An- Najah National University

Faculty of Graduate Studies

Prevalence of Asymptomatic bacteriuria among High risk group of pregnant women attending antenatal Clinic at Ramallah Governmental Hospital/Palestine

By
Majd Milhem

Supervisor
Abdalsalam Khayyat

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This Thesis was Defended Successfully on 29/9/2020 and approved by:

Defense Committee Members	Signature
1. Dr. Abdalsalam Khayyat/ Supervisor	
2. Dr. Rasha Al Hmouz/ External Examiner	
3. Dr. Zaher Nazzal / Internal Examiner	

Dedication

وصلت رحلتي في دراسة الماجستير إلى نهايتها بعد تعب ومشقَّة..
وها أنا ذا أختم بحث تخرُّجي بكل سعادة وامتنان.

امتن لكل من كان له فضل في مسيرتي،
إلى من أُفضِّلهم على نفسي، ولِمَ لا؛ فلقد ضحَّو من أجلي
ولم يدخروا جُهدًا في سبيل تقدمي على الدَّوام أُمِّي وابي سرين وعبد الحكيم ملحم.

إلى خالد الذكر العم محمد أبو شمعه.

إلى اخي وخواتي.

وطفلتي تيا ابو شمعة.

إلى أصدقائي، وجميع من وقفوا بجواري وساعدوني خلال هذه الرحلة
أُقدِّم لكم هذا البحث، وأتمنَّى أن يحوز على رضاكم.

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يسرني تقديم هذا الشكر لوالدي ووالدتي اللذان دعماني دائما دون تردد

و

أوجه شكري لكل من نصحني وساهم معي في إعداد هذا البحث بإيصالي للمراجع والمصادر المطلوبة في أي مرحلة من مراحله

و

أشكر على وجه الخصوص الدكتور عبد السلام الخياط والدكتور محمد الزيات على مساندتي وإرشادي خلال هذا البحث

الاقرار

انا الموقعة ادناه مقدمة الرسالة التي تحمل العنوان:

Prevalence of Asymptomatic bacteriuria among High risk group of pregnant women attending antenatal Clinic at Ramallah Governmental Hospital/Palestine

أقر بأن ما اشتملت عليه هذه الرسالة أنما هي نتاج جهدي الخاص، باستثناء ما تمت الاشارة اليه حيثما ورد، وأن هذه الرسالة ككل، أو أي جزء منها لم يقدم من قبل لنيل أية درجة علمية أو بحث علمي لدى أية مؤسسة تعليمية أو بحثية أخرى.

Declaration

The work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name: اسم الطالبة: محمد الكريم عالم

Signature: التوقيع: محمد الكريم عالم

Date: التاريخ: ٢٠٠٩/٩/١٩

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List of Abbreviation

ASB	Asymptomatic Bacteriuria
UTI	Urinary Tract Infection
CFU	Colony Forming Unit.
PTB	Preterm Birth
LBW	Low Birth Weight
PTL	Preterm Labor
ANC	Antenatal Care
HPF	High Power Field
GBS	Group B Streptococcus
AUG	Amoxycillin-clavulanat
IPM	Imipenem
CAZ	Ceftazidime
CRO	Ceftriaxone
CTX	Cefotaxime
CXM	Cefuroxime
CL	Cefaclor
NOR	Norfloxacin
CIP	Ciprofloxacin
F	Nitrofurantoin
AK	Amikacin
SXT	Sulfamethoxazole-Trimethoprim
Obs & Gyna	Obstetrics and Gynecology

Prevalence of Asymptomatic bacteriuria among High risk group of pregnant women attending antenatal Clinic at Ramallah Governmental Hospital/Palestine

By
Majd Milhem
Supervisor
Abdalsalam Khayyat
Co- Supervisor
Dr. Mohamed Elzayat

Abstract

Background:

Urinary tract infection is an infection affects part of the urinary tract involving the upper or the lower urinary tract; Urinary tract infection does not every time cause signs and symptoms, it may be symptomatic or asymptomatic if the urine contains a significant number of bacteria (10^5 CFUs/1ml) but there are no symptoms, this condition is known as asymptomatic bacteriuria. ASB during pregnancy can enhance the complications like pyelonephritis, prematurity, and low birth weight

Objectives:

To determine the prevalence of bacteriuria among pregnant females booking at Ramallah Governmental Hospital/Palestine as well as the most common causative for ASB. and the antibiotic sensitivity patterns of bacterial isolates.To determine the relation between the ASB and risk factors; socioeconomic level, personal hygiene, and other factors.

Methods:

A cross-sectional study was conducted in a total of 113 pregnant women with no signs or symptoms of the urinary tract infection. Samples of 10 - 15 ml of clean catch mid-stream urine were collected from the participants using sterilized cups. Urine samples were cultured by using standard bacteriological methods. Identification of the causative pathogens and the antibiotic sensitivity testing were made.

Results:

Out of 113 pregnant women, 38 cases (34%) were positive for asymptomatic bacteriuria. There was statistically significant relation between the direction of washing genitals, changing underwear, sexual activity per week and ASB. Escherichia coli was the most isolated bacteria followed by Staphylococcus aureus. Nitrofurantoin showed 100% sensitivity while 66% of the isolates were resistant to Cefaclor.

Conclusions:

The Prevalence of ASB seen in pregnant women in Ramallah Governmental Hospital/Palestine was 34%. Escherichia coli and Staphylococcus aureus are the commonest organisms isolated. A most sensitive test for its detection is urine culture, Direction of washing genitals and sexual activity significantly influence the risk of ASB.

Recommendations:

Pregnant women should be early screened for asymptomatic bacteriuria during pregnancy by microscopy quantitative midstream urine culture; appropriate treatment should be given for positive cases according to antibiotic sensitivity tests.

Nitrofurantoin was recommended to be used as a first-line drug as it is safe, cheap, efficient and very beneficial in the treatment of UTI during pregnancy.

Keywords: Asymptomatic Bacteriuria; Palestine t; Urinary Tract Infection; Urine Culture Nitrofurantoin.

Chapter 1
Introduction

Asymptomatic bacteriuria (ASB) is a common health problem in women and increases in prevalence with age and/or sexual activity, due to the short urethra, pregnancy and easy contamination of urinary tract (UT) with fecal flora ***(Kerure et al., 2013).***

ASB is found in 2-11% of pregnant women ***(Elzayat et al., 2017).*** Detection of ASB in antenatal women is important; if ASB left undiagnosed, 30–40% of pregnant women develop acute pyelonephritis compared with 3–4% of treated patients ***(Matuszkiewicz-Rowińska et al., 2015).*** Pyelonephritis is associated with preterm labor ***(Rahimkhani et al., 2008).***, which is one of the main causes of the neonatal mortality and morbidity worldwide while early treatment will avoid up to 20% of PTL ***(Kazemier et al., 2012; Shruthi, 2015).***

ASB is defined as the presence of at least 10^5 colony-forming units (CFU)/ml of one or two bacterial species in a clean-voided midstream urine sample from an individual without symptoms of UTI ***(Elzayat et al., 2017).***

Pregnant women are two times more commonly affected than age-matched non-pregnant females. This is due to urinary stasis due to progesterone effect in pregnancy in addition to different morphological and physiological changes occurring during pregnancy ***(Chandel et al., 2012).***

The prevalence of ASB is about 3 times higher in diabetic women (ranging from 15-30%) than (10%) in non-diabetic women ***(Sharma et al., 2012).***

