URINARY TRACT INFECTION AMONG FISTULA PATIENTS ADMITTED AT HAMLIN FISTULA HOSPITAL, ADDIS ABABA, ETHIOPIA

BY

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ABBREVIATIONS

AAHFH	Addis Ababa Hamlin Fistula hospital
DMIP	Department of microbiology, Immunology and Parasitology
BAP	Blood agar plate
CAUTI	Catheter-associated urinary tract infection
CLSI	Clinical and Laboratory Standards Institute
CLED	Cysteine lactose electrolyte deficient agar
HAI	Hospital acquired infections
HIV	Human immune deficiency varies
IAI	Intra-Abdominal Infection
ICU	Intensive care unit
LTCFs	Long-term care facilities
MSU	Midstream urine
NBM	Neonatal bacterial meningitis
NHAMCS	National hospital ambulatory medical care survey
OF	Obstetric fistula
RVF	Recto vaginal fistula
UNFPA	United Nations Population Fund Agency
UTIs	Urinary Tract Infections
UPEC	Uropathogenic E. coli
VUR	Vesicoureteral reflux
VVF	Vesico vaginal fistula
WHO	World Health organization

ABSTRACT

Background: Urinary Tract Infection (UTI) causes a serious health problem and affects millions of people worldwide. Patients with obstetric fistula usually suffer from incontinence of urine and stool, which can predispose them to frequent infections of the urinary tract.

Objectives: This study was undertaken to determine the etiologic agents, drug resistance pattern of the isolates and associated risk factor for urinary tract infection among fistula patients in Addis Ababa fistula hospital, Ethiopia.

Methods: Across sectional study was conducted from February to May 2015 at HamlinFistula Hospital, Addis Ababa, Ethiopia. Socio-demographic characteristics and other UTI related risk factors were collected from study participants using structured questionnaires. The mid-stream urine was collected and cultured on Cysteine lactose electrolyte deficient agar, blood agar and MacConkey agar. Antimicrobial susceptibility was done by using disc diffusion method and interpreted according to Clinical and Laboratory Standards Institute (CLSI). Data was entered and analyzed by using SPSS version 20.

Results: Out of 210 fistula patients investigated 169(80.5%) of the patient were younger than 25 years. Significant bacteriuria was observed in 122/210(58.1%) and 68(55.7%) of the isolates were from symptomatic cases. *E.coli 65*(53.7%) were the most common bacterial pathogen isolated followed by *Proteus spp. 31*(25.4%). Statistical Significant difference was observed with history of previous UTI (P= 0.031) and history of catheterization (P=0.001).Gram negative bacteria isolates showed high level of resistance (>50%) to gentamicin and ciprofloxacin, while all gram positive bacteria isolated were showed low level of resistance (20-40%)to most of antibiotic tested.

Conclusion and Recommendation: The overall prevalence of urinary tract infection among fistula patient is 58.1%. This study showed that the predominant pathogen of UTI were *E.coli*followed by *Proteus spp*. It also showed that amoxicillin-clavulanic acid was a drug of choice for urinary tract bacterial pathogens. Based on the finding of the present study routine screening of all fistula patients for UTI and performing urine culture and antimicrobial susceptibility testing is recommended.

Key words*:* UTI, fistula patients, **Hamlin** Fistula Hospital, Addis Ababa, Ethiopia.

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Urinary Tract Infections (UTIs) is an infection caused by the presence and growth of pathogen anywhere in the urinary tract including a kidney, ureter, bladder, and urethra. It is one of the most common bacterial infections in women, and 50% to 60% of adult women experience a UTI during their lifetime (Czaja and Hooton, 2006). In women, the ascent of a number of organisms into the bladder is easier than in men because of the relatively short urethra and absence of bactericidal prostatic secretion. The infections cause a serious health problem affecting millions of people each year and considered among the most common infectious diseases affecting all age groups, from infants to the elderly and also the most common infections seen in hospitalized patients and the second most common, after respiratory tract infections, seen in the general population (El-Naggar *et al*., 2010).

Patients with obstetric fistula (OF) can have frequent bladder infections, incontinence of urine and stool. Many of these patients might live with these conditions for several years. This may further predispose them to health related problems like urinary tract infections (Hilton, 2003).

Obstetric fistula (or vaginal fistula) is a severe medical condition in which a fistula (hole) develops between the rectum and vagina (recto-vaginal fistula (RVF)) or between the bladder and vagina (vesico-vaginal fistula (VVF)) after severe or failed childbirth, when adequate medical care is not available (Miller *et al*., 2005). Vesico-vaginal and recto-vaginal fistulas are debilitating complications of obstructed labor, which primarily affect women and girls in developing countries (Rovner, 2001). Other causes include poorly performed abortion, sexual abuse and rape, other surgical trauma, gynecological cancers or other related radiotherapy treatment and, perhaps the most important, limited or no access to obstetrical care or emergency services (Menefee and Wall, 2002).

It has been cited as one of the most dramatic and physically, psychologically, and socially damaging, yet preventable, complications of labor.

The most common symptom of recto-vaginal fistula is passage of bowl contents through the vagina. It may also cause inflammation of vagina, which result in burning, itching and discharge; or inflammation of bladder which cause frequent and sometimes painful urination. There are also some physical complication likes damage to the cervix or pelvic bones, neurological conditions, leakage of urine and/or feces into the vagina, urogenital infections, ammonia dermatitis, genital lacerations, kidney infections and amenorrhea(Hilton, 2003).Women with obstetric fistula also face other significant physical and social challenges, including infertility, social isolation and unemployment (Erin McFadden *et al*., 2011).

In general, obstetric fistula treatment needs prolonged hospitalization and more intensive nursing cares like prolonged bladder catheterization which may contribute for the development of urinary tract infections in women who have OF. Although it is difficult to determine precise rates, according to the World Health Organization (WHO) and the United Nations Population Fund Agency (UNFPA), estimated 50,000 to 100,000 women develop obstetric fistulas each year and over two million women currently live with obstetric fistula (UNFPA, 2003). In developing countries particularly in sub-Saharan Africa and Asia, where access to emergency obstetrical care is often limited, obstetric fistula usually occurs as a result of prolonged obstructed labor. In Ethiopia, it is estimated that 9 000 women annually develop a fistula, where only 1200 of them are treated (UNFPA, 2009). However, data on impact of UTI on obstetric fistula patients and distribution and antimicrobial drug susceptibility patterns among urinary pathogen isolated from such patients are scarce. Therefore, the aim of this study was to determine the prevalence of UTI, antimicrobial susceptibility pattern of bacterial isolates and the associated risk factors among obstetric fistula patients admitted at Hamlin fistula hospital, Addis Ababa, Ethiopia.

1.2 . Literature Review

1.2.1 Etiologic agents of UTI

UTIs refer to the presence of microbial pathogens within the urinary tract. Although UTI may be caused by any pathogen that colonizes the urinary tract (e.g., fungi, parasites, and viruses), most causative agents are bacteria of enteric origin. There are many bacterial genera that cause urinary tract infection. The bacteria that cause urinary tract infections typically enter the bladder via the urethra. However, infection may also occur via the blood or lymph (Vasudevan, 2014*)*. Any source of possible infection occurs through urethra which initiates the incidence of the infection. It is believed that the bacteria are usually transmitted to the urethra from the bowel, with females at greater risk due to their anatomy. There are many urinary tract bacterial pathogens responsible for this infection. Among those the predominant pathogen is *E. coli* which constitutes up to 80-85% and is followed by *Staphylococcus saprophyticus* which account to 5-10 % (Chen *et al*., 2011). In addition to above mentioned bacterial species *Proteus mirabilis, Proteus vulgari, Enterobacter cloacae*, *Enterobacter aerogens, Klebsiella pneumoniae,Staphylococcus aureus, Coagulase negative Staphylococcus, Pseudomonas aeroginusa, Streptococcus faecalis, Acinetobacter calcoacticus, and Citrobacter freundi* are also associated with the infections (Vasudevan,2014*)*. Urinary tract infection due to viral and fungal causes is rare (Bouza *et al*., 2001).

The pattern of isolates reported from Nigeria was consistent with the usually reported pattern, with *E. coli* being the most common organism isolated in cases of urinary tract infection followed by *S. auerus* and *K. pneumoniae*. *P. aerogunosa* was the least common isolates according to the same report from Nigeria (Okonko *et al*., 2010).

Escherichia coli are a bacterial organism that belongs to the family Enterobacteriaeceae. *E. coli* is one of the main causes of both nosocomial and community acquired infections in humans. The organism is therefore of clinical importance and can be isolated from various clinical specimens. It is one of the organisms most frequently isolated from urine and blood (Russo and Johnson, 2000).

In addition to urinary tract, *E. coli* is the most frequent pathogen associated with intra-abdominal infection (IAI) (Chen *et al*., 2011).As an extra intestinal pathogen, *E. coli* is best

known for causing urinary tract infection, bacteremia, and neonatal bacterial meningitis (NBM). The distinctive strains of *E. coli* responsible for most cases of UTI, sepsis, and NBM represent a limited number of virulent clones that are characterized by specific O.K.H serotypes and derive predominantly from *E. coli* phylogenetic group B2, as defined by multilocus enzyme electrophoresis and to a lesser extent from group D (Russo and Johnson, 2000).

Pseudomonas aeruginosa is an aerobic gram- negative bacterium that is an important cause of both community-acquired and hospital-acquired infections. *Pseudomonas aeruginosa* is member of the gamma Proteobacteria class of bacteria. It is a gram-negative, aerobic rod belonging to the bacterial family Pseudomonadaceae. Since the revisionist taxonomy based on conserved macromolecules (e.g. 16S ribosomal RNA) the family includes only members of the genus *Pseudomonas* which are cleaved into eight groups. *Pseudomonas aeruginosa* is the type species of its group which contains 12 other members (Bouza *et al*., 2001).

Among the species of *Serratia genus, S. marcescens* plays a significant role as etiological factor in the infections in man. It is a gram-negative bacillus classified as a member of the Enterobacteriaceae, has been recognized as a cause of hospital-acquired infection for the last two decades *(*Chaudhuri *et al.,* 1992*)*. It is also differentiated from other gram-negative bacteria by its ability to perform casein hydrolysis, which allows it to produce extracellular metallo proteinases which are believed to function in cell-to-extracellular matrix interactions. *S. marcescens* also exhibits tryptophan and citrate degradation. Another determination of *S. marcescens* is its capability to produce lactic acid via oxidative and fermentative metabolism *(*Chaudhuri *et al.,* 1992*)*. Therefore, it is said that *S. marcescens* is lactic acid O/F+. *S. marcescens* strains were most often isolated from urine collected from intra-vesical catheter (81 strains, i.e. 64.8%) as well as from physiologically passed urine (23 strains, i.e. 18.4%) (Eugenia *et al.*, 1998).

