FREQUENCY OF URINARY TRACT INFECTIONS AMONG PREGNANT WOMEN IN ABUJA

BY

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Being a thesis submitted to the Department of Microbiology, School of Science and Science Education in partial fulfillment of the requirement for the Award of Master of Technology (M. Tech) Degree in Microbiology of the Federal University of Technology, Minna, Nigeria.

OCTOBER 2005

CERTIFICATION

This thesis entitled "Frequency of Urinary Tract Infections among Pregnant Women in Abuja" was carried out under my supervision and has been examined, read and found to have met the regulations governing the award of Master of Technology (M.TECH) degree of the Federal University of Technology, Minna and is approved for its contribution to knowledge and literary presentation.

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DECLARATION

I hereby declare that this work is original and to the best of my knowledge has not been carried out elsewhere. All literatures cited have been listed in the references. The work has not been presented anywhere for any degree or for the purpose of obtaining any qualification.

Sign _____

ANOWAI CLEMENTINA OGO (MRS)

DEDICATION

To my son Chidubem Udochukwu Anowai (a.k.a Prof.) who joined the family within this period and had to sacrifice part of the maternal comfort in the course of this project.

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First I give glory to the Almighty God for strength, sound health and zeal to the end of this programme. I most humbly appreciate Professor S. A. Garba my lecturer and supervisor for his patience, encouragement and thorough supervision of this project. This research was capital intensive but with brilliant advise, persuasion and direction of Dr. Kolo Ibrahim I was able to accomplish the desired goal.

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CHAPTER ONE

INTRODUCTION

A urinary tract infection (UTI) is an inflammation usually caused by bacteria attacking the kidneys, ureters, bladder or urethra. Ureters are tubes connecting kidneys to bladder and urethra is the vessel that leads from bladder to external opening through which urination occurs. The bladder and the urinary tract are normally sterile. Patrick *et al, 2004* defined urinary tract infection as more than 100 organisms per milliliter of urine in a symptomatic patient. Urinary tract infection is caused by a breakdown in the body's defense mechanisms that allows bacteria from the vagina, perineum, rectum, or a sexual partner to invade the urinary tract system. A healthy bladder is safeguarded from bacterial infection by a protective membrane and by regular emptying of urine, which is normally free of bacteria. (Patrick *et al*, 2004).

The objective of this research is to affirm whether urinary tract infection is common among pregnant women in Abuja as documented in some other areas.

Women are more vulnerable to urinary tract infections due to shortness of the urethra. Infection ascends from the urethra to the bladder.

According to Elicia (2005), UTIs are the most common bacterial infections during pregnancy. The following condition increases the risk for urinary tract infection:

(1) A history of urinary tract infection

(2) Diabetes mellitus

(3) Sickle cell anemia trait

(4) Underlying abnormalities of the urinary tract

(5) More than 3 previous pregnancies

(6) Presence of renal stones (nephrolithiasis)

From the study carried out by Rashid and Rashid (2004), the higher order (5- 9) repeat caesarean sections carry no specific additional risk of UTIs for the mother or the baby when compared with the lower order (3- 4) repeat caesarean sections.

Urinary tract infection is the commonest bacterial infection managed in general practice, and is the reason for between 1% and 3% of all general patient consultation, MeRec, (1995). During pregnancy the drainage system from the kidney to the bladder dilates and does not empty rapidly. This reduced flow of urine makes it easier for bacteria to ascend from the bladder to the kidney and for infection to set in. According to Biondi *et al* (1999) pregnant patient are considered immunocompromised UTI hosts. There is

pregnant woman's chance of serious complications from symptomatic and asymptomatic urinary infections.

DTB (1998) reported that up to 50% of women, during their lifetime will suffer from a symptomatic UTI. Cunningham and Lucas, (1994) also indicated that 1 -2% of pregnant women develop acute bacterial cystitis. Pregnancy itself does not predispose women to UTI'S. The prevalence rates of bacteriuria in pregnant women and non pregnant women are essentially the same., Stamm (2001). During pregnancy several physiologic changes occur which cause otherwise healthy women to be more susceptible to serious infection emanating from the UTIs. In both men and women the incidences of asymptomatic bacteriuria and UTI increases substantially with advancing age, coexisting illnesses, and institutional care, (McMurdo and Gillespie 2000).

Urinary tract infections have three principal presentations;

(1) Asymptomatic bacteriuria (presence of multiplying bacteria in the urinary tract without obvious symptoms).

(2) Cystitis, which is an infection of the urinary bladder.

(3) Pyelonephritis, which is a kidney infection that can arise from cystitis.

In asymptomatic patients,s significant bacteria may exist. Bailey *et al* 1983 defined asymptomatic bacteriuria as more than 100,000 organisms per milliliter in 2 consecutive urine samples in the absence of known symptoms. Asymptomatic bacteriuria should be treated in pregnant women to reduce the risk of a symptomatic infection.

The lower urinary tract infection (cystitis) could be due to bacterial or non-bacterial causes e.g. viral, radiation etc. Faro and Fenner (1998) reported that cystitis occurs in approximately 1% of pregnant patients to whom 60% have a negative result on initial screening. Some signs and symptoms of cystitis are hematuria, dysuria, suprapubic discomfort, frequency and nocturia. These symptoms are often difficult to distinguish from those due to pregnancy itself (MacLean 1997). With early diagnosis and treatment, these symptoms usually resolve in a few days. Recurrence is not uncommon. Untreated bladder infection (cystitis) can progress to pyelonephritis, which is significant and potentially dangerous infection.

Pyelonephritis which is upper urinary tract disease in most cases may be due to active cystitis. Stamm and Hooton (1993) indicated that pyelonephritis is the most common urinary tract complications of pregnancy, occurring in approximately 2% of all pregnancies. Gilstrap and Faro (1997)

stated that the rate of the progression of lower UTIs to pyelonephritis in pregnancy patients is as high as 40%. Symptoms of acute pyelonephritis are fever, frank pain and tenderness in addition to significant bacteriuria. Other symptoms may include; nausea, vomiting, frequency, urgency and dysuria. It can be hard to differentiate a kidney infection from food poisoning or appendicitis because of these symptoms. Pyelonephritis may become chronic and can lead to premature labour, bacteremia and difficult in breathing. These two infections could be distinguished by vaginal and urinary cultures.

Infections of the vagina can cause or mimic UTIs which are common in women of reproductive age. According to Robert (1999) 25 – 35% of women aged 20 – 40 years with vaginal infections are at risk of contacting urinary tract infection. John *et al* (2000) reported that UTIs account for approximately 10% of office visits by women, and 15% of women will have a UTI at sometime during their life. The middle aged women and the elderly are more at risk of urinary tract infections. Wallach (2001) indicated that the incidence of asymptomatic bacteria and UTI increase in elderly people.

The organisms that cause UTI during pregnancy are the same as those found in non – pregnant patients. The bacteria that most often cause UTIs sit

on the skin in the genital area. The most common organism associated with UTIs is *Escherichia coli* which accounts for 80 – 90% of UTI (John *et al*, 2000). This originates from fecal flora which colonizes the periurethral area. There are other ways one can get a UTI, example when the normal flow of urine is blocked or is backed up from the bladder into the kidneys. The kidneys or bladder infection can cause repeated infection, which indicates treatment failure or poor hygiene. In rare cases, bacteria can reach the kidneys through the bloodstream.

Other common organisms of UTI are *Staphylococcus saprophyticus*, an aggressive, commonly acquired organism can present with upper urinary tract disease, and the infection is more likely to be persistent or recurrent. UTIs are also caused by some less common organisms such as *Proteus species, Klebsiella species, Enterobacter species, Citrobacter species, Serratia marcescens, Acinetobacter and Pseudomonas species and Candida albicans* (Fenwick *et al*, 2000). Bar *et al*, 1983 reported other less common organisms that may cause UTI to include *Enterococci, Gardnerella vaginalis* and *Ureaplasma_ureolyticum. Candida albicans* infection is rarely found in the community, but is common in hospital patients with risk factors such as indwelling catheter, immunosuppression, diabetes mellitus, and antimicrobial treatment. Senanayake (2005) reported that cesarean section

without urethral catheterization does not compromise the safety or ease of surgery rather it reduces the risk of urinary infection.

The usual criterion for diagnosing urinary tract infection is detection of more that 10^5 organisms per ml of suitably collected urine. If the urine is collected under sterile conditions, counts as low as 10^2 to 10^4 organisms per ml may indicate infection, (Stamm, 1998). When a symptomatic UTI is present, the clinical entities are recognized and they are lower UTI that is cystitis and upper UTI that is pyelonephritis.

Urinary tract infections are frequently seen in pregnant women. In the United States, the prevalence of asymptomatic bacteriuria in pregnant women is 2.5 – 11.0% as against 3 – 8% seen in other women (Schieve *et al*, 1994). Several factors are associated with an increased frequency in various patient populations. The most significant factor appears to be socioeconomic status. Indigent patients have a five – fold increased incidence of bacteriuria compared with that of non indigent patients (Gilstrap and Ramin, 2001). The risk is doubled in women with the sickle cell tract. Leborgne- Samuel *et al* (2004) stated that pregnancy increases the incidence of sickle cell specific complications such as anaemia, vaso-occlusive crisis, abdominal, pulmonary, placental thrombosis infections and toxemia. It was stated in that

study that pregnancy in sickle cell syndrome is a high risk situation- and is associated with raised incidence of maternal and fetal morbidity and mortality, mainly in late pregnancy, during delivery and in the post partum periods. Other risk factors for bacteriuria include diabetes mellitus, neurogenic bladder retention, and a history of previous UTIs (Lawrenson and Logie, 2001). Leukemic reactions during pregnancy, by their clinical symptoms and laboratory changes can imitate acute and chronic leukamias (Nowicka *et al*, 2004).

In 1990, Leigh *et al* reported a 34% rate of symptomatic bacteriuria in women during the first 5 days after caesarean section or delivery that may be due to catherization or prolonged rupture of membrane. Versi and Colleagues (1997) described a higher prevalence of 6% UTI in Caucasian women during pregnancy when compared to Bangladeshi women which is 2%. Complications of acute pyelonephritis during pregnancy can be devastating. Approximately 1 in 50 women with severe pyelonephritis during pregnancy have evidence of pulmonary injury and respiratory insufficiency (Miller and Raimer, 1994). In that same report residual cases were seen in unscreened women, due to lack of prenatal care or in women with recurrences. When socio-economic status is controlled, no significance differences will likely be noticed among the races.

The initial complication of bacteriuria in pregnancy is pyelonephritis. Millar *et al* (1995) stated that overt septic shock, respiratory failure and death may also occur. It was reported in that same study that 25 – 30% of women with untreated asymptomatic bacteriuria in pregnancy progress to symptomatic cystitis and pyelonephritis. Antepartum UTI is a risk factor for adverse perinatal outcomes, low birth weight and preterm delivery. The prevalence of UTI in pregnancy increases with age. Annual incidence of urinary tract infection in women is shown in Table 1.

Table 1: Annual Incidence of Urinary Tract Infections in United Kingdom.

Age Group (years)	Incidence Approximate
Sexually active young women	3%
Women over 60	7%
Women over 70	8%
Women over 80	20%

Source: Prodigy guidance, September 2004

Asymptomatic UTI is bacteriuria in the urine without clinical signs or symptom of infection and it is found on random urine screening in pregnancy. In the case of asymptomatic bacteriuria no physical findings are present and symptoms may arise intermittently, which may be overlooked due to lack of persistence or severity. A symptomatic bacteriuria is a risk factor for an upper UTI; treatment of this condition reduces the risk of a symptomatic infection (Sweet and Gibbs, 1995). For asymptomatic bacteriuria follow – up urine cultures are important to ensure that the infection is eradicated.

Acute cystitis is distinguished from asymptomatic bacteriuria by the presence of symptoms such as dysuria, urgency and frequency in a febrile patient with no evidence of systemic illness. Pregnant women have complicated urinary tract infections. The duration of symptoms may be quite short and may progress to a longer period due to immunocompromised state of pregnancy. Gillstrap and Whalley, (1998) discovered that up to 40% of patients with untreated asymptomatic cystitis later developed symptomatic cystitis. According to Mikhail and Anyaegbunam (1995) a diagnosis of pyelonephritis during pregnancy is made when the presence of bacteria is accompanied by systemic symptoms. American Academy of Pediatrics and ACOG (2001) reported that 1.3% of obstetric patients who delivered at a single hospital developed acute cystitis with no symptoms of pyelonephritis.

There are conditions which predispose a pregnant woman to contact urinary tract infection. These are the smooth muscle relaxation properties of progesterone and the mechanical obstruction by an enlarging uterus and may cause dilation of the renal calices, pelvics, and ureters, which leads to urinary stasis and potential infection. The ureters undergo tonic relaxation because of the mass production of hormones particularly progesterone and estrogens, Cardozo *et al* (2001). Patrick *et al* (2004) scored percentages of pyelonephritis during pregnancy as 2% during the first trimester, 52% during the second trimester and 46% in the third trimester.

The most important complication of bacteriuria in pregnancy is pyelonephritis. Adverse maternal outcomes include premature maternal anemia, amnionitis, and hypertension or preeclampsia. Other rare but serious complications include septic shock, respiratory failure and death. In the study carried out by Gilstrap *et al* (1981) acute pyelonephritis occurs in 1 – 2% of pregnancies and the incidence varies depending on the local prevalence of asymptomatic bacteriuria and whether it is treated. In that report women with urinary tract abnormality such as renal calculi or a history of pyelonephritis are at increased risk with 73% discovered as antepartum and 8% as intrapartum and post partum.

Complications associated with pyelonephritis are serious and it is due to primary bacterial endotoxin damage. Some patients with pyelonephritis also experience difficulty in breathing, maternal anemia with packed cell volume less that 30% due to endotoxin reduced hemolysis. Women who develop preeclampsia during pregnancy seem to be predispose to UTI. Hsu and Witter (1995) carried out a retrospective review of the perinatal database at a major tertiary center and found that UTI was more in women with severe preeclampsia. The authors hypothesize that underlying damage weakens the patients' systemic defense mechanisms against ascending infections. Schieve *et al,* (1994) conducted a study involving 25,746 pregnant women and found that the presence of UTI was associated with premature labour, hypertensive disorders of pregnancy, anemia and amnionitis. Antibiotic treatment decreases the incidence of preterm birth and low birth weight (Hedstrom and Martens, 1993).

Urinary tract infections affect pregnant women in all races. In a research carried out by DeBaun *et al* (1994), retrospective analysis of 24,000 births indicate that the prevalence of UTI during pregnancy is 28.7% in whites and Asians, 30.1% in Blacks and 41.1% in Hispanics. UTI is associated with preterm delivery in all races. In this same study, infants with very low birth weight are 2.8% blacks and 5.6% in whites. These disparities

are associated with body mass index, maternal age, marital status, cigarette smoking, education and prenatal care.

Other factors leading to UTI are atrophic urethritis and vaginitis (in postmenopausal women), incomplete bladder emptying, previous urinary tract surgery. Fihn *et al* (1998) indicated that female diaphragm, spermicide – coated condoms are also risk factors leading to UTI.

Spermicides in condoms and diaphragm may increase the chance of cystitis. Change of contraceptive method should be considered if infection is seen after the use of diaphragm which is common advice but it is controversial and unproven. Theoretically it can distress people with dysuria (Dawson and Whitfield, 1996). A systematic review found insufficient evidence to recommend the use of cranberry juice for preventing UTIs in women (Jepson *et al,* 1998). According to Ziaei *et al* (2004), the effects of progesterone on muscle tone, peristalsis of the ureter and also urinary vasculature may cause urinary tract infection in women who use DepotMedroxyProgesterone Acetate (DMPH) for contraception. Gratacos *et al* (1994) reported that asymptomatic bacteriuria is common with a prevalence of 10% during pregnancy. Thus there is need for routine screening for bacteriuria during pregnancy. Patterson and Andriole, (1987) reported that pregnant women are at increased risk for UTI in week 6 and

CHAPTER TWO

LITERATURE REVIEW

Urinary tract infections (UTIs) are frequently encountered and entail studying in details. There is need for a better understanding of urinary tract infections and prevention of complications. Each part of the urinary tract plays its role in helping the body to eliminate waste product in the form of urine. Urine is produced and excreted by the kidneys. Urine is made up of glomerular filtrate and they are water (95%), glucose, electrolyte, amino acids and waste products of metabolism such as urea, creatinine, uric acid passing from the blood into the capsule (Monica Cheesbrough, 2000).

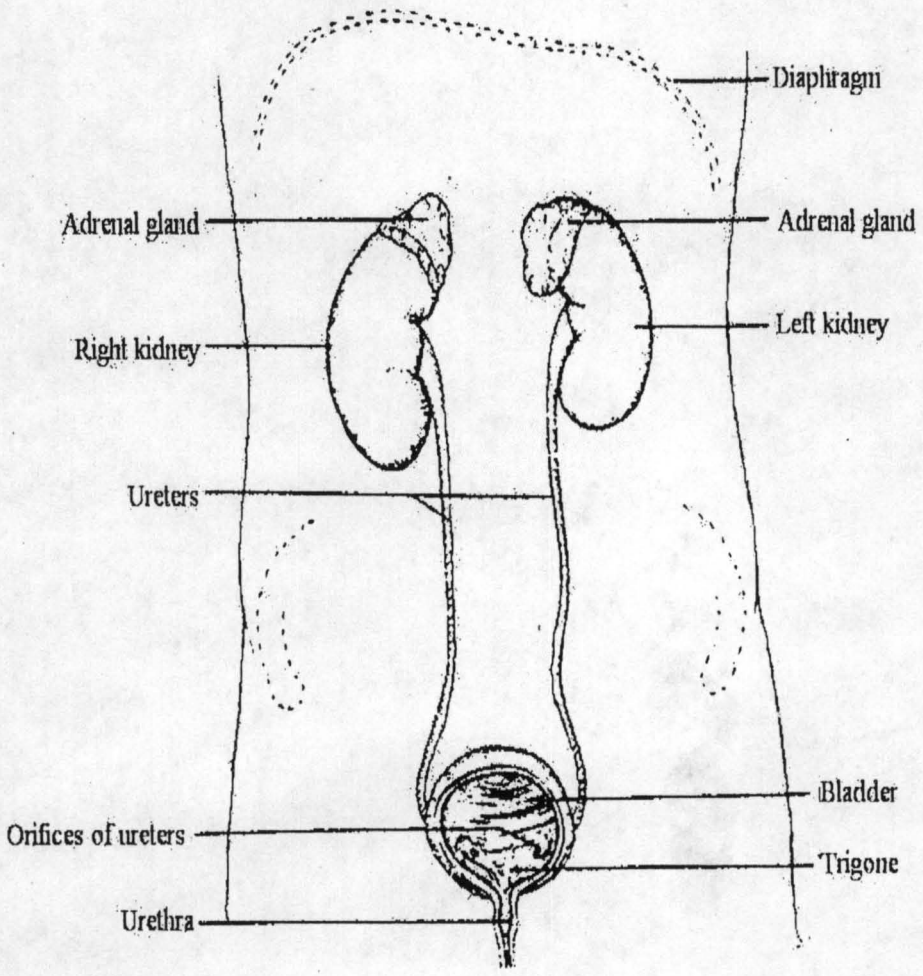

FIGURE 1 STRUCTURE OF THE URINARY TRACT

2.1 GENERAL REVIEW OF URINARY TRACT INFECTION IN PREGNANCY

Contamination of the urine with *Diphtheriods* and *Mycobacterium smegmatis*, may occur as a specimen is being collected. Urine may be contaminated by the urethral normal flora such as *Acinetobacter species* and diphtheriods. Yeasts may also be found in the female urethra. Vaginal contamination may also be indicated by the presence of epithelial cells and a mixed bacterial flora. Schlager *et al* (1995) stated that perineal cleansing does not reduce contamination of urine specimens from pregnant women.

In pregnant women, the incidence of UTI can be as high as 8 percent Mikhail and Anyaegbunam (1995). Pregnant women are at increase risk for urinary tract infection. Urinary tract infections occur more frequently in women than men due to the shortness of the female urethra and its proximity to the anus. A significant bacteriuria has been historically defined as finding more than 10^5 colony – forming units per ml in a suitably collected urine. Stamm and Hooton (1993). Microscopy of urine is a quick and reliable near-patient test for UTI. In 1981 Walter and Marvai noted that enumeration of the number of bacteria in the urine is an extreme important diagnostic procedure. UTI is likely if bacteria and leucocytes are seen in the urine. The changes in the genitourinary tract mucosa related to menopause may

lead to urinary tract infection. The use of contraceptive foams and gels of the vagina during sexual intercourse may lead to UTI, (Hooton *et al*, 1991).