Urine culture is the gold standard screening technique for ASB during pregnancyGram- negative bacteria were mainly responsible for ASB. The most common infecting organism is *Escherichia coli*, which is responsible for 75-90% of bacteriuria during pregnancy, followed by *Klebsiella* spp., *Enterobater,* and *Pseudomonas aeruginosa* ***(Elzayat et al., 2017).***

Gram-positive organisms have recently received more attention as causing bacteriuria and UTI. Although they are seen in small numbers during pregnancy, they are recognized as important causes of UTI ***(Fareid, 2012).***

Early detection and treatment are of considerable importance not only to prevent acute pyelonephritis and chronic renal failure in the mother but also to reduce prematurity and fetal mortality ***(Girishbabu et al., 2011).***

Antibiotic-resistant organisms that cause community-acquired UTI include gram-negative organisms particularly those species that produce *Amp C* enzymes or extended-spectrum β-lactamases (ESBLs), Urea-splitting organisms such as *Proteus* spp., *Morganella morganii* and *Providencia* are often found in patients with indwelling devices. Gram-positive cocci such as methicillin-resistant *S. aureus*, methicillin-resistant coagulase-negative staphylococci, and vancomycin-resistant enterococci are also problematic ***(Pallett and Hand, 2010).***

Antenatal care services in Palestine, Antenatal care is a group of organized and systemic health services offered to pregnant women during the period of pregnancy. The aim of these services is to ensure the safety of pregnancy and make sure that pregnant woman receive their physiological needs, which are found in various parts of the homeland. Palestinian antenatal care system covers four main areas: health promotion, screening, intervention and follow-up and regular ultra sounds, blood tests, folic acid, iron supplementation and etc. Women are assessed for risk factors, pregnancy-related hypertension, diabetes mellitus, anaemia, and are provided with needed medical care.

Pregnant women were encouraged to have their first antenatal visit as early as possible and to have at least five to eight antenatal care visits throughout their pregnancy to follow up the basic signs of pregnancy and early detection of complications that might arise or problems that might threaten the health of the baby or the mother or to diagnose problems and provide medical treatment. Pregnant women receive a comprehensive initial physical examination and regular follow-up care. Women are classified according to their risk status for individualized management.

99% of the women in the Occupied Palestinian Territories reported that they received Antenatal care and benefited from the services offered by the various health care institutions 86% of women who gave birth during the period between 2001 and 2006 and who received Antenatal care said

they started receiving antenatal care in the first third of pregnancy *(Maternal and Child Health Journal, Volume 10, pp. 67-72(6).*

In Palestine, screening for ASB in pregnancy0 is not viewed as an essential component of antenatal care; and as a result, there is little understanding of the prevalence of ASB. Accordingly, this study conducted in **Ramallah Governmental Hospital** sought, to determine the prevalence of ASB during pregnancy, identify the causative organisms involved, their relative proportions, their antibiotic sensitivities and to determine the relation between ASB and selected risk factors; with the aim of making recommendations to improve obstetric practice.

1.2 Significance of the study:

❖ To evaluate the frequency of asymptomatic bacteriuria among pregnant women attending Gynecology and Obstetrics Clinic of **Ramallah Governmental Hospital** for antenatal care

1.3 Study objectives:

❖ To determine the affiliation of the following factors on the prevalence of asymptomatic bacteriuria:

- Multiparity role in asymptomatic bacteriuria.
- Each trimester of pregnancy also on the age group ranged from 18 to 45 years.

❖ Other variable effects:

- Socioeconomic level.
- Educational level.
- Regular changing of underwear.
- The direction of washing the genitals after defecation.
- The frequency of sexual intercourses during pregnancy.
- To recognize the most common causative organisms, the percentage occurrences of isolated bacteria and Antimicrobial susceptibility.

Chapter 2

Literature Review

Asymptomatic bacteriuria in pregnancy

2.1 Background:

Urinary tract infections in pregnancy are classified as either symptomatic or asymptomatic. Symptomatic urinary tract infections divided into lower tract (acute cystitis) or upper tract (acute pyelonephritis) infections. Acute cystitis defined as acute bacterial invasion of bladder mucosa and acute pyelonephritis defined as sudden infection and inflammation of kidney tissue, calyces, and renal pelvis which characterized by exudative purulent localized inflammation accompanied by fever, groin pain, pus or blood in urine and bacteriuria ***(Matuszkiewicz-Rowińska et al., 2015).*** **Figure 1** ***upper and lower UTI.***

Asymptomatic bacteriuria is defined as presence of persistent and actively multiplying bacteria in positive urine culture presenting a significant count of pathogen that is greater than or equal to 10^5 colony-forming units per mL (10^5 CFUs/1ml) without any obvious symptoms of UTI ***(Demilie et al., 2014),*** except in the case of growth of Staphylococcus aureus ;which even 10^2 CFUs per ml were considered as significant ***(Chandel et al., 2012).***

If there are more than 10^5 CFU/ml in a clean-catch urine, there is 80% probability that it is true bacteriuria. If two different samples demonstrate the same specimen at least $\geq 10^5$ CFU/ml, the probability increases to 95%,

However, after 7-10 days, the second culture will be positive only in about 65%. This observation supports the possibility of spontaneous resolution of ASB ***(Bennett et al., 2014).***

ASB can be seen in a pregnant and non-pregnant woman with a similar incidence in both but, pregnancy can enhance the complications (Shruthi, 2015).

Up to 30-40% of pregnant women with asymptomatic bacteriuria have a high chance to develop acute pyelonephritis (Mokube et al., 2013).

Pregnancy enhances the progression from ASB to symptomatic bacteriuria (SB). ASB needs special attention, due to lack of symptoms and its adverse consequences in pregnancy, which could lead to pyelonephritis and adverse obstetric outcomes ***(Kerure et al., 2013).***

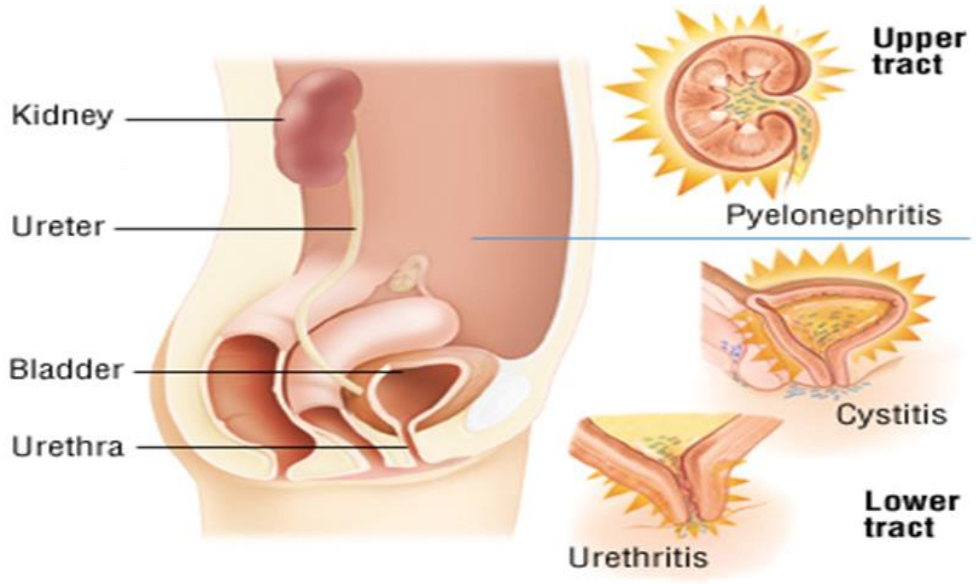

Figure 1: Upper and lower uriniry tract infection . ***(Sharma, 2012).***

2.2 Causative Organisms:

The etiologic agents that identified with bacteriuria are similar in pregnant and non-pregnant women. Since the female urethra is short leading to an increase in the frequency of colonization with organisms from the gastrointestinal tract ***(Schnarr, 2008; Juhi et al., 2016).Figure 2.***