In uncomplicated UTIs caused by gram-positive uropathogens, only *Staphylococci*, mainly *Staphylococcus saprophyticus*, play a significant role and contribute to about 5–15% of

cases. *Enterococci*, if present in uncomplicated UTI, are usually found in mixed infections, making it difficult to define their specific role whether as pathogens, colonizers or contaminants *(*Chaudhuri *et al.,* 1992*)*. In complicated UTIs, *Staphylococci and Enterococci* are the main gram-positive uropathogens. These organisms have become common in hospitals, nursing homes and chronic care facilities. UTIs caused by these organisms are associated with serious underlying illness and institutionalization (Osterberg *et al*., 1990).

1.2.2. Virulence factors and pathogenesis of UTI

Bacterial virulence factors play a significant role in determining whether an organism will invade the urinary tract and the level of infection acquired. Uropathogenic *E. coli* (UPEC) is present within bowel flora and pathogenic strains of this microorganism can infect the urinary tract by expressing specific virulence factors that permit adherence and colonization of the lower urinary tract. After the initial colonization period, pathogens can ascend into the urinary bladder resulting in symptomatic or asymptomatic bacteriuria (Niall and Hugh, 2011). Adhesins found on the surface of the bacterial membrane are responsible for initial attachment onto urinary tract tissues (Mulvey, 2002) (Figure 1.2).

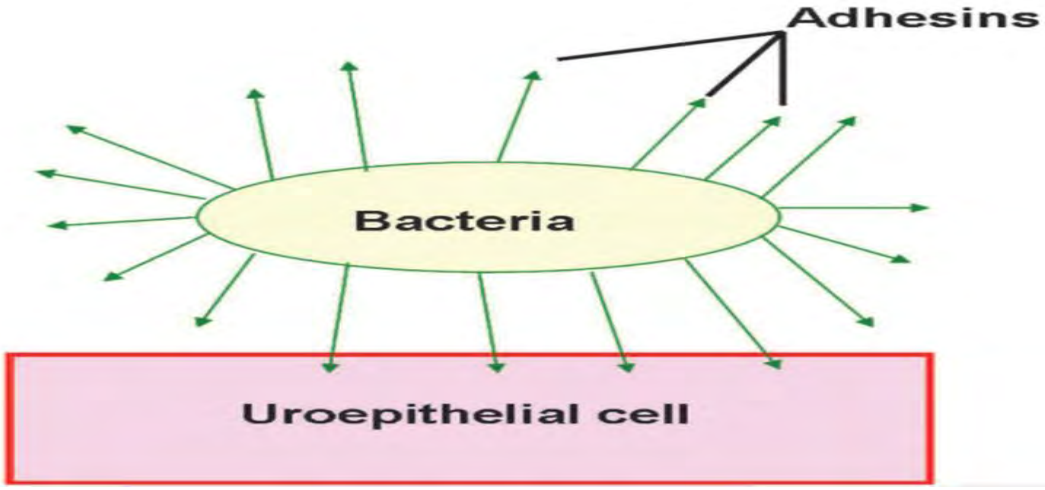

Figure.1.1. Adhesins on the uropathogen are responsible for attachment of the bacteria to the uroepithelial cell membrane of the host.

Adhesins are classified as fimbrial or afimbrial, depending on whether the adhesin is displayed as part of a rigid fimbria or pilus. Fimbriae and pili are surface glycoproteins that function as ligands for glycolipid and glycoprotein receptors on uroepithelial cells.

Bacteria may produce 100-400 pili on the same cell and other cells can produce the same pilus type. A pilus is composed of subunits referred to as pilin and they are classified as either mannose sensitive or mannose resistant, based on their ability to mediate haemagglutination of erythrocytes (Lau *et al*., 2005). The most common types of pili are types 1, P and S. Assemble of pili within the urinary tract is mediated by the „chaperone/ usher pathway" where periplasmic chaperones such as P pilus chaperone „PapD" and type 1 pilus chaperone „FimC" possess two immunoglobulin (Ig)-like domains that are oriented to form a boomerang like shape (Kau *et al*., 2005). A number of studies have demonstrated that interactions between the Fim H adhesin and epithelial cells on the bladder"s surface are essential for colonization and infection of bladder epithelium with strains of *Uropathogenic E. coli*. After binding to the epithelial surface the activated Fim H adhesins migrate towards deeper urothelial layers and penetrate the cell membrane (Mulvey, 2002; Anderson *et al*., 2004). Once the uropathogen is intracellular the invasive process continues as bacteria proliferate within the cytosol to form clusters (Anderson *et al*., 2004). Eight hours after inoculation the phenotypic appearance of the bacteria changes to an engulfing „biofilm" like structure that protects against the host"s immune response and shields the uropathogen from its surrounding environment (Justice *et al*., 2004). Morphological changes allow the uropathogen to evade the host"s immune response (Justice *et al*., 2004; Hooton, 2004). Bacteria that have clustered will eventually detach from their group, become motile and flee the host cell. Urinary tract obstruction and stasis of urine flow can significantly alter the host"s defense mechanisms and both factors strongly predispose to complicated UTIs.

During the obstructive process local mucosal defense mechanisms are disturbed as the epithelial lining over-distends and pooled urine functions as a mean for bacterial growth and proliferation. Urinary catheters, particularly in patients with high residual volumes, are also ideal media for uropathogens to colonize the urinary tract (Hooton, 2004).

1.2.3. Epidemiology of UTI

Urinary tract infection is among the most common bacterial infections encountered in clinical practice and account for the significant morbidity and severe health problem in persons of all ages (Figure 1.1). Both genders male and female are susceptible to infection, but because of their anatomy and reproductive physiology women are more vulnerable to the infections (Samia, 2012). It is estimated that 20% of women develop a UTI during their lifetime; the incidence increases at puberty and remains high throughout adult life, only after the age of 50 years is a similar incidence seen in males (Schnarr and Smaill, 2008). UTI accounts for approximately 23% of all hospital acquired infections (HAI). Frequent or recent sexual activity is the most important risk factor for urinary tract infection in young women. Nearly 80% of all urinary tract infections in premenopausal women occur within 24 hours of intercourse. UTIs are very rare in celibate women. Other aging-related urinary conditions, such as urinary incontinence, menopause and pregnancy can also increase the risk for recurrent urinary tract infections in women.

Asymptomatic bacteriuria occurs in 2–10% of all pregnancies and its prevalence is closely related to socioeconomic status (Schnarr andSmaill,2008).

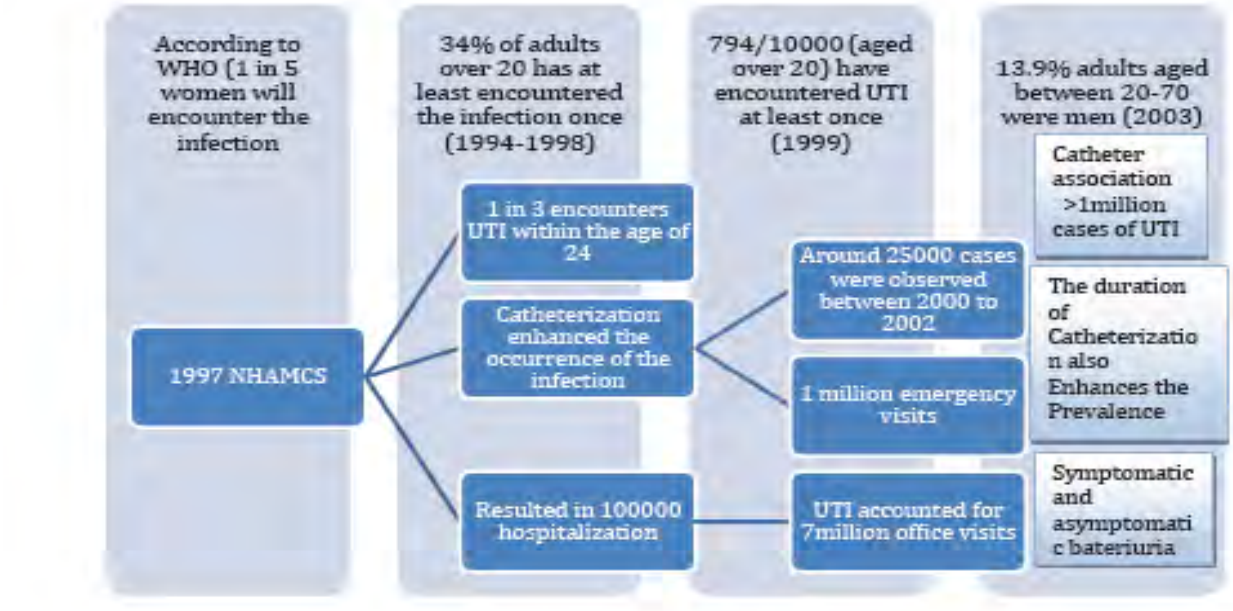

Figure.1.2.Globally prevalence of UTI among different groups of people over the last fewyears (Vasudevan, 2014) NHAMCS:-National hospital ambulatory medical care survey.

Catheter-associated bacteriuria is the most common health care–associated infection worldwide and is a result of the widespread use of urinary catheterization, much of which is inappropriate, in hospitals and long-term care facilities (LTCFs). It is the most common health care–associated infection worldwide (Tambyah, 2004). It accounts for up to 40% of hospital-acquired infections and most of the 900,000 patients with nosocomial bacteriuria in United State hospitals each year (NNIS, 2004). From 15% to 25% of patients in general hospitals have a urethral catheter inserted at some time during their stay, and the rate of catheter use appears to be increasing (Saint *et al*., 2008). It is also among the most common infections in LTCFs, although symptomatic UTI is less common than respiratory and skin and soft-tissue infections (Smith *et al*., 2008). It is estimated that over 1.1 million patients in United State LTCFs have a urethral catheter in place at any given time. Almost all of those residents with long-term indwelling catheters are bacteriuric (Smith *et al*.,2008).

P. aeruginosa is a common cause of nosocomial UTIs; accounting for approximately 9% of UTIs hospital wide and up to 16.3% of UTIs in intensive care unit (ICU) patients (Jodra *et al*., 2006). *P. aeruginosa* is more frequently responsible for nosocomial UTIs in patients with indwelling urinary catheters than in those without these devices (10.5% vs. 4.1%) (Bouza*et al.*, 2001).

The prevalence of UTIs in Africa setting varies greatly in different country. Study done for evaluation of antimicrobial susceptibility of *Enterobacteriaceae* causing urinary tract infections *in Africa indicates Escherichia coli*, *Klebsiella* spp., and *Proteus* spp. were the most commonly encountered uropathogens. This study also reports Cefotaxime, imipenem, fosfomycin, and ciprofloxacin were the antibiotics with the highest activity against *E. coli and* amikacin and ciprofloxacin against *Klebsiella* spp. (Giannoula *et al*., 2013). Other study done in Tanzania among pregnant women; the prevalence of UTIs was 16.4%. This study also shows that *E .coli* strain was the most common isolates (Olsen *et al*., 2000). The prevalence of UTIs among pregnant women in Nigeria was 47.5%, while the high prevalence was seen in age group of 21-25 and the least percentage had seen in age groups of 26-30 years. In Ethiopia there are published information concerning the etiologies and resistance patterns of community acquired UTIs and for catheter associated urinary tract infection (CAUTI).

