females (277.6 cases per 100,000 population). Chlamydia was reported to be the most notifiable disease in 2008, in Canada by the Public health agency of Canada.

24.5% of HIV-infected pregnant women in Europe had one STI or more. The most common STI bacterial STI was syphilis 2.0%, while HPV-related warts accounted for 8.6 % (Alvares, 2012). A study done in the UK showed that the prevalence of chlamydia increased with increasing number of sexual partners in the past year. The highest prevalence was noted in the age group 18 to 19 years for the women, while for the men, it was 20 to 24 years. The prevalence of gonorrhea among men and women was less than 0.1%, and was mainly found among individuals with high risk factors. (Sonnenberg, 2013).

According to Araujo, 2014, the prevalence of STIs among female athletes in Sao Paulo was 46%, with 2 cases of chlamydia, and no case of gonorrhea, syphilis, hepatitis B HIV infection and hepatitis C. The prevalence of STIs among pregnant women in Brazil was 36.5%. Generally, 3.9% had syphilis, 9.8% had chlamydia and 1.5% had gonorrhea according to Alvares, 2012.
Moodley, 2015 showed that among 1480 pregnant women who were recruited in a study in South Africa, 32.3% tested positive for any of the STIs while they were pregnant, whereas

19.2% were positive after retesting 14 weeks postpartum. Among 700 sexually active young women from randomly selected high schools in a KwaZulu-Natal district of South Africa, 27.8% were HIV-infected, while the 25.3% had chlamydia, and 15.6% had gonorrhea according to Kleppa, 2015. Rukasha, 2013 showed that of 380 specimens collected in a South African study, 8 had a positive result on microscopy, 24% showed a positive result on culturing, and the remainder showed a positive result on using a commercial PCR kit. Menendez, 2010 showed that 79% of women aged 14-61 years in Mozambique were diagnosed with at least one active STI. The prevalence of the infections was: Trichomonas vaginalis 31%, Neisseria gonorrhoeae 14%, Chlamydia trachomatis 8% and syphilis 12 %. These findings were similar to recent studies in Tanzania. The reproductive age group accounted for a higher prevalence of STIs. The prevalence of individual STIs among pregnant women was found to be: 51.1% HSV, 25.6% syphilis, 11.8% trichomoniasis, 1.2% gonorrhea, 32.6% bacterial vaginosis and 39.9% candidiasis. The prevalence of vaginal infections was 64%, while that of serological STIs was 51 %(Nyaradzai, 2010).

Kakaire, 2015 showed that in a study involving women living with HIV/AIDS in Uganda, the prevalence of STIs was 11.1%, while the prevalence of individual STIs was as follows; gonorrhea 5.4%, chlamydia 0.9%, and trichomoniasis 5.9 %. According to Asiki, 2011, the prevalence of active syphilis in the Lake Victoria fishing community in Uganda was 4.3 %. In a study that involved sex workers in Uganda, HIV seroprevalence was 37% while for the other STIs was gonorrhea 13%, chlamydia 9%, trichomoniasis 17%, candidiasis 11.1% and bacterial vaginosis 56% according to Vandepitte, 2011. A Ugandan study involving 640 participants who provided interpretable data, an estimated 50% were males. The prevalence of STIs among males was 0.8% chlamydial, 4.3% syphilis, 0.4% HIV, and none had gonorrhea. In the females, the individual STI prevalence was; 32.6% bacterial vaginosis, 2.5% chlamydia, 1.0% gonorrhea, 0.9% trichomoniasis and 0.9% HIV infection (Rutherford, 2014).

The epidemiology of STIs is determined by sexual activity, although maintenance and spread of various STIs varies according to one’s susceptibility, multiple sexual partners, pathogenicity, infection duration and the probability of infection according to Gwenda, 2014. A WHO report of 2015 STIs are mainly spread via sexual contact, whereas some of the STIs can be spread via

blood or blood products. Many STIs can be spread from mother-to-child during pregnancy and child birth. Examples of such STIs include chlamydia, gonorrhea, primary hepatitis B, HIV and syphilis.

Trichomonas vaginalis can cause vaginitis in women: though uncommon in men, it may cause symptomatic or asymptomatic nongonococcal urethritis. Kensaku, 2013 further noted that among men, the prevalence of trichomoniasis among men with urethritis was 1.4%, while among men without urethritis, it was 1.0%. Clinical conditions associated with trichomoniasis include nongonococcal urethritis, prostatitis, urethral stricture disease, epididymitis and infertility. According to Naidoo, 2013 in a study done Durban, Johannesburg, 15-34% of 1485 women had a vaginal discharge, 6.5% of whom had trichomoniasis. The annual incidence of new infections of trichomoniasis was 8.6 per 100 populations. According to Naidoo, 2013 in a study done in Miami, Florida, using wet mount of urine samples, there was 9% prevalence of trichomoniasis in the patients, while screening using NAAT increased the prevalence up to 20%. The main symptoms of STIs included vaginal discharge 89%, pruritis 58.1%, bad smell 41.9% and abdominal pain 44.2% (Nunez-Forero, 2016).

2.2 Risk factors

The risk factors for both men and women that participated in the study included self-reported incarceration, having a casual sex partner during follow-up, and having a prevalent STI at baseline. For women, other risk factors included having two or more heterosexual partners, while for the men; it was increased frequency of drunkenness according to Sutcliffe, 2009. In a Zimbabwean study, risk factors for a positive serologic result among pregnant women included increasing age above 30 years, polygamy, multigravida, alcoholic partner, and number of lifetime sexual partners (Nyaradzai, 2010).