E. coli is the most common organism isolated from patients with ASB. However, the infecting organisms are diverse, within *Enterobacteriaceae; Proteus, Klebsiella, Enterobacter, Citrobacter* species, *Pseudomonas aeruginosa,* gram-positive organisms, as staphylococci, group B streptococcus (GBS), *Enterococcus* species and others; *Gardnerella vaginalis and Ureaplasma urealyticum* ***(Macejko and Schaeffer, 2007).***

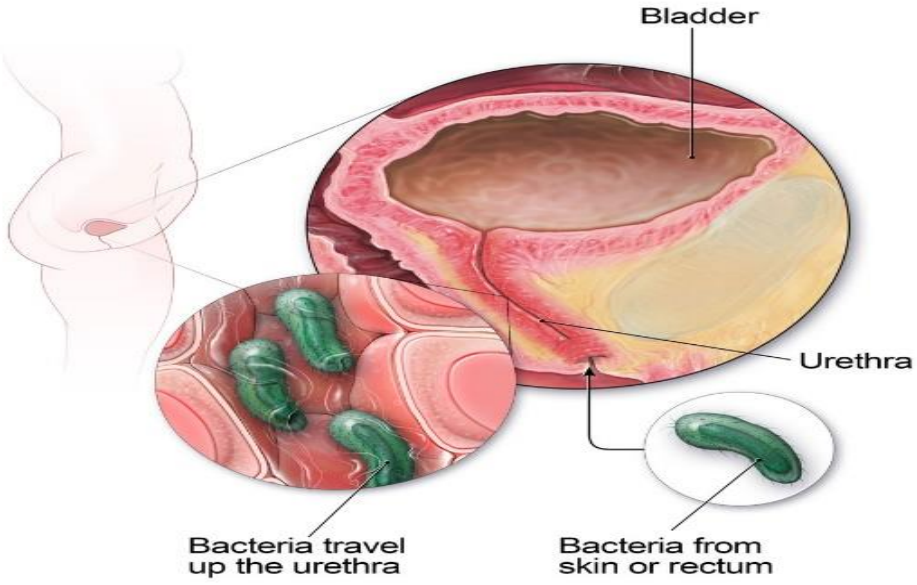

Figure 2: Contamination of the urinary tract by bacteria from skin or rectum. ***(Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)).***

2.3 Prevalence:

ASB is common, but the prevalence in populations varies widely with age, sex, and the presence of genitourinary abnormalities. For healthy women, the prevalence of bacteriuria increases with advancing age, the prevalence of ASB is 2-11 % among pregnant mothers, as revealed by different studies, 10% of those with asymptomatic bacteriuria progress into symptomatic bacteriuria during pregnancy, while If asymptomatic bacteriuria is missed untreated up to 30–40% of mothers develop acute pyelonephritis compared with 3–4% in treated patients ***(Matuszkiewicz-Rowińska et al., 2015; Elzayat et al., 2017).***

2.4 Risk Factors:

Whether bacteriuria becomes symptomatic UTI or ASB is determined by the interplay of the host response to the pathogen and the virulence of the organism ***(Trautner, 2012; Nicolle, 2014).***

A) Host factors:

They include genetic predisposition, sex (female, pregnancy, sexual activity, and method of contraception), age and parity, diabetes mellitus, anemia, HIV, socioeconomic status, and poor genital hygiene ***(Desalegn et al., 2018).***

1) Genetic predisposition:

The innate immune response of the UT to bacterial invasion involves Toll-like receptors (TLRs) that recognize pathogens and chemokine receptors that trigger neutrophil recruitment ***(Ragnarsdottir et al., 2008). Figure 3.***

Hernandez *et al.*, 2011 suggested that the host-specific immune response to ASB is mainly determined through innate immune mediators. The host immune response is less vigorous with ASB than with symptomatic infection. Polymorphism of receptors involved in the inflammation process seems to be involved in the degree of susceptibility to developing symptomatic UTI ***(Hernández et al., 2011).***

After binding to uroepithelial cell receptors and expression of virulence factors by uropathogens, TLRs are activated. Subsequently, they activate the innate immune response, along with the production of cytokines ***(Fischer et al., 2006).***

TLR4 is a receptor expressed on neutrophils and shown to play an important role in the host response to uropathogens. TLR4 is the host immunity factor with the best-defined relationship to ASB; reduced TLR4 expression and signaling are both associated with ASB in children ***(Fischer et al., 2006; Nielubowicz and Mobley, 2010).***

Certain polymorphisms in the TLR4 promoter can lead to an attenuated immune response, promoting the asymptomatic carrier state ***(Ragnarsdóttir et al., 2010).***

After binding of uropathogens to the receptor, the main cytokine involved in the response is IL-8, which binds to the CXCR1 receptor on the neutrophil plasma membrane. CXCR1 mediates the migration of uropathogens through the urothelial wall, leading to pyuria. IL-8 levels in the blood have been

demonstrated to correlate positively with the number of neutrophils found in the urine during infection ***(Minardi et al., 2011).***