Study done at Jimma university teaching hospital indicate that *Klebsiella spp.*(33.3%) and *E.coli*(27.7%) were the most common bacteria pathogen isolated in both groups followed by *Enterobacter spp.* (6%) (Teshager *et al.*, 2008). Other study done in Ethiopia at Dessie health research laboratory to asses Prevalence and antibiogram of bacterial isolates from urinary tract infections indicates *E.coli*(63.6%) was the dominant isolates followed by *klebsiella spp.*(8.5%) and *Proteus spp*.(8.2%) (Kibret and Abera, 2014).Also the same report with the *E.coli* (31.7%) the commonest bacterial pathogen was reported from other bacteriological finding in Ethiopia which were conducted at Gondar university hospital(Yismaw *et al*.,2012).

Study in south west Ethiopia on community acquired UTIs and CAUTI indicates that gram negative bacteria isolated in both groups showed high level of resistance (88-100%) to ampicillin, amoxicillin-carbencillin and cephalexin.

The same study also indicate amoxicillin-clavulanic acid and polymyxin B as a drug of choice (Teshager *et al.*, 2008), while other study shows nitrofurantoin and gentamicin considered as appropriate antimicrobial for empirical treatment urinary tract infections (Kibret and Abera, 2014).

1.2.4. Risk factors associated with urinary tract infection

A. Pregnancy

Pregnancy is one of the factors which increase the risk of UTI partly due to the pressure of gravid uterus on the ureters causing stasis of urine flow and is also attributed to the humoral and immunological changes during normal pregnancy (Ramzan *et al*., 2004; Demilie *et al*., 2012). UTI is common with varying prevalence by age, sexual activity and the presence of genitourinary abnormalities (Colgan *et al*., 2006). In pregnancy UTI carries risk of foetal loss, pre-term labour, intrauterine growth retardation, maternal anemia and also the chance of recurrent infections (Kladensky, 2012).

B. Functional abnormalities

Obstetric fistula is one of the risk factors for the development of UTI in women (Hilton, 2003). Women with a functional abnormality of the urinary tract are also at a higher risk of

developing a UTI. Inability to empty the bladder, as in the case of neurogenic bladders, frequently results in urinary retention, urinary stasis, and suboptimal clearance of bacteria from the urinary tract (Colgan *et al*., 2006). Clean intermittent catheterization is helpful for emptying the neurogenic bladder, but catheterization itself may introduce bacteria to this normally sterile space. Chronically elevated bladder pressure secondary to poor emptying also may cause secondary VUR, in which the elevated pressure increases the potential renal damage of phylonephritis (Kladensky, 2012)

C. Sexual activity

Sexual activity has been recognized as a risk factor for the development of UTI in young women (Weir and Brien, 2000). Urogenital colonization and selection for uropathogenic microbes secondary to the use of spermicides are also suspected risk factors for UTI and currently are undergoing investigation (Finer and Landau, 2004). Some researchers have suggested that adolescent UTI be seen as a marker of sexual activity (Nguyen and Weir, 2002). A similar risk has not been demonstrated in men. Uropathogenic strains of *E coli* also are more likely to be shared during sexual intercourse than commensal *E coli* (Foxman *et al*., 2002). Although the exact relationship between sexual activity and UTI in young woman is currently unclear, the proposed mechanism is direct transfer of bacterial from the bowel or vagina to the urethral meatus during sexual intercourse (Zhang and Foxman, 2013).

D. Duration of Catheterization

Duration of catheterization is the most important risk factor for the development of catheter associated bacteriuria (Loeb *et al*., 2008). Thus, rates will vary in published studies according to how long the patients have been catheterized and how often urine cultures are performed. By 1 month, nearly all patients with an indwelling catheter will be bacteriuria. Other risk factors associated with catheter associated bacteriuria include not receiving systemic antimicrobial therapy, female sex, microbial colonization of the drainage bag, and catheter insertion outside the operating room, catheter care violations, rapidly fatal underlying illness, older age, diabetes mellitus, and elevated serum creatinine at the time of catheterization (Maki and Tambyah, 2001).

E. Chronic Medical Condition

Urinary tract infection (UTI) is a major problem in diabetics. The risk of developing infection in diabetic patients is higher and urinary tract is the most common site for infection (Nicolle, 2000). Changes in host defense mechanisms, the presence of diabetic cystopathy and micro-vascular disease in the kidneys may play a role in the higher incidence of UTI in diabetic patients.

Different medical condition like kidney problem, neurogenic bladder, sickele cell anemia, immune system problem like HIV patient and urinary tract abnormality are also increase the risk for UTIS (Hackenhaar and Albernaz, 2013).

F. Other Factors

In healthy women, the prevalence of bacteriuria increases with age from about 1 percent in females with 5 to 14 years of age to more than 20 percent in women at least 80 years of age (Colgan *et al*., 2006).

The prevalence is higher among individuals in lower socioeconomic classes and those with a past history UTI (Hackenhaar and Albernaz, 2013). UTI is more common in primigravidae than multiparae, previous history of UTI increases the chance by 50%, presence of asymptomatic bacteria increases the chance by 25%, abnormality in the renal tract is found in about 25 % (Emiru *et al*., 2013).

1.2.5. Clinical features

The infection is named based on the site of infection. The infection of urethra and ureter are referred to as urethritis and ureteritis, respectively; whereas cystitis and pylonephritis corresponds to bladder and kidney infections (Czaja and hooton, 2006; Vasudevan, 2014 and Hooton, 2004). Therefore the infection of bladder and urethra are referred as the infection of the lower urinary tract whereas the kidney and ureter infection is an indication of upper tract infection. Cystitis is a common type of infection whereas the infection associated with the renal damage is an issue of serious concern.

Generally UTIs are classified based on the factors that trigger the infection and the nature of occurrence. Taking these aspects into consideration, UTIs can be classified as follows (Hooton, 2004):-

i. Uncomplicated or complicated (based on the factor that triggers the infection)

ii. Primary or recurrent (depending on the nature of occurrence)

Uncomplicated and complicated urinary tract infection: This is a consequence of bacterial infection and the prevalence is higher in women than men. This includes the common form of the infection like the cystitis and phylonephritis which affects the lower and the upper tracts leading to bladder and kidney infections (Hooton, 2004). In contrast, complicated urinary tract infection occurs in men and women at any point of their life and has the tendency to produce severe outcomes resulting in death under serious circumstances. These infections are highly intricate and are difficult to treat and they are persistent (Czaja and Hooton, 2006). These complicated urinary tract infections can lead to outcomes like structural anomalies that blights that capability of the urinary tract to flush out the urine and this in turn provides better scope for the growth of bacteria as urine is considered to be a suitable growth medium and leads to dire consequences. Patients with urinary tract infection are often subjected to medical devices and one such device commonly employed among the patients are the urinary catheters which serve as a common means of infection. In addition, bladder and kidney malfunction and kidney transplants are the other factors for complicated urinary tract infection. The first three months after kidney transplant is very crucial and the patient is vulnerable to develop such complications (Niall and Hugh, 2011).

Recurrent urinary tract infection: This is a common phenomenon that is observed among women who have experienced uncomplicated UTIs and they are classified as re-infection and relapse. Major cases of UTIs are referred to as re-infections and the condition is encountered by the patient after several weeks of antibiotic treatment (Hooton, 2004). The less frequent type of recurrent UTI is known as relapse which is an outcome of treatment failure and the patient encounters the condition within two weeks of the previous infection. Relapse UTIs are usually associated with pyelonephritis which results in renal failures, kidney impediments through kidney stones and anatomical abnormalities in men and women. In addition, the classification of UTIs is also based on the extent of symptoms exhibited by the patients which groups the UTIs in to symptomatic and asymptomatic UTIs (Czaja and Hooton, 2006).

The bacterial count is an important parameter to signify the presence of symptomatic and asymptomatic UTIs. The most common pathogen known for conferring the infection is *E. coli* which constitutes up to 80 to 85% followed by the other pathogens that reside in the urinary tract like *Pseudomonas*, *Klebsiella*, *Staphylococcus*, and *Enterococcus*. In addition, to bacteria other microbes like fungi and viruses are known to cause UTIs but bacterial mean of infection predominates (Hooton, 2004).

Symptoms of Urinary tract infection

UTI can be manifested as asymptomatic or symptomatic infection based on the presence and absence of the symptoms.

A. Cystitis: This is commonly called as lower urinary tract infection or bladder infection and affects the bladder. It causes the following symptoms (Niall and Hugh, 2011).

i. Pressure in lower pelvis pain

ii. Dysuria (painful urination)

iii. Polyuria (frequent urination)

iv. Urinary urgency

v. Nocturia (urination during night)

vi. Haematuria (urine with traces of blood)

Cystitis is further classified based on the etiology and therapeutic approach and traumatic cystitis considered as the common form of cystitis among females causing the bruising of the bladder. This is often followed by bacterial cystitis (Hooton, 2004). The coliform bacteria are transferred to the bladder from the bowel through the urethra.

B. Pyelonephritis: This is commonly referred to as upper urinary tract infection and affects the kidneys. It is also known as "pyelitis". Severe incidence causes the accumulation of pus around kidneys and is known as "pyonephrosis". Symptoms of pyleonephritis include fever and flank pain in addition to symptoms seen in lower urinary tract infection (Hooton, 2004).

1.2.6. Laboratory Diagnosis of UTI

The aim of the microbiology laboratory in the management of UTI is to reduce morbidity and mortality through accurate and timely diagnosis with appropriate antimicrobial sensitivity testing. Different methods are used to diagnosis urinary tract infections; however

culture remains the preferred method of detecting and quantifying bacterial growth (Cheesbourgh, 2006). Urine cultures are performed to detect organisms that are the causative agents of urinary tract infections. Urinary pathogens will usually yield high counts having uniform colonial morphology and should be sub cultured directly to routine media for identification and susceptibility testing. Cystine-Lactose-Electrolyte-Deficient Agar (CLED) supports the growth of a great majority of the bacteria which causes urinary tract infections and is used to differentiate and identify these pathogens (Isenberg, 2004). In addition, it has the advantage of restricting the swarming of *Proteus spp*. on the medium surface. The nutrients in CLED Agar are supplied by the peptones, pancreatic digests of gelatin and casein, and beef extract. Lactose is included to provide an energy source for organisms capable of utilizing it by a fermentative mechanism. The cystine permits the growth of dwarf colony coliforms. Bromthymol blue is used as a pH indicator to differentiate lactose fermenters from lactose-nonfermenters. Organisms which ferment lactose will lower the pH and change the color of the medium from green to Yellow (Koneman *et al*., 1997). Electrolyte sources are reduced in order to restrict the swarming of *Proteus* species. Typical colonial morphology of urinary pathogens on CLED Agar is as follows:-

Escherichia coli .....Yellow colonies, opaque, and center slightly deeper yellow

Klebsiella spp.....Yellow to whitish-blue colonies, extremely mucoid

Proteus spp .....Translucent blue colonies

Pseudomonas aeruginosa ……...Green colonies with typical matted surface and rough periphery and "Sweet" odor.