Symptomatic urinary tract infection is common during pregnancy because of the suppression of the immune system during pregnancy. In symptomatic urinary tract infection bacteria are virtually demonstrated in the urine in large numbers. The absence of easily demonstrable bacteria in uncentrifuged urine indicates urinary infection. Quantitative estimation of the number of bacteria in the urine necessitates significant bacteriuria and also differentiates microorganisms.

Urethral trauma, as occurs during sexual intercourse, may cause introduction of bacteria in the bladder. This may also cause bruising or inflammation of the urethra-also known as "honeymoon Cystitis." The precise role of sexual intercourse in the pathogenesis of urinary infections remains unclear. In 1975 Sanford reported that prostatitis or urethral obstruction due to prostatic hypertrophy are important factors, predisposing bacteriuria. Symptoms of acute urethral syndrome are bacterial cystitis, frequency and dysuria syndrome, non-urethral syndrome, acute pyuria syndrome, irritable urethral syndrome, and acute dysuria syndrome (Brumfitt *et al*, 1998).

Urinary tract infection when not treated could lead to mortality and morbidity. Asscher (1966) stated that urinary tract infections are a common cause of morbidity. It is estimated that approximately 20% of all women have a UTI at least once, with the incidence increasing with age. UTI may arise as a result of any anatomical barrier to free flow of urine through the urinary tract. The cost of screening for asymptomatic bacteria (ASB) and UTI in pregnancy has been shown to be cost – effective when compared to treating UTI and pyelonephritis without screening. According to the study carried out by Rouse *et al (*1995) in Parkland Hospital there was reduction in cases of acute pyelonephritis from 4% to 1-2% after implementing a screening and treatment program for asmptomatic bacteriuria in pregnancy. Nunns (1995) also made the same report. Treatment of asymptomatic bacteriuria reduces the risk of pyelonephritis, pre-term delivery and low birth weight (Smaill, 2001). Wadland and Plante (1989) performed a cost benefit analysis of screening for bacteriuria in pregnant women versus in patient treatment of pyelonephritis and found a substantial decrease in overall cost with screening. Romero *et al* (1989) also discovered that treatment of pregnant women with asymptomatic bacteriuria decreases the incidence of preterm birth and low birth weight infants. Screening for asymptomatic bacteriuria is cost effective and also reduces the risk of

pyelonephritis. The diagnosis and treatment of asymptomatic bacteriuria will also prevent development of symptomatic cystitis.

Pregnant women in poor physical or mental condition develop urinary tract infection than those in general good conditions. Versi *et al* (1997) attributed the differences to hygiene practices and clothing. The risk of developing UTI is doubled in women with sickle cell trait. Glucosuria occurs due to impaired re-absorption by the collecting tubule and loop of Henle of the 5% often filtered glucose. The fractional excretions of amino acids are high throughout pregnancy. Previous infection with urea – splitting organisms notably *Proteus* and related species is often associated with the formation of urinary stones.

The pathophysiological changes seen in pregnancy increases a healthy pregnant woman's chance of serious infections complicating from asymptmatic and symptomatic urinary tract infection. However, controversy exists as to whether bladder pressure increases or decreases the chances of urinary tract infection (Pastore *et al*, 1999).

2.2 PATHOGENESIS OF URINARTY TRACT INFECTION

Urinary tract infections are caused by bacteria and non bacterial agents. Pregnant women are prone to urinary tract infection from one stage of the pregnancy to the other. *Patter*son and Andriole in (1987) reported that increased bladder volume and decreased bladder tone, along with decreased tone, contribute to increased urinary stasis and ureterovesical reflux. The physiologic increase in plasma volume during pregnancy is caused by bacteria infection of the bladder, urethra and kidney. Most pathogens that cause urinary tract infection are bowel flora (Andriole1998).

Sober and Kaye (1990) stated that once bacteria reach the urinary tract, three factors determine whether infection ensues, they are:

(1) Virulence of the pathogen

(2) Size of the inoculums

(3) Host defense mechanisms

In pregnancy there is immune suppression, which account for greater chances of urinary tract infection. The most common pathogen attributed to UTI is *Escherichia coli.* In the study carried out by Fenwick *et al* (2000) these organisms were isolated at the following percentages:

Escherichia coli	80 – 85%

Klebsiella pneumoniae	5%
Proteus mirabilis	5%
Enterobacter species	3%
Staphylococcus saprophyticus	2%
Group B beta – hemolytic *streptococcus*	1%

The fungal pathogens isolated were *Candida albicans*. *Trichomonas vaginalis* is a protozoa sometimes isolated in cases of UTI. Less common organisms that may cause UTI include enterococci, *Gardnerella vaginalis* and *Ureaplasma ureolyticum*, McDowall *et al* (1981). The obvious reason for *Escherichia coli* being commonly isolated in many cases of UTI is because Escherichia is a normal flora in the bowel but it is pathogenic in the urinary tract. Infection result from ascending colonization of the urinary tract. Parasites like *Schistosoma haematobium* could be observed.

2.3 CLINICAL FEATURES OF UTI

The clinical symptoms of UTI are frequency, dysuria, suprapubic pain, sometimes haematuria and pyuria. These symptoms are in the case of cystitis or pyelonephritis but in asymptomatic bacteriuria these symptoms may not be there. Untreated asymptomatic bacteria is a risk factor for acute cystitis (40% develop) and pyelonephritis (25 – 30 develop) in pregnancy,

Vazquez and Villar (2000). Asymptomatic bacteriuria should be treated in pregnant women. According to Lutters and Vogt, (2000), studies on treatment of urinary tract infection (UTI) in the elderly are in general of poor quality. There is the need for advocation of all the preventive measures of UTI in elderly since treatment does not improve outcome. Acute cystitis is complicated by upper-urinary tract disease (i.e. pyelonephritis) 15 – 50% of the time (Roberts, 1999). In that same study, it was also stated that pyelonephritis is the most common urinary tract complication of pregnancy, occurring in approximately 2% of all pregnancies. Lucas and Cunningham (1994) further noted the subsequent increased risk of developing pyelonephritis in patients with asymptomatic bacteriuria. In that research it was reported that 60% of untreated asymptomatic bacteriuria can lead to the development of acute cystitis.

UTIs may cause different symptoms in different people. Symptoms like burning sensation when one urinate and strong urine odor also indicates UTI. Asymptomatic bacteriuria occurs in 2.3 – 10% of pregnancies with an increased incidence in multifarious and in older mothers (Kass, 1970). This reduced flow of urine makes it easier for bacteria to ascend from the bladder to the kidney, and for infection to set in. Increases in urinary progesterone

and estrogens may lead to a decreased ability of the lower urinary tract to resist invading bacteria (Lucas, 1993).

Recurrent UTI is defined as repeated episodes of infection. Relapse is defined as a repeat UTI with the same strain of organism and this often suggests treatment failure. It could occur as a result of laboratory failure to type the organism in order to identify the strain. Cooper (2001) noted that limited evidence suggests that routine investigation is not likely to be beneficial. Cattell (1997) also emphasized that persistent failure to eradicate the infection is an indication for referral. In cases of recurrent, relapse and ré- infection there is need for urine culture and typing of the isolated organism for effective treatment to be delivered.

In the study carried out by John *et al* (2000) up to 70% of pregnant women develop glucosuria, which encourages bacterial growth in the urine. Glucosuria and an increase in urine amino acids during pregnancy are additional factors leading to UTI. Glucose excretion increases in pregnancy by 100-fold over non-pregnant values of 100mg/dl. In the early stage of pregnancy amino acids level increases and normalizes in the second half.

In a study carried out by Stephen *et al* (1985) at university of Washington to assess the relationship between diaphragm and UTI, a patient was considered to have UTI if she complained of acute dysuria, frequency or urgency and had a clean catch midstream urine specimen with growth more than 10^2 colonies per ml of an aerobic gram negative bacteria or *Staphylococcus saprophyticus*. In the case of this control study, diaphragm use and vaginal flora were compared among 114 women with acute urinary tract symptoms. The incidence of UTI in 192 diaphragm users and 182 women taking oral contraceptive was determined during a mean follow-up period of 4 – 9 months by Fihn *et al* (1985). Both studies showed significantly increased risk of UTI in diaphragm users, vaginal colonization with *Escherichia coli* significantly greater in diaphragm than in non – users and were strongly associated with presence of UTI.

Studies by Svanborg – Eden and deMan (1987) have shown stronger binding of *Escherichia coli* (isolated from infected urine) to the genitourinary tract epithelia cells of infection-prone women than to the cells of non infected control subjects. Other factors that predispose a woman to UTIs are increase in sexual activity, urinary tract obstruction, previous infection and menopause which is as a result of hormonal changes. Socio-economic factors such as poverty, malnutrition, poor personal hygiene,

inadequate water suppliers and provision of health facilities also predispose a pregnant woman to infection.

2.4 METHODOLOGY FOR THE DIAGNOSIS OF UTI

The specimen for diagnosis of UTI is urine. Urine specimen can be obtained as midstream clean-catch urine specimen from all patients with urinary tract infection. There are several methods for specimen evaluation, all have benefits and limitations, and clean-catch specimen reduces, but does not eliminate, the possibility of cross-contamination from the urethra and vagina. According to Sussman and Asscher (1979) the key to diagnosis is microscopic and bacteriological examination of urine. Specimen kept in room temperature may have falsely elevated colony counts. Urine specimen can be refrigerated if it cannot be transported immediately. A clean-catch mid-stream urine sample is generally recommended (Walter and Knopp, 1989). Some workers like Belmin *et al* (1993), Lifshitz and Kramer (2000) have shown some evidence that mid-stream urine (MSU) collection may not meaningfully reduce contamination and may not be necessary in practice.

Microscopically UTI can be diagnosed with certainty only when significant numbers of bacteriuria are present in the urine. Urine microscopy is an advantage because minimal processing is required as the

urine can be examined with centrifuging or staining. It is also recommended because moderate investment in equipment, training, and organization is required.

The standard criterion for evaluation of UTI in pregnancy is urine culture. Examination of the urine for pus cells is of little value in the diagnosis of UTI in pregnancy. A urine culture should be obtained at the first antenatal visit to screen for asymptomatic bacteriuria, urine culture should also be carried out after treatment of bacteriuria and if symptoms of UTI are present. A urine culture should be obtained on admission in cases of pyelonephritis and for patients who have recurrent or who are not responding to initial treatment regimes. Quantitative urine culture enables the distinction to be made between contamination and infection of the urine. The detection of significant bacteriuria is a powerful epidemiological tool whereby apparently healthy population can be screened for UTI.

A colony count of 100,000 colony-forming units (CFUs) per milliliters historically has been used to define a positive culture result. Patients with true UTIs whose urine may yield fewer numbers of bacteria than the classical 10^5 cfu/ml include infants and children, males, catheterized patients, resistant cases and symptomatic obstruction that may prevent

organisms from being eliminated. According to Lucas and Cunningham (1994) true positive culture result as low as 100 CFUs per milliliter of bacteria indicates UTI. Culture results can be used to identify organisms and antibiotic sensitivities.

2.4.1 BLOTTING PAPER STRIP METHOD

Two blotting paper strips with a foot measuring 12.6mm are dipped into each specimen and then held upright to absorb excess fluid. One can be impressed on MacConkey agar and the other on 5% human blood agar. The number of colonies in the foot will then be counted after incubation. In this method 15 colonies represent $<10^4$ organisms per ml. 15 – 20 colonies represent $>10^4$ organisms per ml. Duerden *et al* (1975) used this method and microorganisms specific for UTI were isolated.

2.4.2 DIP SLIDES METHOD

Dip slides consist of media coated disposable plastic slide-spoons. Inoculation is by dipping the slide-spoon in a container of urine or by allowing a flow of urine to pass over the medium. Different types of agar media may be put on the two sides of the slide-spoon e.g. nutrient agar and eosine methylene blue agar. Grob (1978) reported different results on the different media. They are used to avoid the over growth of commensals

when there is likely to be a delay in a specimen reaching the laboratory. Dip-slides are expensive and it may not be possible to separate a true pathogen for sensitivity testing when contaminants are also present.

2.4.3 BIOCHEMICAL TESTS USED IN INVESTIGATING UTI

This method involves the use of commercially prepared multi – test reagent strip for chemical content of urine. Proteinuria is found in most bacterial urinary tract infections. Urinary pathogens e.g. *Escherichia coli* (commonest cause of UTI), *Proteus* species and *Klebsiella* species are able to reduce the nitrate normally present in urine to nitrite. A positive test indicates bacteriuria and therefore suggests UTI. A negative test does not rule out UTI because some pathogens e.g. *Pseudomonas species*, *Staphylococcus sp* do not produce nitrate reductase and frequent urination (common in cystitis) reduces the time available for the enzyme to act. When first morning urine is tested, about 80-90% of UTI caused by nitrate-reducing pathogens can be detected (Lammers *et al*, 2001). Griess test can also be used for leucocyte esterase test (Mathews *et al*, 1998).

Leucocyte esterase (LE) is an enzyme that is specific for polymorphonuclear neutrophils (pus cells). It detects the enzyme from active and lyzed white blood cells. LE testing is an alternative method of

detecting pyuria when it is not possible to examine fresh urine microscopically for white cells or when the urine is not fresh and is likely to contain mostly white blood cells (Mathews *et al,* 1998). Leucocytes can contaminate the specimen and with that a positive test does not make a diagnosis of UTI certain. A negative LE test does not rule out the diagnosis of UTI, since the test is insensitive, and pyuria is not always found in UTI.

Blood and protein are sometimes found in the urine when there is a UTI, but their presence or absence does not help in making the diagnosis. Combining results of nitrite, blood and protein tests increases sensitivity but decrease specificity (Hurlbut and littenberg, 1991). In the research carried out by Phelan *et al* (2004) in Australia, accepting the dipstick proteinuria result at face value led to an incorrect diagnosis of preeclampsia or gestational hypertension in 85% (50%) women.

2.4.4 **MICROSCOPIC EXAMINATION**

Urine is examined microscopically as a wet preparation to detect pus cells, *Trichomonas vaginalis*, motile trophozoites, Schistosoma eggs e.t.c. A drop of uncentrifuged or centrifuged urine is placed on a glass slide; a cover slip is applied and examined under a microscope. Examination of a Gram stained smear provides additional useful information. Mati (1974) in his

work identified an increase in the number of pus cells in 154 (72%) wet film and 161 (75%) in gram stained film from specimen that gave no growth. Pyuria with a sterile urine culture may be found when a patient with urinary tract infection has been treated with antimicrobials.

2.4.5 AUTOMATED METHODS

These are developed for screening urine specimens. The detection of bacterial adenosine triphosphate (ATP) by measuring light emitted by the reaction of luciferin – luciferase. The luminescent tests are somewhat expensive and do not take time.

The Bac-T-Screen bacteriuria detection devices employ a method whereby urine is forced through a filter paper, which retains microorganisms. A dye is then applied to visualize the particulate matter that has adhered to the filter paper.

Uriscreen is a manual screening system that measures the enzyme catalase in urine. The enzyme catalase produced by micro-organism reacts with the hydrogen peroxide to produce bubbles as in catalase test. Teppa and Roberts 2005 stated that uriscreen test had inadequate sensitivity for rapid screening of bacteriuria in pregnancy

The antibody-coated bacteria test is used to localize the site of infection to the bladder (cystitis) or renal tissue (pyelonephritis) using a non-invasive technique. Thomas (1983) used this method and discovered some deep-seated infection other than cystitis.

2.4.6 **RENAL ULTRASONOGRAPHY**

This is a radiographic method. In 1994 Loughlin used this to perform an intravenous pyelogram during persistent infection after appropriate antibiotic therapy and when there is the suggestion of a structural abnormality not evident on ultrasonography. Even the low-dose radiation involved in an intravenous pyelogram however, may be dangerous to the fetus and should be avoided if possible. Limited evidence suggests that routine investigation, example with excretory urography, cystoscopy, or ultrasound is not likely to be beneficial (Cooper, 2001).

Special investigations are not routinely requested. Ahmad *et al* (1991) stated that referral for imaging or functional test is indicated for women with frequent episodes of UTI i.e. more than three times a year. In cases of haematuria Jewkes *et al* (1990) recommended referral or functional tests. Sanderson (1998) suggested referral for imaging or special tests for women with history of pyelonephritis, calculi or previous genitourinary tract

surgery. The need for imaging and functional tests is also indicated for women who have persistently failed to respond to appropriate antimicrobial therapy (Stamm, 1998).

2.4.7 **ANTIMICROBIAL TREATMENT.**

Population studies on bacterial sensitivities can be difficult to apply to usual clinical settings. Empiric antimicrobial therapy must be comprehensive and should cover all likely pathogens. According to Steinke *et al* (2001), trimethoprim is still an effective first- choice treatment for uncomplicated UTI in general practice.

In 2001 Manges and colleagues reported rates of resistance of *Escherichia coli* to trimethoprim as 20%- 40%. Nitrofurantoin is at least as effective as trimethoprim, but is more expensive and can cause nausea and vomiting.

Quinolones (e.g Ciprofloxacin and Olflocaxin) are appropriate for second- line treatment (C Mc Nulty&PHLS, personal communication 2001). Cefuroxine (2^{nd} generation Cephalosporin) inhibits both gram positive and gram negative activity. Yaris *et al* (2004) stated that the possibility of

pregnancy should be considered when prescribing antibiotics for urinary tract infections in women of reproductive age.

British National Formulary, 42nd edition (2002) stated that non-steroidal anti-inflammatory drugs (NSAIDS) are best avoided during pregnancy. Wise and Andrews (1998) documented that uncomplicated urinary tract infection (UTI) generally resolves within a few days, even if no specific treatment is given. Tran *et al* (2001) reported that drugs commonly used in UTI are excreted in higher concentrations in the urine than are used in laboratory testing. This explains, in part, why bacterial resistance is not always associated with treatment failure. In 2001 Pries*t et al* stated that patterns of antimicrobial resistance vary widely when different centers are compared.

Blind antimicrobial therapy for bacterial cystitis should not be recommended because:

(1) The theoretical analyses have not been tested in practical.

(2) The risk of promoting resistance to antimicrobial has not been adequately taken into consideration. McIsaac *et al* (2002) supported this view.

With the above 2 points suggestion by Barry *et al* (1997) that empirical antimicrobial should be prescribed for women with typical symptoms of cystitis should be reviewed.

There is limited evidence to support the efficacy of self treatment, Gupta *et al* (2001). The option of giving a prescription to commence treatment on recurrence of symptoms should be discouraged. Asymptomatic bacteriuria does not need to be treated with antimicrobial, Agency for Health Care Policy and Research, 1999. Measures for treating symptomatic UTI include replacement of catheter if it is blocked or has been in site for some time (Nicolle, 2001). Raz *et al* (2000) recommends that the replacement of indwelling catheter before anti-microbial treatment. Antibiotic therapy should be initiated after all necessary culture results are obtained. Treatment of all symptomatic and asymptomatic patients with bacteriuria is important.

CHAPTER THREE

MATERIALS AND METHODS

This research was carried out on 300 pregnant women attending antenatal clinic in the three major hospitals in Abuja namely: Wuse General Hospital, Maitama District Hospital and Asokoro District Hospital. The urine specimens of these women were collected during the three trimesters. These samples were collected during their routine antenatal clinic visits and analysed in hospital laboratory. The study subjects were grouped according to the stage of pregnancy as 1st Trimester (1-3 months), 2nd Trimester (4-6 months) and 3rd Trimester (7-9 months). The method employed in the investigation was that used by some other researchers in different areas of urinary tract infection in pregnancy such as Phelan *et al* (2004) used dipstick urinalysis, and Teppa and Roberts (2005) used the uriscreen test to detect significant asymptomatic bacteriuria during pregnancy.

3.1 COLLECTION OF URINE SPECIMENS

Midstream, clean-catch urine specimens were collected from the subjects under study. These women were instructed on how to collect the urine specimen using the toilet facilities attached to these hospitals. A sterile dry, wide-necked, leak-proof container (universal plastic sterile container) was given to each pregnant woman. No catheterized specimen was used in

this study. Each specimen was labeled with the date, the name, and the number of the patient, and the time of collection. Personal details like age was collected and arranged as shown on Table 2 below,

TABLE 2: Age Distribution of Total Population Sampled.