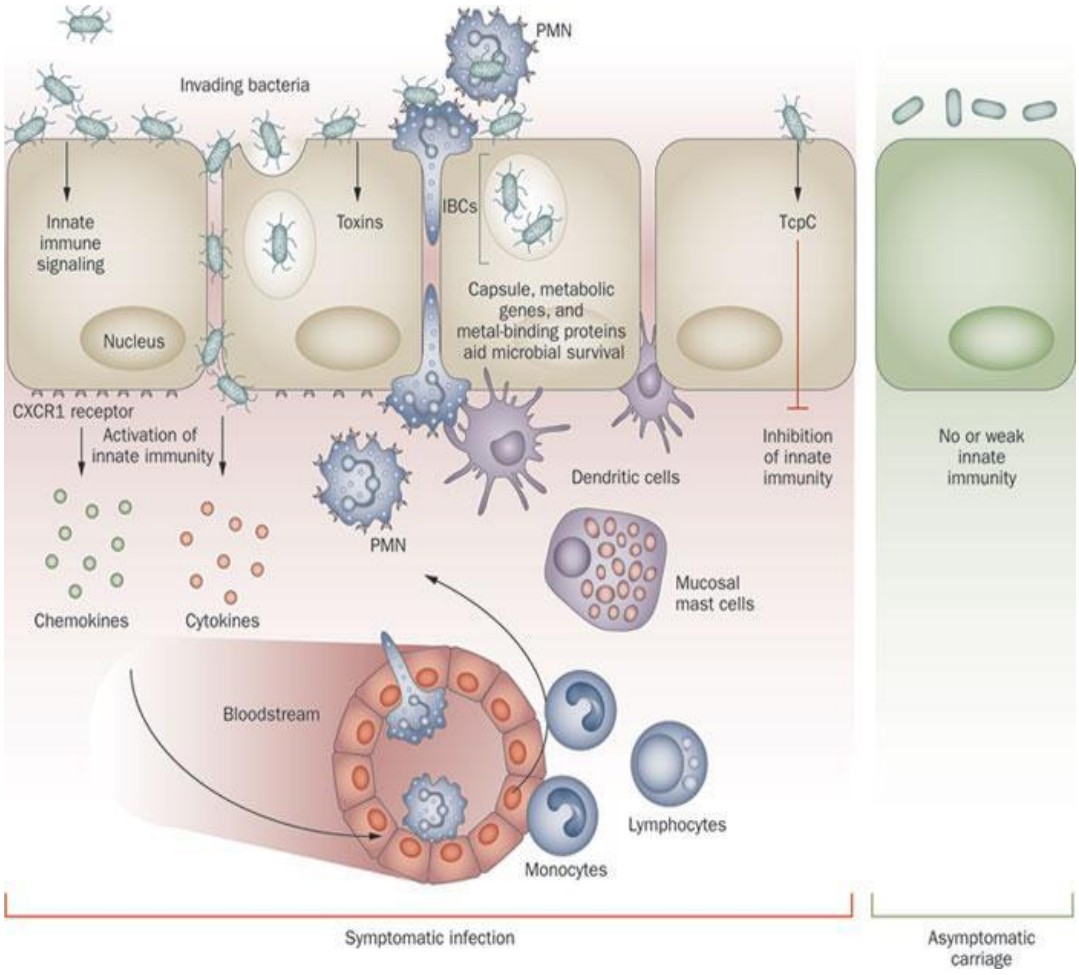

Figure 3: Immune response to symptomatic and asymptomatic UTI. ***(Ragnarsdóttir et al., 2011).***

2) Sex:

Urinary tract infection is more common between women than men ***(Emonet et al., 2011).***

The lifetime risk of catching urinary tract infections is higher about 50 percentages in women more than men. ***(Emonet et al., 2011).*** This dissimilarity is attributed to the following reasons:

- The urethra is shorter in females than males, the male urethra is about 20 cm in length, includes three parts: prostatic, membranous, and spongy, while the female urethra is about 4 cm in length, it is fused with the anterior wall of the vagina and ends between the clitoris and the vagina. The lower third of the urethra is continuously contaminated with pathogens from the vagina and the rectum because of the proximity of the anus to the vagina.
- Females tend not to empty their bladders as completely as males do.
- The female urogenital system is extra exposed to bacteria during sexual contact.
- It has been assessed that one in three women of childbearing age can catch UTI and especially during pregnancy, women are more liable to UTI owing to the different anatomical and physiological state throughout the pregnancy. ***(Tadesse et al., 2014a).***

Women tend to have ASB more often than men because bacteria can reach the bladder more easily in women. This is partially due to the short and wider female urethra and its proximity to the anus. Bacteria from the rectum can easily travel up the urethra and cause infections ***(Girishbabu et al., 2011).***

Pregnant women are two times more commonly affected than age-matched non-pregnant females. This is due to urinary stasis due to progesterone effect in pregnancy in addition to different changes occurring during pregnancy ***(Chandel et al., 2012).***

The higher rate of urine formation during pregnancy as an effect of the increased load of secretory products, with an increase in the glomerular filtration rate up to 50% or more in pregnancy ***(Cheung and Lafayette, 2013).***

Pregnancy is a unique state with anatomic and physiologic UT changes. The renal pelvis and ureters begin to dilate as early as the eighth week of pregnancy and the bladder itself is displaced superiorly and anteriorly ***(Ansari and Rajkumari, 2011).***

Mechanical compression from the enlarging uterus is the principal cause of hydroureter and hydronephrosis, but smooth muscle relaxation induced by progesterone results in decreased peristalsis of the ureters increased bladder capacity and urinary stasis ***(Elzayat et al., 2017). Figure 4.***

Decreased urine concentration resulting from increased plasma volume, differences in urine pH and osmolarity and pregnancy-induced glycosuria and aminoaciduria may facilitate bacterial growth ***(Ansari and Rajkumari, 2011).***

ASB is common in sexually active females as the pathogen entry is facilitated by sexual activity ***(Girishbabu et al., 2011)***, women who are sexually active are six-times more likely to present with infection compared with women who are not sexually active.

The previous study showed that women who use spermicides for birth control have an increased vaginal pH and increased colonization with potential uropathogens, particularly *E. coli* ***(Stapleton, 2017).***

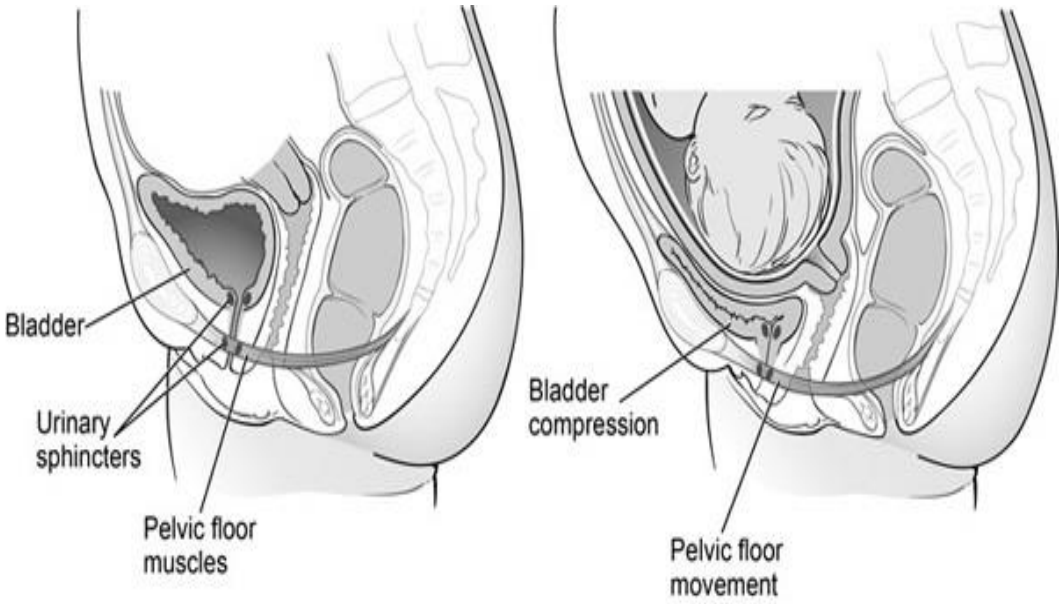

Figure 4: Mechanical compression from the expanding uterus during pregnancy.
source:https://my.clevelandclinic.org/health/diseases/5745-pregnancy-childbirth-and-bladder-control.

3) Age and parity:

Girishbabu et al., (2011) found that the prevalence of ASB increases with higher parity and advancing age. There is a strong association between anatomical and functional alterations of bladder emptying and recurrent UTI. After menopause, there is a significant reduction in estrogen secretion by the ovary, which is often associated with vaginal atrophy. Estrogens stimulate proliferation of *Lactobacillus* in the vaginal epithelium, causing reduction of vaginal pH, thereby preventing vaginal colonization by *Enterobacteriaceae*. In addition, the absence of estrogens decreases the volume of the vaginal muscles, resulting in relaxation of the ligaments holding the uterus, pelvic floor, and bladder, resulting in prolapse of the internal genitalia ***(Girishbabu et al., 2011; Minardi et al., 2011).***

4) Diabetes mellitus:

The chronic consequences of diabetes mellitus on the genitourinary system are generalized vascular disease including renal artery stenosis, diabetic nephropathy, different degree of glucosuria and abnormal function of the immune system. Diabetic neuropathy involving the UT may be a potential mechanism that could increase the risk of UTI in diabetics, because it may result in dysfunctional voiding and urinary retention ***(Minardi et al., 2011).*** The prevalence of ASB is known to be higher in women with diabetes mellitus than in those without this disease ***(Renko et al., 2011).***

5) Anemia:

Kremery *et al.*, (2001) found that bacteriuria in pregnancy was associated with maternal anemia, but ***Jain et al., (2013***) did not find any association between bacteriuria and anemia ***(Jain et al., 2013).***

Severe anemia predisposes to infection particularly during pregnancy especially reproductive tract and UTI. Hemolysis with subsequent anemia in pregnant women with pyelonephritis is caused by lipopolysaccharide-induced red blood cell membrane damage ***(Jabbar, 2006).***

6) HIV:

Mokube et al. reported that bacteriuria was found to be more prevalent in HIV-positive cases (20.4%) compared with (3%) in HIV-negative patients. But, this study was not specific to pregnant women. As well, risk factors other

than HIV were not taken into consideration ***(Mokube et al., 2013).***

7) Socioeconomic status:

The prevalence of ASB is most closely related to low socioeconomic status, which is a common predisposition in both pregnant and non-pregnant women due to impaired personal hygiene ***(NICE Clinical Guidelines, 2008).***

8) Poor genital hygiene:

pregnant women find it problematic to clean their anus properly after defecating or after urination and the direction of cleaning and drying of the perineum after intercourse is another risk factor which promotes bacterial infection because most of the bacteria that causing bacteriuria is in fecal flora ***(Obiora et al., 2014).***

B) Organism factors:

It is not well understood why patients with ASB do not develop symptoms, while the organisms are the same types of bacteria that cause UTI. One possible mechanism is that bacteria with decreased virulence may colonize the urine rather than cause asymptomatic infection ***(Smaill, 2007).***

In ASB, *E. coli* is the most common organism which is responsible for 75-90% of bacteriuria during pregnancy, with other gram-negative rods and certain gram-positive organisms including *S. saprophyticus* and enterococci occasionally being isolated ***(Smaill, 2007; Girishbabu et al., 2011).***

Specific virulence factors in uropathogenic strains *E. coli* (UPEC), including toxins, adhesins, pili or fimbriae that allow adherence to uroepithelial

cells and prevent bacteria from urinary lavage allowing for multiplication and tissue invasion, are associated with invasive infection and pyelonephritis in pregnancy.

However, the frequency of virulence-associated determinants is lower in *E. coli* associated with ASB compared to pyelonephritis. Only 22% of strains of *E. coli* isolated from women with ASB had the capacity to adhere to uroepithelial cells compared with 75% in the group of women who developed acute pyelonephritis ***(Smaill, 2007).***

GBS is an uncommon cause of true UTI, and its isolation from the urine in pregnancy reflects heavy vaginal colonization. There is an association between GBS bacteriuria and preterm rupture of membranes, premature delivery, and early-onset neonatal sepsis ***(Kessous et al., 2012; Ipe et al., 2013).***

S. saprophyticus is a common UTI pathogen in younger women. It is reported to colonize the rectum and, to a lesser extent, the cervix and urethra in a small proportion of women ***(Minardi et al., 2011)***, however, the importance of this organism in asymptomatic pregnant women has not been established. *S. aureus* is not considered a typical uropathogen. Specialized culture techniques have identified anaerobic organisms and other fastidious microorganisms in a large percentage of pregnant women, but the significance of these organisms from the urine and perinatal outcomes has not been systematically studied. Up to 15% of pregnant women will have *U. urealyticum* and *G. vaginalis* isolated from bladder urine ***(Smaill, 2007).***

2.5 Complications:

ASB was linked to a long list of pregnancy complications that can be classified into maternal and fetal complications.

I. Maternal Complications:

Maternal complications which associated with asymptomatic bacteriuria are short-term complications of symptomatic lower tract infection or pyelonephritis, and longer-term complications, such as urolithiasis, hypertension, genitourinary malignancy, renal failure, and death. Others possibilities are pre-eclampsia, advanced cervical dilatation, chorioamnionitis, and anemia. ***(Hanna et al., 2014).***

Pregnancy enhances the progression from ASB to SB which could lead to pyelonephritis which is a serious complication leading to severe morbidity, including multi-system derangement from endotoxemia and sepsis ***(Hill et al., 2005; Sheffield and Cunningham, 2005).***

Pyelonephritis in pregnancy has been associated with many perinatal complications including bacteremia, respiratory insufficiency, anemia, renal disease, hypertension, preterm labor and low birth weight ***(Hill et al., 2005).***

The most dramatic maternal complication associated with UTIs is bacteremia and septic shock, induced by resistant pyelonephritis ***(Matuszkiewicz-Rowińska et al., 2015).*** Endotoxin-mediated damage includes diminished peripheral vascular resistance and changes in

cardiovascular output. With the release of lipid, A of *E. coli* endotoxin into the maternal circulation, a cascade response of pro-inflammatory cytokines, histamine, and bradykinins is precipitated, which may lead to the more serious complications as septic shock, disseminated intravascular coagulation, respiratory insufficiency, and adult respiratory distress syndrome ***(Galajdova, 2010).***

Conde-Agudelo et al., (2008) found that there is a relationship between UTIs and pre-eclampsia. Several mechanisms have been proposed to explain how maternal infection might be involved in the etiology of pre-eclampsia or its manifestations. These include direct effects of the infectious agents on the arterial walls, including endothelial injury or dysfunction, acute atherosis, and local inflammation that might cause relative uteroplacental ischemia ***(Conde-Agudelo et al., 2008).***

The mechanism for an association between premature rupture of membranes in pregnant women and UTI can be explained by the release of metalloproteinases by macrophages, via cytokines which degrade the membranes predisposing them to rupture ***(Sayres Jr, 2010; Wax et al., 2010)***, in a similar way as do collagenases and phospholipases issued from bacteria ***(Bhutta et al., 2010).***

UTI during pregnancy can bathe the vagina with bacterial pathogens causing intra-amniotic infection and this is a recognized risk factor for neonatal sepsis. This observation is particularly true for GBS-related ASB ***(Anderson et al., 2007).***

II. Fetal Complications:

Fetal complications which associated with asymptomatic bacteriuria include intrauterine growth restriction, low birth weight, pre-term labor and premature rupture of membrane ***(Tadesse et al., 2014a).***

Jayalakshmi and Jayaram, (2008) showed that ASB can cause stillbirth, bacteriuria during pregnancy can even cause sudden unexpected infant death to women with UTI ***(Jayalakshmi and Jayaram, 2008).***

There is an association between GBS-bacteriuria and preterm rupture of membranes, premature delivery, and early onset neonatal sepsis ***(Ipe et al., 2013).***

2.6 Diagnosis of ASB in pregnancy

ASB is a microbiologic diagnosis based on the isolation of a specified quantitative count of bacteria in a properly collected specimen of urine from pregnant women without signs or symptoms of UTI.

Urine culture with colony count:

It is considered the gold standard method for diagnosis of ASB during pregnancy. However, it is expensive, require laboratory expertise and take 24–48 h for results to become available ***(Gayathree et al., 2010).***

A key aspect of the diagnosis of ASB is differentiating contamination from true bacteriuria. The original criterion for diagnosing ASB was equal or

more than 10^5 CFU/ml of a single uropathogen on two consecutive clean catch samples, with a 95% probability that the woman has true bacteriuria. The detection of $\geq 10^5$ CFU/ml in a single voided midstream urine is accepted as a more practical and adequate alternative, although there is only an 80% probability, the woman has true bacteriuria ***(Schnarr and Smaill, 2008).***

Although the majority of guidelines recommend a single urine culture at the first prenatal visit, two more recent prospective studies have concluded that urine should be cultured in each trimester of pregnancy to improve the detection rate of ASB ***(McIsaac et al., 2005; Tugrul et al., 2005; Matuszkiewicz-Rowińska et al., 2015).***

According to the **Center for Disease Control and Prevention (CDC),** asymptomatic bacteriuria must meet at least 1 of the following criteria ***(CDC, 2019)*** :

1- Patient has had an indwelling urinary catheter within 7 days before the culture and patient has a positive urine culture that is $\geq 10^5$ microorganisms per cc of urine with no more than 2 species of microorganisms without fever (>38˚C), urgency, frequency, dysuria, or suprapubic tenderness.