Serratia spp……. Blue to intense blue colonies

Enterococcus spp .....Small yellow colonies, about 0.5 mm in diameter

Staphylococcus aureus .....Deep yellow colonies, uniform in color

Coagulase negative Staphylococci ...Pale yellow colonies, more opaque than *E. faecalis*

1.2.7. Treatment and prevention

The commencement of the treatment process starts after the diagnosis of the infection but these initial attempts of treating the disease can lead to problematic consequences as the treatment has to be made after the confirmation of the etiological agent.Treatment of UTI is

often started empirically and therapy is based on information determined from the antimicrobial resistance pattern of the urinary pathogens (Wilson and Gaido, 2004).

The prevalence of antimicrobial resistance among urinary pathogens has been increasing worldwide due to aberrant use of antibiotics in practice (Bonadio *et al*., 2001). The initial treatment efforts involve the employment a variety of antimicrobial agents and this could in turn make the pathogen resistant to commonly employed drugs. Therefore, a sporadic assessment of the causative pathogens against the antimicrobial agents is necessary. Even though amoxicillin, ciprofloxacin, gentamicin, ceftriaxone, cotrimaxole and ampicillin are used to treat urinary tract infection, it is important to perform antimicrobial sensitivity tests to choice appropriate treatments. Study done for evaluation of antimicrobial susceptibility of *Enterobacteriaceae* causing urinary tract infections *in Africa indicates* Cefotaxime, imipenem, fosfomycin, amikacin and ciprofloxacin were the antibioticswith the highest activity against the most commonly isolated UTI pathogens *E. coli* and *Klebsiella* spp. (Giannoula *et al*.,2013). Study in Ethiopia on UTI shows amoxicillin-clavulanic acid and polymyxin B were a drug of choice (Teshager *et al.*, 2008), while other study shows nitrofurantoin and gentamicin considered as appropriate antimicrobial for empirical treatment of urinary tract infections (Kibret and Abera, 2014).Complicated urinary tract infection requires longer treatment duration compared to uncomplicated UTI (10-14) days (Nicolle, 2000 and Thomas *et al*., 2010). Performing a good personal hygiene is important, since there is incontinence of urine and stool in fistula patient which predispose them to UTIs, so personal hygiene is performed correctly to prevent prolonged contact with urine or feces.

Proper hydration and nutrition and emptying the bladder are also important to prevent bladder infections. After surgical procedures, catheterization is common in most obstetric fistula patients to empty the bladder, so it is important to insert urinary catheters using aseptic technique:- performing hand hygiene before and after any manipulation of the catheter device or site, maintain an unobstructed urine flow, preventing kinks, vertical loops and blockages in the tubing, maintain a sterile, continuously closed drainage system and keep the collection bag below the level of the bladder at all times to prevent reflux of urine back into the bladder (Thomas *et al*., 2010).

1.3 . Significance of the study

UTIs are a major cause of hospital admissions and are associated with significant morbidity and health care costs. It causes serious health problem and affecting a million of people over the world. Its annual global incidence is about 250 million (Barisic *et al*., 2003).

Obstetric fistula continue to be a considerable cause of morbidity worldwide (Kabir, 2003). Globally, more than half a million young women die from complications of pregnancy and childbirth in each year and almost all these deaths occur in developing countries. In Ethiopia, it is estimated that 9 000 women annually develop a fistula, where only 1200 of them are treated (UNFPA, 2009).

However, data on impact of UTI on obstetric fistula patients and distribution and antimicrobial drug susceptibility patterns among urinary pathogen isolated from such patients are scarce and there is also no previous data on UTI in the current study site.

- ❖ . Therefore ,finding from this study will help as:-
- ✓ Standing point for further study concerning UTI among obstetric fistula patients in Hamlin fistula hospital or elsewhere in the world.
- ✓ Provide base line information for diagnosis and management of urinary tract infection among fistula patients.
- ✓ It also gives base line information about a treatment of choice concerning urinary tract infection among fistula patients.
- ✓ It would also inform policy makers, health providers and stake holders about the prevalent of bacterial pathogen of urinary tract infection among fistula patients.
- ✓ The result obtained from this study would help the police makers to design an appropriate strategies which will be help for the prevention of UTIs and to prevent increment of drug resistance bacteria in Hamlin fistula hospital and else where in the world.

1.4. Objectives of the Study

General objective

- To assess the problem of urinary tract infections among fistula patients admitted at Hamlin fistula hospital, Addis Ababa Ethiopia.

Specific objectives

- To identify bacterial urinary tract pathogens among fistula patient admitted at fistula hospital, Addis Ababa, Ethiopia.
- To determine antimicrobial resistance pattern of urinary tract pathogens to the commonly prescribed antibiotics
- To identify the possible risk factors associated with UTI among fistula patients

CHAPTER TWO: MATERIALS AND METHODS

2.1. Study Design, Area and Period

A cross sectional study was conducted from February to May 2015 at Hamlin Fistula Hospital, Addis Ababa, Ethiopia. The hospital is located in Addis Ababa at Lideta sub city. This hospital was established in 1974, since its establishment the hospital treated more than 42,000 women suffering from obstetric fistula. It accepts patients from every corner of the country. In addition the hospital also undergo outreach program to give awareness on prevention activities of the case.

2.2 .Study Population

During the period from February to May, a total of 210 fistula patient admitted to the Hamlin Fistula Hospital were screened for significant bacteriuria. The study populations were all fistula patients who were treated during the study period. All consenting fistula patients selected as study participant was included in the study. After obtaining informed consent, study participants were interviewed about their socio-demographic characteristics, presence and duration of their clinical manifestation and information on related risk factors by using a structured questionnaire.

The sample size was calculated by taking prevalence from the previous similar study (76.1%) on fistula patients (Adeoye *et al*., 2011). Using 95% confidence interval with 5% margin error sample size was calculated as follows:-

$$N = \frac{z^2 p (1-p)}{D^2}$$

$$N = \frac{(1.96)^2 * 0.761(1-0.761)}{(0.05)^2}$$

$$N = 280$$

Where n= No sample included, Z^2 = confidence interval, P= prevalence from previous study and D = acceptable difference = 5%

We had planned to collect 280 samples. We could collect only 210 samples from February to May 2015.

2.3. Exclusions and Inclusions Criteria

- **Exclusion criteria**

  Fistula patient treated with antibiotics within 15 day.

- **Inclusion criteria**

All consenting fistula patients selected as study participant was included in the study**.**

2.4. Measurement variables

Independent variables were: - age, marital status, educational status, occupation, clinical features, duration of hospital stay, previous history of UTI and previous history of catheterization

Dependent variable was: - presence and absence of urinary tract bacterial pathogen among fistula patients.

2.5. Collection and Handling of Urine Specimen

Clean-catch mid-stream urine (MSU) was collected from fistula patients. The patients were informed by the attending nurses or laboratory technicians on how to collect the specimen in the sterile bottle container. Accordingly, about 10 to 20 ml urine specimen was collected in a sterile screw-capped, wide-necked container. Sample was collected by aseptic techniques from catheters from study participants who had catheters at the time of samples collection. The specimen was immediately delivered to the hospital microbiology laboratory unit for laboratory investigation.

2.6. Culture and Identifications

The urine sample was inoculated onto cysteine lactose electrolyte deficient agar (CLED) media; blood agar and MacConkey agar (Oxoid, England) with calibrated loop of 0.001 ml (Graham and Galloway, 2001). The inoculated media was incubated overnight (18-24 hrs) at 37^{o}C.

After overnight incubation, the bacterial growth on the respective media was observed, and total colony count was done and checked for significant bacteriuria (Cheesbourgh, 2006).

A significant bacteriuria was considered if urine culture yields $\geq 10^5$ CFU/mL midstream urine. All positive urine cultures showing significant bacteriuria was sub cultured and further identified by their characteristics appearance on their respective media(colony morphology) and confirmed by the pattern of biochemical reactions using the standard procedures (Vandepitte *et al*., 2003; Cheesbourgh, 2006).

The *Enterobacteriaceae* were identified by indole production, citrate utilization, motility test, urease test, and oxidase test as shown Table 2.1. For gram positive bacteria Coagulase and catalase tests were used (Cheesbrough, 2008)

Table 2.1. Biochemical tests for gram negative bacterial isolates

Organisms	**Oxidase**	**Lactose**	**Indole**	**Urease**	**Citrate**	**Motility**
E. coli	-	+	+	-	-	+
Klebsiella spp	-	+	-/+	+	+	-
Serratia	-	+	-	-	+	+
Proteus	-	-	+/-	+	+/-	+
Pseudomonas spp.	+	-		-	+	+/-

2.7. Antimicrobial Susceptibility Testing

Disk diffusion method was employed for antibiotic susceptibility testing (AST) as recommended by CLSI (CLSI, 2007). Mueller-Hinton agar (Oxoid) was used for susceptibility testing. Antibiotics discs (Oxoid Ltd) used were: Ceftriaxone (CRO) (30 µg), Chloramphenicol (C) (30 µg), Gentamicin (CN) (10 µg), Ampicillin (AMP) (10 µg), Ciprofloxacin (CIP) (10 µg),) Nitrofurantion (F) (300 µg), Penicillin (P) (10 iu), Cloxacillin (OB) (5 µg) and amoxicillin-- clavulanic acid (AMC) (30 µg).

Briefly pure bacterial culture was transferred into a tube containing 5 ml sterile normal saline (0.85 % NaCl) and mixed gently until it forms a homogenous suspension. The turbidity of the suspension was adjusted to the optical density of McFarland 0.5.

A standard inoculum adjusted to 0.5 McFarland was swabbed on to Muller- Hinton agar (Oxoid) and antibiotic discs were dispensed after drying the plate for 3-5 min and incubated at 37^{o}C for 24 hours. Diameter of the zone of inhibition around the disc was measured to the nearest millimeter using a metal caliper and the isolate was classified as sensitive, intermediate and resistant according to CLSI (2007).

2.8. Quality Control`

E. coli (ATCC 25922), *S. aureus* (ATCC25923) and *P. aeruginosa* (ATTC 27853) (CLSI, 2007) were used a reference strains for culture and sensitivity testing throughout the study.

2.9. Statistical Analysis

Data was entered and analyzed using SPSS version 20 software. Odds ratio was used to screen the possible potential risk factors and to compare the proportion of bacterial isolates with patients‟ demographic information and comparison of antimicrobial resistances. P-value <0.05 was considered statistically significant.

2.10. Ethical Consideration

The research project was ethically cleared by Research and Ethics Committee of Department of Microbiology, Immunology and Parasitology and approved by DMIP. Written informed consent was obtained from all the study participants before data and urine samples was collected. Official permission from the Fistula hospital was also obtained.