Age Group	No of Women	% Collection
15 – 20 years	20	6.6
21 – 25 years	80	26.6
26 – 30 years	100	33.3
31 – 35 years	75	25
36 – 40 years	25	8.3
TOTAL	300	100

Other information like stage of pregnancy and residential area were also noted. Residential areas of this woman are shown on Table 3.

TABLE 3: Residential Areas of these pregnant Women used in this Research

Residential Areas	No of Samples	% Sampled
Garki	20	6.66
Apo	20	6.66
Idu/Karimo/Gwagwa	30	10
Mpape	20	6.66
Kubwa/Dutse/Bwari	25	8.33
Maitama	7	2.33
Gwarimpa	16	5.33
Jabi	15	5
Wuse	18	6
Kado	15	5
Asokoro	6	2
Jikwoyi/Karu	16	5.33
Alaita/Airport Road	27	9
Kuchigoro	5	1.66
Mararaba	20	6.66
Nyanya	22	7.33
Durumi	18	6

There was immediate delivery of these specimens since they were collected using the toilet facilities attached to the laboratory. These specimens were collected and analysed the same day. No preservative like boric acid was used since it was analysed immediately after collection. Some specimens were refrigerated at 4^0C for 1-2hours while waiting to be processed.

3.2 URINE APPEARANCE

The colour and appearances of the urine specimen were recorded. Normal freshly passed urine is clear and pale to dark yellow (amber) in colour. The yellow colour is due to pigments urochrome, urobilin and porphyrins. The specimen container was observed for leakage or not.

3.3 CULTURE

Immediately after macroscopy or appearance, these specimens were cultured on Blood agar, chocolate and MacConkey agar. A calibrated wire loop of 0.001ml was used to inoculate a quarter of the culture media because it is inexpensive, simple to perform, and provides individual colonies that are easier to identify and remove for antimicrobial sensitivity testing. The loop was flamed red hot and allowed to cool. A primary inoculation was made on one side of Blood agar and MacConkey agar plate and then

streaked to other areas after reflaming the wire loop. This method ensures that distinct colonies are obtained.

At the end of the inoculation, MacConkey agar and Blood agar plates were incubated aerobically in the incubator at 37^0C while chocolate agar plates were loaded in a carbon IV oxide candle jar and then incubated at 37^0C overnight. The morphological appearances were noted during plate reading.

3.4 PLATE READING

After overnight incubation these plates were read macroscopically. Morphological appearance e.g size, colour, swarming, smell, elevation, crenation, texture, smooth etc were noted and used for identification. These organisms were picked and stored on nutrient agar slant for further biochemical, serology and sensitivity testing. Some plates with tiny growth were further incubated for another 24 hours for further multiplication and prominent microorganism to be seen. Those with no growth or insignificant growth were discarded. During plate reading these microorganisms were identified using the following characteristics

Escherichia coli.

Morphology: - *Escherichia.coli* is a Gram negative, usually motile rod. Some strains are non-motile. Few strains are capsulated.

Culture: - It is an aerobe and also a facultative anaerobe. Optimum temperature for growth is 36-37°C with temperature range of 18-44°C. On blood agar or chocolate agar *Escherichia coli* produces 1 – 4 mm diameter colonies after overnight incubation. The colonies may appear mucoid and some strains are haemolytic.

On MacConkey agar it ferments lactose and produce smooth pink colonies. Some strains are late or non- lactose fermenting.

Klebsiella pneumoniae

Morphology: - It is gram negative, non-motile, usually capsulated rods.

Culture: - They are aerobes and facultative anaerobes. On chocolate agar, klebsiellae produce large grey-white usually mucoid colonies. They are lactose fermenting and produce mucoid pink colonies on MacConkey agar.

Pseudomonas aeruginosa

Morphology: - It is a Gram – negative, non-sporing motile rod. Some strains are capsulated.

Culture: - It is an obligatory aerobe. Recognized by the pigments it produces e.g. blue-green pigment and a yellow-green fluorescent pigment. Very few strains are non – pigment producing.

Culture: - They are large flat spreading colonies, which are often haemolytic and usually (90% of strains) pigment producing on chocolate agar. The pigments diffuse into the medium giving it a dark greenish-blue colour. Some strains produce small colonies or mucoid colonies. On MacConkey agar *Pseudomona aeruginosa* produces pale coloured colonies.

Proteus mirabilis

Morphology-They are actively motile, non-capsulate and are Gram negative pleomorphic rods. Temperature range is 35 - 37°C.

Culture: - Most proteus culture has a characteristics fishy odour on blood or chocolate agar. On MacConkey agar they are non-lactose fermenting colonies after overnight incubation at 35 - 37°C.

Staphylococcus saprophyticus

Morphology: -Gram positive cocci of uniform size, occur in groups but also singly and in pairs. They are non motile and non capsulate.

Culture: - They grow well aerobically and in a carbon dioxide enriched atmosphere. Most strains also grow anaerobically. Temperature is 10-42°C

with an optimum of 35-37%. On chocolate or blood agar they may be white or yellow and non – haemolytic. They may or may not grow on MacConkey.

Streptococcus agalactiae

Morphology: - Group B streptococci are Gram positive cocci, occur in short chains but also in pairs and singly. They are non-motile. Most strains are capsulated.

Culture: - They are grey mucoid colonies about 2mm in diameter, surrounded by a small zone of beta-haemolysis on chocolate agar. Most strains grow on MacConkey agar.

3.5 CHEMICAL TEST FOR ABNORMAL CONSISTITUENTS.

Urine dip strips were used. They are commercially prepared and there are different types manufactured by different manufacturers. In this study, combi 9 test RL (Boehringer Mannheim) was used. It analyses for: P^{H}, Glucose, Ascorbic acid, ketones, Nitrites, protein, Bilirubin, Urobilinogen and haemoglobin. This test was carried out the same day after collection because the stability of the automated dipstick urinalysis varies with substances tested (Froom *et al*, 2000). One strip was dipped into each of the specimen and inverted for proper absorption and removal of excess. The

result was read by matching the colour change with the standard colour on the container. Urinalysis has a specificity of 97-100% when compared to culture in the diagnosis of asymptomatic bacteriuria.

These 9 parameters on chemical urinalysis strip are:

(a) P^H: - P^H (60 seconds) 5.0 6.0 7.0 8.0 9.0

This test is based on the double indicator (methyl red/bromothymol blue) principle that gives a broad range of colours covering the entire P^H range. Colours range from orange through yellow and green to blue.

(b) Ascorbic acid: - neg. + ++

The detection is based on the colouration of Tilmans reagent. In the presence of ascorbic acid a colour change takes place from blue to red. Ascorbic acid concentration can have a disturbing effect particularly in the event of low glucose concentration.

(c) Blood: - neg + ++ +++

The detection is based on the pseudoperoxidative activity of haemoglobulin and myoglobin, which catalyze the oxidation of an indicator by an organic hydroperioxide producing a green colour.

(d) Urobilinogen: - neg + ++ +++

This test is based on the modified Ehrlich reaction. The diazonium salt on the test paper forms a reddish azo compound with urobilinogens. Higher values are pathological. Absence of urobilinogen in the urine are pathological but are not indicated by the strips. Exposure of urine to light for a longer period of time may lead to lowered or falsely negative results. Large amount of bilirubin produces a yellow colouration. Too high or falsely positive results can be caused by the presence of diagnostic or therapeutic dyes in the urine. Urine urobilinogen is increased in any condition that causes an increase in production or retention of bilirubin.

(e) Bilirubin: - neg + ++ +++

This test is based on the coupling of bilirubin with diazotized dichloroanaline in a strong acid medium. Some urine contents can produce a yellow colouration of the test strip. Ascorbic acid and nitrite in higher concentration inhibit the test.

(f) Nitrite: - negative positive

Microorganisms which are able to reduce nitrate to nitrite are indicated indirectly by this test. The principle of Griess reagent is the basis of this test. The test paper contains an amine and a coupling component. A red coloured azo compound is formed by diazotization and subsequent coupling. Pink colour indicates a bacteria infection of the urinary tract. False negative can be produced by high doses of ascorbic acid, antibiotic therapy and by very low nitrate concentrations in urine as the result of low nitrate diet or strong dilution produces low nitrate concentration. Falsely positive result can be produced by the presence of diagnostic or therapeutic dyes in the urine.

(g) Ketones: - neg + ++ +++

It is based on the sprinciple of legal's test. Acetoacetic acid and acetone form with sodium nitroprusside in alkaline medium a violet coloured complex. Colour development range from buff-pink for a negative reading to purple for positive results. Urine testing detects acetoacetic acid. In ketoacidosis it can be present in large amounts in the urine.

(h) Protein: - neg + ++ +++

The test is based on the protein error principle of indicators (tetrabromophenolphtalein ethyl ester). The test zone is buffered to a constant P^H value and changes colour from yellow to greenish blue in the presence of albumine. False positive in alkaline urine, intake of quinine drugs and disinfectant residues in the urine sampling vessel. Heavy proteinuria usually represents an abnormality in the glomerular filtration barrier. The test is more sensitive for albumin than for globulins or haemoglobin.

(i) Glucose: - neg + ++ +++ ++++

The principle is based on the glucose – peroxidase – chromogen reaction. Pathological glucose concentrations are indicated by a colour change from green to bluish green. Large quantities of ascorbic acid result in lower or negative result. Falsely positive reaction can also be produced by a residue of perioxide containing cleansing agents.

Urine dipstick tests are not suitable for screening for UTI in asymptomatic women and that is the reason why cultures were also carried out.

3.6 MICROSCOPY

Microscopy was performed in all the specimens after culture. Microscopy of urine is a quick and reliable near-patient test for UTI. A 20ml test-tube was filled to three quarter level and centrifuged for 5minutes at 3000rpm (rpm-revolution per minute). An automatic centrifuge was used in this study such that after setting at the required time and speed, the centrifuge stopped on reaching that. The supernatant was discarded and deposit examined. This was done by placing a drop of the deposit on a glass slide and then covered with cover slip. It was then examined under x10 objective of the microscope and in some cases x40 for enlargement. The vital micro-organisms were noted.

3.7 GRAM STAIN REACTION

In 1884 Gram Hans Christian, a Danish doctor working in Berlin, accidentally stumbled on a method which still forms the basis for the identification of bacteria. He discovered that certain stains were preferentially taken and retained by bacterial cells. Gram stain divides bacteria into two large groups. In Gram-positive bacteria, the purple crystal violet stain is trapped by the layer of peptidoglycan which forms the outer layer of the cell. In gram-negative bacteria, the outer membrane prevents the stain from reaching the peptidoglycan layer in the periplasm. The outer

membrane is then permeabilized by acetone treatment, and the pink safranin counter stain is trapped by the peptidoglycan layer. Microorganisms were picked from culture plates, gram stained and examined under the microscope.

3.8 BIOCHEMICAL TEST

There are many biochemical tests for identification of these bacteria. The following biochemical tests were carried out for identification and confirmation of these organisms. These biochemical tests are helpful in identification of microorganisms to species level before confirmation by serology testing

3.8.1 INDOLE TEST

This test was performed based on the principle that certain enterobacteria e.g. *Escherichia coli* breakdown the amino acid tryptophan with the release of indole. Kovac's reagent was used in this research.

PROCEDURE FOR TEST.

1. The test organism was inoculated in a bijou bottle containing 3ml of sterile tryptone water.
2. It was then incubated at 37°C for 48 hours.

3. Test for indole was done by adding 0.5ml of Kovac's reagent. It was then shaken and examined for a red colour on the surface layer within 10 minutes.

RESULT: - Red surface layer--------Positive indole test

Yellow surface layer---Negative indole test

3.8.2 CITRATE UTILIZATION TEST

This test is used in the identification of enterobacteria, K*lebsiella pneumoniae*. The principle is based on the ability of an organism to use citrate as its only source of carbon.

Simon's citrate agar was used in this study to identify K*lebsiella pneumonia*

PROCEDURE

(1) Citrate agar slant were prepared in bijou bottles as recommended by the manufacturer and stored at 2 – 8°C.

(2) Using a straight wire loop the suspected organism was picked and streaked on the simmon's citrate agar slope and the butt stabbed.

(3) It was incubated at 35°C for maximum of 48hours.

Bright blue ---------- Positive citrate test

No change in colour of media---------- Negative citrate test.

3.8.3 VOGES PROSKAUER (VP) TEST

This test is used in the differentiation of enterobacter, K*lebsiella pneumonia* by_fermentation of glucose with the production of acetyl methyl carbinol (acetoin) which can be detected by oxidation reduction reaction.

PROCEDURE

1. 2ml of sterile glucose phosphate peptone water medium was inoculated with the test organism and incubated at 37 °C for 48 hours.
2. 2ml of 4% potassium hydroxide and 3mls of 5% solution of alpha naphtol in absolute alcohol was added after incubation. The tube was shaken at intervals to ensure maximum aeration.

Result: - Positive result was detected as a pink colour in 2-5 minutes.

3.8.4 TEST FOR ENZYMES

Some of these microorganisms isolated from urinary tract infection have some enzymatic reactions. These enzymes were tested with biochemical reagent. In this study specific enzymatic reactions for the organism understudy were carried out for identification of the organism.

3.8.4.1 CATALASE TEST

This test was used to identify those organisms that can produce the enzyme catalase e.g. *Staphylococcus* from non-catalase producing bacteria such as *Streptococci*.

In this test catalase acts as catalyst in the breakdown of hydrogen peroxide to oxygen and water.

METHOD

1. 2-3ml of hydrogen peroxide was poured into a test tube.
2. With a wooden stick several colonies of the test organism was picked and immersed in the peroxide solution.
3. It was observed for immediate bubbling.

Result: - Active bubbling indicated positive catalase test. No bubble was reported as negative catalase test.

3.8.4.2 OXIDASE TEST

This test was used in the identification of *Pseudomonas* specie and this is based on the principle that this organism produces the cytochrome oxidase, which oxidizes tetramethyl-p-phenylenediamine dihydrocloride.

REAGENT: - Oxidase reagent test paper supplied commercially was used for the test.

METHOD:

1. The strip was moistened with a drop of water.
2. Using an applicator stick a colony of the test organism was picked and rubbed on the reagent strip.

RESULT: The change in colour of the strip to a red-purple colour was recorded as positive for oxidase test. Negative result was denoted by no change in colour.

3.8.4.3 COAGULASE TEST

This test was carried out to differentiate *Staphylococcus aureus* from *Staphylococcus saprophyticus*. *Staphylococcus aureus* is positive for coagulase while *Staphylococcus saprophyticus* is negative for coagulase. Coagulase produced by the organism causes plasma to clot.

PROCEDURE

1. Two drops of physiological saline were placed on each end of the slide.
2. The test organism was emulsified in each.

3. A loopful of plasma was added and mixed with one suspension of the test organism and observed for clumping within 10 seconds.

No plasma was added to the control.

RESULT: - Clumping within 10 seconds was recorded positive for *Staphylococcus aureus*. No clumping within 10 seconds was used to identify *Staphylococcus saprophyticus*. Pathogen Priority approach by WHO was considered and not intermediate or low priority.

3.8.4.4 UREASE TEST

This was used to differentiate enterobacteria. Proteus strains are strong urease producers. The principle is based on the hydrolysis of urea by the enzyme urease to give ammonium and carbon iv oxide.

METHOD:

2. The medium (Christensens medium) was prepared according to the manufacturers instructions.
3. The test organism was inoculated on the entire surface and then incubated overnight at 37^0C

RESULT: - Pink colour indicated positive urease test. Absence of a pink colour was reported as negative urease test.

3.8.5 IDENTIFICATION BY SEROTYPING

This is an antigen-antibody reaction. The reaction depends on the fact that serum of an animal immunized against a microorganism contains highly specific antibodies that react in a characteristic manner with the particular microorganism. Such antisera may agglutinate or clump the corresponding antigen, and this effect can be observed with the naked eye.

In this research suspected microorganisms were serotyped using commercially prepared antisera sort from the Winners Medical Diagnostics and Research Institute.

3.8.6 SENSITIVITY TESTING

After the biochemical and serology tests, sensitivity test was carried out on all the isolates. Sensitivity testing was done on all isolates to the following antibiotics using the Kirby-Bauer method. Commercially prepared Gram positive and Gram-negative disks by Kirby-Bauer were used. Some broad spectrum antibiotics in the single disc form were added e.g pefloxacin, ciprofloxacin, cerfuroxinne and cephalexin. These antibiotics micro-rings are represented in Figure 2 and Figure 3 on the next two pages.

CHAPTER FOUR

RESULTS

4.1 Urine Appearance

Appearances (colour and clarity) were observed and reported for the three trimesters (Table 4). Significant numbers of specimens were amber/yellow in colour. This amber/yellow colour was observed in 84, 61 and 71 specimens for the three trimesters respectively. The large number 78, 65 and 73 of urine specimens in the three trimesters are amber and clear (Table 4). Few specimens represented as 6, 9 and 6 for the three trimesters respectively were deep amber. For turbidity 6, 13 and 11 for the three trimesters were seen and reported as shown in Table 4. Detailed results of appearances for the patients are represented in Appendices I, III and V.

4.2 Microscopy

Epithelial cells and pus cells were significantly reported (Table 5). In some specimens, 1, 2, 3 or 4 cells were seen per high power field (hpf). Casts (granular and hyaline casts) were scarcely seen. Yeast cells were significantly identified in the third trimester compared to 1st and 2nd trimesters (Table 5). Red blood cells and *Trichomonas vaginalis* were seen at a reasonable rate in all the 3 trimesters. Few crystals were seen due to

immediate examination of specimens in the 2nd and 3rd trimesters. Detailed microscopy results for the 300 specimens are on Appendices I, III and V. Table 6 represents significant microscopy results and bacteriuria.

TABLE 4: Appearance of the Urine Specimens for the 1st, 2nd and 3rd Trimesters.

Colour of Specimen	1st Trimester	2nd Trimester	3rd Trimester
Amber	84	61	71
Pale amber	10	30	23
Deep amber	6	9	6
Clear	78	65	73
Slightly turbid	16	22	16
Turbid	6	13	11

TABLE 5: Microscopy (Wet Mount) Results for the 1st, 2nd and 3rd Trimesters.

Microscopy	1st Trimester	2nd Trimester	3rd Trimester
Epithelial cell	99	97	97
Pus cells	95	94	92
Red Blood Cells	11	14	8
Cast	2	1	1
Yeast cells	10	14	19
Trichomonas vaginalis	4	6	4
Crystals	Nil	3	2

TABLE 6: Significant Result of Urine Microscopy

Cells	Significant	Insignificant
Pus cells	**116 (36.6%)**	**184 (61.3%)**
Epithelial cells	**74**	**226**
Red blood cells	**8**	**292**
Bacteriuria	**255**	**45**

4.3 Chemical constitutes in Urine

Chemical urinalysis as shown on Table 6 indicated that most specimens were acidic. Proteins were significantly seen in the 1st and 2nd trimesters compared to the 3rd trimester (Table 6). Ketone was scarcely seen (Table 6). Ascorbic acid was significantly noticed in 2nd trimester compared to 1st and 3rd trimesters (Table 6). Other chemical constitutes were seen at insignificant rate (Table 6). Comprehensive results of urine chemical analysis are on Appendices I, III and V.

4.4 Morphology of isolates

Morphology of isolates were observed from Gram Stain reaction and cultural characteristics. In some culture plates more than one microorganisms were seen and picked separately for identification as shown on Table 8. Detailed results for all the specimens are on Appendices I, III and V. List of specimens with mixed bacterial growth are represented on Table 9. Results of morphology and cultural appearances are on Table 10. Average percentages of these organisms are on a pie chart in Figure 2. *Escherichia coli* is the most common pathogen while *Staphylococcus saprophyticus* is the least common pathogen (Figure 2).

TABLE 7: Urine Chemical Analysis for the 1st, 2nd and 3rd Trimesters.