2- Patient has not had an indwelling urinary catheter within 7 days before the first positive culture and patient has had at least 2 positive urine cultures that are $\geq 10^5$ microorganisms per cc of urine with repeated isolation of the same microorganism and no more than 2 species of microorganisms without fever (>38˚C), urgency, frequency, dysuria, or suprapubic tenderness**.**

Other methods for detecting bacteriuria:

1) Pyuria:

Direct microscopic examination of urine for leukocytes count/HPF is rapid, inexpensive and requires little technical expertise; however, the sensitivity is generally low ***(Smaill, 2007).***

Pyuria is evidence of inflammation in the genitourinary tract and is common in subjects with ASB. Pyuria also accompanies other inflammatory conditions of the genitourinary tract in patients with negative urine culture results. These may be either infectious, such as renal tuberculosis and sexually transmitted diseases, or noninfectious, such as interstitial nephritis. Thus, by itself, the presence of pyuria is not sufficient to diagnose bacteriuria, and the presence or absence of pyuria does not differentiate symptomatic from ASB ***(Nicolle et al., 2005).***

2) Gram staining:

Gram staining is a promising rapid screening approach both in effectiveness and cost but *Lactobacilli*, the normal vaginal flora cannot be distinguished from pathogenic bacteria on microscopy in gram stain, which may decrease the specificity of the gram-stain screening test if the urine is contaminated ***(Ullah et al., 2012).***

3) Dipsticks:

Another approach for the screening of ASB, commonly used in many

countries in the world is dipstick-testing. These are leukocyte esterase test, nitrite test and combination, either or both positive, of the leukocyte esterase and nitrite tests. The dipstick leukocyte esterase test, which detects esterase released from degraded white blood cells, is an indirect test for bacteriuria. This test is sensitive (74 – 96%) but not very specific (59 – 98%) ***(Ramakrishnan and Scheid, 2005).***

The dipstick nitrite is a test for nitrate reductase organisms like coliform bacilli but not for non-nitrate reductase organisms like enterococci, some staphylococci, and some *P. aeruginosa*. It has variable sensitivity (35 – 85%) but good specificity of over 90%. The leukocyte esterase and nitrate reductase tests used in combination, either or both positive, have been found to have sensitivity and specificity of around 80% ***(Kline and Lewis, 2016).***

Although dipsticks are cheap, rapid tests and require little experience, they have repeatedly been shown to be unreliable diagnostic tools for ASB ***(Kacmaz et al., 2006; Rogozinska et al., 2016).***

4) Chlorhexidine test:

When chlorhexidine is added to a suspension of bacterial cells, it is immediately adsorbed on the bacterial surface. Even at low concentrations, there is a rapid and irreversible loss of cellular proteins and nucleic acid which causes their precipitation ***(Okonkwo et al., 2006).***

This is proved by cloudiness, precipitate or particulate matter in the contents of the test tube in which 5 drops of chlorhexidine are added to 10 drops of urine. A cloudy color indicated a positive result ***(Okusanya et al., 2014).***

The chlorhexidine test is cheap, simple to use by middle-level health personnel and requires no microscope or electricity. When used to detect bacteriuria in patients with UTI, it was very sensitive but had low accuracy and specificity, this is because chlorhexidine also reacts with other components of urine, such as cells and crystals. So, it cannot replace urine dipsticks in routine use for the detection of ASB ***(Okonkwo et al., 2006).***

Screening for ASB in pregnancy

Screening for asymptomatic bacteriuria through screening urine of all pregnant women during antenatal visits and treatment of bacteriuria has been considered as a significant maternal and neonatal intervention packages and components, it has been involved as one of the most cost-effective strategies to achieve the Millennium Development Goals(MDGs) for health ***(Evans et al., 2005).***

It`s necessary to screen ASB for prevention and early detection during pregnancy because of the high prevalence of asymptomatic bacteriuria during pregnancy. Also, it causes maternal and neonatal mortality and morbidity. Moreover, it will be difficult to describe antibiotics during pregnancy because of its adverse effect on the neonate ***(Schnarr, 2008).***

The guidelines in obstetric care screening recommend urine culture at the first prenatal visit while other prospective studies have reported that it is necessary to check the pregnant urine by culture in each trimester for early detection and follow-up of this condition in this important section of the population ***(Schnarr, 2008).*** There have been no evaluating studies of repeated testing during the whole pregnancy.

A prospective study in Sweden involved in 3254 pregnant females were examined to measure the risk of getting the bacteriuria during different period of gestation, the risk of acquiring bacteriuria during pregnancy from the 12th gestational week to the end of gestation was increased from 0.8% to 1.93% and the risk of acquisition was the maximum between the week 9th and 17th,therefore, the authors reported that the optimal time for screening was the 16th gestational week ***(Schnarr, 2008).***

The cost of the screening; in the United States, the costs of screening and treatment of asymptomatic bacteriuria and pyelonephritis during the pregnancy has been estimated to be about US$ 1605 and US$ 2864, respectively ***(Hazhir, 2007).***

Comparing the accuracy of screening tests: a systematic review of eight prospective studies concerning the accuracy of available tests for screening asymptomatic pregnant patients ,by comparing any one of these tests or combination of rapid urine test with the urine culture , the sum of these studies reported that there is no test accurate enough to alternate the urine culture for

screening of this serious clinical condition and no exact evidence to support using any screening tests other than quantitative urine culture for asymptomatic bacteriuria among pregnant women ***(Schnarr, 2008).***

Another study for comparing and analysis of the accuracy of the urine dipstick to exclude a urine infection of pregnant women were ten pregnant women included in the subgroup analyses of the accuracy of nitrites on. The authors determined that the accuracy of urine dipsticks for nitrites was high (diagnostic odds ratio = 165), urine dipsticks test is a negative test for both leukocyte esterase and nitrites that can exclude infection in the urine of pregnant women ***(Schnarr, 2008).***

Treatment

Early detection and treatment of ASB are of considerable importance not only to prevent acute pyelonephritis and chronic renal failure in the mother but also to reduce prematurity and fetal mortality in the offspring ***(Gayathree et al., 2010).***

However, on the other hand, unnecessary antibiotics, for example, fluoroquinolone overtreatment, may cause adverse effects including gastrointestinal effects, colonization by resistant pathogens and *Clostridium. difficile* infection ***(Werner et al., 2011).***

Common Drugs used in the treatment

An ideal antimicrobial agent should be orally administrable and able to achieve high urinary and tissue levels without producing any nephrotoxicity ***(Rizvi and Siddiqui, 2010).***

The antibiotic of choice should be safe in pregnancy, in circumstances when culture and sensitivity are not feasible, empiric, broad-spectrum treatment would be appropriate and when susceptibility is known, narrow-spectrum, specific antibiotic treatment would be appropriate ***(Trestioreanu et al., 2015).***

FDA pregnancy risk categories for drugs are:

- **Category A:** Generally acceptable. Controlled studies in pregnant women show no evidence of fetal risk.
- **Category B:** Maybe acceptable. Either animal studies show no risk, but human studies not available or animal studies showed minor risks and human studies done and showed no risk.
- **Category C:** Use with caution if benefits justify risks. Animal studies show risk on the fetus and human studies not available or neither animal nor human studies done.
- **Category D:** Use in life-threatening emergencies when no safer drug available. There is evidence of human fetal risk ***(Gradwohl et al., 2016).***

Treatment of ASB can be accomplished with a variety of FDA category B drugs including amoxicillin, cephalosporins, nitrofurantoin, and trimethoprim/sulfa. Fluoroquinolones FDA Category C, should generally not be

used during pregnancy.