CHAPTER THREE: RESULTS

3.1. Socio Demographic Characteristics of Study Subjects

The socio demographic information of the study participants are presented in Table 3.1. The data collected in this study consisted of 210 fistula patients admitted to Hamlin Fistula Hospital for surgical repair. All were investigated for presence or absence of urinary bacterial pathogen during the study period between February and May, 2015. The age range of study participants was 12 to 42 years (mean age of 21 years).Majority of the study participants 118 (56.2%) were in the age group of 21-25 years and 196(93.3%) were from rural settings. Of 210 study participants 85 (40.5%) were from Oromia region (Figure 3.1) and 163(77.6%) were illiterate while 67(31.9%) were housewives. Overall 134(63.8%) of the study participant had less than 500 ETB personal monthly incomes. A high proportion 77(36.7%) of the study participants are divorced and 99 (47.1%) had a previous history of catheterizations (Table 3.1.).

Table 3.1. Socio demographic characteristics of 210 Fistula patients investigated for UTIs at Hamlin Fistula hospital, Addis Ababa, Ethiopia (February-May 2015)

Variables	**Frequency**	**Percent (%)**
Age (years)		
10-15	2	1.0
16-20	49	23.3
21-25	118	56.2
26-30	25	11.9
31-40	9	4.3
36-40	6	2.9
>40	1	0.5
Residence		
Rural	196	93.3
Urban	14	6.7
Educational status		

Illiterate	163	77.6
Primary School	44	21.0
Above primary school	3	1.4
Occupation		
Merchant	34	16.2
Farmer	62	29.5
Student	17	8.1
House Wife	67	31.9
Daily Laborer	23	11.0
Others	7	3.3
Marital status		
Single	72	34.3
Married	61	29.0
Divorced	77	36.7
Personal income (ETB)		
Less than 500	134	63.8
500-1000	51	24.3
1001-1500	17	8.1
Above 1500	8	3.8
Previous history of catheterization		
Yes	99	47.1
No	111	52.9
Previous history of UTI		
Yes	85	40.5
No	125	59.5

ETB - Ethiopian birr.

From the total of 210 fistula patient investigated for urinary tract infections, majority of the patient came from Oromia region 85(40.5%) followed by Amhara region 49(23.3%) and southern nations nationalities 40(19%). Only few percentage 2(1%) of study participants were from Addis Ababa (Figure 3.1.).

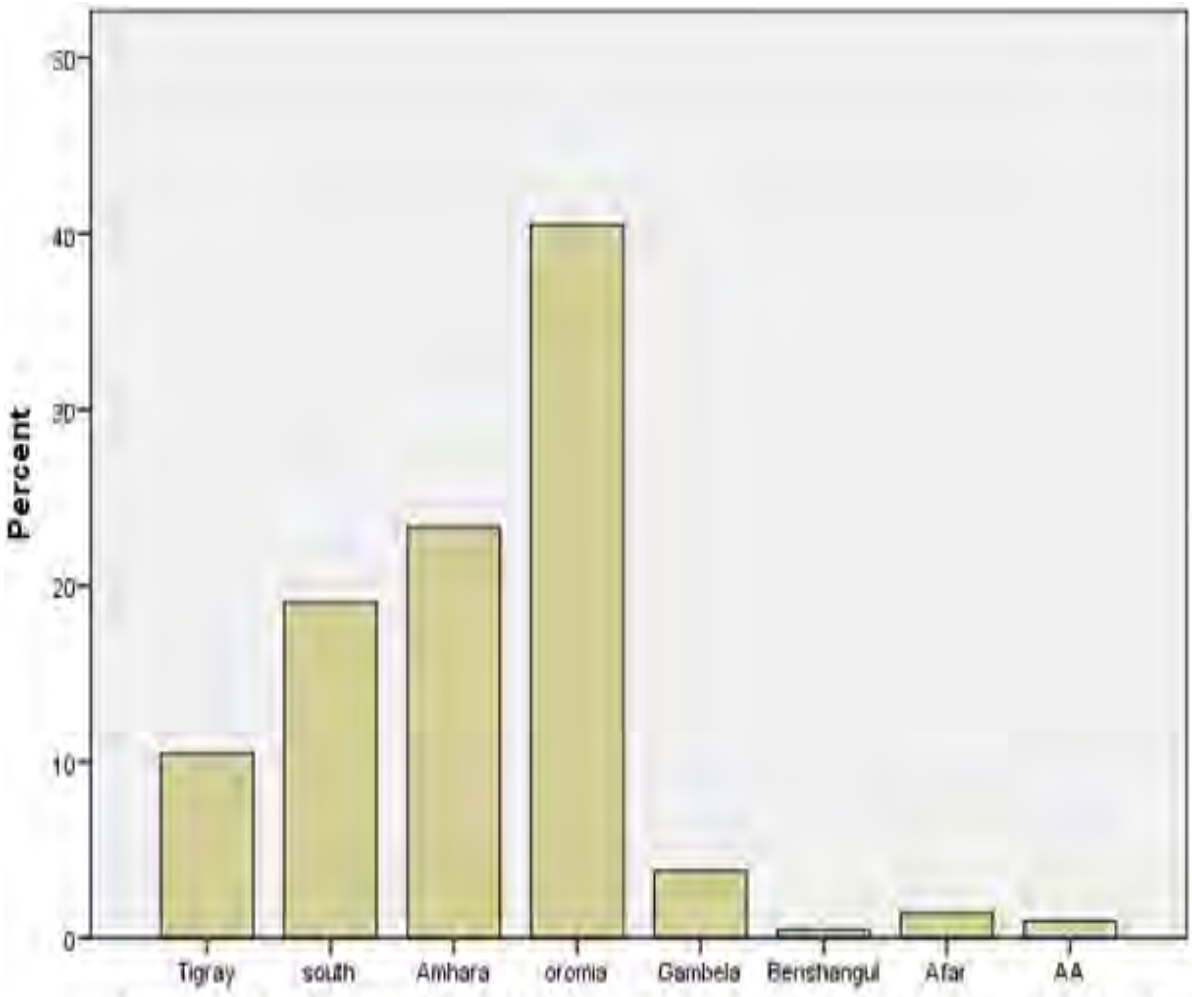

Figure 3.1.Distribution of screened fistula patient in each reagion of Ethiopia

3.2. Clinical Features

The commonest clinical features observed among 210 fistula patients were irritative voiding symptoms 85 (40.3%), followed by suprapubic pain 73 (34.6%), hematuria 64 (29.9%) and nocturia 41 (19.4%) as shown in Table 3.2.

Table 3.2. Clinical presentation of fistula patient admitted to Hamlin Addis Ababa Fistula Hospital, Ethiopia (February-May 2015).

Clinical presentation	**Frequency No. (%)**	
	Yes	**No**
Nocturia	41(19.4)	169(80.6)
Hematuria	63(29.9)	147(69.7)
Suprapubic pain	73(34.6)	137(65.4)
Irritative voiding symptom	85(40.3)	125(59.7)
Dysuria	25(12.7)	185(87.3)

3.3. Significant Bacteriuria and Bacterial Etiologies

Significant bacteriuria was observed in 122 (58.1%) of 210 fistula patient screened for urinary tract infections (Table 3.3). The overall prevalence of bacterial isolates of the current study was 58.1% and 68(55.7%) of the isolates were from symptomatic cases (Table 3.3.).

Of the total of 117 (55.7%) symptomatic cases 68 (58.1%) of them were positive for significant bacteriuria while from the total of 93(44.3%) asymptomatic cases 54(58.1%) were positive for significant bacteriuria. The odds of developing UTI for both symptomatic and asymptomatic patients are the same, OR 95% CI (1002(0.577-1.74), which indicate there is no association between clinical sign and significant bacteria isolates.

In general no statistically significant differences were observed in the isolation frequency of each pathogen in the two groups ($p>0.05$) as shown in Table 3.3.

Table 3.3. Significant bacteriuria among symptomatic and asymptomatic fistula patient"s investigated for UTIs in Hamlin Fistula Hospital, Addis Ababa, Ethiopia (February-May 2015).

Fistula patients With UTI	**Significant bacteriuria**		**Total**	**OR(95%CI)**	**P value**
	Yes	**No**			
Symptomatic No. (%)	68(58.1)	49(41.9)	117(55.7)	1.002(0.577-1.74)	0.994
Asymptomatic No. (%)	54(58.1)	39(41.9)	93(44.3)		
Total No. (%)	122(58.1)	88(41.9)	210(100)		

Of the 210 urine sample examined for significant bacteriuria, 122(58.1%) had a positive bacterial culture as shown in Table 3.3.

Of the 122 isolates only 5(4.1%) of them were gram positive bacteria while nearly all 117 (95.9%) were gram negative bacteria. *E. coli* 65(53.7%) were the commonest bacterial pathogen isolated and followed by *Proteus* spp.31 (25.4%). *Klebsiella spp.*and *Pseudomonas spp.*accounted for 14(11.5%) and 4(3.27%) respectively. Others found in small number included *Serratia spp.*3(2.46%),*Coagulase negative Staphylococcus*3(2.46%) and *S. aureus 2(1.64 %). Serretia spp., coagulase negative staphylococcus and S. aureus* were only isolated from symptomatic fistula patients (Table.3.4.).

Table 3.4 .Frequency and types of bacterial species isolated from asymptomatic and symptomatic UTI among fistula patients at Hamlin Fistula Hospital, Addis Ababa, Ethiopia(February-May 2015).

Bacteria species isolated	**Symptomatic UTI No. (%)**	**Asymptomatic UTI No. (%)**	**Total No. (%)**
E. coli	31(45.5)	34(62.9)	65(53.3)
Klebsiella spp.	9(13.2)	5(9.2)	14(11.5)
Pseudomonas spp.	2(2.9)	2(3.7)	4(3.3)
Proteus spp.	18(26.4)	13(24.7)	31(25.4)
Serratia spp	3(4.4)	0(0.0)	3(2.45)
CONS	3(4.4)	0(0.0)	3(2.45)
S.aureus	2(2.9)	0(0.0)	0(0.0)
Total	**68(55.7)**	**54(44.3)**	**122(100)**

CONS- *cougulase negative staphylococcus*

3.4 . Risk factors associated with urinary tract infections.

Significant bacteriuria was strongly associated with history of previous UTI and history of catheterization ($p<0.05$) as shown in Table 3.5. Statistical significance difference was observed in relation to previous history of catheterization and UTI with OR (95%CI) 2.739(1.547, 4.849), P value= 0.001 and OR (95%CI) 1.879(1.060, 3.331), P value=0.031 respectively. The average duration of hospital stay among fistula patient screened for UTI was 30 days with range of 1 to 60 days. From admitted patient 38(18.1%) was screened for UTI within two days of admission while 22(18%) of them were with significant bacterial isolates. Of the total 210 study participants 122(58.1%) study participants were diagnosed with significant bacteriuria. The majority these patient 100/122 (82%) stayed in hospital for more than 3 days. There is no statistical significance difference was observed in relation to duration of hospital stay with the OR (95%CI) (0.990(0.486, 2.017) and P value > 0.05. Educational status, marital status, occupation and other independent variable used were not show statistical significance difference with P value >0.05 as shown in Table.3.5.