Chemical Test		1st	2nd	3rd
PH	Acid	70	66	69
	Neutral	19	18	19
	Alkaline	11	16	12
Glucose		5	7	3
Ascorbic acid		9	18	8
Ketone		1	1	Nil
Nitrite		8	11	11
Protein		21	24	15
Bilirubin		4	3	2
Urobilinogen		6	4	3
Blood		10	9	4

TABLE 8: List of specimens with mixed growth

Specimen Number	Organisms Isolated
9a (i)	*Staphylococcus species*
9a (ii)	*Klebsiella pneumoniae*
49a (i)	*Staphylococcus species*
49a (ii)	*Escherichia coli*
3b (i)	*Proteus mirabilis*
3b (ii)	*Pseudomonas species*
37b (i)	*Proteus mirabilis*
37b (ii)	*Escherichia coli*
2c (i)	*Klebsiella pneumoniae*
2c (ii)	*Escherichia coli*
27c (i)	*Proteus mirabilis*
27c (ii)	*Escherichia coli*
72c (i)	*Escherichia coli*
72c (ii)	*Staphylococcus species*
81c (i)	*Klebsiella pneumoniae*
81c (ii)	*Streptococcus species*

TABLE 9: Number of Organisms Isolated

	Organisms	Number	%
A.	*Escherichia coli*	210	82
B.	*Proteus mirabilis*	13	5.5
C.	*Klebsiella pneumoniae*	12	4.7
D.	*Pseudomonas aeruginosa*	7	2.7
E.	*Streptococcus agalactiae*	7	2.7
F.	*Staphylococcus saprophyticus*	6	2.4

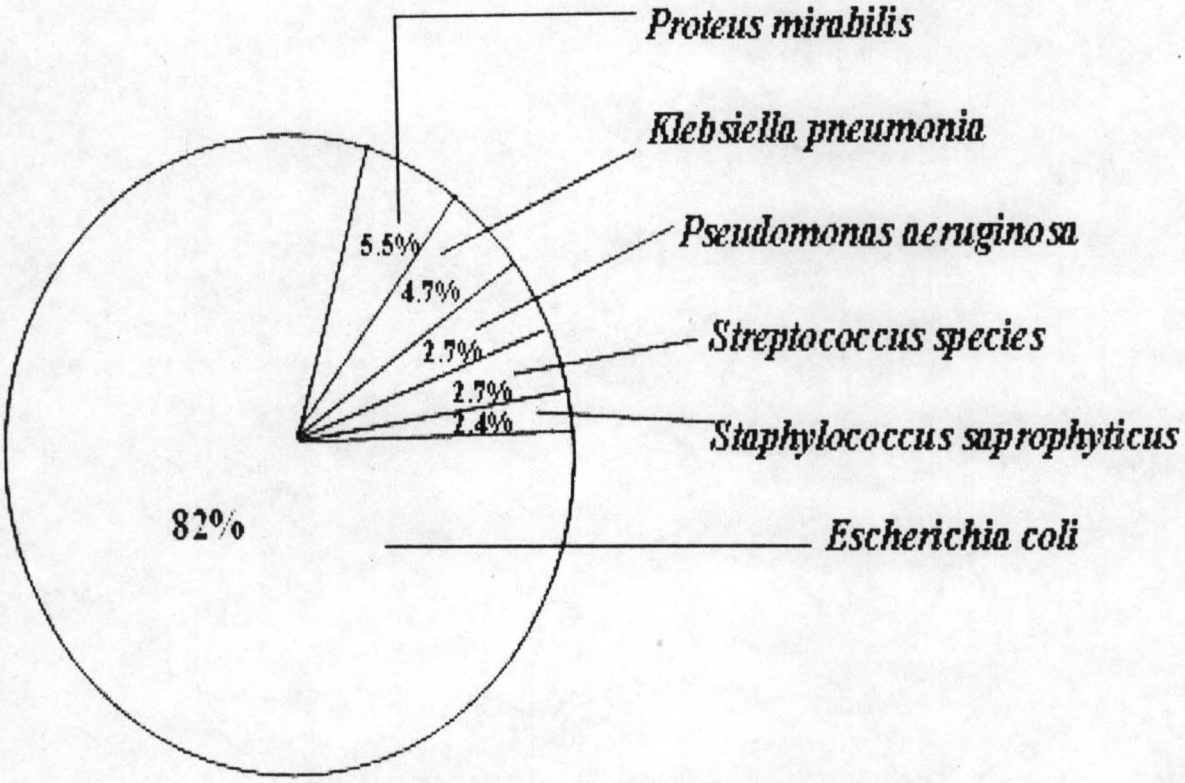

FIGURE 2: **Pathogenic organisms Isolated and percentage of the isolate.**

4.5 Biochemical Reactions

Biochemical reactions for the 3 trimesters are summarized on Table 10. There were cases of Indole negative for *Escherichia coli* (Appendices II, IV and VI). Priority pathogens were taken into considerations in biochemical reactions. Detailed results of biochemical reactions for the isolates are on Appendices II, IV and VI.

4.6 Serological Reactions

Isolated microorganisms in order words antigens were tested with know antisera. Polyvalent antisera for all organisms isolated were used (Table 11). Monovalent antisera were not available for use in this study. Comprehensive results of serological reactions are on Appendices II, IV and VI.

4.7 Antimicrobial Sensitivity tests

Following confirmatory tests on the microorganisms antimicrobial testing was done considering the subjects under study, tetracycline was ignored in the micro-ring multi-disk. Antibiotics like Ofloxacin (OFL), Augmentin (AUG), Amoxycillin were found to be highly sensitive to most microorganisms (Appendice II, IV and VI). In 31a of Appendice II the organism *Escherichia coli* was sensitive to the entire antibiotics disk and in 68b of Appendice IV, *Pseudomonas aeruginosa* was resistant to the

antimicrobial micro-ring disk but only sensitive to single disc (Cefuroxine and Ciprofloxacin). Detailed antimicrobial testing of all the isolates are represented on Appendices II, IV and VI. Table 12 represents summary of percentage sensitivity of all the isolates to Gram Positive and Gram Negative antibiotics discs used.

TABLE 10: Isolates

Characteristics	*E. coli* A	*P. Mirabilis* B	*K. Pneumonia* C	*P. aeruginosa* D	*S. agalactiae* E	*Staph.saprophyticus* F
Gram reaction	Gram neg. rod	Gram neg. rod	Gram neg. rod	Gram neg. rod	Gram positive cocciin short chain	Gram positive cocciin clusters
Motility	+	+	+	+	-	-
Lactose Fermentation	+	-	-	-	-	Some LF
Indole	+	-	-	-	-	-
Citrate	-	-	+	-	-	-
Catalase	-	-	-	-	-	+
Urease	-	+	-	-	-	-
Voges Proskauer	-	-	+	-	-	-
Coagulase	-	-	-	-	-	-
Oxidase	-	-	-	+	-	-
Pigmentation	-	-	-	+	-	-
Haemolysis	-	-	-	-	β-haemolytic	Some strains

Table 11: Serotyping using Polyvalent Antisera

Microorganism	Polyvalent antisera
Escherichia coli	+
Klebsiella pneumoniae	+
Proteus mirabilis	+
Pseudomonas aeruginosa	+
Staphylococcus saprophyticus	+
Streptococcus agalachaes	+

KEY: + = Clumps/agglutinins

TABLE 12: Results of Sensitivity Testing

Antibiotics (Conc.)	Organisms (% Sensitivity)					
	E. coli	*P. Mirabilis*	*P. aeruginosa*	*Strept. spp.*	*K. Pneumonia*	*Staph. aureus*
Augmentin (30mg)	192 (64%)	16 (5.3%)	11 (3.7%)	4(1.3%)	6 (2%)	6 (2%)
Amoxycilin	158 (52.7%)	12 (4%)	7 (2.3%)	5(1.7%)	5 (1.7%)	3(1%)
Chloramphenicol	-	-	1 (0.3%)	1(0.3%)	5 (1.7%)	2(0.6%)
Cloxaciline	-	1 (0.3%)	-	-	5 (1.7%)	1(0.3%)
Cotrimoxazole	41 (13.7%)	1 (0.3%)	-	-	-	-
Gentamincin	104 (34.7%)	9 (3%)	7 (2.3%)	-	4 (1.3%)	5(1.7%)
Erythromacin	-	-	-	-	3(1%)	1(0.3%)
Nalidixic Acid	76 (25.3%)	5 (0.7%)	1(0.3%)	-	2(0.6%)	1(0.3%)
Nitrofurantoin	125 (41.7%)	10 (3.3%)	2(0.6%)	1(0.3%)	4)	1(0.3%)
Ofloxacin	199 (66.3%)	15 (5%)	8(2.7%)	9(3%)	2 (0.6%)	1(0.3%)

KEY: Conc. = Concentration.

CHAPTER FIVE

DISCUSSION

Urinary Tract Infections was documented by MeRec (1995) to be the commonest bacterial infections managed in general practice. John *et al* (2000) also stated that UTIs during pregnancy are a common cause of maternal and perinatal morbidity. Asymptomatic bacteriuria can lead to the development of cystitis and pyelonephritis. All pregnant women should be screened for bacteriuria and subsequently be treated with antimicrobial agent. The bacteria that cause urinary tract infections are usually from the intestinal tract or the skin near the opening of the bladder of that individual. In the majority of cases of bacteriuria and UTI in pregnancy, Prognosis is excellent. Many cases of acute cystitis and pyelonephritis in pregnancy are due to untreated asymptomatic bacteriuria, Baerheim, (2001)

In this research, 300 pregnant women attending the major three hospitals in Abuja were screened for bacteriuria during their routine antenatal clinic. In Table 1, the numbers of samples collected from different age groups were shown. From that table there was no pregnant woman less than 25 years and above 40 years of age. These women were not selected for a particular age group rather they were picked as seen. One third

(33.3%) of women used in this study were between 26 to 30 years. 26.6% of them were all at the child bearing age.

These pregnant women were from different parts of Abuja as show on Table 2. From that table few women were seen from Maitama and Asokoro districts indicating that most women from Government reserved area use the National Hospital and top private hospitals. Few women were seen from Kuchigoro because of the distance to the city. From Mararaba which is in Nassarawa State more pregnant women were seen because of the nearness to Abuja.

Pregnant women troop to these district hospitals because of the standard health care delivery services provided in these hospitals. These hospitals are more equipped than other general hospitals in FCT except Gwagwalada Specialist hospital and National Hospital, which is well located and is quite expensive compared to General Hospitals. It was also possible for me to analyze these specimens after collection each day because the laboratories were up to standard.

In this research as shown on Table 8, pathogens associated with urinary tract infections were isolated during the 1st, 2nd, and 3rd trimesters. In this research pregnant women used were not monitored from conception to delivery due to non compliance. Specimens were collected and grouped

based on stage of pregnancy. This shows that urinary tract infections can occur at any stage of pregnancy. It is then necessary to screen all pregnant women for bacteriuria and also check for recurrent infections for those who have been previously infected. According to U.S. Preventive Services Task Force, (1996) for women who are pregnant, a urine sample should be cultured to screen for bacteriuria. *Gilstrap and Whalley*, (1998) recommended that women should have a urine culture monthly throughout pregnancy after treatment of asymptomatic bacteriuria.

Table 8 represents the average of organisms isolated during the 1st, 2nd and 3rd trimesters. The most frequent bacteria in pregnant women is *Escherichia coli* which formed 82% of microorganisms isolated. From results (Fig. 4) of this study, it is clear that *Streptococcus, Staphylococcus* and *Pseudomonas aeruginosa* are less common cause of urinary tract infection in Abuja. This result compares favourably with that of Patrick *et al.*, 2004 where 80-90% women had UTI.

In this research chemical urinalysis using Combi 9 was used. In some cases protein in urine and microorganisms were seen in culture. This indicates evidence of infection (Mathews, 1998). Microorganisms were also seen in some cases of absence of protein in urine. In some antenatal women used in this study sugar was seen in their urine, which is an indication of

pregnancy induced diabetes. For cases of nitrite producing organisms like *Proteus Mirabilis*, nitrites were seen in the urine.

The normal range of P^H of urine is usually between 5 and 6, but in this study alkaline urine of P^H 8 to 9 were seen which could be attributed to diet and drug use, (Lammers *et al*, 2001). Some significant blood test in urinalysis were noted which could be as a result of spotting or pathological conditions (Appendice I). Minor blood reports e.g blood (+) seen in this research could be as a result of trauma. Bilirubin and urobilinogen seen in some cases could as well suggest jaundice in pregnancy or malaria in pregnancy, (Phelan *et al*, 2004). Glucose was seen in some specimens without ketones as often suggestive of diabetes which could be as a result of starvation. Very few specimens had ketones and were negative for glucose. In the chemical urinalysis result some specimens were positive for ascorbic acid and some were negative (Appendices I, III and V). In evaluation of symptomatic patient's urine, dipstick is a useful and inexpensive test. The addition of protein and blood increases the specificity of the test in the evaluation of UTI (Hurlbut and Littenberg, 1991)

The microscopic (wet mount) result is represented on Table 5. In that table epithelial cells were seen in most of the specimens because they are female subjects. *Trichomonas vaginalis* and yeast cells were also seen in

specimens, which could be associated to the level of hygienic practice. White blood cells (pus cells) were significantly isolated. Red blood cells were also seen in some cases. Few casts and crystals, (Appendice I, III and V) were seen. There was no *Schistosoma haematobium* in any of the specimen. In the study carried by *Millar and Cox,* (1997) 1-2 bacteria in an unspun catheterized specimen is more than 20 bacteria per high-power field in spun urine and this correlate closely with more than 10^5 CFUs per milliliter of bacteria on urine culture.

In culture plate microorganisms were identified by noting their cultural characteristics. Biochemical test like indole test, urease test,oxidase test, coagulase test, catalase, methyl red, Voges Proskauer were carried out on these organisms. Commercially prepared antiserum was used for serology test, which further confirms the organisms isolated. Sensitivity test was also done to specify the actual antimicrobial that will eradicate the pathogen. Sensitivity and resistant pattern were noted using the 1st line antimicrobial incorporated in Gram positive and Gram negative disc by Kirby-bauer. Second generations antimicrobial were used in single disc method. Both were commercially prepared.

Sensitivity pattern using second line antimicrobial is more glaring. In some cases first line antimicrobial also show good zone of clearance.

Cephalexin is a first generation cephalosporin and was found effective against most urinary pathogens. Public Health Laboratory Services (PHLS) 2001 recommends that for all antimicrobials, a 3 –day course be given in line with national guidelines. Second generation drugs used in single disc is more expensive and is reserved for use in secondary care for serious infections.

RECOMMENDATIONS AND CONCLUSION

In general, with the preliminary result, treatment of pregnant patients with acute cystitis should be initiated before the results of the culture are available. The antibiotic of choice should focus on coverage of the common pathogen pending when the organism is identified and sensitivities determined. A treatment course of seven to ten days is the standard method because of the risks associated with recurrence. Patients treated for a shorter time frame are more likely to have a recurrence of the infection (Leibovici *and* Wysen beek, 1991a & 1991b). The more the course of treatment, the more bacterial resistance is promoted. Early, aggressive treatment is important in preventing complications from pyelonephritis. The most common reason for initial treatment failure is resistance of the infecting organism to the antibiotic.

Urinary tract infections in pregnancy lead to serious maternal and prenatal morbidity if not treated. When appropriate screening and treatment are followed, this morbidity can be limited. A urinary tract infection may manifest as asymptomatic bacteriuria, acute cystitis or pyelonephritis. All pregnant women should be screened for bacteriuria from time to time during pregnancy and subsequently treated with correct antibiotic when infection occurs. Acute cystitis and pyelonephritis should be treated aggressively during pregnancy.

Routine urinalysis is recommended for all pregnant women. If there is nitrite, protein and leucocyte in urine, culture need to be obtained. On first antenatal visit, it is also recommended that urine culture be investigated for UTI. If the prevalence of symptomatic bacteriuria is high then screening and treatment based-culture with reculture also are cost-benefit effective.

For women who are prone to UTI or how to prevent UTI, the following are recommended:

(1) Cranberry juice-Kontiokari *et al* (2001) found an absolute risk reduction of 20% for recurrence of UTI. Jepson *et al* (2000) reported the efficacy of cranberries in treating UTI.

(2) Drink plenty of water (about six glasses per day) so that you urinate often.

(3) Do not try to hold your urine once your bladder feels full.

(4) Empty your bladder completely each time you pass urine.

(5) Women prone to UTIs should urinate after having sex. It is also recommended to wash before and after sex.

(6) Wipe yourself from front to back when you defecate so that you do not transport bacteria to urinary tract.

(7) Avoid feminine hygiene products e.g. perfumed toiletries and wear all cotton under wear.

(8) Avoid tight clothing which may trap heat and promote bacterial growth.

This research has examined the pathogenesis and bacteriology of UTIs during pregnancy. The diagnosis, treatment and prevention were also reviewed. There is urgent need for proper guidelines, dissemination of information to practitioners and supervision of antimicrobial usage in low income countries like Nigeria. Irrational and unnecessary drug use can be expensive and harmful. Important recommendations have been mentioned in this research. If the knowledge and recommendations in this research are followed, UTI in pregnancy will be greatly reduced or eliminated.

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APPENDICES

APPENDIX I: - URINALYSIS, MORPHOLOGY AND CULTURAL CHARACTERISTICS FOR THE 1ST TRIMESTER

S/N	SPECIMEN	APPEARANCE	CHEMICAL ANALYSIS	WET MOUNT	MORPHOLOGY	CULTURAL CHARACTERISTIC	SUSPECTED ORGANISM
1a	Urine	Amber & Clear	P^H 6.0 Others – nil	Epithelial cells + Pus Cells 0 – /hpf No Rbcs/cast seen	No bacteria growth	No bacterial growth	-
2a	„	Amber & Clear	P^H 5.0 Others – Nil	Epithelial cells ++ Pus Cells 1-2/hpf No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey,3mm on Chocolate/blood agar	*Escherichia coli*
3a	„	Amber & Clear	P^H 6.0 Others – Nil	Epithelial cells ++ Pus Cells 2-3/hpf Rbc 1-2/hpf No cast seen	„	Lactose Fermenter on MacConkey,2mm on Chocolate/blood agar	*Escherichia coli*
4a	„	Pale amber & Clear	P^H 6.0 Sugar + Others – Nil	Epithelial cells + Pus Cells 0-1/hpf No Rbcs/ Cast seen	„	Lactose Fermenter on MacConkey,1mm on Chocolate/blood agar	*Escherichia coli*
5a	„	Amber & Clear	P^H 7.0 Protein + Other Nil	Epithelial cells ++ Pus Cells+ Rbcs 0-1/hpf No cast seen	„	Lactose Fermenter on MacConkey,3mm on Chocolate/blood agar	*Escherichia coli*
6a	„	Deep amber & Clear	P^H 6.0 Protein + Nitrate + others Nil	Epithelial cells ++ Pus Cells 3-4/hpf No Rbcs/cast seen	Actively motile	Fish odour on Chocolate/blood agar Non Lactose Fermenter on MacConkey.	*Proteus mirabilis*
7a	urine	Amber & Clear	P^H 7.0 Others Nil	Epithelial cells ++ Pus Cells 0-1/hpf No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey,2mm on Chocolate/blood agar	*Escherichia coli*
8a	Urine	Amber & Clear	P^H 5.0 Others Nil	Epithelial cells ++ Pus Cells + No Rbcs / Cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey,2mm on Chocolate/blood agar	*Escherichia coli*

9a	,,	Pale amber & Clear	P^H 6.0 Protein + Others Nil	Epithelial cells + Pus Cells ++ Rbcs + No cast seen	Gram positive cocci in short chains	White yellow and non haemolytic	*Staphylococcus* species
					Gram negative non motile rod	Large mucoid colonies	*Klebsiella* species
10a	,,	Amber & Slightly turbid	P^H 6.0 Others Nil	Epithelial cells 2-3/hpf Pus cells + No Rbcs/ cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey,2mm on Chocolate/blood agar	*Escherichia coli*
11a	,,	Amber & Clear	P^H 6.0 Sugar + Others Nil	Epithelial cells + Pus cells + No Rbcs/ cast Seen	Actively motile	Fishy odour on Chocolate/blood agar Non Lactose Fermenter on MacConkey	*Proteus mirabilis*
12a	,,	Amber & Slightly turbid	P^H 8.0 Others Nil	Epithelial cells ++ Pus cells 2-3/hpf No Rbcs/Cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey,3mm on Chocolate/blood agar	*Escherichia coli*
13a	,,	Deep Amber & Slightly turbid	P^H 6.0 Others Nil	Epithelial cells + Pus cells 3-4/hpf No Rbcs/Cast seen	,,	Lactose Fermenter on MacConkey,2mm on Chocolate/blood agar	*Escherichia coli*
14a	Urine	Amber & Clear	P^H 8.0 Others Nil	Epithelial cells ++ *Trichomonas vaginlis* + Pus cells ++ Yeast Cells ++ Rbcs +No cast seen	Gram Negative motile rod	Late Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
15a	,,	Pale amber & Clear	P^H 5.0 Protein ++ Others Nil	Epithelial cells + Pus cells ++ NO Rbcs/Cast seen	,,	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
16a	,,	Amber & Clear	P^H 6.0 Ascorbic Acid + Other Nil	Epithelial cells + Pus cells 2-3/hpf No Rbcs No cast seen	,,	,,	*Escherichia coli*
17a	,,	Amber & Clear	P^H 6.0 Ascorbic Acid + other - Nil	Epithelial cells 3-4/hpf Pus cells 0-1/hpf No Rbcs/Cast seen	Gram Negative non motile rod	Large mucoid colonies	*Klebsiella* species
18a	,,	Amber & Clear	P^H 7.0 Blood + Nitrate ++ Others - Nil	Epithelial cells ++ Pus cells 1-2/hpf No Rbcs/Cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey,2mm on Chocolate/blood agar	*Escherichia coli*