1. Nitrofurantoin:

Nitrofurantoin has a broad antibacterial activity. It is active against *E. coli, Citrobacter* species, GBS, enterococci, *S. aureus, S. epidermidis, K. pneumoniae, and Enterobacter* species, but it is not active against *Proteus* spp. ***(Cunha et al., 2011; Munoz-Davila, 2014).***

Nitrofurantoin appears safe in all trimesters of pregnancy. There is a low level of resistance to nitrofurantoin among uropathogens. Nitrofurantoin has been shown to effectively treat ASB, it attains therapeutic concentrations in the urine and is suitable for treating ASB and acute cystitis, however, it is not appropriate for treating pyelonephritis because it does not achieve adequate tissue penetration ***(Goldberg et al., 2013, 2015).*** It may cause hemolytic anemia in patients who have glucose-6-phosphate dehydrogenase deficiency ***(Guinto et al., 2010; Smaill and Vazquez, 2015).***

2. Trimethoprim-Sulfamethoxazole (Co-trimoxazole):

Trimethoprim should be avoided in the first trimester because it is a folic acid antagonist associated with increased risk of neural tube defects ***(Macejko and Schaeffer, 2007).*** Sulfonamides are best avoided in the third trimester because they may cause neonatal jaundice. Sulfonamides could displace bilirubin from albumin-binding sites and could cause severe jaundice leading to kernicterus. Acute hemolytic anemia is another complication that could occur in

newborns with glucose-6-phosphate dehydrogenase deficiency ***(Guinto et al., 2010).***

3. Penicillins

Penicillins are considered safe to use in pregnancy. However, the use of broad-spectrum antibiotics should be avoided when a narrow spectrum antibiotic would be more appropriate ***(Trestioreanu et al., 2015).***

There are concerns that broad-spectrum antibiotics increase the risk of *C. difficile*, methicillin-resistant *S.aureus* and resistant UTIs. *C. difficile* infection can be life-threatening in pregnant women ***(Werner et al., 2011).***

Ampicillin is clinical effective because it is highly concentrated in the urine, but high resistance rates limit its use as a single agent. *E. coli* has become increasingly resistant to ampicillin, Amoxicillin is not suitable for empirical therapy as there is high resistance to it ***(Alanazi et al., 2018).***

Amoxicillin-clavulanate: Amoxicillin interferes with the synthesis of cell wall mucopeptides during active multiplication, resulting in bactericidal activity against susceptible bacteria. Clavulanic acid is a β-lactamase inhibitor. This drug combination treats bacteria normally resistant to beta-lactam antibiotics ***(Wisher, 2012).***

4. Cephalosporins:

Cephalosporins, although expensive, are safe in pregnancy Currently, most cephalosporins have both oral and parenteral combinations and have been

noted to be the first line drug for pyelonephritis and the most commonly used antimicrobials for symptomatic UTI in hospital settings ***(Onoh et al., 2013).***

Cephalexin is a first-generation cephalosporin that inhibits bacterial growth by inhibiting bacterial cell wall synthesis ***(Gradwohl et al., 2016).*** They have good activity against a wide spectrum of Gram-positive bacteria including penicillinase-producing *Staphylococci*. However, they are not active against methicillin-resistant *S. aureus* or *Enterococci* ***(Wisher, 2012).***

Cefuroxime is a second-generation cephalosporin. It is more stable to hydrolysis by beta-lactamases produced by Gram-negative bacteria, and therefore have enhanced activity against many of the *Enterobacteriaceae*. Cefuroxime has the ability to cross the placenta after the second trimester of pregnancy, without fetal toxic side-effects ***(Sipos et al., 2011).***

5. Quinolones:

Quinolones are best avoided in pregnancy because of their renal toxicity to the fetus. Acquired resistance to nalidixic acid may readily occur and together with its derivatives the quinolones, are considered teratogenic and are therefore not recommended ***(Guinto et al., 2010).***

Fluoroquinolones are commonly prescribed for the treatment of UTI. They include norfloxacin, ciprofloxacin, and levofloxacin. They are expensive and have been associated with teratogenicity in the first trimester and risk of auditory and vestibular toxicity in the fetus in later trimesters. They have been

shown to impair cartilage development in animal studies. Although this adverse effect has not been described in humans, fluoroquinolones should be avoided in pregnancy. However, for recurrence and persistent UTI, quinolones could be used with caution in late pregnancy or postpartum after counseling, especially if it is the only sensitive drug ***(Schnarr and Smaill, 2008; Onoh et al., 2013).***

6. Aminoglycosides:

The advantage of using an aminoglycoside is that high renal parenchymal concentration is obtained, but there is a theoretical risk of ototoxicity and nephrotoxicity in the fetus because the drug crosses the placenta ***(Schnarr and Smaill, 2008).***

7. Tetracyclines:

Exposure to tetracycline since week 13 following conception affects the color of deciduous teeth, which appear yellowish and even darker: brown or gray-brown ***(Sipos et al., 2011).***

8. Fosfomycin

Fosfomycin is a derivative of phosphonic acid which is a bactericidal agent active against most UTI pathogens, including *E. coli,* enterococci, *Citrobacter, Enterobacter, Klebsiella* and *Serratia* species. It is a new antibiotic that can be taken as a single dose 3g orally which is equally effective as a 7-10-day course of nitrofurantoin, norfloxacin or co-trimoxazole. It is primarily excreted unchanged in the urine, and concentrations remain high for 24-48

hours after a single dose ***(Estebanez et al., 2009).***

Duration of therapy and Route of administration

ASB is treated with oral antibiotics. One, three and 7-day antibiotic courses have been evaluated. A seven-day treatment period is required to ensure eradication. Treatment with antibiotics for three days is as effective as longer courses, e.g. seven to ten days, however, the risk of relapse is higher ***(Villar et al., 2000; Briggs and Nageotte, 2009).***

Recurrent infections may have serious consequences for pregnant women, therefore, a longer course of antibiotics is used to avoid the higher rate of relapse with short courses. A follow-up urine culture can be requested one to two weeks after the antibiotic course has been completed to ensure eradication ***(Trestioreanu et al., 2015).***

For pyelonephritis after 24 weeks' gestation, intravenous antimicrobial therapy should be initiated and continued until the patient has been afebrile for 48 hours. Conversion to oral antibiotics to complete a course lasting 10–14 days should occur before hospital discharge ***(Le et al., 2004).***

It is recommended that all pregnant women who have confirmed ASB are treated with antibiotics. The choice of antibiotic can be guided by the known sensitivities. Recommended antibiotic regimens are the following ***(Hooton and Stamm, 2008)*** **:**

- Amoxicillin (if susceptible): 500 mg by mouth three times a day for three to seven days.
- Amoxicillin-clavulanate: 500 mg by mouth twice a day for three to seven days.
- Nitrofurantoin: 50 mg four times a day, avoid at 36+ weeks, for three to seven days.
- Trimethoprim: 300 mg once a day to be avoided in the first trimester.
- Sulfisoxazole: 500 mg by mouth three times a day for three to seven days.
- Cephalosporin such as:
- Cefpodoxime 100 mg by mouth every 12 hours for three to seven days.
- Cephalexin: 500 mg twice a day to be the least preferred option.
- Fosfomycin: 3 g by mouth as a single dose.