Table 3.5.Significant bacteriuria in relation to socio-demographic characteristics and associated factors of obstetric fistula patients at Hamlin Addis Ababa Fistula Hospital, Ethiopia (February-May 2015)

Variables	**Significant bacteriuria**		**Total No. (%)**	P-value
	Yes No. (%)	**No No. (%)**		
Age (years)				
10-15	2(100)	0(00)	2(1.0)	0.765
16-20	24(40.7)	25(59.3)	49(23.3)	
21-25	72(61)	46(39)	118(56.2)	
26-30	15(60)	10(40)	25(11.9)	
31-35	6(66.6)	3(33.3)	9(4.3)	
36-40	2(33.3)	4(66.6)	6(2.9)	
Above 40	1(100)	0(00)	1(.5)	
Marital status				
Single	40(55.5)	32(44.5)	72(34.3)	0.856
Married	38(62.9)	23(37.1)	61(29.0)	
Divorced	44(57.1)	33(42.9)	77(36.7)	
Educational status				
Illiterate	97(59.5)	66(40.5)	163(77.6)	0.534
Primary School	23(52.7)	21(46.3)	44(21.0)	
Greater	1(33.3)	2(66.6)	3(1.4)	
Occupation				
Merchant	17(50)	17(50)	34(16.2)	0.52
Farmer	33(53.2)	29(46.8)	61(29.5)	
Student	7(41.2)	10(58.8)	17(8.1)	
House Wife	45(67.1)	22(32.9)	77(31.9)	
Daily Laborer	16(69.6)	7(30.4)	23(11.0)	

Others	4(57.1)	3(42.9)	7(3.3)	
Personal income(ETB				
Less 500	78(58.2)	56(41.8)	134(63.8)	0.955
500-1000	29(56.8)	22(53.2)	51(24.3)	
1001-1500	11(64.7)	6(35.3)	17(8.1)	
Above 1500	4(50)	4(50)	8(3.8)	
Residence				
Rural	112(91.8)	84(95.4)	196(93.3)	0.31
Urban	10(8.2)	4(4.6)	14(6.7)	
Previous history of catheterization				
Yes	70(57.4)	29(33.3)	99	0.001
No	52(42.6)	59(67.7)	111	
Previous history of UTI				
Yes	57(46.7)	28(31.8)	85	0.031
No	65(53.3)	60(68.2)	125	
Duration of hospital stay				
Less than 3 days	22(18)	16(18.2)	38(18.1)	0.978
Equal or above 3 days	100(82)	72(81.8)	172(81.9)	

3.5. Antimicrobial Susceptibility Testing

Gram Negative Bacteria

The resistance pattern of gram negative bacteria (n=117) against 6 antimicrobial agents are shown in Table 3.6. Gram negative bacteria isolates showed low level of resistance to most of antimicrobial tested, 21.4% to amoxicillin -clavulanic acid and ceftriaxone and 33.3% to both nitrofurantoin and chloramphenicol. Intermediate level of resistance (3.4- 7.7%) was observed to most of antimicrobial tested except amoxicillin -clavulanic acid. High level of resistance (>50%) was observed to gentamicin and ciprofloxacin.

Among the isolates *Klebsiella spp.*shows low rate of resistance to ceftriaxone (14.3%) and nitrofurantoin (7.5%), while the same rate of intermediate resistance level (7.5%) to gentamicin, nitrofurantoin and ceftriaxone were observed. The isolate also shows high rate of resistance to ciprofloxacin (78.6%).

Pseudomonas spp. shows low rate of resistance (20%) to both ciprofloxacin and chloramphenicol and high rate of resistance (80%) to nitrofurantoin, while it was not showed any resistance level to both gentamicin and ceftriaxone.

E .coli was the commonest bacterial pathogen isolated which showed low resistance rate (21.6%, 24.6%, and 32.2%) to amoxicillin- clavulanic acid, ceftriaxone and chloramphenicol, respectively. The isolates also shows high rate of resistance to ciprofloxacin (56.9%) and gentamicin(53.8%). *Proteus spp.*and *Serratia spp.* were also other bacterial isolates which showed the high level of resistance to gentamicin (61.3% and 66.6%) respectively, while they were showed low resistance rate to ceftriaxone(19.4%, 33.3%).

Table 3.6. Antimicrobial resistance pattern of gram negative bacteria isolated from fistula patient at Hamlin Fistula Hospital, Addis Ababa, Ethiopia 2015, Ethiopia (February-May 2015)

Bacterial isolates		**Antimicrobial Tested**					
		AMC	**CIP**	**CN**	**F**	**C**	**CRO**
E. coli (n=65)	S	51(78.4)	28(43.1)	25(48.5)	36(55.4)	41(63.1)	45(69.2)
	I	0(0.0)	0(0.0)	5(7.7)	3(4.6)	3(4.6)	4(6.1)
	R	14(21.6)	37(56.9)	35(53.8)	26(40)	21(32.2)	16(24.6)
Klebsiella spp. (n=14)	S	14(100)	3(21.4)	6(42.8)	12(85.7)	10(71.4)	11(78.6)
	I	0(0.0)	0(0.0)	1(7.1)	1(7.5)	0(0.0)	1(7.5)
	R	0(0.0)	11(78.6)	7(50)	1(7.5)	4(28.6)	2(14.3)

Pseudomonas spp. (n=4)	S	1(20)	3(80)	4(100)	1(20)	3(80)	4(100)
	I	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
	R	3(80)	1(20)	0(0.0)	3(80)	1(20)	0(0.0)
Proteus spp. (n=31)	S	25(80.6)	13(41.9)	12(48.7)	20(64.5)	17(54.8)	21(67.7)
	I	0(0.0)	4(12.9)	0(0.0)	2(6.5)	1(3.2)	4(12.9)
	R	6(19.4)	14(45.9)	19(61.3)	9(29)	13(41.9)	6(19.4)
Serratia spp. (n=3)	S	1(33.3)	0(0.0)	1(33.3)	3(100)	3(100)	2(66.6)
	I	0(0.0)	1(33.3)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
	R	2(66.6)	2(66.6)	2(66.6)	0(0.0)	0(0.0)	1(33.3)
Total (n=117)	S	92(78.6)	47(40.2)	48(41)	72(61.5)	74(63.2)	83(70.9)
	I	0(0.0)	5(4.3)	6(5.1)	6(5.1)	4(3.4)	9(7.7)
	R	25(21.4)	65(55.5)	63(53.8)	39(33.3)	39(33.3)	25(21.4)

CRO: Ceftriaxone; C: Chloramphenicol; CN: Gentamicin; F: Nitrofurantoin; CIP: Ciprofloxacin; AMC: Amoxicillin- clavulanic acid

Gram Positive Bacteria

The resistance pattern of gram positive bacteria (n=5) against 11 antimicrobial agents are shown in Table 3.7.All gram positive bacteria isolated were 100% sensitive to Amoxicillin-clavulanic acid and ciprofloxacin. Low level of resistance (20-40%) was observed to all the rest of antibiotic tested. *S.aureus* was not showed any resistance level to all antibiotic tested except penicillin which shows equal rate (50%) of resistance and intermediate resistance level. Among the gram positive bacteria, CONS shows 20% intermediate resistance level to penicillin (Table 3.7).

Table 3.7. Antimicrobial resistance pattern of gram positive bacteria isolated from fistula patient at Hamlin Addis Ababa Fistula Hospital, Ethiopia (February-May 2015)

Bacterial isolates		**Antimicrobial tested**								
		AMC	**CIP**	**CN**	**F**	**C**	**CRO**	**OB**	**AMP**	**P**
CONs (n=3)	**S**	3(100)	3(100)	1(33.3)	2(66.6)	2(66.6)	2(66.6)	2(66.6)	1(33.3)	2(66.6)
	I	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
	R	0(0.0)	0(0.0)	2(66.6)	1(33.3)	1(33.3)	1(33.3)	1(33.3)	2(66.6)	1(33.3)
S.aureus (n=2)	**S**	2(100)	2(100)	2(100)	2(100)	2(100)	2(100)	2(100)	2(100)	0(0.0)
	I	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(50)
	R	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	(0.0)	0(0.0)	1(50)
Total (n=5)	**S**	5(100)	5(100)	3(60)	4(80)	4(80)	4(80)	4(80)	3(60)	2(40)
	I	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(20)
	R	0(0.0)	0(0.0)	2(40)	1(20)	1(20)	1(20)	1(20)	2(40)	2(40)

CRO: Ceftriaxone; C: Chloramphenicol; CN: Gentamicin; F: Nitrofurantoin ;P:Penicillin;CIP: Ciprofloxacin; AMC; Amoxicillin- clavulanic acid; AMP: Ampicillin; OB: Cloxacillin

CHAPTER FOUR: DISCUSSION

A variety of enteropathogenic bacteria are known to cause UTI worldwide. UTIs are among the most common bacterial infections in humans, both in the community and hospital settings. It is a serious health problem affecting millions of people each year and is the leading cause of gram-negative bacteremia (El-Naggar *et al*., 2010).Patients with obstetric fistula (OF) can have frequent bladder infections, incontinence of urine and stool. Many of these patients might live with these conditions for several years. This may further predispose them to health related problems like urinary tract infections (Hilton, 2003). However, there is a lack of concrete evidences that show the magnitude of UTI and antimicrobial sensitivity pattern in obstetric fistula patients throughout the world and it is difficult to compare all the current findings with previous reports.

This study finding showed that low socioeconomic status was one of the factors that were not significantly associated with increased UTI (P value = 0.955) as indicated in Table 3.5.This report was the same with other report from Thailand which report insignificant association between UTI and socio economic status (Kovavisarach*et al.*,2009). Another study on pregnant women in North West Ethiopia (Emiru *et al.*, 2013) showed that pregnant women who had monthly income of less than 500 Ethiopian birr have (18.9%) more likely to have bacteriuria than those who had high socioeconomic income level. Also other study in Egypt on UTI showed the presence of association between low income level and UTI (Dimetry *et al.*, 2007). This could be due to the relation of low socioeconomic status with nutrition and immunity especially in fistula patients.

This study finding also showed that educational status was one of the factors that were not significantly associated with increased UTI (P value =0.534) as indicated in Table 3.5. The frequency of UTI (59.5%) was higher among illiterate fistula patients when compared with others. This study was the same as other studies which indicate absence of association between level of education and UTI among pregnant women in Pakistan (Sheikh *et al.*, 2000) and in Tanzania (Masinde *et al.*, 2009).

In general, the overall prevalence of UTI in the present study was 58.1%, which is almost similar with other report from India (60%)(Alka Nerurkar *et al.,* 2012*)*. But the present finding of UTI was lower than other studies from Libya (65.7%*)* (Samia, 2012) and Nigeria (76.1%) (Adeoye *et al.*2011).

Lower report was also reported from other African country Tanzania (Masinde *et al.*, 2009); Nigeria (47.5%) (Okonko *et al*., 2010).The prevalence of present study was also higher than other reports from Ethiopia; North West Ethiopia (Ferede *et al.*, 2012) and(52.8%) (Wondimeneh *et al.*, 2014), Addis Ababa (Assefa *et al.*, 2008); and Dessie(22.7%)(Kibret and Abera,2014).