19a	,,	Amber & Slightly turbid	P^H 6.0 Protein + Nitrate ++ Others nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/Cast seen	Gram Negative motile rod	Blue green pigment on Chocolate/blood agar, pale coloured colonies on MacConkey	*Pseudomonas aeruginosa*
20a	,,	Amber & Clear	P^H 6.0 Others nil	Epithelial cells + Pus cells + No Rbcs/Cast seen	,,	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
21a	,,	Amber & Clear	P^H 7.0 Others nil	Epithelial cells + Pus cells 1-2/hpf Yeast cells + No Rbcs/Cast seen	Gramn Negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
22a	,,	Amber & Clear	P^H 8.0 Others nil	Epithelial cells + Pus cells 0-1/hpf No Rbcs/Cast seen	,,	Late Lactose Fermenter on MacConkey,3mm on Chocolate/blood agar	*Escherichia coli*
23a	,,	Amber & Clear	P^H 6.0 Others nil	Epithelial cells ++ Pus cells 0-1/hpf No Rbcs/Cast seen	No bacterial growth	No bacterial growth	——
24a	,,	Amber & Clear	P^H 5.0 Protein + Blood ++ Others – nil	Epithelial cells + Pus cells 2-3/lof Rbcs ++/ No cast seen	Gram Negative motile rod	Late Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
25a	,,	Amber & Clear	P^H 6.0 Others nil	Epithelial cells + Pus cells – Nil No Rbcs/Cast seen	No bacterial growth	No bacterial growth	——
26a	,,	Pale amber & Clear	,,	Epithelial cells + Pus cells 1-2/hpf No Rbcs/Cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey,2mm on Chocolate/blood agar	*Escherichia coli*
27a	,,	Amber & Clear	P^H 5.0 N + Others nil	Epithelial cells ++ Pus cells ++ No Rbcs/ Cast seen	Actively motile	Fishy of our on Chocolate/blood agar Non Lactose Fermenter on MacConkey,	*Proteus mirabilis*
28a	Urine	Amber & Slightly turbid	P^H 7.0 Others – Nil	Epithelial cells + Pus cells + No Rbcs/Cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey,3mm on Chocolate/blood agar	*Escherichia coli*
29a	,,	Amber & Clear	P^H 6.0 Ascorbic Acid + Other - Nil	Epithelial cells + Pus cells 4-5/hpf No Rbcs/Cast seen	,,	,,	,,

30a	,,	Amber & Clear	,,	Epithelial cells + Pus cells 0-1/hpf No Rbcs/Cast seen	,,	Lactose Fermenter on MacConkey,1mm on Chocolate/blood agar	*Escherichia coli*
31a	Urine	Amber & Clear	P^H 7.0,Protein + Ketone + Others – Nil	Epithelial cells ++ Pus cells 0-1/hpf No Rbcs/Cast seen	,,	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
32a	,,	Amber & Slightly turbid	P^H 6.0 Protein + Others – Nil	Epithelial cells 3-4/hpf Pus cells + No Rbcs/Cast seen	,,	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
33a	,,	Amber & Clear	P^H 5.0 Others – Nil	Epithelial cells + Pus cells 2-3/hpf No Rbcs/Cast seen	,,	,,	*Escherichia coli*
34a	,,	Amber & Clear	P^H 6.0 Others – Nil	Epithelial cells ++ Pus cells – Nil No Rbcs/Cast seen	No bacterial growth	No bacterial growth	———
35a	,,	Pale amber & Slightly turbid	P^H 8.0 Others – Nil	Epithelial cells ++, Pus cells – Nil No RBCS + No cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey,3mm on Chocolate/blood agar	*Escherichia coli*
36a	,,	Amber & Clear	P^H 6.0 Ascorbic acid + others – Nil	Epithelial cells 2-3 /hpf Pus cells 0-1/hpf No Rbcs/Cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
37a	,,	Amber & Clear	P^H 6.0, Protein + Others – Nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/Cast seen	,,	Late Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
38a	,,	Amber & Slightly turbid	P^H 6.0 Others – Nil	Epithelial cells ++ Pus cells 2-3/hpf No Rbcs/Cast seen	,,	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
39a	,,	Amber & Clear	P^H 7.0, Blood + Others - Nil	Epithelial cells +, Pus cells +, Yeast cells + No Rbcs/Cast seen	No bacterial growth	No bacterial growth	———
40a	,,	Amber & turbid	P^H 8.0 Others – Nil	Epithelial cells +, Pus cells +,Yeast Cells ++ No Rbcs/Cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*

41a	,,	Amber & Clear	P^H 9.0 Others – Nil	Epithelial cells ++, Pus cells +, Yeast Cells + No Rbcs/Cast seen	,,	,,	*Escherichia coli*
42a	,,	Amber & Slightly turbid	P^H 6.0, Ptotein + Others – Nil	Epithelial cells +, Pus cells + No Rbcs/Cast seen	,,	,,	*Escherichia coli*
43a	,,	Amber & Clear	P^H 6.0 Others – Nil	Epithelial cells 3-4/hpf Pus cells 2-3/hpf No Rbcs/Cast seen	,,	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
44a	Urine	Amber & Clear	P^H 5.0 Ascorbic acid + Others - Nil	Epithelial cells +, Pus cells + No Rbcs/Cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
45a	,,	Deep Amber & Clear	P^H 6.0 Urobilinogen + Bilinuben + Others – Nil	Epithelial cells +, Pus cells 1-2/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
46a	,,	Amber & Clear	P^H 7.0 Ascorbic acid + Others – Nil	Epithelial cells +, Pus cells2-3/hpf No Rbcs/cast seen	Gram Negative motile rod	Late Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
47a	,,	Amber & Slightly turbid	P^H 5.0 Others – Nil	Epithelialcells+ Pus cells+++, Rbcs + No cast seen	,,	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
48a	,,	Amber & Clear	P^H 6.0 Others – Nil	Epithelial cells +, Pus cells 2-3/hpf No Rbcs/cast seen	,,	,,	*Escherichia coli*
49a	,,	Amber & turbid	P^H 6.0, Blood+ Others – Nil	Epithelial cells + Pus cells numerous Rbcs – no cast seen	See previous Description	See previous Description	*Staphylococcus Escherichia coli*
50a	,,	Amber & clear	P^H 7.0 Others – Nil	Epithelial cells +, Pus cells – Nil No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
51a	,,	Amber & clear	P^H 6.0 Sugar+ Others – Nil	Epithelial cells 3-4/hpf Pus cells 3-4/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
52a	,,	Amber &	P^H 8.0	Epithelial cells +,	No bacterial	No bacterial growth	———

		clear	Urobilinogen + Others – Nil	Pus cells 1-2/hpf No Rbcs/cast seen	growth		
53a	,,	Amber & Turbid	P^H 6.0, Protein + Others – Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	No bacterial growth	No bacterial growth	——
54a	,,	Amber & Turbid	P^H 6.0, Blood ++ Protein++ Others – Nil	Epithelial cells ++, Pus cells ++, Rbcs ++ No cast seen	Gram positive cocci in short chain	Greymucoid colonies on Chocolate/blood agar B-haemolytic	*Streptococcus* species
55a	,,	Amber & clear	P^H 6.0 Others – Nil	Epithelial cells (++), Pus cells (+) No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
56a	,,	Amber & clear	P^H 6.0, Nitrite (+) Ascorbic acid + Others – Nil	Epithelial cells +, Pus cells 3-4/hpf No Rbcs/cast seen	Actively motile	Fishy odour on Chocolate/blood agar Non Lactose Fermenter on MacConkey	*Proteus mirabilis*
57a	,,	Amber & clear	P^H 6.0 Others – Nil	Epithelial cells +, Pus cells + No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
58a	,,	Amber & clear	P^H 5.0 Others – Nil	Epithelial cells +, Pus cells – Nil No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
59a	,,	Amber & clear	P^H 5.0, Protein + Others – Nil	Epithelial cells ++, Pus cells + No Rbcs/cast seen	,,	,,	*Escherichia coli*
60a	,,	Amber & clear	P^H 6.0, Bilirubin +,Urobilinogen + Others – Nil	Epithelial cells +, Pus cells + No Rbcs/cast seen	No bacterial growth	No bacterial growth	——
61a	,,	Amber & clear	P^H 6.0, Protein + Others – Nil	Epithelial cells +, Pus cells 2-3/hpf No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
62a	,,	Amber & clear	P^H 7.0, Blood + Others – Nil	Epithelial cells ++, Pus cells +, Yeast Cells++ Rbcs+ No cast seen	Gram positive cocci in short chains	Grey muciod colonies on Chocolate/blood agar, B-haemolytic	*Streptococcus* species
63a	,,	Amber & clear	P^H 8.0, Protein (+) Others – Nil	Epithelial cells +, Pus cells + No cast, No Rbcs	Gram Negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*

64a	,,	Amber & slightly turbid	P^H 6.0, Nitrite + Ascorbic + Others – Nil	Epithelial cells +. Pus cells 3-4/hpf Hyaline cast + no Rbcs seen	Actively motile	Fishy odour on Chocolate/blood agar Non Lactose Fermenter on MacConkey	*Proteus mirabilis*
65a	,,	Amber & clear	P^H 6.0, Blood + Others – Nil	Epithelial cells +. Pus cells – Nil No Rbcs/cast seen	Gram Negative motile rod	Late Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
66a	,,	Amber & Clear	P^H 7.0 Others – Nil	Epithelial cells 2-3.hpf Pus cells 0-1/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
67a	,,	Amber & clear	P^H 5.0, Ascorbic 5.0 Others nil	Epithelial cells ++, Pus cells – Nil No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
68a	,,	Amber & clear	P^H 6.0 Others – Nil	Epithelial cells ++, Pus cells 1-2/hpf No Rbcs/cast seen.	No bacterial growth	No bacterial growth	———
69a	,,	Amber & slightly turbid	P^H 7.0, Blood ++ Others – Nil	Epithelial cells +++, Pus cells + Rbcs+++ No cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
70a	,,	Amber & turbid	P^H 6.0, Protein ++ Nitrite + Others – Nil	Epithelial cells ++, Pus cells ++,Yeast Cells++ No Rbcs/cast seen	Actively motile	Fishy odour on Chocolate/blood agar Non Lactose Fermenter on MacConkey	*Proteus mirabilis*
71a	Urine	Amber & clear	P^H 8.0 Others – Nil	Epithelial cells + Pus cells 1-2 /hpf Yeast cells + No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
72a	,,	Amber & clear	P^H 7.0 Others –Nil	Epithelial cells +. Pus cells 1-2/hpf *Trichomonas vaginlis* + No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
73a	,,	Pale amber & clear	P^H 7.0 Others – Nil	Epithelial cells +. Pus cells 3-3/hpf No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
74a	,,	Amber & clear	P^H 6.0, Protein + Others – Nil	Epithelial cells 3-4/hpf	,,	,,	*Escherichia coli*

				Pus cells 0-1/hpf No Rbcs/cast seen			
75a	,,	Amber & clear	P^H 7.0 Others – Nil	Epithelial cells 2-3/hpf Pus cells 0-1/hpf No Rbc/cast seen	,,	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
76a	,,	Deep amber & clear	P^H 6.0, Protein + Urobilinogen ++ Bilirubin + Others – Nil	Epithelial cells 1-2/hpf Pus cells 2-3/hpf No Rbcs/cast seen	,,	,,	*Escherichia coli*
77a	,,	Amber & clear	P^H 6.0 Others – Nil	Epithelial cells 2-3/hpf Pus cells 1-2/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	——
78a	,,	Amber & clear	P^H 8.0 Others – Nil	Epithelial cells +, Pus cells + No Rbcs/cast seen	Gram Negative motile	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
79a	,,	Pale amber & clear	P^H 9.0 Others – Nil	Epithelial cells +, Pus cells ++ No Rbcs/cast seen	,,	,,	*Escherichia coli*
80a	,,	Deep amber & slightly turbid	P^H 6.0, Protein +++, Blood (+) Others – Nil	Epithelial cells ++, Pus cells ++ No Rbcs/cast seen	Gram positive cocci in short chains	Grey mucoid colonies on Chocolate/blood agar B-haemolytic	*Streptococcus* species
81a	,,	Amber & clear	P^H 6.0 Others – Nil	Epithelial cells 2-3/hpf Pus cells 1-2/hpf No Rbcs/ cast seen	Gram Negative motile	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
82a	,,	Amber & clear	P^H 5.0 Others – Nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/cast seen	,,	,,	*Escherichia coli*
83a	,,	Amber & clear	P^H 5.0, Protein + Others – Nil	Epithelial cells +, Pus cells +, Yeast Cells ++ *T. vaginalis* + No Rbcs/cast seen	No bacterial growth	No bacterial growth	——
84a	,,	Light amber & clear	P^H 6.0, Blood + Others – Nil	Epithelial cells +, Pus cells +, Rbcs ++. No cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*

85a	Urine	Amber & clear	P^H 6.0 Others – Nil	Epithelial cells +, Pus cells 3-4/hpf No Rbcs/cast seen	,,	Lactose Fermenter on MacConkey 2mm on Chocolate/blood agar	*Escherichia coli*
86a	,,	Amber & clear	P^H 6.0,Protein (+) Others – Nil	Epithelial cells (++) Pus cells 0-1/hpf Yeast cells (+) No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
87a	,,	Pale amber & clear	P^H 5.0 Others – Nil	Epithelial cells (+) Pus cells 1-2/hpf No Rbcs/cast seen	,,	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
88a	,,	Amber & clear	P^H 5.0, Protein + Sugar +, Nitrite + Others – Nil	Epithelial cells (+) Pus cells 2-3/hpf Yeast cells ++ Rbcs/cast – Nil	,,	Lactose Fermenter on MacConkey, 4mm on Chocolate/blood agar	*Escherichia coli*
89a	,,	Deep amber & ckear	P^H 6.0,Protein (+) Urobilingen (+) Bilinrubin trace Others - Nil	Epithelial cells (+) Pus cells 1-2/hpf No Rbcs/cast seen	,,	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
90a	,,	Amber & clear	P^H 7.0 Others - Nil	Epithetial cells 3-4/hpf, Pus cells 0-1/hpf No Rbcs/cast seen	,,	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
91a	,,	Amber & slightly turbid	P^H 7.0 Others – Nil	Epithelial cells (+) Pus cells – Nil No Rbcs/cast seen	Gram Negative non motile rod	Large mucoid colonies	*Klebsiella* species
92a	,,	Amber & clear	P^H 7.0 Others – Nil	Epithelial cells(+) Pus cells – Nil No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
93a	,,	Amber & turbid	P^H 6.0, Protein (++), sugar Nil, Nitrite (+) Others – Nil	Epithelial cells +++ Pus cells –n (+++) *T. vaginalis* +No Rbcs/cast seen.	Gram Negative non-motile rod	Large mucoid colonies	*Klebsiella* species
94a	,,	Amber & slightly turbid	P^H 6.0 Others – Nil	Epithelial cells 1-2/hpf, Pus cells 2-3/hpf No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
95a	Urine	Amber & clear	P^H 6.0, Blood + Ascorbic acid (+) Others – Nil	Epithelial cells(+) Pus cells 2-3/hpf No Rbcs/cast seen	,,	,,	*Escherichia coli*

96a	,,	Amber & clear	P^H 7.0 Others – Nil	Epithelial cells nil, Pus cells 0-1/hpf No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
97a	,,	Amber & slightly turbid	P^H 5.0, Blood(++) urobilirugen (++) Others – Nil	Epithelial cells(++) Pus cells (+) Hyaline cast (+) No Rbcs seen	,,	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
98a	,,	Amber & clear	P^H 5.0 Others – Nil	Epithelial cells 2-3/hpl, Pus cells 1-2/hpf No rbcs/cast seen	,,	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
99a	,,	Pale amber & clear	P^H 6.0 Prtein-Nil Sugar (+) Others – Nil	Epithelial cells 3-4/hpf, Pus cells 1-2/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
100a	,,	Amber & clear	P^H 6.0 Others – Nil	Epithelial cells (+) Pus cells 2-3/hpf No Rbcs/cast seen	Gram Negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*

HPF- High Power Focus Rbcs- Red Blood Cells

APPENDIX II: - BIOCHEMICAL SEROLOGY & SENSITIVITY ON THE ISOLATED MICROORGANISM FIRST TRIMESTER

SPECIMEN NUMBER	MICRO - ORGANISM	INDOLE	COAG U LASE	CATA LASE	UREAS E	OXIDAS E	CITRAT E	V. PROSK	POLYVALENT ANTISERA	RESISTANCE	SENSITIVITY
1a	No bacterial Growth										
2a	*Escherichia coli*	+	-	-	-	-	-	-	Clumps	COT AMX -	GEN NAL AUG OFL NIT
3a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NIT - NAL	OFL, AMX AUG GEN CIP
4a	*Escherichia coli*	+	-	-	-	-	-	-	+	- NAL	COT GEN OFL AUG NIT AMX
5a	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN COT - NIT NAL	OFL AUG AMX CXM
6a	*Proteus mirabilis*	-	-	-	+	-	-	-	+	AMX - NAL COT	NIT OFL AUG GEN
7a	*Escherichia coli*	+	-	-	-	-	-	-	+	AUG NAL COT NIT	OFL GEN - AMX
8a	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX COT GEN COT	OFL AUG NAL NIT
9a(i)	*Staphylococcus species*	-	+	+	-	-	-	-	+	ERY GEN COT -	AUG OFL AMX CXM
9a(ii)	*Klebsiella species*	-	-	-	-	-	+	+	+	NAL GEN -	NIT OFL AUG
10a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT -	NIT OFL AUG AMX NAL GEN
11a	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN COT NAL	NIT OFL AMX GEN AUG
12a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT -NIT AMX	NAL OFL AUG GEN
13a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NAL GEN -	OFL AUG AMX NIT

14a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NAL	GEN OFL AUG NIT AMX
15a	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN -	OFL AMX AUG NIT NAL COT
16a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NAL NIT	AMX AUG OFL GEN -
17a	*Klebsiella species*	-	-	-	-	-	+	+	+	AMX COT GEN	OFL AUG NIT NAL PEF
18a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT GEN NAL	AUG OFL NIT AMX -
19a	*Pseudomonas aeruginosa*	-	-	-	-	+	-	-	+	- AMX GEN NIT NAL -	OFL AUG PEF CIP
20a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT -	OFL AUG NIT NAL AMX GEN
21a	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT GEN	OFL AUG NIT NAL AUG
22a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - GEN AMX	OFL AUG CIP NAL NIT
23a	*No Bacterial Growth*										
24a	*Escherichia coli*	+	-	-	-	-	-	-	-	COT - GEN	AUG OFL AMX NIT NAL
25a	*No Bacterial Growth*										
26a	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT NAL COT GEN	AUG OFL AMX -
27a	*Proteus mirabilis*	-	-	-	+	-	-	-	+	COT - NAL AMX	OFL AUG NIT GEN
28a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT -	OFL AUG NIT NAL GEN AMX