Other risk factors of acquiring STIs include: abusing alcohol or recreational drugs, forced sexual intercourse with an irregular partner, being promiscuous, having unprotected sex and being young.

METHODS

3.1 Study design

This was a retrospective study carried out by reviewing the data of patients that who attended the STI clinic of Mulago Hospital in Uganda from July 2015 to December 2015.

3.2 Study area

The study was carried out at the laboratory of the STI clinic of Mulago Hospital.

3.3 Study duration

The study was conducted between the months of May to July.

3.4 Study population

Patients who attended the laboratory of the STI clinic of Mulago Hospital in Uganda from July 2015 to December 2015, and had a urinalysis test performed.

3.5 Study unit

A patient who attended the laboratory of the STI clinic of Mulago Hospital in Uganda from July 2015 to December 2015, and had a urinalysis test performed.

3.6 Sample size

This was calculated using the Kish Lisle formula given below;

$$N = \frac{Z^2 P(100 - P)}{E^2}$$

Where

N is the minimum sample size

E is the required precision of the estimate, assumed to be 5%

P is the prevalence of STIs in previous studies

For a study done among women living with HIV in Uganda (Kakaire, 2015); P=11%

$$N = \frac{1.96 \times 1.96 \times 11.1(100 - 11.10)}{5^2}$$

N=152

Therefore, the sample size was 152 patients.

3.7 Inclusion criteria

All patients whose urine samples were examined at the laboratory of the STD clinic.

3.8 Exclusion criteria

Patients who had samples other than urine processed at the laboratory of the STD clinic.

3.9 Variables

3.9.1 Outcome variables

These were the different STIs diagnosed in the urine samples of the patients.

3.9.2 Independent variables

Demographic characteristics.

3.10 Data collection procedure

Data of patients who had their urine samples processed and examined at the laboratory of the STD clinic from July 2015 to December 2015 was reviewed until the sample size was attained. That data had been written in the laboratory register. The researcher picked out only the data which was in line with the objectives of the study, which included; age and sex of the patient, as well as the results of urine examination.

Urine examination included macroscopy, biochemical analysis using urinalysis strips and microscopy of the wet preparation.

Macroscopic examination of the urine sample included taking note of the color, and consistency. The biochemical analysis of the urine samples was achieved using the urinalysis reagent strip. Of the ten parameters taken note of in urinalysis, included in this study were: protein, ketones, pH, glucose and nitrite. The results were recorded as nil, 1+, 2+ and 3+, or as a quantity of the parameter, according to the color changes as indicated by the manufacturer.

Microscopic evaluation of the smear slides was achieved using the ×10 objective for screening, and the ×40 objective for detailed examination of yeast cells, casts, leucocytes, bacteria, RBCs, parasites, crystals, WBCs and epithelial cells.

RBCs, epithelial cells, casts, crystals, bacteria, yeast cells and parasites were quantified as nil, +, ++, and +++, depending on the number seen. Leucocytes were quantified as the number seen per high field: <5 WBC/HPF, 6-20 WBC/HPF, and 21-40 WBC/HPF and >40 WBC /HPF.

3.11 Data management

3.11.1 Data entry

This was achieved manually by the use of Microsoft Excel spreadsheet ‘07, and the findings of the study were presented in the form of bar graphs, pie-charts, frequency tables and line graphs.

3.13 Ethical considerations

An introductory letter was obtained from the head of the Pathology department of Makerere University, which was presented to the in-charge of the STI clinic of Mulago Hospital. All the information obtained from the interaction of the research participant with the patients’ data was considered confidential. Identification numbers was allocated to the samples of the patients, for purposes of masking their true identity.

3.14 Dissemination of results

The findings of the study will be availed to the CHS Pathology department of Makerere University, STI clinic of MNRH, and at the CHS library.

RESULTS

4.1 Demographics

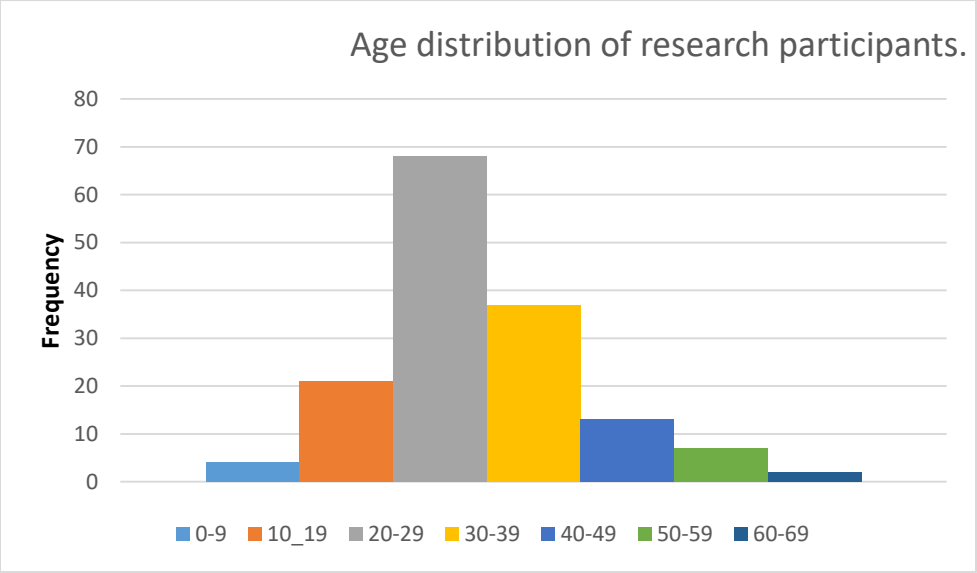
4.1.1 Sex

Of the 152 research participants whose data was reviewed, 112 were females (73.7%) and 40 were males (26.3%).