According to the current study majority of the study participants had previous history of catheterization and this factor had strong association with development of UTIs with the OR (95%CI) 2.739(1.547, 4.849) and P value = 0.001 (Table 3.7). But absence of association was reported from west north Ethiopia (Wondimeneh *et al.*, 2014).

In this study, the most commonly isolated organisms were *Escherichia coli (*53.7%), *Proteus* spp.(25.4%) and, *Klebsiella spp.*(11.5%). Similar isolate with different frequency was found on study done in Libya, *Escherichia coli (*33.98%), *Proteus* spp. (21.48%) and *Klebsiella pneumoniae(*10.3 %) (Samia,2012). Previous study done in India report high percentage of*Escherichia coli (44.9%)* bacteria isolated followed by *Enterobacter spp.*(17.83%)(Alka Nerurkar *et al., 2012)* while in present study *Enterobacter spp.*was not isolated and *Escherichia coli* (53.7%) was*followed by proteus spp. (24.5%)* and it *was* most of dominant isolate in the current study, similar to other many studies. This confirms that *Escherichia coli* are one of the most prevalent gram negative aerobic bacterial pathogen causing urinary tract infections. Though it is considered and the most Uropathogenic due to its virulence factors for colonization and invasion of the urinary epithelium (Anderson *et al*., 2004).

According to previous study done in West Ethiopia *Citrobacter* (24.5%) (Wondimeneh *et al*., 2014) was the most dominant bacterial isolated while in this study *Citrobacter* was not isolated and *Escherichia coli (53.7%)* was the most dominant isolated similar to other many studies *(39%, 44.9%, 31.7%)*(Foxman *et al,* 2002;Alka Nerurkar *et al, 2012* andYismaw *et al.*,*2012)*respectively.

The second and the third most dominant bacterial isolate reported from this study were *Proteus spp.*and *Klebsiella spp.*similar to the ones documented from Libya,where *Proteus spp.*and *Klebsiella spp.*, respectively were the second and third dominant species(Samia, 2012).

But this was different from the study done in North of Ethiopia where *Klebsiella spp. (8.5%) and Proteus spp. (8.2%)* was the second and the third dominant species respectively (Kibretand Abera, 2014).

In the present study, the prevalence of symptomatic and asymptomatic bacteriuria were the same (58.1%), with the OR (95%CI) of 1.002(0.577-1.74) and P value of 0.978, which indicate there is no statistically significant differences observed in the isolation frequency of each pathogen in the two groups ($p>0.05$) as shown in Table 3.5. This study was the same as previous study done in North West Ethiopia where no statistically significant differences were observed (Yismaw *et al*., *2012).*

The finding of this study also revealed that past history of UTI had strong association with UTI with the OR (95%CI) 1.879 (1.060, 3.331) and P value = 0.031 as indicated in Table 3.5. Similar finding were reported from North West Ethiopia (Emiru *et al.*, 2013) and (Yismaw *et al.*, *2012)*. Another study in Tanzania also reported that past history of UTI is a risk factor for UTI during pregnancy (Masinde *et al.*, 2009). But absence of association was reported from Thailand (Kovavisarach *et al.*, 2009).

This finding also revealed that history of catheterization had strong association with UTI with the OR (95%CI) 2.739(1.547, 4.849) and P value = 0.001,which is almost similar with other reports where catheterization is the most important risk factor for the development of catheter associated bacteriuria (Loeb *et al*., 2008).

According to finding of this study (34.6% and 40.3 %) of the obstetric fistula patients had history of suprapubic pain and irritative voiding symptoms, respectively. They had also history of dysuria (12.7%), hematuria (29.9%) and nocturia (19.4.2%) (Table 3.2).Similar finding is reported from North West Ethiopia while 15.1% and 37.7% of the obstetric fistula patients had history of suprapubic pain and irritative voiding symptoms, respectively and 3.8% had also history of dysuria(Wondimeneh *et al.*, 2014). Similar study from North West Ethiopia also report history of urethral strictures (1.9%) (Wondimeneh *et al.*, 2014), while in the present study there is no history of urethral strictures identified.

In this report, gram negative bacteria isolated showed high level of resistance to ciprofloxacin and gentamicin(>50%) andintermediate level of resistance (3.4- 7.7%) was observed to most of antimicrobial tested except amoxicillin-clavulanic acid.

This is in contrast to previous study done in Ethiopia, where gentamicin considered as appropriate antimicrobial for empirical treatment of urinary tract infections (Kibret and Abera, 2014). According to percent study all gram negative bacteria isolate were sensitive (61.5%-78.6%) to amoxicillin-clavulanic acid, nitrofurantoin, ceftriaxone and chloramphenicol. The same result were also reported from other previous study in Ethiopia were amoxicillin–clavulanic acid was appropriate drug of choice for UTI (Teshager *et al.*, 2008). Low level of resistance (20-40%) was observed to all gram positive isolates *(S.aureus and CON*s) to Ceftriaxone, Chloramphenicol, Gentamicin, Nitrofurantoin, Penicillin,Ampicillin and Cloxacillin. This study also reveals 100% sensitivity to Amoxicillin-clavulanic acid and ciprofloxacin for all gram positive bacteria isolates. The same result were reported from other previous Ethiopian studies where low level of resistance (8.6%-34.3) was reported with the same antibiotic tested with the current studies except for Penicillin which shows significant level of resistance(>50%)(Yismaw *et al*.,2012).

CONCLUSION AND RECOMMENDATIONS

The overall prevalence of urinary tract infection among fistula patient was 58.1%. The prevalence of significant bacteriuria among both asymptomatic and symptomatic fistula patients was almost the same. This study showed that the predominant pathogen of UTI were *E.coli* which account 53.7% of the isolated urinary tract pathogen. *Proteus spp.*and *Kliebsiella spp.* was the second and the third dominant bacteria isolated respectively. Significant bacteriuria was significantly associated with history of previous UTI and history of catheterization. This study also showed that amoxicillin-clavulanic acid was a drug of choice for both gram negative and gram positive bacteria while ciprofloxacin and ceftriaxone were found effective against gram negative and positive bacteria isolated respectively.

Based on the finding of the present study the following recommendations are made:-

- Routine screening of all fistula patients for UTI and performing urine culture and antimicrobial susceptibility testing is recommended because percentage of significant bacteriuria isolated is high in asymptomatic fistula patient as the same as in symptomatic fistula patient.
- The prevalence of significant bacteriuria isolated through this study was high and history of catheterization is significantly associated with UTI; therefore infection control programs conducted by Hamlin Fistula Hospital should be implemented more strongly to control more effectively the high prevalence of bacterial pathogen.
- Amoxicillin-clavulanic acid is a drug of choice recommended for urinary bacterial pathogens.
- Future research should be done to identify magnitude of other UTI pathogens among fistula patients.
- In generally, continuous surveillance program is needed for both hospital and community acquired UTIs to provide the basis of empirical therapy and to identify the ground cause of UTIs in fistula patients.

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ANNEX I: QUESTIONNAIRE

Questionnaire for investigation of urinary tract infections among fistula patients admitted to Addis Ababa fistula hospital.

I .Socio-demographic characteristics

1) Patient code _____
2) Patient address :Region □ Oromia □ Amhara □ Tigray □ Southern □ Afar □ Somali □ B/gumuz □Gambela □Harari □ AA □ D/Dawa
3) Residence □ urban □ Rural
4) Sex □ female
5) Age in year‟s □ 10- 15 □ 16-20 □ 21-25 □ 26-30 □ 31-35 □ 36-40 □≥41
6) Marital status □ Single □ divorced □ married
7) Educational status □ Illiterate □ Primary school □ Greater
8) Occupation □ Merchant □ Farmer Student □ House wife □ Daily laborer □ others
9) Monthly income □ ≤500 □ 1001-1500 □ 501-1000 □ ≥1500

II. Risk factors

1) Have you had a previous history of catheterization? □ Yes □ No
2) Are you pregnant? □ Yes □ No
3) Have you had a previous urinary tract infection (UTI)? □ Yes □ N0
4) Do you have any of the following chronic diseases?

□ Diabetes □ HIV □ Kidney failure □ others, if yes; specify _____

5) How many days did you stay in the hospital? □< days □< 2 days □<a wks
6) III. Clinical features

1). which of the following symptoms are you experiencing?

□ Dysuria □ Hematuria □Urgency □Nocturia

□ Suprapubic pain □ Irritative voiding symptoms □ Urethral strictures □ No symptoms

Result Report Sheet

Culture and AST Result

1. Patient code: _____ Date of sample collection: _____

Type of urine sample □pre operation MSU □post operation MSU □ from Catheter

2. Bacteria isolation and Antimicrobial susceptibility testing

	Bacteria isolated:								
Antibiotic tested / AST result	AMC	CIP	CN	F	C	CRO	OB	AMP	P
S									
I									
R									

ANNEX II: Information sheet for study participants

Title of project: Urinary tract infections among fistula patient admitted at Fistula Hospital Addis Ababa, Ethiopia.

Name of the Principal Investigator: Tekalegn Dereje

Department of Microbiology, Immunology & Parasitology, School of Medicine, Addis Ababa University

Purpose:

The purpose of this research is to study the urinary tract infections among fistula patient, admitted at fistula hospital AA, Ethiopia.

UTI is a common type of infection which causes serious health problem and affects millions of people every year. It is also a common problem in women who have developed fistula as a complication of prolonged labor. Study on the antimicrobial resistance pattern and risk factors of urinary tract pathogen among fistula patients will have significance on identification of the responsible pathogenic organisms and associated risk factors and influence the control and management of patients with this condition. This project was developed with this aim and would like to ask your voluntary participation in the conduct of the study. The study will take about 6 months.

Procedure:

If you consent to be part of this study, you will be examined by health professional of the Hospital to check your general clinical conditions. Based on this examination, the health professional will decide whether you are eligible to participate in this research or not.

We will ask you some questions to answer the question of the risk factors associated with UTI. For laboratory examination, you will provide a mid-stream urine sample.

Risk and Discomfort

Participating in this research project will not cause you any discomfort and has minimal risk and no invasive procedure as part of this study.

Benefits

Your participation in this research project might have direct benefit to you depending on the laboratory result that your treating physician can use for management of your condition. In addition, your participation is likely to help us in understanding the drug resistant pattern and urinary tract associated risk factor of urinary tract pathogen among fistula patient which may benefit in the future to design preventive measures for others.

Incentives

There is no any incentive for your participation in this research project.

Confidentiality:

Any information collected about the participant from this research will be kept confidential. It will be stored in a file, which will not have your name on it, but a code number assigned to it. Which number belongs to which name will be kept under lock and key, and it will not be revealed to anyone except the principal investigator and health professional attending you.

Participant right

You have full right to refuse from participating in this research if you do not wish to participate; and this will not affect your treatment or health services you get at this health institution in any way. You have also had full right to withdraw from this research at any time you wish to, without losing any of your rights as a patient in your health institution.

Contact persons

This research project is reviewed and approved by Department of Microbiology, immunology; and Parasitology research ethical committee, AAU and fistula hospital

research ethical Committee. The main task of ethical committees is to make sure that research participants are protected from any harm. If you want more information and check about this project, you can contact through the following addresses.