31a	*Escherichia coli*	+	-	-	-	-	-	-	+	-	OFL AUG NIT NAL GEN AMX COT -
32a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - GEN	NIT NAL OFL AUG AMX
33a	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT NAL COT -	OFL AUG AMX GEN
34a	*No Bacterial Growth*										
35a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT -	OFL AUG AMX GEN NIT NAL
36a	*Escherichia coli*	+	-	-	-	-	-	-	+	- GEN NAL	OFL AUG AMX NIT COT
37a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - GEN AUG	OFL NIT NAL AMX
38a	*No Bacterial Growth*										
39a	*No Bacterial Growth*										
40a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT AMX NAL	OFL AUG NIT - GEN
41a	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT AMX NAL	OFL AUG NIT GEN
42a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NAL -	OFL AUG NIT GEN AMX
43a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NAL AUG	OFL NIT GEN AMX -
44a	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT	OFL NIT NAL AMX GEN AUG
45a	*No Bacterial Growth*										
46a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NAL GEN -	OFL AUG AMX NIT
47a	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT NAL COT -	OFL AMX AUG GEN
48a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL AUG AMX GEN NIT

	coli									AUG	GEN AMX -
44a	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT	OFL NIT NAL AMX GEN AUG
45a	*No Bacterial Growth*										
46a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NAL GEN -	OFL AUG AMX NIT
47a	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT NAL COT -	OFL AMX AUG GEN
48a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL AUG AMX GEN NIT
49a(i)	*Staphylococcus species*	-	-	-	-	-	-	-	+	- NAL COT NIT	OFL AUG AMX GEN
49a(ii)	*Escherichia coli*	+	-	-	-	-	-	-	+	COT GEN -	OFL AUG AMX NAL NIT
50a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NIT NAL	OFL AUG AMX GEN
51a	*No Bacterial Growth*										
52a	*No Bacterial Growth*										
53a	*No Bacterial Growth*										
54a	*Streptococcus species*	-	-	-	-	-	-	-	+	COT - GEN ERY	CXC CHL AMX CXM AUG
55a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NIT NAL	OFL AMX AUG GEN
56a	*Proteus mirabilis*	-	-	-	+	-	-	-	+	COT NAL - GEN	OFL CIP AUG AMX NIT
57a	*Escherichia coli*	+	-	-	-	-	-	-	+	NAL COT -	OFL GEN AUG NAL NIT
58a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT -	OFL GEN AUG NAL

											NIT GEN
59a	*Escherichia coli*	+	-	-	-	-	-	-	+	- GEN NIT NAL	OFL AMX AUG COT
60a	*No Bacterial Growth*										
61a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - GEN	OFL AUG AMX NIT NAL
62a	*Streptococcus species*	-	-	-	-	-	-	-	+	COT ERY - GEN	AMX CXC AUG CHL
63a	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT NIT NAL	AUG OFL AMX GEN
64a	*Proteus mirabilis*	-	-	-	+	-	-	-	+	- COT AMX	OFL GEN AUG NIT NAL
65a	*Escherichia coli*	-	-	-	-	-	-	-	+	NAL COT GEN AMX	AUG OFL NIT -
66a	*No Bacterial Growth*										
67a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL GEN	OFL AUG AMX NIT
68a	*No Bacterial Growth*										
69a	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT NAL NIT	OFL AMX AUG GEN
70a	*Proteus mirabilis*	-	-	-	+	-	-	-	+	COT - NAL NIT GEN	AUG OFL AMX PEF
71a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - AMX	OFL AUG GEN NIT NAL
72a	*No Bacterial Growth*										
73a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT GEN -	OFL AUG AMX NAL NIT
74a	*Escherichia coli*	+	-	-	-	-	-	-	+	- AMX NAL COT	GEN OFL AUG NIT
75a	*Escherichia coli*	+	-	-	-	-	-	-	-	COT - NIT	OFL AUG NAL GEN AMX
76a	*Escherichia coli*	+	-	-	-	-	-	-	-	AMX COT - GEN	OFL AUG NIT NAL

77a	*No Bacterial Growth*										
78a	*Escherichia coli*	+	-	-	-	-	-	-	-	NAL NIT COT -	OFL AUG AMX GEN
79a	*Escherichia coli*	+	-	-	-	-	-	-	-	NIT -	OFL AMX AUG COT - GEN
80a	*Streptococcus species*	-	-	-	-	-	-	-	+	COT - GEN AMX	ERY CHL CXC AUG
81a	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT OFL ANG	AMX GEN NIT NAL
82a	*Escherichia coli*	+		-	-	-	-	-	+	COT - NAL	OFL AUG GEN NIT AMX
83a	*No Bacterial Growth*										
84a	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN - NAL	OFL AUG NIT AMX COT
85a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NIT NAL	OFL AUG AMX GEN
86a	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT COT - GEN	OFL AMX AUG NAL
87a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - GEN	OFL AMX NAL NIT AUG
88a	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT	OFL AMX NAL NIT AUG GEN
89a	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN AMX COT	AUG NAL NIT OFL -
90a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT GEN	AUG NAL NIT OFL - AMX
91a	*Klebsiella species*	-	-	-	-	-	+	+	+	COT GEN NAL AMX	NIT OFL AUG - PEF
92a	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NIT - NAL GEN	OFL AUG AMX CIP

93a	*Klebsiella species*	-	-	-	-	-	-	+	+	COT - NIT NAL	OFL AUG AMX GEN
94a	*Escherichia coli*	-	-	-	-	-	-	-	+	COT - AMX NIT	OFL AUG GEN NAL
95a	*Escherichia coli*	-	-	-	-	-	-	-	+	NIT NAL COT	OFL AUG GRN AMX -
96a	*Escherichia coli*	-	-	-	-	-	-	-	+	- NAL NIT COT	AUG OFL AMX GEN
97a	*Escherichia coli*	-	-	-	-	-	-	-	+	NAL COT - GEN	OFL AUG AMX NIT
98a	*Escherichia coli*	-	-	-	-	-	-	-	+	COT -	OFL NIT AUG NAL AMX GEN
100a	*Escherichia coli*	-	-	-	-	-	-	-	+	GEN COT - NIT	OFL AUG NAL AMX

NAL: - NALIDIXIC ACID
AUG: - AUGMENTIN
CHL: - CHLORAMPHENICOL

OFL: - OFLOXACIN
ERY: - ERYTHROMYCIN
CXC: - CLOXACILLINE

APPENDIX III: - URINALYSIS, MORPHOLOGY AND CULTURAL CHARACTERISTICS FOR THE SECOND TRIMESTER

S/N	SPECIMEN	APPEARANCE	URINALYSIS	WET MOUNT	MORPHOLOGY	CULTURAL CHARACTERISTIC	SUSPECTED ORGANISM
1b	Urine	Amber & clear	P^H 8.0 Ascorbic acid ++ Others - Nil	Epithelial cells ++ Pus cells 0-1/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	____
2b	''	Pale amber	P^H 6.0 Ascorbic acid ++ Others - Nil	Epithelial cells ++ Pus cells +, Yeast cells +, Rbcs 2-3/hpf No cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chococlate	*Esherichia coli*
3b	''	Pale amber & clear	P^H 6.0 Nitrite + Others - Nil	Epithelial cells + Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chococlate	*Esherichia coli*
					Gram negative motile rod	Pale coloured colonies on MacConkey. Blue green pigment on blood agar/ chocolate agar	*Pseudomonas aeruginosa*
4b	''	Amber & slightly turbid	P^H 7.0 Others - Nil	Epithelial cells ++ Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chococlate	*Esherichia coli*
5b	''	Amber & clear	P^H 6.0 Others - Nil	Epithelial cells 1-2/hpf Pus cells nil No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
6b	''	Deep amber & clear	P^H 5.0 Blood ++ Others - Nil	Epithelial cells + Pus cells 0-1/hpf Rbcs ++ *T. vaginalis* + No cast seen	No bacterial growth	No bacterial growth	____
7b	''	Amber & clear	P^H 8.0 Sugar + Others - Nil	Epithelial cells nill Pus cells 0-1/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
8b	''	Amber & clear	P^H 6.0	Epithelial cells +	Gram pos cocci	Grey mucoid colonies	*Streptococcu*

8b	"	Amber & clear	P^H 6.0 Protein + Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram pos cocci in short chains	Grey mucoid colonies on Chocolate/blood agar B-haemolytic	*Streptococcus species.*
9b	"	Amber & slightly turbid	P^H 6.0 Protein + Nitrite + Ascorbic acid + Others - Nil	Epithelial cells ++ Pus cells + Yeast cells ++ No Rbcs/cast seen	Actively motile	Fishy odour on Chocolate/blood agar Non Lactose Fermenter on MacConkey	*Proteu mirabiliss*
10b	"	Amber & clear	P^H 5.0 Others - Nil	Epithelial cells +++ Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
11b	"	Amber & clear	P^H 7.0 Others - Nil	Epithelial cells ++ Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
12b	"	Amber & clear	P^H 5.0 Others - Nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
13b	"	Amber & turbid	P^H 6.0 Others - Nil	Epithelial cells ++ Pus cells +++ No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
14b	"	Pale amber & clear	P^H 8.0 Protein ++ Sugar + Others - Nil	Epithelial cells + Pus cells ++ Yeast cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
15b	"	Pale amber & clear	P^H 6.0 Ascorbic acid + Others - Nil	Epithelial cells + Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
16b	"	Amber & clear	P^H 5.0 Protein + Others - Nil	Epithelial cells 2-3/hpf Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
17b	"	Deep amber & clear	P^H 6.0 Urobilinogen + Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood	*Esherichia coli*

18b b	''	Amber & slightly turbid	P^H 9.0 Protein + Nitrite + Others - Nil	Epithelial cells 1-2/hpf Pus cells ++ No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
19b	Urinie	Amber & clear	P^H 6.0 Others - Nil	Epithelial cells + Pus cells 0-1/hpf Yeast cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
20b	''	Pale amber & slightly turbid	P^H 6.0 Nitrite ++ Ascorbic acid + Others - Nil	Epithelial cells ++ Pus cells + Rbcs 3-4/hpf No cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
21b	''	Amber & clear	P^H 5.0 Ascorbic acid + Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConke,y 2mm on Chocolate/blood agar	*Escherichia coli*
22b	''	Pale amber & turbid	P^H 7.0 Protein ++ Others - Nil	Epithelial cells ++ Pus cells ++ Yeast cells ++ *T-vaginalis* + Rbcs 2-3/hpf No cast seen	Gram negative, motile rod	Blue green pigment on Chocolate/blood agar pale coloured colonies on MacConkey	*Pseudomonas aeruginosa*
23b	''	Amber & clear	P^H 6.0 Others - Nil	Epithelial cells + Pus cells nil No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
24b	''	Amber & slightly turbid	P^H 7.0 Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
25b	''	Amber & clear	P^H 6.0 Protein + Others - Nil	Epithelial cells 2-3/hpf Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
26b	''	Pale amber & clear	P^H 7.0 Others - Nil	Epithelial cells + Pus cells + Ca oxacrystals + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
27b	''	Amber & clear	P^H 8.0 Protein ++ Ascorbic acid +	Epithelial cells 0-1/hpf Pus cells 0-1/hpf	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood	*Escherichia coli*

			Others - Nil	No Rbcs/cast seen		agar	
28b	Urine	Deep amber & clear	P^H 6.0 Nitrite + Others - Nil	Epithelial cells + Pus cells 0-1/hpf No Rbcs/cast seen	Actively motile	Fishy odour on Chocolate/blood agar, NLF on MacConkey	*Proteus mirabilis*
29b	"	Amber & slightly turbid	P^H 8.0 Protein + Nitrite + Others - Nil	Epithelial cells ++ Pus cells ++ Rbcs 1-2/hpf Yeast cells + No Rbcs/cast seen	Actively motile	Fishy odour on Chocolate/blood agar Non Lactose Fermenter on MacConkey	*Proteus mirabilis*
30b	"	Amber & clear	P^H 6.0 Others - Nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
31b	"	Amber & turbid	P^H 5.0 Others - Nil	Epithelial cells + Pus cells ++ *T. Vaginalis* + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
32b	"	Pale amber & slightly turbid	P^H 6.0 Ascorbic acid + Others - Nil	Epithelial cells ++ Pus cells + *T. vaginalis* + Rbcs + No cast seen	No bacterial growth	No bacterial growth	———
33b	"	Amber & turbid	P^H 6.0 Others - Nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
34b	"	Amber & clear	P^H 6.0 Protein – Nil Sugar + Others - Nil	Epithelial cells 1-2/hpf Pus cells 0-1/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
35b	"	Amber & slightly turbid	P^H 7.0 Blood + Ascorbic acid + Others - Nil	Epithelial cells + Pus cells + Yeast cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
36b	"	Pale amber & clear	P^H 7.0 Others - Nil	Epithelial cells 4-5/hpf Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 4mm on Chocolate/blood agar	*Esherichia coli*

37b	''	Pale amber & slightly turbid	P^H 8.0 Protein + Sugar- Nil Nitrite + Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Same as described	Same as described	*Proteus mirabilis*
							Esherichia coli
38b	''	Amber & clear	P^H 9.0 Protein + Others - Nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
39b	''	Pale amber & clear	P^H 6.0 Others - Nil	Epithelial cells 1-2/hpf Pus cells 0-1/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	____
40b	''	Pale amber & clear	P^H 5.0 Protein + Sugar + Ketones + Others - Nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
41b	''	Amber & clear	P^H 5.0 Others - Nil	Epithelial cells + Pus cells nil No Rbcs/cast seen	No bacterial growth	No bacterial growth	____
42b	''	Amber & slightly turbid	P^H 6.0 Ascorbic acid + Others - Nil	Epithelial cells ++ Pus cells + Triple phosphate crystals + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
43b	''	Amber & clear	P^H 5.0 Others - Nil	Epithelial cells 1-2/hpf Pus cells 1-2/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	____
44b	''	Pale amber & slightly turbid	P^H 6.0 Others - Nil	Epithelial cells + Pus cells + Yeast cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
45b	''	Amber & clear	P^H 6.0 Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
46b	Urine	Amber & slightly turbid	P^H 5.0 Blood + Others - Nil	Epithelial cells ++ Pus cells ++ Rbcs + *T. vaginalis* +	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood	*Esherichia coli*

				No cast seen		agar	
47b	''	Pale amber & slightly turbid	P^H 7.0 Protein + Others - Nil	Epithelial cells + Pus cells ++ No Rbcs/cast seen	Gram pos cocci in short chains	Grey mucoid colonies on Chocolate/blood agar B –haemolytic	*Streptococcus species*
48b	''	Amber & clear	P^H 6.0 Others - Nil	Epithelial cells 1-2/hpf Pus cells 0-1/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	____
49b	''	Amber & turbid	P^H 8.0 Nitrite (+) Ascorbic acid + Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
50b	''	Pale amber & clear	P^H 8.0 Others - Nil	Epithelial cells + Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
51b	''	Amber & clear	P^H 7.0 Others - Nil	Epithelial cells 1-2/hpf Pus cells nil No Rbcs/cast seen	No bacterial growth	No bacterial growth	____
52b	''	Amber & clear	P^H 6.0 Others - Nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
53b	''	Deep amber & turbid	P^H 6.0 Bilirubin ++ Urobilinogen +++ Others - Nil	Epithelial cells ++ Pus cells + Yeast cells ++ No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
54b	''	Amber & clear	P^H 6.0 Others - Nil	Epithelial cells 3-4/hpf Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
55b	Urine	Amber & clear	P^H 6.0 Protein + Ascorbic acid + Others - Nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/cast seen	No significant bacterial growth	No significant bacterial growth	____

56b	''	Amber & clear	P^H 6.0 Others - Nil	Epithelial cells 1-2/hpf Pus cells 3-4/hpf Rbcs 0-1/hpf No cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
57b	''	Amber & slightly turbid	P^H 7.0 Protein + Nitrite + Others - Nil	Epithelial cells + Pus cells ++ No Rbcs/cast seen	Actively motile	Fishy odour on Chocolate/blood agar Non Lactose Fermenter on Chocolate/blood agar MacConkey	*Proteus mirablis*
58b	''	Deep amber & clear	P^H 6.0 Blood ++ Others - Nil	Epithelial cells + Pus cells 2-3/hpf Rbcs +++ No cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
59b	''	Amber & clear	P^H 5.0 Others - Nil	Epithelial cells 1-2/hpf Pus cells nil No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
60b	''	Pale amber & clear	P^H 5.0 Others - Nil	Epithelial cells + Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
61b	''	Amber & turbid	P^H 6.0 Protein + Ascorbic acid + Sugar – Nil Urobilinogen + Others - Nil	Epithelial cells ++ Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
62b	''	Amber & clear	P^H 8.0 Others - Nil	Epithelial cells 2-3/hpf Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
63b	Urine	Pale amber & clear	P^H 7.0 Others - Nil	Epithelial cells + Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
64b	''	Amber & clear	P^H 6.0 Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*

65b	''	Amber & slightly turbid	P^H 6.0 Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
66b	''	Amber & clear	P^H 6.0 Ascorbic acid + Others - Nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
67b	''	Pale amber & clear	P^H 7.0 Protein + Others - Nil	Epithelial cells ++ Pus cells + Yeast cells + No Rbcs/cast seen	Gram pos cocci in clusters	White yellow & non haemolysis	*Staphylococcus Species*
68b	''	Pale amber & slightly turbid	P^H 7.0 Nitrite + Others - Nil	Epithelial cells + Pus cells ++ No Rbcs/cast seen	Gram negative, motile rod	Blue green pigment on Chocolate/blood agar pale coloured colonies	*Pseudomonas aeruginose*
69b	''	Deep amber & clear	P^H 6.0 Blood + Others - Nil	Epithelial cells + Pus cells 1-2/hpf Yeast cells + No Rbcs/cast seen	Gram negative, motile rod	Large mucoid colonies	*Klebsiella pneumonia*
70b	''	Amber & clear	P^H 7.0 Others - Nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
71b	''	Pale amber & clear	P^H 5.0 Protein + Sugar + Others - Nil	Epithelial cells 1-2/hpf Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
72b	Urine	Amber & clear	P^H 5.0 Others - Nil	Epithelial cells nil Pus cells 0-1/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	*Escherichia coli*
73b	''	Amber & clear	P^H 8.0 Others - Nil	Epithelial cells + Pus cells 3-4/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
74b	''	Pale amber & turbid	P^H 6.0 Protein + Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*

75b	''	Amber & slightly turbid	P^H 5.0 Nitrite + Ascorbic acid + Others - Nil	Epithelial cells ++ Pus cells + *T. vaginlis* + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
76b	''	Amber & clear	P^H 6.0 Others - Nil	Epithelial cells 1-2/hpf Pus cells 0-1/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
77b	''	Amber & slightly turbid	P^H 5.0 Protein + Ascorbic acid + Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
78b	''	Pale amber & clear	P^H 6.0 Others - Nil	Epithelial cells 1-2/hpf Pus cells nil No Rbcs/cast seen	No bacterial growth	No bacterial growth	____
79b	''	Amber & clear	P^H 7.0 Blood + Others - Nil	Epithelial cells + Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
80b	''	Pale amber & slightly turbid	P^H 8.0 Others - Nil	Epithelial cells ++ Pus cells + Rbcs 1-2/hpf Yeast cells + No cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
81b	''	Amber & clear	P^H 6.0 Nitrite + Others - Nil	Epithelial cells + Pus cells + *T. vaginalis* + Rbcs 3-4/hpf No cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
82b	''	Amber & turbid	P^H 8.0 Protein + Others - Nil	Epithelial cells +++ Pus cells ++ No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
83b	''	Amber & clear	P^H 6.0 Protein – Nil Sugar ++ Ketones + Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram pos cocci in chains	White yellow & non haemolysis	*Staphylococcus spacies*

84b	''	Amber & clear	P^H 5.0 Others - Nil	Epithelial cells 2-3/hpf Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
85b	''	Pale amber & turbid	P^H 6.0 Protein + Blood + Others - Nil	Epithelial cells + Pus cells + Rbcs + No cast seen	Gram negative, non motile rod	Large mucoid colonies	*Klebsiella species Pneumonia*
86b	''	Amber & clear	P^H 7.0 Others - Nil	Epithelial cells 1-2/hpf Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
87b	''	Amber & clear	P^H 5.0 Others - Nil	Epithelial cells + Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
88b	''	Amber & slightly turbid	P^H 6.0 Others - Nil	Epithelial cells + Pus cells + Rbcs 1-2/hpf No cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
89b	''	Amber & clear	P^H 6.0 Others - Nil	Epithelial cells + Pus cells 3-4/hpf Yeast cells + No Rbcs/cast seen	Gram negative, motile rod	Large mucoid colonies	*Klebsiella pneumonia*
90b	''	Pale amber & clear	P^H 5.0 Protein + Ascorbic acid + Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
91b	''	Pale amber & turbid	P^H 8.0 Protein ++ Nitrite + Others - Nil	Epithelial cells ++ Pus cells ++ No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
92b	''	Pale amber & clear	P^H 7.0 Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
93b	''	Pale amber & clear	P^H 6.0 Sugar + Others - Nil	Epithelial cells 1-2/hpf Pus cells 0-1/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	———