4.1.2 Age

There was normal distribution of the age of the research participants, with the peak ranging from 20 to 29 years as shown in Fig. 1.

Fig. 1: Age distribution of research participants.



The research participants' age distribution was: 2.6% were of 0 to 9 years, 13.8% were of 10 to19 years, 44.7% were of 20 to 29 years, 24.3% were of 30 to 39 years, 8.6% were of 40 to 49 years, 4.6% were of 50-59 years and 1.3% was of 60-69 years, as shown in Table 1.

Tab 1: Age distribution of research participants.

Age group	Percentage	Number of participants
0-9	2.6	4
10-19	13.4	21
20-29	44.7	68
30-39	24.3	37
40-49	8.6	13
50-59	4.6	7
60-69	1.3	2

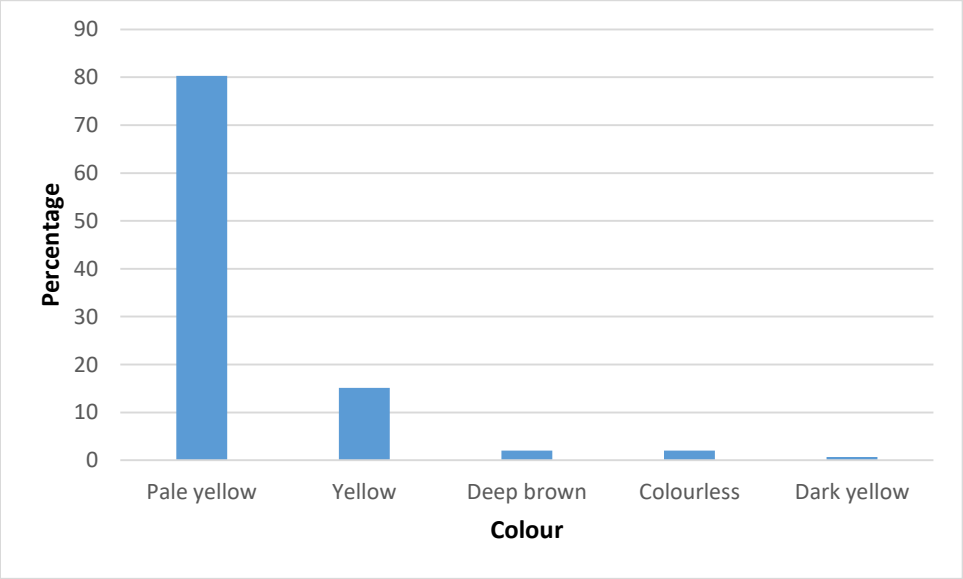
4.2 Macroscopic examination of urine samples

This included two parameters: color and consistency

4.2.1 Color

Urine samples had the following colors: 80.3% were pale yellow (n=122), 15.1% were yellow (n=23), 2.0% were deep brown (n=3), 2.0% were colorless (n=3) and 0.7% was dark yellow (n=1).

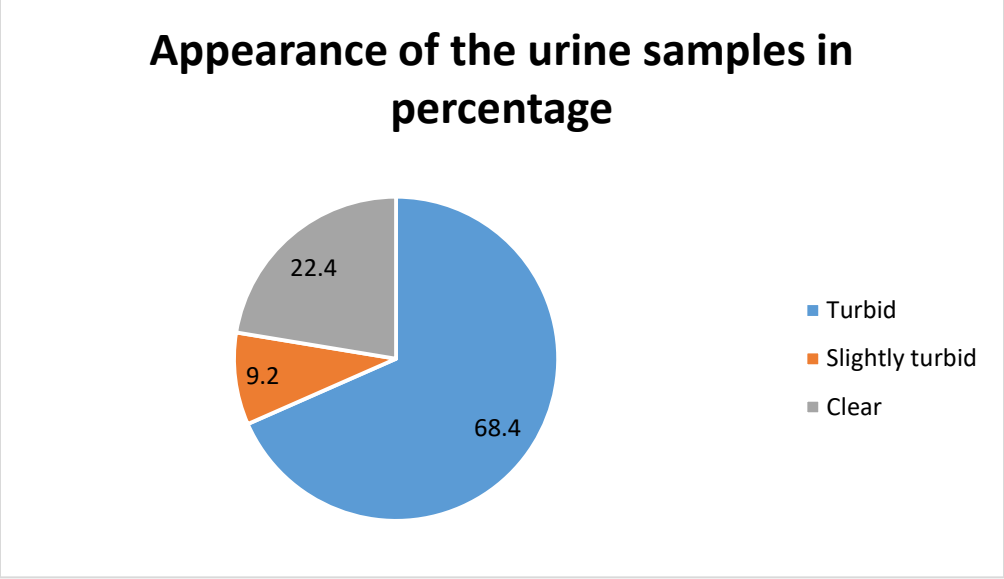
Fig.2: Color distribution of urine samples.



4.2.2 Appearance

Of all the urine samples processed, 68.4% (n=104) were turbid, 9.2% (n=14) were slightly turbid, and 22.4% (n=34) were clear.

Fig.3: Appearance of urine samples in percentage.