Fistula hospital Research Ethical Committee: Tel:----------

If you have any questions about this research project, feel free to contact the following individuals at any point of time.

Tekalegn Dereje Mobile: _____

ANNEX III: Consent form for study participants

Name: _____

Identification Code: _____

I read the information sheet (or it has been read to me). I have understood that this study is about "urinary tract infections among fistula patient, admitted at fistula hospital AA, Ethiopia". The investigator has briefed me that there is minimal risk associated with sample collection. I have asked some questions and clarification has been given to me. For this study I have been requested to give urine sample. I have also been informed that I will respond to some questions related to possible risk factors of UTI .I have been informed that the study might directly benefit me based on the laboratory results. The investigator also informed me that all the laboratory results and all private information about me will be kept confidential. Moreover, I have also been well informed of my right to withdraw from participating in this project and that my actions will have no impact on the overall health services. I have been given enough time to think over before I signed this informed consent. It is therefore, with full understanding that I gave my informed consent and approved my agreement with my signature.

Participant"s signature: _____Date:_____

Investigator"s signature: _____ Date: _____

Witness signature 1._____ Date: _____

2. _____Date:_____

Information sheet and consent form in Amharic language

<u>በጥናቱ ለሚሳተፍ የተዘጋጀ የመረጃ ቅጽ</u>

<u>የፕሮጀክቱ ርዕስ፡</u> በፎስቱላ ሆስፒታል በፌስቱላ ተጠቅተው ከተኙት መካከል የሽንት መሸኛ አካላት ላይ ኢንፍክሽን የደረሰባቸውን ማጥናት

የጥናቱ አዘጋጅ፣ ተካልኝ ደረጀ

በአዲስ አበባ ዩኒቨርስት የህክምና ት/ቤት የማይክሮባዮሎጂ፣ ኢሚናሎጂ እና ፓራሳይቶሎጂ ትምህርት ክፍል

<u>የጥናቱ ዓላማ</u>

የጥናቱ ዓላማ በፌስቱላ ተጠቅተው በፌስቱላ ሆስፒታል በሚታከሙ ህሙማን ላይ የሽንት መሸኛ አካላት ኢንፌክሽን ማጥናት ነው፡፡

በዓለማችን በሚሊዮኖች የሚቆጠሩ ሰዎች በሽንት መሸኛ አካላት ላይ በሚደርስባቸው ችግር የተነሳ ለከፋ የጤና ችግር ተጋልጠው ይገኛሉ፡፡ ይህ በሽታ በፌስቱላ ህሙማን ላይ ጎልቶ የሚታይ ችግር ነው፡፡ ሰለሆነም በዚህ ጥናት በሽታው ለመድሃኒቶች በሚሰጠው ምላሽ እና በሽታውን ያመጣውን ፀረ-ህዋስ በቀላሉ ለመለየት እና እንዲሁም የበሽተኛውን ጤንነት ወደላቀ ደረጃ ለማድረስ የሚረዱ ሁኔታዎች መለየትና መቆጣጠር ነው፡፡ የዚህ ጥናት ዓላማ ይህ መሆኑን አውቀው----------

በአጠቃላይ ለመጨረስ የሚፈጀው ጊዜ 6 ወራት ያህል ነው፡፡

<u>መመሪያ</u>

እርስዎ በጥናቱ ለመሳተፍ ከፈቀዱበጤና ሃኪሞች አጠቃላይ ምርመራ ይደረግልዎታል፡፡በምርመራው መሠረት፣ እስርዎ ጥናቱን ለማካሄድ በጤና ባለሞያዎቹ በጥናቱ እንዲሳተፍ ወይም እንዳይሳተፍ በምርመራቸው መሠረት ውሳኔ ይሰጣሉ፡፡ ለዚህም የላባራቶሪ ምርመራ ይረዳን ዘንድ በነርሶች እርዳታ የሽንት ናሙና ይሰጡናል፡፡

<u>ተጋላጭነት እና ተፅዕኖዎቹ</u>

የእርስዎ በዚህ ጥናት መሳተፍ የሚፈጥረው እንዲሁም የሚያስከትለው ችግር የሌለ መሆኑን እንዲታውቁ እንፈልጋለን፡፡

<u>እርስዎ በዚህ ምርመራ ውስጥ መሳተፍዎ የሚሰጥዎት ጥቅም</u>

የእርስዎ በዚህ ምርምር ውስጥ መሳተፍም የሚሰጥዎት ዋናኛው ጥቅም በላቦራቶሪ የምርመራ ውጤት መሠረት በከፍተኛ የህክምና ባለሞያዎች ለህመምዎ እርዳታ እንዲያገኙ ይረዳዎታል፡፡ ከዚህም በተጨማሪ የፌስቱላ ታማሚ ሆነው በሽንት መሸኛ አካላተ ላይ በደረሰባቸው ከፍተኛ ህመም ለሚሰቃዩ

በላቦራቶሪ ውስጥ በሚደረግ የተዋስያን ጥናት መሠረት መድሃኒት የተላመዱትን ተዋህሲያን በመለየትና ወደፊት እነዚህ በሽታውን አምጪ ተዋህሲያንን በተሻለ ሁኔታ ለመከላከል ይረዳን ዘንድ የእርስዎ አስተዋጽኦ የጎላ ነው።

ምንዳ

እርስዎ በዚህ መርምር በመሳተፍዎ የሚሰጥዎት ገንዘብ የለም።

ሚስጥራዊነት

በዚህ መረምር ውስጥ እርስዎ ሲሳተፉ ሚስጥርዎ በከፍተኛ ሁኔታ የተደበቀ ነው። በሚሰጡት የመረጃ ወረቀት ላይ የእርስዎ ስም በፍፁም አይፃፍም። በስምዎ ፈንታ ሚስጥራዊ የመለያ ቁጥር ይሰጥዎታል። ይህ እርስዎ የሚሰጡት መረጃ ሚስጢርነቱ እንደተጠበቀ ፋይል ተደርጎ ይቀመጣል። ይህ እርስዎ የሰጡት መረጃ የሚታየው ምርመራውን በሚያካሂደው ሰው እና በቅርበት የእርስዎን ጤንነት በሚከታተል ሃኪም ብቻ ሆኖ መረጃዎ ሚስጢርነቱን እንደጠበቀ በተዘጋጀለት ቦታ ተቆልፎ ይቀመጣል።

የተሳታፊው መብት

እርስዎ በዚህ ምርምር ውስጥ መሳተፍ ካልፈለጉ ፍላጎትዎን የማሳወቅ ባለ ሙሉ መብት ኖት። ባለ መሳተፍዎ በተቋሙ የሚያገኙት አገልግሎት በምንም ዓይነት ሁኔታ አይቋረጥብዎትም፣ ማንም የጤና ባለሙያም ሆነ በዚህ ተቋም ውስጥ የሚደርስብዎ ችግር የለም። በምርምሩ ለመሳተፍ ፍቃደኛም ሆነው በመሀል ካልተመቾዎት የማቋረጥ ሙሉ መብት አልዎት።

ጥያቄ ካልዎት

ይህ የምርምር ፕሮጀክት በአዲስ አበባ ዩኒቨርስቲ የማይክሮባዮሎጂ፣ ኢሚኖሎጂ እና ፓራስቶሎጂ ትምህርት ክፍል የምርምር ስነ-ምግባር ኮሚቴ እና በፌስቱላ ሆስፒታል የምርምር ስነ-ምግባር ኮሚቴ በጥልቀት የታየ እና የተፈቀደ ነው። የነዚህ ኮሚቴዎች ዋና ዓላማቸው በጥናቱ የሚሳተፍ አካላትን ምንም ዓይነት ችግር እንደማይደርስባቸው ማረጋገጥ ነው።

ምን አልባት እርስዎ ስለዚህ ምርምር ተጨማሪ ጥያቄ ካልዎት በሚከተለው አድራሻ መጠየቅ ይችላሉ።

የፌስቱላ ሆስፒታል የምርምር ስነ-ምግባር ኮሚቴ

ስ.ቁ ----------

እርስዎ ምንም አይነት ጥያቄ ካልዎት ነፃ ሆነው በማንኛውም ሰዓት ከዚህ በታች የተጠቀሰውን ግለሰብ ማነጋገር ይችላሉ።

ተካልኝ ደረጀ ሞባይል ----------

<u>የጥናቱ ተሳታፊ የስምምነት ማረጋገጫ ቅጽ</u>

ስም ----------

መለያ ቁጥር ----------

የዚህን ምርምር መረጃ አንብቤ ተረድቼዋለሁ፡፡ /ወይም ተነቦልኛል/ ይህ ጥናት የሚካሂደው በፌስቱላ ተጠቅተው በአዲስ አበባ ፌስቱላ ሆስፒታል በሚታከሙፌስቱላ ህሙማን ላይ የሽንት መሸኛ አካላት ኢንፌክሽን ማጥናት እንደሆነ ተረድቻለሁ፡፡ ጥናቱን የሚያካሂደው ሰው የሽንት ናሙናውን እንደሚወስድልኝም ተረድቻለሁ፡፡ የተለያዩ ጥያቄዎችንም ጠይቄ ማብራሪያ ተሰጥቶኛል፡፡

በተጨማሪም ለዚህ በሽንት መሸኛ ላይ ኢንፌክሽን ሚያደርሱ ሰለሚችሉት አጋላጭ ሁኔታዎች ስጠየቅ የማውቀውን ለመመለስ ተስማምቻለሁ፡፡ የዚህ የላቦራቶሪ የናሙና ምርመራ ውጤት በቀጥታ የሚጠቅመው እኔን እንደሆነ ተረድቻለሁ፡፡ ጥናቱን የሚያካሂደው ግለሰብም የላቦራቶሪ የምርመራ ዉጤትና የኔ የግል መረጃዎች ሁሉ በሚስጥር እንደሚጠበቁ አረጋግጦልኛል፡፡ በተጨማሪም በምርመሩ ሂደት ወቅት በመሀል ካልተመቸኝ ጥናቱ ውስጥ መሳተፍን በየትኛውም ሰዓት የማቋረጥ መብት እንዳለኝ እና በማቋረጤም በግል ምንም ዓይነት ችግር እንደማይፈጠርብኝ አረጋግጠውልኛል፡፡ ይህንን የመስማማያ ሰነድ ስፈርም በቅድሚያ እንዳስብበት በቂ ግዜ ተሰጥቶኛል፡፡

ስለዚህ በከፍተኛ ሁኔታ ሰለ ጥናቱ ተረድቼ በራሱ ፈቃድ እና ፍላጎት ይህንን የመግባቢያ ሰነድ ፈርማአለሁ፡፡

የተሳታፊው ፊርማ----------ቀን----------

የተመርማሪው ፊርማ----------ቀን----------

የምስክሮች ፊርማ

1. **----------ቀን ----------**
2. **----------ቀን----------**

DECLARATION

I, the undersigned, declare that this M. Sc Research thesis is my original work, has not been presented for a degree in other university and that all sources of materials used for the thesis have been duly acknowledged.

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