94b	''	Deep amber & clear	P^H 5.0 Protein + Urobilinogen ++ Bilirubin ++ Others - Nil	Epithelial cells + Pus cells 2-3/hpf No Rbcs/cast seen	Gram pos cocci in short chains	Grey mucoid colonies on Chocolate/blood agar B-haemolytic	*Streptococcus Species*
95b	''	Deep amber & clear	P^H 6.0 Urobilinogen ++ Bilirubin ++ Blood ++ Others - Nil	Epithelial cells ++ Pus cells + Granular cast + Rbcs ++	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
96b	''	Amber & clear	P^H 7.0 Others - Nil	Epithelial cells + Pus cells 3-4/hpf No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
97b	Urine	Pale amber & clear	P^H 8.0 Others - Nil	Epithelial cells 0-1/hpf Pus cells 1-2/hpf Yeast cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
98b	''	Deep amber & turbid	P^H 6.0 Others - Nil	Epithelial cells + Pus cells ++ No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
99b	''	Amber & clear	P^H 5.0 Ascorbic acid + Others - Nil	Epithelial cells nil Pus cells 0-1/hpf No Rbcs/cast seen	Gram negative, motile rod	Yellow green pigment on Chocolate/blood agar pale coloured colonies on MacConkey,	*Pseudomonas aeruginose*
100b	''	Pale amber & slightly turbid	P^H 6.0 Blood + Others - Nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative, motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*

T. vaginalis: - Trichomonas vaginalis

APPENDIX IV: - BIOCHEMICAL SEROLOGY & SENSITIVITY ON THE ISOLATED MICROORGANISM SECOND TRIMESTER

SPECIMEN NUMBER	MICRO ORGANISM	INDOLE	COAGU LASE	CATA LASE	UREASE	OXIDASE	CITRATE	VOGES PROSK	POLYVALENT ANTISERA	RESISTANCE	SENSITIVI TY
1b	*No Bacterial Growth*										
2b	*Esherichia coli*	+	-	-	-	-	-	-	+	NAL - AMX COT	OFL AMX AUG NIT
3b(i)	*Esherichia coli*	+	-	-	-	-	-	-	+	NIT NAL COT -	GEN OFL AUG
3b(ii)	*Pseudomonas aeruginosa*	-	-	-	-	+	-	-	+	AMX NAL - COT NIT AUG	CHL CXM CIP
4b	*Esherichia coli*	+	-	-	-	-	-	-	+	COT NAL GEN -	NIT OFL AMX AUG
5b	*Esherichia coli*	+	-	-	-	-	-	-	+	AMX GEN NIT COT	OFL AUG AMX
6b	*No bacterial Growth*										
7b	*Esherichia coli*	+	-	-	-	-	-	-	+	AMX NAL	COT NIT OFL AUG COT -
8b	*Streptococcus species*	-	-	-	-	-	-	-	+	CXC COT GEN -	ERY AMX CHL AUG
9b	*Proteus mirabilis*	-	-	-	+	-	-	-	+	AUG COT NIT AMX NAL -	OFL CMX GEN
10b	*Esherichia coli*	+	-	-	-	-	-	-	+	- COT NAL AMX	OFL GEN NIT AUG
11b	*Esherichia coli*	+	-	-	-	-	-	-	+	AUG COT NAL NIT	- OFL AMX GEN
12b	*Esherichia coli*	+	-	-	-	-	-	-	+	COT - AMX NAL	OFL GEN AUG NIT
13b	*Esherichia coli*	+	-	-	-	-	-	-	+	COT - NAL NIT	OFL AUG AMX GEN
14b	*Esherichia coli*	+	-	-	-	-	-	-	+	AMX COT -	OFL AUG GEN NIT NAL

15b	*Escherichia coli*	+	-	-	-	-	-	-	+	NAL COT GEN	OFL AUG NIT - AMX
16b	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - GEN	OFL AUG AMX NIT NAL
17b	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT GEN COT	OFL AUG AMX NAL
18b	*Escherichia coli*	+	-	-	-	-	-	-	+	NAL -	OFL AUG AMX NIT GEN COT
19b	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX - COT	OFL AUG NIT NAL GEN
20b	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT GEN	OFL AUG AMX NIT NAL
21b	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT NAL -	OFL AUG AMX COT GEN
22b	*Pseudomonas aeruginosa*	-	-	-	-	+	-	-	+	OFL AUG AMX NAL GEN	CIP NIT AUG
23b	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL AUG AMX GEN NIT
24b	*Escherichia coli*	+	-	-	-	-	-	-	+	- NAL AMX	OFL AUG AMX COT NIT
25b	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN AMX COT	OFL AUG NIT NAL -
26b	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - AMX	OFL AUG GEN NAL NIT
27b	*Escherichia coli*	+	-	-	-	-	-	-	+	NAL - COT	OFL AUG GEN NIT AMX
28b	*Proteus mirabilis*	-	-	-	+	-	-	-	+	GEN COT	OFL AUG NIT NAL AMX

29b	*Proteus mirabilis*	-	-	-	+	-	-	-	+	COT	OFL AUG NIT NAL AMX -
30b	*Esherichia coli*	+	-	-	-	-	-	-	+	- GEN	OFL AUG NIT NAL AMX GEN
31b	*Esherichia coli*	+	-	-	-	-	-	-	+	COT - GEN NAL	OFL AUG NIT NAL COT
32b	*No bacterial Growth*										
33b	*Esherichia coli*	+	-	-	-	-	-	-	+	AMX -	OFL AUG NIT NAL COT
34b	*Esherichia coli*	+	-	-	-	-	-	-	+	- NAL	OFL AUG NIT AMX GEN COT
35b	*Esherichia coli*	+	-	-	-	-	-	-	+	COT - GEN	OFL AUG NIT AMX NAL CIP
36b	*Esherichia coli*	+	-	-	-	-	-	-	+	COT NAL GEN	OFL AUG NIT AMX - AMX
37b(i)	*Proteus mirabilis*	-	-	-	+	-	-	-	+	OFL NAL COT NIT AMX -	AUG GEN CXM
37b(ii)	*Esherichia coli*	+	-	-	-	-	-	-	+	OFL AUG CEP	AMX GEN NIT NAL - COT
38b	*Esherichia coli*	+	-	-	-	-	-	-	+	NIT COT NAL	OFL GEN AUG - AMX
39b	*No bacterial Growth*										
40b	*Esherichia coli*	+	-	-	-	-	-	-	+	COT -	OFL GEN AMX AUG NIT NAL
41b	*No bacterial Growth*										
42b	*Esherichia coli*	+	-	-	-	-	-	-	+	- COT GEN	AUG OFL PEF AMX NIT NAL

43b	*No bacterial Growth*										
44b	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN	OFL AUG AMX NIT NAL COT -
45b	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX COT NAL	OFL AUG NIT GEN -
46b	*Escherichia coli*	+	-	-	-	-	-	-	+	NA - GEN	OFL AUG NIT AMX COT
47b	*Streptococcus species*	-	-	-	-	-	-	-	+	COT -	CHL ERY AMX CXC AUG GEN
48b	*No bacterial Growth*										
49b	*Escherichia coli*	+	-	-	-	-	-	-	+	NAL NIT COT -	OFL AMX GEN AUG
50b	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NIT	OFL AUG AMX GEN NAL CEP
51b	*No bacterial Growth*										
52b	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT NAL -	OFL AMX AUG GEN COT
53b	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT -	OFL AUG AMX GEN NAL COT
54b	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX - COT	OFL AUG AMX - GEN
55b	*No bacterial Growth*										
56b	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NAL AMX	OFL AUG NIT GEN -
57b	*Proteus mirabilis*	-	-	-	+	-	-	-	+	AUG COT - NAL	OFL AMX NIT GEN CIP
58b	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT	OFL AMX NIT GEN - NAL
59b	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN NAL	OFL AMX NIT GEN -

43b	*No bacterial Growth*										
44b	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN	OFL AUG AMX NIT NAL COT -
45b	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX COT NAL	OFL AUG NIT GEN -
46b	*Escherichia coli*	+	-	-	-	-	-	-	+	NA - GEN	OFL AUG NIT AMX COT
47b	*Streptococcus species*	-	-	-	-	-	-	-	+	COT -	CHL ERY AMX CXC AUG GEN
48b	*No bacterial Growth*										
49b	*Escherichia coli*	+	-	-	-	-	-	-	+	NAL NIT COT -	OFL AMX GEN AUG
50b	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NIT	OFL AUG AMX GEN NAL CEP
51b	*No bacterial Growth*										
52b	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT NAL -	OFL AMX AUG GEN COT
53b	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT -	OFL AUG AMX GEN NAL COT
54b	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX - COT	OFL AUG AMX - GEN
55b	*No bacterial Growth*										
56b	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NAL AMX	OFL AUG NIT GEN -
57b	*Proteus mirabilis*	-	-	-	+	-	-	-	+	AUG COT - NAL	OFL AMX NIT GEN CIP
58b	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT	OFL AMX NIT GEN - NAL
59b	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN NAL	OFL AMX NIT GEN -

											NAL COT
75b	*Esherichia coli*	+	-	-	-	-	-	-	+	- NAL AMX	OFL AUG NIT COT GEN
76b	*Esherichia coli*	+	-	-	-	-	-	-	+	AMX COT -	OFL AUG NIT GEN NAL
77b	*Esherichia coli*	+	-	-	-	-	-	-	+	OFL COT -	AUG NIT NAL GEN AMX
78b	*No bacterial Growth*										
79b	*Esherichia coli*	+	-	-	-	-	-	-	+	GEN NAL	OFL AUG AMX NIT COT NAL
80b	*Esherichia coli*	+	-	-	-	-	-	-	+	COT - NAL GEN	OFL AUG AMX NIT
81b	*Esherichia coli*	-	-	-	-	-	-	-	+	NIT COT NAL	OFL AUG AMX - GEN
82b	*Esherichia coli*	+	-	-	-	-	-	-	+	AMX NAL	OFL AUG COT NIT - GEN
83b	*Staphylococcus species*	-	-	-	-	-	-	-	+	CHL AMX CXC COT	AUG - GEN ERY
84b	*Esherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL AUG AMX GEN NIT
85b	*Klebsiella species*	-	-	-	-	-	+	+	+	OFL AMX NAT - COT	GEN AUG NIT
86b	*Esherichia coli*	+	-	-	-	-	-	-	+	COT - NAL NIT	OFL AUG AMX GEN
87b	*Esherichia coli*	+	-	-	-	-	-	-	+	NAL	OFL AUG AMX NIT COT - GEN
88b	*Esherichia coli*	+	-	-	-	-	-	-	+	NAL NIT	OFL AUG AMX - COT GEN
89b	*Klebsiella*	-	-	-	-	-	+	+	+	- COT NAL	OFL

	species									AUG NIT	AMX GEN
90b	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX COT -	OFL AUG GEN NIT NAL
91b	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT COT -	OFL AUG AMX NAL GEN
92b	*Escherichia coli*	-	-	-	-	-	-	-	-	COT - AUG	OFL AMX NAL NIT GEN CIP
93b	*No bacterial Growth*										
94b	*Streptococcus species*	-	-	-	-	-	-	-	+	COT - AMX	ERY GEN AUG NAL CXC
95b	*No bacterial Growth*										
96b	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL AUG AMX GEN NIT
97b	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX NIT NAL	OFL AUG AMX GEN COT
98b	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL AUG AMX NIT GEN
99b	*Pseudomonas aeruginosa*	-	-	-	-	+	-	-	+	COT - AMX NAL	OFL AUG NIT GEN CIP
100b	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN COT NAL	OFL AMX AUG NIT

AMX: - AMOCYCILLIN
NIT: - NITROFURANTON
NAL: - NALIDIXIC ACID
AUG: - AUGMENTIN
CHL: - CHLORAMPHENICOL
COT: - COTRIMOXAZOLE
GEN: - GENTAMICIN
OFL: - OFLOXACIN
ERY: - ERYTHROMYCIN
CXC: - CLOXACILLINE

APPENDIX V: - URINALYSIS, MORPHOLOGY AND CULTURAL CHARACTERISTIC FOR THE THIRD TRIMESTER

S/N	SPECIMEN	APPEARANCE	URINALYSIS	WET MOUNT	MORPHOLOGY	CULTURAL CHARACTERISTIC	SUSPECTED ORGANISM
1c	Urine	Amber & clear	P^H 6.0 Protein + Other - Nil	Epithelial cells (+) Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on 1-4 mm on Temperature18-44^{0}C	*Esherichia coli*
2c	"	Pale amber & clear	P^H7.0 Other – Nil	Epithelial cells (+) (+) Yeast cells (+) No Rbcs/cast seen	Gram negative non motile rod	Large mucoid colonies	*Klebsiella species*
					Gram negative motile rod	Lactose Fermenter on 1-4 mm on Temperature18-44^{0}C	*Esherichia coli*
3c	"	Amber & clear	P^H6.0 Other – nil	Epithelial cells (+) Pus cells nil No Rbcs/cast seen	No bacterial growth	No bacterial growth	____
4c	"	Pale amber & clear	P^H6.0 Other – nil	Epithelial cells 2-3/hpf, Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 4mm on Chocolate/blood agar Temperature18-44^{0}C	*Esherichia coli*
5c	"	Amber & clear	P^H 5.0, Nitrite (+) Other – Nil	Epithelial cells 2-3/hpf, Pus cells 0-1/hpf No Rbcs/cast seen	Actively motile	Fishy odour on Chocolate/blood agar N on Lactose Fermenter on MacConkey	*Proteus mirabilis*
6c	"	Deep amber & clear	P^H6.0 Urobilinogen (+) Other – nil	Epithelial cells (+) Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
7c	"	Amber & clear	P^H 8.0 Other – nil	Epithelial cells (+) Pus cells 1-2/hpf No Rbcs/cast seen	"	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
8c	"	Amber & clear	P^H 8.0, Ascorbic acid(++) Other – nil	Epithelial cells nil, Pus cells 1-2/hpf No Rbcs/cast seen	"	Lactose Fermenteron MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
9c	Urine	Amber &	P^H 8.0,Protein	Epithelial cells (+)	Gram negative	Gram negative motile	*Esherichia*

		slightly turbid	(+) Other – nil	Pus cells (+), Rbcs 1-2/hpf No cast seen	motile rod	rod	*coli*
10c	''	Amber & clear	P^H 7.0 Other – nil	Epithelial cells (+) Pus cells3-4/hpf No Rbcs/cast seen	''	Lactose Fermenter on MacConkey, 4mm on Chocolate/blood agar	*Esherichia coli*
11c	''	Amber & clear	P^H 6.0 Other – nil	Epithelial cells (+) Pus cells2-3/hpf No Rbcs/cast seen	''	''	*Esherichia coli*
12c	''	Amber & clear	P^H 6.0 Other – nil	Epithelial cells (+) Pus cells2-3/hpf Rbcs 1-2/hpf Yeast (+) No cast seen	No bacterial growth	No bacterial growth	____
13c	''	Pale amber & slightly turbid	P^H 7.0 Other – nil	Epithelial cells ++ Pus cells (++) No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
14c	''	Amber & clear	P^H 6.0 Other – nil	Epithelial cells 2-3/hpf,Pus cells 0-1/hpf No Rbcs/cast seen	Gram positive cocci in clusters	White yellow & non-haemolysis Temperature 10-42^{0}C	*Staphylococcus species*
15c	''	Amber & clear	P^H 5.0, Ascorbic acid(+) Other – nil	Epithelial cells (+) Pus cells 1-2/hpf No Rbcs/ cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
16c	''	Pale amber & clear	P^H 8.0 Others – nil	Epithelial cells 1-2/hpf, Pus cells nil No Rbcs/ cast seen	No bacterial growth	No bacterial growth	____
17c	''	Amber & clear	P^H 6.0,Protein-Nil Sugar + Others – nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
18c	Urine	Amber & turbid	P^H 6.0 Nitrite + Others – nil	Epithelial cells (+++) Pus cells ++ Rbcs 0-1/hpf Yeast (+) No cast seen	Actively motile	Fishy odour on Chocolate/blood agar Non Lactose Fermenter on MacConkey	*Proteus mirabilis*
19c	''	Amber & clear	P^H 5.0 Others – nil	Epithelial cells ++ Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
20c	''	Amber & clear	P^H 6.0	Epithelial cells +	No bacterial growth	No bacterial growth	

			Others – nil	Pus cells nil No Rbcs/cast seen			
21c	"	Pale amber & clear	P^H 7.0 Others – nil	Epithelial cells ++ Pus cells 2-3/hpf Yeast cells (+) No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
22c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cells + Pus cells 0-1/hpf No Rbcs/cast seen	"	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
23c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cells + Pus cells 2-3/hpf No Rbcs/cast seen	"	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
24c	"	Deep amber & turbid	P^H 5.0, Protein ++ Sugar – Nil Bilirubin + Urobilingen ++ Blood ++ Others – nil	Epithelial cells ++ Pus cells ++ Rbcs +++ No cast seen	"	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
25c	"	Amber & clear	P^H 7.0 Others – nil	Epithelial cells + Pus cells 0-1/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
26c	"	Amber & clear	P^H 7.0 Others – nil	Epithelial cells nil,Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
27c	urine	Amber & slightly turbid	P^H 6.0, Nitrite (+) Others – nil	Epithelial cells + Pus cells 4-5/hpf No Rbcs/cast seen	Actively motile	Fishy odour on Chocolate/blood agar & swarm	*Proteus mirabilis*
						Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
28c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cell + Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
29c	"	Pale amber & clear	P^H 6.0, Ascorbic acid +	Epithelial cells 3-4/hpf, Pus cells nil No Rbcs/cast seen	No bacterial growth	No bacterial growth	———

			Others – nil				
30c	"	Amber & turbid	P^H 6.0 Others – nil	Epithelial cells +++, Pus cells++ Yeast cell++ No Rbcs/cast seen	Gram negative non motile rod	Large mucoid colonies	*Klebsielle species*
31c	"	Amber & clear	P^H 8.0 Others – nil	Epithelial cell 1-2/hpf Pus cells + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
32c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cells + Pus cells 2-3/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	——
33c	"	Amber & slightly turbid	P^H 5.0 Others – nil	Epithelial cell + Pus cells 3-4/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
34c	"	Amber & clear	P^H 5.0 Others – nil	Epithelial cells 2-3/hpf,Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
35c	Urine	Pale amber & clear	P^H 6.0,Nitrite + Others – nil	Epithelial cells + Pus cells 3-4/hpf Yeast cells + No Rbcs/cast seen	Gram negative motile rod	Blue green pigment on Chocolate/blood agar, pale coloured colonies on MacConkey,	*Pseudomonas aeruginosa*
36c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cell + Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative non motile rod	Large mucoid colonies on Chocolate/blood agar Lactose Fermenter& large mucoid pink colonies on MacConkey	*Klebsiella species*
37c	"	Amber & slightly turbid	P^H 6.0 Others – nil	Epithelial cell + Pus cells + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
38c	"	Amber & clear	P^H 7.0 Others – nil	Epithelialcells++ Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Esherichia coli*

39c	"	Amber & clear	P^H 7.0 Others – nil	Epithelial cells nil, Pus cells nil No Rbcs/cast seen	No bacterial growth	No bacterial growth	____
40c	"	Amber & clear	P^H 8.0 Others – nil	Epithelialcells+ Pus cells +, Yeast cell + *T. vaginalis* + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
41c	"	Pale amber & clear	P^H 8.0, Sugar ++ Ketone + Others – nil	Epithelialcells+ Pus cells 0-1/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
42c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cells 1-2/hpf, Pus cells nil No Rbcs/cast seen	No bacterial growth	No bacterial growth	____
43c	"	Amber & clear	P^H 5.0 Ascorbic acid + Others – nil	Epithelialcells+ Pus cells +, Yeast cell – Nil. T. vaginalis + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
44c	Urine	Amber & slightly turbid	P^H 6.0 Others – nil	Epithelial cell + Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
45c	"	Amber & slightly turbid	P^H 9.0 Protein ++ Others – nil	Epithelial cell + Pus cells +, Rbcs1-2/hpf No cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
46c	"	Amber & clear	P^H 6.0 Nitrite + Others – nil	Epithelialcells+ Pus cells 4-5/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
47c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cells + Pus cells 2-3/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	____
48c	"	Pale amber & clear	P^H 7.0 Others – nil	Epithelial cells 4-5/hpf, Pus cells 0-1/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	____