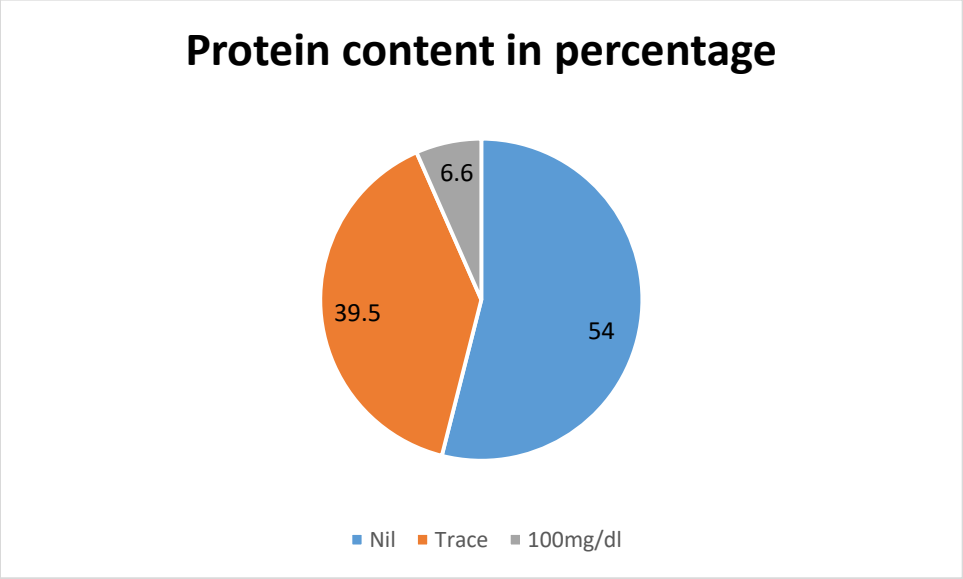
4.3 Biochemical examination of urine samples.

This was achieved using urinalysis strips which measure ten parameters, including leukocytes, nitrite, urobilinogen, protein, pH, blood, specific gravity, ketones, bilirubin and glucose. However, the parameters that were taken note of in the laboratory register include: protein, glucose and ph. Other parameters such as ketones and nitrites were recorded in certain cases, where a sample showed a positive result.

4.3.1 Protein

The test for protein content in the urine samples was negative in 54.0% the urine samples (n=82), trace in 39.5% (n=60) and100mg/dl in 6.6% (n=10).

Fig.4: Protein content of urine samples in percentage.



4.3.2 Glucose

The glucose content of the urine samples was recorded as follows: 98.3% (n=149) – Nil, and 2.0% (n=3) –Trace.

4.3.3 pH

The pH of the urine samples ranged from pH 6.0 to pH 9.0, as shown below in Table 2.

Table 2: pH of urine samples

pH	6.0	6.5	7.0	7.5	8.0	8.5	9.0
Number of patients	80	19	40	10	2	0	1
Percentage	52.6	12.5	26.3	6.6	1.3	0	0.7

4.3.4 Nitrite

Of the urine samples, 99.3% were negative for nitrite, while 0.7 % was positive for nitrite.

4.3.5 Ketones

Of the urine samples 99.3% were negative for ketones, while 0.7 % was positive for nitrites.

4.4 <u>Microscopic examination of urine samples</u>

Microscopic features included: presence of epithelial cell, pus cells, yeast cells, red blood cells and casts. A distinct category of no abnormality detected was also reported.

38.2% (58) urine samples had both pus cells and epithelial cells, 2.0% (3) urine samples had both red blood cells and pus cells and 2.6% (4) urine samples had both epithelial cells and red blood cells.

One urine sample had: epithelial cells, casts and pus cells; another urine sample had pus cells, red blood cells and casts and another urine sample had pus cells, yeast cells and epithelial cells.

4.4.1 No Abnormality Detected (NAD)

There was no abnormality detected in 37.5% of the slides that were prepared.

4.4.2 Epithelial cells

Of the preparations examined, 30.9% had less than 5 epithelial cells / hpf :, 21.7% had 6 to 20 epithelial cells /hpf:, 4.0% had 21 to40 epithelial cells/ hpf , and 43.4% were negative. Only 13.8% of the urine samples had only epithelial cells, as the cellular component.

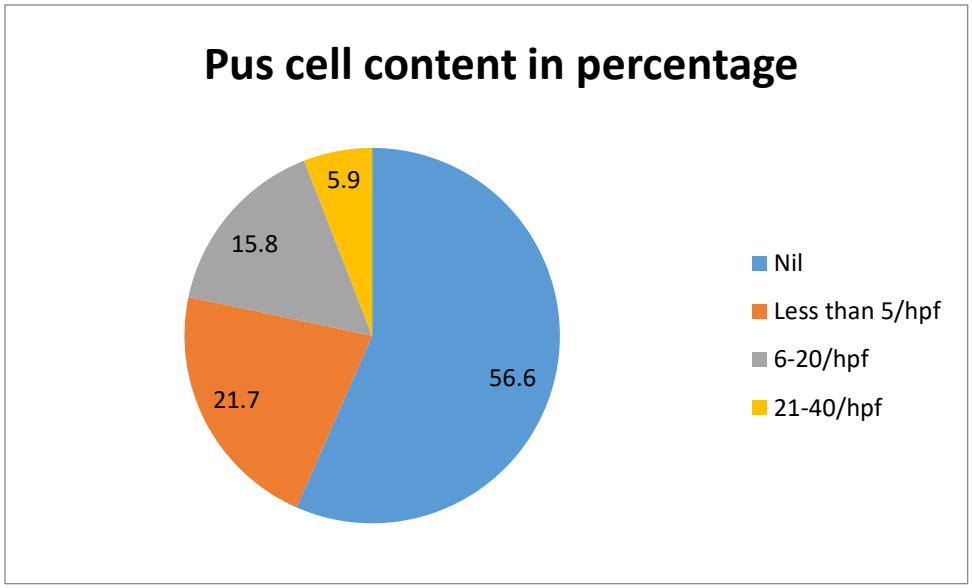
Table 3:Composition of epithelial cells.