49c	"	Amber & clear	P^H 5.0 Nitrite + Others – nil	Epithelial cells+ Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Esherichia coli*
50c	"	Amber & slightly turbid	P^H 7.0 Others – nil	Epithelial cells ++ Pus cells 0-1/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
51c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cells+ Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenteron MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
52c	"	Pale amber & clear	P^H 6.0 Others – nil	Epithelial cells+ Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
53c	"	Amber & clear	P^H 7.0 Others – nil	Epithelial cells nil Pus cells 1-2/hpf Yeast + No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
54c	Urine	Amber & turbid	P^H 6.0. Nitrite (+) Ascorbic acid + Others – nil	Epithelial cells+++ Pus cells ++ Granular cast (+) No Rbcs/cast seen	Actively motile	Fishy odour on Chocolate/blood agar Non Lactose Fermenter on MacConkey	*Proteus mirabilis*
55c	"	Amber & clear	P^H 5.0 Others – nil	Epithelial cells+ Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative motile rod	LLactose Fermenters on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
56c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cells ++ Pus cells nil No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
57c	"	Amber & clear	P^H 5.0 Others – nil	Epithelial cells+ Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
58c	"	Amber & slightly turbid	P^H 6.0 Others – nil	Epithelial cells 2-3/hpf, Pus cells + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenteron MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
59c	"	Pale amber & clear	P^H 7.0 Others – nil	Epithelial cells ++ Pus cells + Yeast cells (+) No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*

60c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cells + Pus cells 0-1/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
61c	"	Pale amber & slightly turbid	P^H 8.0, Protein (+) Nitrite + Others – nil	Epithelial cells++ Pus cells (+) No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
62c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cells+ Pus cells 3-4/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
63c	"	Pale amber & turbid	P^H 5.0, Protein ++ Ascorbic (+) Blood + Others – nil	Epithelial cells ++ Pus cells ++ Yeast cells ++ Rbcs 1-2/hpf No cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
64c	Urine	Amber & clear	P^H 6.0 Others – nil	Epithelial cells+ Pus cells 0-1/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
65c	"	Pale Amber & clear	P^H 6.0 Others – nil	Epithelial cells ++ Pus cells (+) No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
66c	"	Amber & clear	P^H 7.0 Sugar + Others – nil	Epithelial cells 2-3/hpf, Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
67c	"	Amber & clear	P^H 6.0, Protein + Sugar ++ Others – nil	Epithelial cells++ Pus cells (+) Yeast cells (+) No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
68c	"	Amber & slightly turbid	P^H 5.0 Others – nil	Epithelial cells++ Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenteron MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
69c	"	Pale amber & clear	P^H 6.0 Others – nil	Epithelial cells+ Pus cells + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
70c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cells ++ Pus cells 0-1/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
71c	"	Amber & clear	P^H 7.0 Others – nil	Epithelial cells+ Pus cells 1-2/hpf No Rbcs/cast seen	No bacterial growth	No bacterial growth	———

72c	''	Deep amber & clear	P^H 6.0 Urobilingen +++ Bilrubin ++ Others – nil	Epithelial cells ++ Pus cells + Hyaline cast + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
					As described before	As described before	*Staphylococcus species*
73c	''	Amber & clear	P^H 8.0 Others – nil	Epithelial cells + Pus cells 3-4/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
74c	Urine	Pale amber slightly turbid	P^H 6.0,Protein + Nitrite + Others – nil	Epithelial cells + Pus cells + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Esherichia coli*
75c	''	Amber & clear	P^H 6.0 Ascorbic acid + Others – nil	Epithelial cells 3-4/hpf, Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative motile rod	Large mucoid colonies on Chocolate/blood agar Lactose Fermenter& large mucoid pink colonies on MacConkey	*Klebsiella species*
76c	''	Amber & clear	P^H 7.0 Others – nil	Epithelial cells + Pus cells +,Rbcs 1-2/hpf No cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
77c	''	Pale amber & clear	P^H 6.0, protein + Blood + Others – nil	Epithelial cells ++ Pus cells +, Rbcs + No cast seen	No bacterial growth	No bacterial growth	———
78c	''	Amber & clear	P^H 5.0 Protein + Others – nil	Epithelial cells + Pus cells + T – Vaginalis + Yeast cells + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*
79c	''	Amber & clear	P^H 6.0 Others – nil	Epithelial cells 1-2/hpf, Pus cells 0-1/hpf No Rbcs/ cast seen	No bacterial growth	No bacterial growth	———
80c	''	Pale amber & clear	P^H 5.0 Ascorbic acid + Others – nil	Epithelial ells + Pus cells 3-4/hpf No cast seen	No bacterial growth	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Esherichia coli*

81c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cells++ Pus cells 1-2/hpf No Rbcs/cast seen	As described earlier	As described earlier	*Klebsiella species*
							Streptococcus species
82c	"	Amber & turbid	P^H 5.0 Protein ++ Sugar – Nil Nitrite + Others – nil	Epithelial cells ++ Pus cells ++ Yeast cells + No Rbcs/cast seen	Actively motile	Fishy odour on Chocolate/blood agar Non Lactose Fermenter on MacConkey	*Proteus mirabilis*
83c	Urine	Pale amber & clear	P^H 5.0 Others – nil	Epithelial cells+ Pus cells 0-1/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
84c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cells 2-3/hpf, Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
85c	"	Amber & clear	P^H 7.0 Others – nil	Epithelial cell + Pus cells + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
86c	"	Amber & slightly turbid	P^H 6.0 Protein + Others – nil	Epithelial cell + Pus cells + No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
87c	"	Pale amber & slightly turbid	P^H 8.0 Protein + Others – nil	Epithelial cell + Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
88c	"	Amber & clear	P^H 6.0 Others – nil	Epithelial cell + Pus cells + Yeast cells (+) No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
89c	"	Pale amber & turbid	P^H 6.0 Others – nil	Epithelial cell ++ Pus cells + Yeast cells ++ No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
90c	"	Amber & slightly turbid	P^H 7.0 Protein + Sugar – Nil Nitrite + Others – nil	Epithelial cell ++ Pus cells + Rbcs 1-2/hpf No cast seen	Actively motile	Fish odour on Chocolate/blood agar Non Lactose Fermenter on MacConkey	*Proteu mirabiliss*

91c	''	Deep amber & turbid	P^H 6.0 Protein +++ Sugar – Nil Nitrite + Others – nil	Epithelial cell +++ Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
92c	urine	Amber & clear	P^H 5.0 Others – nil	Epithelial cell + Pus cells + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter n MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
93c	''	Pale amber & clear	P^H 8.0 Others – nil	Epithelial cell 3-4/hpf Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
94c	''	Amber & clear	P^H 6.0 Blood + Others – nil	Epithelial cell + Pus cells 0-1 No Rbcs/cast seen	No bacterial growth	No bacterial growth	———
95c	''	Amber & clear	P^H 6.0 Others – nil	Epithelial cell nil Pus cells 2-3/hpf Yeast cells + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 1mm on Chocolate/blood agar	*Escherichia coli*
96c	''	Amber & turbid	P^H 5.0 Others – nil	Epithelial cell ++ Pus cells ++ No Rbcs/cast seen	Gram negative motile rod	Yellow green pigment on Chocolate/blood agar pale coloured colonies on MacConkey	*Pseudomonas aeruginosa*
97c	''	Amber & slightly turbid	P^H 6.0 Protein + Others – nil	Epithelial cell + Pus cells + T-viginalis + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*
98c	''	Pale amber & clear	P^H 7.0 Others – nil	Epithelial cell ++ Pus cells 2-3/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
99c	''	Deep amber & clear	P^H 6.0 Others – nil	Epithelial cell + Pus cells 1-2/hpf No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 3mm on Chocolate/blood agar	*Escherichia coli*
100c	''	Amber & clear	P^H 7.0 Others – nil	Epithelial cell 2-3/hpf Pus cells + Yeast cells + No Rbcs/cast seen	Gram negative motile rod	Lactose Fermenter on MacConkey, 2mm on Chocolate/blood agar	*Escherichia coli*

APPENDIX VI: - BIOCHEMICAL SEROLOGY & SENSITIVITY ON THE ISOLATED MICROORGANISM THIRD TRIMESTER

SPECIMEN NUMBER	MICRO ORGANISM	INDOLE	COAGU LASE	CATA LASE	UREASE	OXIDAS E	CITRAT E	VOGES PROSK	POLY VALENT ANTISERA	RESISTANCE	SENSITIVITY
1c	*Esherichia coli*	+	-	-	-	-	-	-	+	COT - NIT	OFL AUG AMX NIT GEN
2c(i)	*Klebsiella species*	-	-	-	-	-	+	+	+	- COT NIT NAL	OFL AUG AMX GEN
2(ii)	*Esherichia coli*	+	-	-	-	-	-	-	+	COT -	OFL AUG AMX GEN NIT NAL
3c	*No Bacteria Growth*										
4c	*Esherichia coli*	+	-	-	-	-	-	-	-	NIT NAL COT	OFL AMX AUG GEN - CXM
5c	*Proteus mirabilis*	-	-	-	+	-	-	-	-	- NAL NIT COT	OFL AUG AMX GEN PEF
6c	*Esherichia coli*	+	-	-	-	-	-	-	-	COT GEN NAL	AUG AMX OFL NIT -
7c	*Esherichia coli*	+	-	-	-	-	-	-	-	- COT NAL	OFL AUG AMX NIT GEN
8c	*Esherichia coli*	+	-	-	-	-	-	-	-	GEN - NIT NAL	AUG OFL AMX COT
9c	*Esherichia coli*	+	-	-	-	-	-	-	-	NIT COT AMX OFL	GEN AUG NAL -
10c	*Esherichia coli*	+	-	-	-	-	-	-	-	COT - GEN	OFL AUG NAL NIT AMX
11c	*Esherichia coli*	+	-	-	-	-	-	-	-	AMX COT -	OFL AUG NAL NIT GEN

12c	*Escherichia coli*	+	-	-	-	-	-	-	-	COT AUG - NAL	OFL AMX NIT GEN
13c	*Escherichia coli*	+	-	-	-	-	-	-	-	GEN - COT	AUG NIT NAL OFL AMX
14c	*Staphylococcus species*	-	-	-	-	-	-	-	-	COT - CHL	ERY CXC AUG AMX GEN
15c	*Escherichia coli*	+	-	-	-	-	-	-	-	AMX COT - NAL	OFL AUG NIT CIP
16c	*No Bacteria Growth*										
17c	*Escherichia coli*	+	-	-	-	-	-	-	-	COT - NAL NIT	OFL AUG AMX
18c	*Proteus mirabilis*	-	-	-	-	-	-	-	-	- COT GEN	OFL AUG AMX NIT NAL
19c	*Escherichia coli*	+	-	-	-	-	-	-	-	GEN NIT NAL	OFL AUG AMX COT -
20c	*No Bacteria Growth*										
21c	*Escherichia coli*	+	-	-	-	-	-	-	-	COT NIT NAL OFL AMX	GEN - AUG
22c	*Escherichia coli*	+	-	-	-	-	-	-	-	COT NIT NAL	OFL AUG AMX - GEN
23c	*Escherichia coli*	+	-	-	-	-	-	-	-	COT - NAL	OFL AUG AMX NIT GEN
24c	*Escherichia coli*	+	-	-	-	-	-	-	-	NIT COT GEN	OFL NAL – AUG AMX
25c	*No Bacteria Growth*										
26c	*Escherichia coli*	+	-	-	-	-	-	-	-	AMX AUG -	AOF NIT NAL COT
27c(i)	*Proteus mirabilis*	-	-	-	+	-	-	-	-	COT - GEN NAL	OFL CXC AUG AMX NIT

											NIT CIP
16c	*No Bacteria Growth*										
17c	*Esherichia coli*	+	-	-	-	-	-	-	-	COT - NAL NIT	OFL AUG AMX
18c	*Proteus mirabilis*	-	-	-	-	-	-	-	-	- COT GEN	OFL AUG AMX NIT NAL
19c	*Esherichia coli*	+	-	-	-	-	-	-	-	GEN NIT NAL	OFL AUG AMX COT -
20c	*No Bacteria Growth*										
21c	*Esherichia coli*	+	-	-	-	-	-	-	-	COT NIT NAL OFL AMX	GEN - AUG
22c	*Esherichia coli*	+	-	-	-	-	-	-	-	COT NIT NAL	OFL AUG AMX - GEN
23c	*Esherichia coli*	+	-	-	-	-	-	-	-	COT - NAL	OFL AUG AMX NIT GEN
24c	*Esherichia coli*	+	-	-	-	-	-	-	-	NIT COT GEN	OFL NAL – AUG AMX
25c	*No Bacteria Growth*										
26c	*Esherichia coli*	+	-	-	-	-	-	-	-	AMX AUG -	AOF NIT NAL COT
27c(i)	*Proteus*	-	-	-	+	-	-	-	-	COT - GEN	OFL

27c(ii)	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX COT -	OFL AUG NIT NAL GEN
28c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL AUG AMX NIT GEN
30c	*Klebsiella species*	+	-	-	-	-	+	+	+	NAL NIT COT -	OFL AUG AMX GEN CXM
31c	*Escherichia coli*	+	-	-	-	-	-	-	+	- NAL GEN	OFL AUG AMX NIT COT
32c	*No Bacteria Growth*										
33c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT GEN -	OFL AUG AMX NIT NAL
34c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NIT -	OFL AMX AUG NAL GEN
35c	*Psuedomonas aeruginosa*	-	-	-	-	+	-	-	+	COT - NIT AMX NAL	OFL AUG CXM
36c	*Klebsiella species*	-	-	-	-	-	+	+	+	- COT AMX	NIT OFL AUG NAL GEN
37c	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX NAL COT	OFL AUG NIT - GEN
38c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT -	OFL AUG AMX NIT NAL - GEN
39c	*No Bacteria Growth*										
40c	*Escherichia coli*	+	-	-	-	-	-	-	+	NAL GEN NIT	OFL AUG AMX - COT
41c	*Escherichia coli*	+	-	-	-	-	-	-	+	NAL GEN NIT -	OFL AUG AMX COT

43c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL AUG AMX GEN NIT
43c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL AUG AMX GEN NIT
44c	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT GEN NAL AMX	OFL COT AUG -
45c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - GEN	OFL AUG AMX NIT NAL
46c	*Escherichia coli*	+	-	-	-	-	-	-	-	NIT GEN COT -	OFL AUG AMX NAL NIT
47c	*No Bacteria Growth*										
48c	*No Bacteria Growth*										
49c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT GEN -	OFL AUG AMX NAL NIT
50c	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX AUG COT NAL	OFL NIT GEN -
51c	*No Bacteria Growth*										
52c	*Escherichia coli*	+	-	-	-	-	-	-	-	COT -	OFL NIT GEN - NIT AMX
54c	*Proteus mirabilis*	-	-	-	+	-	-	-	+	NAL COT NIT -	OFL AUG AMX GEN CIP
55c	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX COT NIT NAL	OFL AUG GEN -
56c	*No Bacteria Growth*										
57c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT GEN OFL NAL - AMX	AUG GEN NIT
58c	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN COT -	AUG AMX NIT NAL OFL

59c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL NIT	OFL AUG AMX GEN
61c	*Escherichia coli*	+	-	-	-	-	-	-	+	- GEN COT	OFL AUG AMX NAL NIT
62c	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT GEN NAL	OFL AUG AMX NIT
63c	*Escherichia coli*	+	-	-	-	-	-	-	+	NAL NIT GEN	OFL AUG AMX COT -
64c	*No Bacteria Growth*										
65c	*No Bacteria Growth*										
66c	*Escherichia coli*	+	-	-	-	-	-	-	+	- COT AMX NAL	OFL AUG NIT GEN
67c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT -	OFL AUG NIT NAL GEN AMX
68c	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT COT NAL - GRN	OFL AUG AMX CXM
69c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL GEN	OFL AUG AMX NIT
70c	*No Bacteria Growth*										
71c	*No Bacteria Growth*										
72c(i)	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT NAL -	AUG AMX OFL COT GEN
72c(ii)	*Staphylococcus species*	-	-	-	-	-	-	-	+	CXC COT ERY -	CHL AMX AUG GEN
73c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL AUG AMX NIT GEN
74c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - AUG OFL	NIT AMX NAL GEN
75c	*Klebsiella specie*	-	-	-	-	-	+	+	+	COT NAL - NIT	OFL AUG AMX PEF

76c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL NIT AUG AMX
77c	*No Bacteria Growth*										
78c	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX NAL NIT	OFL AUG COT - GEN
80c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NAL NIT	OFL AUG AMX GEN -
81c(i)	*Klebsiella species*	-	-	-	-	-	+	+	+	- GEN AMX NIT	OFL AUG COT
81c(ii)	*Streptococcus species*	-	-	-	-	-	-	-	+	COT AUG AMX	GEN NIT NAL OFL
82c	*Proteus mirabilis*	-	-	-	+	-	-	-	+	COT - GEN	OFL AUG AMX NIT NAL
83c	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT COT -	OFL AUG AMX GEN -
84c	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN COT - NAL	OFL AUG AMX NIT
85c	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX COT GEN	OFL AUG AMX NIT NAL
86c	*No Bacteria Growth*										
87c	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN AMX - NAL	OFL AUG NIT GEN
88c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT GEN	OFL AUG NIT NAL – AMX
89c	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT AUG COT -	OFL AMX NAL GEN
90c	*Proteus mirabilis*	-	-	-	+	-	-	-	+	NAL - GEN AMX	OFL AUG COT NIT
91c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL AUG GEN NIT

76c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL NIT AUG AMX
77c	*No Bacteria Growth*										
78c	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX NAL NIT	OFL AUG COT - GEN
80c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT NAL NIT	OFL AUG AMX GEN -
81c(i)	*Klebsiella species*	-	-	-	-	-	+	+	+	- GEN AMX NIT	OFL AUG COT
81c(ii)	*Streptococcus species*	-	-	-	-	-	-	-	+	COT AUG AMX	GEN NIT NAL OFL
82c	*Proteus mirabilis*	-	-	-	+	-	-	-	+	COT - GEN	OFL AUG AMX NIT NAL
83c	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT COT -	OFL AUG AMX GEN -
84c	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN COT - NAL	OFL AUG AMX NIT
85c	*Escherichia coli*	+	-	-	-	-	-	-	+	AMX COT GEN	OFL AUG AMX NIT NAL
86c	*No Bacteria Growth*										
87c	*Escherichia coli*	+	-	-	-	-	-	-	+	GEN AMX - NAL	OFL AUG NIT GEN
88c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT GEN	OFL AUG NIT NAL – AMX
89c	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT AUG COT -	OFL AMX NAL GEN
90c	*Proteus mirabilis*	-	-	-	+	-	-	-	+	NAL - GEN AMX	OFL AUG COT NIT
91c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NAL	OFL AUG GEN NIT

2c	*Escherichia coli*	+	-	-	-	-	-	-	+	- AMX NAL	NIT GEN COT
93c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT - NIT NAL	OFL AUG AMX GEN
94c	*No Bacteria Growth*										
95c	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT NAL	OFL AUG AMX GEN COT –
96c	*Pseudomonas aeruginosa*	-	-	-	-	+	-	-	+	OFL AUG AMX GEN COT - NAL NIT	CXM CIP
97c	*Escherichia coli*	+	-	-	-	-	-	-	+	COT GEN NAL	OFL AUG AMX NIT -
98c	*Escherichia coli*	+	-	-	-	-	-	-	+	- GEN NAL	OFL AUG AMX NIT COT
99c	*Escherichia coli*	+	-	-	-	-	-	-	+	- GEN COT NIT NAL	OFL AMX AUG
100c	*Escherichia coli*	+	-	-	-	-	-	-	+	NIT NAL - AMX	OFL AMX AUG COT GEN

AMX: - AMOCYCILLIN
NIT: - NITROFURANTON
NAL: - NALIDIXIC ACID
AUG: - AUGMENTIN
CHL: - CHLORAMPHENICOL
COT: - COTRIMOXAZOLE
GEN: - GENTAMICIN
OFL: - OFLOXACIN
ERY: - ERYTHROMYCIN
CXC: - CLOXACILLINE