Microscopy	Percentage	Number of samples
Negative	43.4	66
Less than 5/hpf	30.9	47
6-20/hpf	21.7	33
21-40/hpf	4.0	7

4.4.3 Pus cells

The preparations had pus cells as follows: 21.7% had less than 5 pus cells/ hpf, 15.8% had 6-20 pus cells/ hpf, 5.9% had 21-40pus cells/ hpf and 56.6% were negative for pus cells. Only 4.0% of the preparations had pus cells as their only cellular component.

Fig.5: Pus cell content in percentage.



4.4.4 Yeast cells

Of the urine preparations, 0.7% (n=1) were positive for yeast cells, while 99.3 % (n=151) were negative for yeast cells.

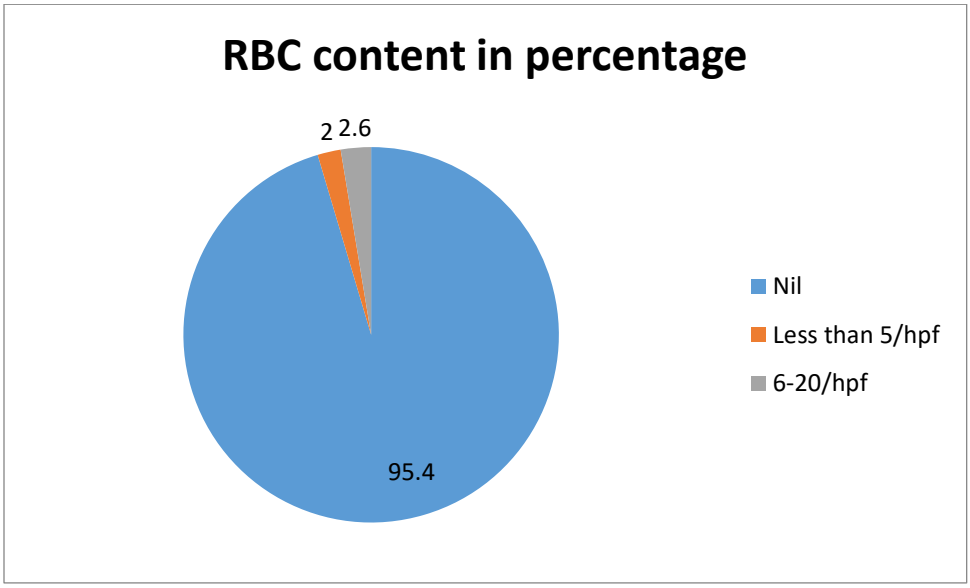
4.4.5 Casts

Of the urine preparations, 2.0% (n=3) were positive for cellular casts, whereas the remainder, 98% (n=149), were negative for casts.

4.4.6 Red blood cells

Red blood cells were seen as less than 5 RBCs/ hpf in 2.0% of the preparations, 6-20 RBCs/hpf in 2.6% of the preparations, and negative in 95.4% of the preparations. There was no case where the only red blood cells were the only cellular component on microscopy.

Fig.6: RBC content in percentage.



5.0 DISCUSSION OF RESULTS

Females were the majority of the study participants. According to the CDC factsheet, women have a higher tendency than men to visit hospitals as compared to men (CDC, 2015).

A similar study showed results where a slightly higher number of women attended government health facilities (Voeten, 2004).

A study conducted in South Africa was composed of more males (63.3%) than females (36.7), and greater than 99% of the participants sought for help when they had a symptom or sign of an STI. 76.8% of the participants attended public healthcare facilities, 50 (15.1%) visited traditional healers while 22 (6.6%) went to the pharmacy for consultation (Govender, Eche, 2010).

In a study conducted among Ghanaian women the prevalence of STI symptoms was18.5%. Of the study participants, only 35.0% of the women who were symptomatic for STIs sought and received medical care. The search for medical care was associated with presence of vaginal odor and one's wealth index (Richard et al, 2008).

The two age groups with the most research participants were 20-39 and 30-39. People in this age group are of the reproductive age, and therefore are exposed to risk factors such as having multiple sexual partners, being sexually active and change of partners. Results of a similar study showed that age group 25-44 years accounted for the most STIs with 59.7% prevalence in male. (Vora, 2011).

The normal color of urine ranges from pale yellow to yellow, and varies with someone's hydration status. Colorless urine indicates over hydration, while dark yellow urine is indicative of dehydration. Deep brown urine is due to the presence of degenerated red blood cells. Other factors that can affect the color of urine include; diet, metabolic products, infection and medication.

The colors of urine samples in this study were: 80.3% _pale yellow, 15.1% _yellow, 2.0% _deep brown, 2.0% _ colorless and 0.7% _ dark yellow.

The normal urinary pH ranges from 4.5 to 8.0 and is normally slightly acidic due to metabolic activity. Most research participants (approximately 65%) had slightly acidic urine with pH of 6.0 and 6.5. Alkaline urine in a patient with UTI suggests the presence of a urea splitting organism. Uric acid calculi are associated with acidic urine. Alkaline urine has a pH greater than 7.0 and is common in renal tubular acidosis, chronic renal failure and metabolic acidosis due to vomiting. In contrast to acidic urine, alkaline urine favors the growth of microorganisms such as bacteria.

A similar study conducted among women showed that a total of 89(40.8%) and 27(12.4%) women had acidic and alkaline urine respectively, whereas the remaining 102(46.8%) had urine pH of 7(Uneke, 2006).

Nitrites are not normally found in urine but result when bacteria reduce urinary nitrates to nitrites. A positive dip stick nitrite test indicates that these organisms are present in significant numbers (100000per ml).

Presence of nitrites in the urine samples was noted as 0.7%, while 99.3% samples were negative for nitrites in this study. 6.4% of the women screened had nitrites in their urine, which presented as a sign of infection with bacteria especially Escherichia coli, Enterobacter species, Klebsiella species and Proteus species, which convert nitrates into nitrites (Uneke, 2006).

Turbidity of a urine sample is attributed to the amount of cellular and proteinous components, as well as the hydration status of an individual. Increased turbidity is related to increased amount of cellular and proteinous components. In this study, of the urine samples processed, 68.4% (n=104) were turbid, 9.2% (n=14) were slightly turbid, while 22.4% (n=34) were clear.

Proteinuria is defined as presence of 100 to 200 mg per dl which is a hallmark of renal disease. Common causes of proteinuria include; congestive heart failure, dehydration, diabetes mellitus, exercise, emotional stress, fever, seizures and primary glomerular causes (Jeff, 2005).

The dipstick test for proteins was negative in 54.0% the urine samples (n=82), trace in 39.5% (n=60) and100mg/dl in 6.6% (n=10). In a study conducted among women, 43(19.7%) of the urine samples were positive for protein (Uneke, 2006).

Ketonuria is most commonly associated with uncontrolled diabetes. It can also occur in other conditions such as pregnancy, carbohydrate-free diets and starvation.

The presence of pus cells is due to pathology such inflammation and infections. A urine specimen with a positive result on both leukocyte esterase and microscopy, and in addition has a minimum of 10WBCs per high per high power field resulted in a diagnosis of urethritis. Furthermore a diagnosis of urethritis would require further investigation for Chlamydia trachomatis or Gonorrhea neisseria. (Workowsk, 2015).

In a certain study to determine STIs among women, two hundred forty-three (92%) research participants had an abnormal urinalysis result, which was defined as a greater-than-trace leukocyte esterase level a positive nitrite test result, or pyuria defined as more than five white blood cells per high-power field. (Myreen, 2015). Pus cells were seen in 126(57.8%) of the women on microscopy while moderate to many pus cells were observed among 33(15.1%) of the women in a similar study (Uneke, 2006).

In samples that were positive for leukocytes or blood, 62% had an STI while those that were positive for both nitrites/protein and leukocytes/blood positive, 28% had an STI. Based on results in a similar study, the researcher noted that abnormal urinalysis results should prompt the provider to add additional STI testing for gonorrhea and trichomoniasis. In this study, urine leukocytes appeared as a much more useful predictor of gonorrhea and trichomoniasis in symptomatic adolescent women (Huppert, 2007).

Hematuria is not a normal finding in urine, and is distinguished by visualization of intact RBCs on microscopic examination of urinary sediments. It is caused by injury to the kidney, familial causes (Nail-Patella syndrome, hereditary nephritis) and primary glomerulonephritis. The specificity and sensitivity of urinalysis dipsticks in the detection of micro hematuria is 65 to 99% and 91 to 99% respectively (Jeff, 2005).

Red blood cells in this study were seen as less than 5 RBCs/ hpf in 2.0% of the preparations, 6-20 RBCs/hpf in 2.6% of the preparations, and negative in 95.4% of the preparations. There was significant hematuria in only 2.6% of the preparations. In a study which involved women, on urinalysis, blood was detected in 18 (8.3%) of them (Uneke, 2006).

In a study involving children, using dipstick urinalysis, hematuria was defined as the presence of trace or more blood in the urine, while significant hematuria was the presence of more than 20 RBCs in the urine. On microscopic examination of the urine sediment, hematuria was the presence of 2 or more red blood cells. Of the 272 subjects studied, 12 research participants had hematuria on dipstick urinalysis with the prevalence rate of 4.4% while 24 research participants had hematuria on the confirmatory urinary sediment microscopy with the prevalence rate of 8.8% (Yauba, 2014).

Epithelial cells occur in urine due to exfoliation by surfaces that come into contact with the urine along its passage in the urinary tract. Of the preparations examined in this study, 30.9% had less than 5 epithelial cells / hpf :, 21.7% had 6 to 20 epithelial cells /hpf:, 4.0% had 21 to40 epithelial cells/ hpf , and 43.4% were negative. Only 13.8% of the urine samples had only epithelial cells, as the cellular component. A similar study showed that epithelial cells were seen among 103(47.2%) women (Uneke, 2006).

Finding yeasts on microscopy is a clue to a fungal infection. The urine samples that were positive had been collected from female research participants. Yeast cells are a clue to the presence of a fungal infection such as candidiasis.

Candida infection was diagnosed with the aid of routine urinalysis procedures such as presence of pyuria, protein and blood, in addition to measurement of leukocyte esterase. (William, 2005).

In this study, only 0.7% preparations were positive for yeast cells.

This is similar to what was observed in a study about under diagnosis of STIs, 12% (n=13) of the research participants had yeast infections. STIs were found to be more prevalent among patients who had urinary symptoms than those who did not have the symptoms, although this difference was never statistically significant (Huppert, 2007).

5.1 Conclusion

The use of wet prep in diagnosis of STIs requires sufficient clinical history, in order to differentiate them from UTIs. The distinguishing symptoms are dysuria and pain during urination. These symptoms would be absent in case of STIs. Wet prep is a fast way of doing routine urinalysis, but has a low sensitivity and specificity, as indicated in this study, requiring secondary tests to determine causative organisms. Such methods include; urine culture and NAAT. However, urine wet prep is easily used to diagnose trichomoniasis on microscopy.

5.2 Recommendations

Wet preparation of urine is an important tool in the diagnosis of Sexually Transmitted Infections, as it is a rapid and simple method.

REFERENCES

1.Araujo MP, Kleine HT, Parmigiano TR, Gomes NT, Caparroz GP, Silva ID, Girão MJ, Sartori . Prevalence of sexually transmitted diseases in female athletes in São Paulo, Brazil. Einstein (Sao Paulo). 2014 Jan-Mar; 12(1):31-5.

2. Catherine G. Sutcliffe, Apinun Aramrattana, Susan G. Sherman, Bangorn Sirirojn, Danielle German, Kanlaya Wongworapat, Vu Minh Quan, Rassamee Keawvichit, David D. Celentano, Incidence of HIV and Sexually Transmitted Infections and Risk Factors for Acquisition among Young Methamphetamine Users in Northern Thailand. Sex Transm Dis. 2009: May 36(5): 284-289.

3. Centers for Disease Control. Sexually Transmitted Disease Surveillance 2014. Arkansas

4. Da Ros CT, Schmitt Cd S. Global epidemiology of sexually transmitted diseases. Asian J Androl. 2008 Jan; 10(1):110-4.

5. Forhan SE, Gottlieb SL, Sternberg MR, et al. Prevalence of sexually transmitted infections among female adolescents aged 14-19 in the United States. Pediatrics 2009; 124:1505.

6. Govender I, Eche M. Health-seeking behavior of people with sexually transmitted infections in the community of Nkomazi East, Mpumalanga. South Afr J Epidemiol Infect. 2012; 27(4).

7. G Marx, G John-Stewart, R Bosire, D Wamalwa, P Otieno, and C Farquhar. Diagnosis of sexually transmitted infections and bacterial vaginosis among HIV-1-infected pregnant women in Nairobi. J STD AIDS. 2010 Aug; 21(8): 549–552.

8. Gwenda Hughes, Catherine M Lowndes Epidemiology of sexually transmitted infections: UK, 2014. Epidemiology and Behavior.

9. Hafner LM, Wilson DP, Timms P· Development status and future prospects for a vaccine against Chlamydia trachomatis infection. Vaccine. 2014 Mar 20; 32(14):1563-71.

10. H. Tookes, N Hirsch, C Diaz, O Ponomareva, J G Castro. Prevalence of Trichomonas vaginalis, chlamydia and gonorrhea in women at the Miami-Dade County Health Department STD Clinic. Sex Transm Infect 2011; 87:A103-A104

11. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia. 2006 annual surveillance report. Sydney: National Centre in HIV epidemiology and clinical research; 2006.

12. Jill S. Huppert, Frank Biro, Dongmei Lan, Joel E. Mortensen, Jennifer Reed, and Gail B. Slap. Urinary symptoms in adolescent females: STI or UTI? J Adolesc Health. 2007 May; 40(5): 418–424.

13. Judith Vandepitte, Helen A Weiss, Justine Bukenya, Nassim Kyakuwa, Etienne Muller, Anne Buvé, Patrick Van der Stuyft, Richard J Hayes, Heiner Grosskurth. Association between Mycoplasma genitalium infection and HIV acquisition among female sex workers in Uganda: evidence from a nested case–control study. Sex Transm Infect 2014; 90:7 545.

14. Jeff A. Simerville, William C. Maxted, and John J. Pahira. Urinalysis: A Comprehensive Review Am Fam Physician. 2005 Mar 15; 71(6):1153-1162.

15. Kensaku Seike, Shin-Ichi Maeda, Yasuaki Kubota, Masayoshi Tamaki, Mitsuru Yasuda, Takashi Deguchi. Prevalence and morbidity of urethral Trichomonas vaginalis in Japanese men with or without urethritis. Sex Trans-2012-050702

16. Kleppa E, Holmen SD, Lillebø K, Kjetland EF, Gundersen SG, Taylor M, Moodley P, Onsrud M. Cervical ectopy: associations with sexually transmitted infections and HIV. A cross- sectional study of high school students in rural South Africa. Sex Transm Infect. 2015 Mar; 91(2):124-9.

17. Lilian Nuñez-Forero, Luisa Moyano-Ariza, Hernando Gaitán-Duarte, Edith Ángel-Müller, Ariel Ruiz-Parra, Patricia González, Andrea Rodríguez, Jorge E Tolosa. Diagnostic accuracy of rapid tests for sexually transmitted infections in symptomatic women Sex Transm Infect 2016; 92:1 24-28.

18. Jeff A. Simerville, William C. Maxted, and John J. Pahira. Urinalysis: A Comprehensive Review Am Fam Physician. 2005 Mar 15; 71(6):1153-1162.

19. Mark H, Dhir A, Roth C. Sexually Transmitted Infections in the United States: Overview and Update. Am J Nurs. 2015 Sep; 115(9):34-44,

20. Menéndez C, Castellsagué X, Renom M, Sacarlal J, Quintó L, Lloveras B, Klaustermeier J, Kornegay JR, Sigauque B, Bosch FX, Alonso PL. Prevalence and risk factors of sexually transmitted infections and cervical neoplasia in women from a rural area of southern Mozambique. Infect Dis Oster Gynecol. 2010.

21. Moodley D, Moodley P, Sebitloane M, Soowamber D, McNaughton-Reyes HL, Groves AK, Maman S. High prevalence and incidence of asymptomatic sexually transmitted infections during pregnancy and post-delivery in KwaZulu Natal, South Africa. Sex Transm Dis. 2015 Jan; 42(1):43-7.

22. Myreen E. Tomas, Damon Getman, Curtis J. Donskey, Michelle T. Heckerd. Over diagnosis of Urinary Tract Infection and under diagnosis of Sexually Transmitted Infection in Adult Women Presenting to an Emergency Department. Journal of Clinical Microbiology August 2015 53(8)

23. Naidoo S, Wand H. Prevalence and incidence of Trichomonas vaginalis infections in women participating in a clinical trial in Durban, South Africa. Sex Transm Infect. 2013 Sep; 89(6):519-22.

24.Nyaradzai E Kurewa,Munyaradzi P Mapingure,Marshal W Munjoma,Mike Z Chirenje,Simbarashe Rusakaniko, Babill Stray-Pedersen.The burden and risk factors of Sexually Transmitted Infections and Reproductive Tract Infections among pregnant women in Zimbabwe. BMC Infectious Diseases2010; 10:127

25. Oliveira FA, Pfleger V, Lang K, Heukelbach J, Miralles I, Fraga F, Sousa AQ, Stoffler-Meilicke M, Ignatius R, Kerr LF, Feldmeier H. Sexually transmitted infections, bacterial vaginosis, and candidiasis in women of reproductive age in rural Northeast Brazil: a population-based study. Mem Inst Oswaldo Cruz. 2007 Sep; 102(6):751-6.

26. Othman Kakaire, Josaphat Kayogoza Byamugisha, Nazarius Mbona Tumwesigye, Kristina Gamzell-Danielsson. Prevalence and Factors Associated with Sexually Transmitted Infections among HIV Positive Women Opting for Intrauterine Contraception. Pone. April 10, 2015:10.1371.

27. Pam Sonnenberg, Soazig Clifton, Simon Beddows, Nigel Field, Kate Soldan, Clare Tanton, Catherine H Mercer Silva, Alexander, Andrew, Phelps, Bob, Philip, Wendy, Kaye Wellings, Catherine A Ison, Anne M Johnson Prevalence, risk factors, and uptake of interventions for sexually transmitted infections in Britain: findings from the National Surveys of Sexual Attitudes and Lifestyles (Natsal).Volume 382, No. 9907, p1795–1806, 30 November 2013

28.Pearson WS, Davis AD, Hoover KW, Gift TL, Owusu-Edusei K, Tao G. Demographic and Health Services Characteristics Associated With Testing for Sexually Transmitted Infections Among a Commercially Insured Population of HIV-Positive Patients. J Acquir Immune Defic Syndr. 2015 Nov 1; 70(3):269-74

29. Public Health Agency of Canada. (2010). Canadian Guidelines on Sexually Transmitted Infections. Ottawa: Public Health Agency of Canada.

30. Richard MK Adanu, Allan G Hill, Joseph D Seffah, Rudolf Darko, John K Anarfi, Rosemary B Duda. Sexually Transmitted Infections and Health Seeking Behavior among Ghanaian Women in Accra. Afr J Reprod Health 2008; 12[3]:151-158).

31. Rita Vora, Indian J Sex Trans Dis. Dec 2011:22:2, 86-89.

32. Rutherford GW, Anglemyer A, Bagenda D, Muyonga M, Lindan CP, Barker JL, Johnston L, Hladik W. University students and the risk of HIV and other sexually transmitted infections in Uganda: the Crane survey. Int J Adolesc Med Health. 2014; 26(2):209-15.

33. Satterwhite CL, Torrone E, Meites E, Dunne EF, Mahajan R, Ocfemia MC, et al. Sexually Transmitted Infections among US Women and Men: Prevalence and Incidence Estimates, 2008. Sexually Transmitted Diseases.2013; 40(3):187-93.

34. Sonnenberg P, Clifton S, Beddows S, et al. Prevalence, risk factors, and uptake of interventions for sexually transmitted infections in Britain: findings from the third National Survey of Sexual Attitudes and Lifestyles (Natsal-3). Lancet 2013; 382: 1795e806.

35. Travassos AG, Brites C, Netto EM, Fernandes Sde A, Rutherford GW, Queiroz CM. Prevalence of sexually transmitted infections among HIV-infected women in Brazil. Braz J Infect Dis. 2012 Nov-Dec; 16(6):581-5.

36.Truong, Hong-Ha M, Pipkin, Sharon, O'Keefe, Kara J. , Louie, Brian, Liegler, Teri, McFarland, Willi MD, Grant, Robert M. Bernstein, Kyle Scheer, Susan. Brief Report: Recent Infection, Sexually Transmitted Infections, and Transmission Clusters Frequently Observed Among Persons Newly Diagnosed With HIV in San Francisco

37. Uneke C, Ugwuja E, Isiogu N, Iloegbunam R, Elom M. An Assessment of Urine Analysis, Trichomonas vaginalis and Schistosoma haematobium Infections in Women Attending Out-patient Clinics in Southeastern Nigeria. The Internet Journal of Laboratory Medicine. 2006 Volume 2 Number 1.

38. Weinstock H, Berman S, Cates W. Sexually transmitted diseases among American youth: incidence and prevalence estimates, 2000. Perspective Sex Reproductive Health 2004; 36(1):6–10

39. Workowsk KA. Centers for Disease control and prevention. Sexually transmitted diseases and guidelines. Clin Infect Dis. 2015 Dec15. 61 Suppl 8:5759-62

40. Yauba M Saad1, Aikhionbare H Abiodun, Ogunrinde G Olufemi, Bugaje A Mairo. Correlation between Dipstick Urinalysis and Urinary Sediment Microscopy in Detecting Hematuria in Children with Sickle Cell Anemia in a Tertiary Hospital. Sch. J. App. Med. Sci., 2014; 2(6D):3087-3091