Even when treated, GBS is associated with heavy vaginal colonization and therefore an increased risk of neonatal GBS disease ***(Ranabir et al., 2010).*** Pregnant women found to have GBS infection in the urine should be treated at the time of diagnosis, with amoxicillin or cephalexin. Prophylaxis, usually with penicillin G, is given during delivery.

Prevention of ASB in pregnancy

It can be classified into general measures including general hygiene, cranberry juice, and probiotics and specific main vaccination.

- **General hygiene:**

General measures for treatment or against recurrence and prophylaxis are

often asked for by patients, based on risk factors present in a patient. These measures used to ensure good hygiene and reduce bacterial contamination of the urethral meatus. Sufficient fluid intake, at least two liters per day and regular voiding are commonly believed to have a flushing effect on the UT; bacterial proliferation might be hindered, owing to shorter retention of urine in the patient's bladder. Micturition after sexual intercourse is supposed to rinse bacteria from the bladder and thus prevent UTI. Since damage to the physiological vaginal flora facilitates UTI, exaggerated genital hygiene, deodorant sprays, vaginal lotions or douching, etc, should be avoided ***(Rizvi and Siddiqui, 2010).***

- **Cranberry juice:**

Cranberries, usually as cranberry juice, have been used to prevent UTI. Cranberries contain a substance that can prevent bacteria from sticking on the walls of the bladder by suppression of *E. coli* fimbriae by proanthocyanidins. The juice is also bacteriostatic perhaps due to hippuric acid. This may help prevent bladder and other UTIs. Cranberries have been found effective in the form of pure juice, and capsules and tableted extracts ***(Wojnicz et al., 2012).***

- **Probiotics:**

The installation of *Lactobacillus* into the vagina is believed to stop the ascending of uropathogens into the bladder. Most authors consider this approach promising, but further research is needed before probiotics can be recommended for prevention of UTI ***(Reid and Bruce, 2006).***

Probiotics are touted to protect the vagina from colonization by uropathogens with steric hindrance or blocking potential sites of attachment, production of hydrogen peroxide which is microbicidal to *E. coli* and other uropathogens, maintenance of a low pH, and induction of anti-inflammatory cytokine responses in epithelial cells ***(Barrons and Tassone, 2008).***

- **Vaccination**

Although it appears that a prior UTI fails to elicit a protective host immune response and uropathogen heterogeneity complicates vaccine design, data from animal model studies offer encouragement for successful ropathogenic strains *E. coli* UPEC vaccine development ***(Billips et al., 2008; Sivick and Mobley, 2010).***

Immunization with UPEC antigens can stimulate a mucosal immune response that may be effective at preventing experimental UTI and increases in urinary and serum antibody titers correlate with reductions in bladder bacterial load and infection duration ***(Alteri et al., 2009).***

To better enable a strong mucosal immune response, research into novel antigen delivery systems, routes of immunization and adjuvants, such as a modified heat-labile toxin, engineered outer membrane vesicles and mast cell activators, have been ongoing ***(Chen et al., 2010).***

Chapter 3

Methodology

3.1 Study Design:

The study is a descriptive cross sectional study combining the use of questionnaire and laboratory analysis of samples obtained from the study subjects.

3.2 Setting

Antenatal Clinic at Ramallah Governmental Hospital/Palestine. The hospital operates specialist antenatal. Ramallah Governmental hospital represents the high risk group of pregnant women“.

3.3 Study Population

Inclusion Criteria

The current study was conducted on pregnant females attending obstetric clinic for antenatal care. Their ages ranged from 18 to 41 years. They were grouped according to gestational age.

Exclusion Criteria

Women excluded were pregnant females showing :

1. Dysuria, frequency and urgency (e.g. Past history of UTI symptoms).

2. Diabetes mellitus/hypertension.

3. A history of antibiotic therapy taken within two weeks prior to the study.

4. Pyrexia of unknown origin.

5. Known congenital anomalies of the urinary tract.

6. Age more than 41 years.

7. Patients who do not give their consent.

3.4 Study Instruments

Semi structure interview was used to collect the data; the researcher introduced herself and explained the purpose and needed producers to take part in the study on privet circumstances, then followed by patient consent to share the answers of the presented questionnaires.

All individuals are subjected to the following:

- Semi medical history.

- Urine analysis.

- Urine culture of a clean morning midstream urine sample on appropriate media: blood, MacConkey and cysteine lactose electrolyte deficient (CLED) agars.

-Bacterial colony counts by calibrated lope method.

-Identification of the isolated organisms by the ordinary biochemical reactions.

- Statistical analysis of the obtained hosresults.

- Kuppuswamy's Socioeconomic Status Scale, its An online tool is available to measure Socioeconomic status by a taking number of factors into account, Education, occupation, and income of the individual to assess the finding. This data is used to determine the level of one's SES, usually classified as low, middle, and high.

3.5 Sample Size

Sample size calculated to be 113 cases.

Sample size determined using the formula:

$$N = \frac{z^2 pq}{d^2}$$

"Z"	Standard deviate by CL= 95% for normal distribution. 95% – Z-Score = **1.96**
"P"	Expected proportions in populations based on previous studies prevalence of **8%** obtained from a similar study
"q"	Absolute error or precision q = 1 − p = **0.92**
"d "	Degree of precision of the estimate = **0.05**.
"N" sample size	$\frac{1.96^2 \times 0.08 \times 0.92}{0.05^2} = \frac{3.84 \times 0.08 \times 0.92}{0.0025}$ **= 113 cases**

3.6 Data Management/Analysis

The data was entered into a secured personal computer using Microsoft Excel software 2016 version and analyzed using Epi Info™ version 7.2 computer software. Frequency distribution of selected variables was done first. Prevalence of asymptomatic bacteriuria in Pregnancy estimated with 95% confidence interval. Significance was considered at a p-value of <0.05.

3.7 Ethical Consideration

Approval for the study obtained from An Najah national university ethical committee, and informed consent obtained from the cases after adequate information on the purpose of the study, objectives, process, discomfort and benefit.

Chapter 4
Laboratory

4.1 Laboratory Processing of Urine:

A sterile universal bottle was given to each pregnant woman. We explained to the subjects that we need to collect the urine with as no contamination as possible.

The pregnant women taught how to collect the urine sample under aseptic condition by cleaning the area around the urethral orifice with clean water, drying the area and collecting the urine with the labia held apart. The urine collection method was done by allowing the first part of urine to pass out into the toilet, then stop the urine flow and position the container and collect the midstream portion of the urine, then finish by urinating the final portion of the urine into the toilet.

For each pregnant woman, we were expected to produce approximately 50 mL of clean voided midstream urine sample into a sterile, screw-cap universal bottle according to the appropriate instructions to ensure that the samples are free of contamination.

The specimen collection process was done by the researcher. The date, time, name and age have been labeled on the bottle.

The samples were transported to Al Rabee Lab within 1 hours in a container. Special care was taken to maintain the containers sterile by ensuring that there the spillage will not occur from any bottle.

The specimens were processed within 1 hour. The role was if processing is not immediately carried out, the specimens would be refrigerated at 4 °C. The specimen processing as whole was done within 4 hours from specimen collection.

At first, I was observing how the urine processing was done and subsequently, take part in the handling of the samples under the supervision of the laboratory physician. I was also there during the reading of the culture and sensitivity results to learn and ensure accuracy.

4.2 Sterilization of Media and Materials

The media used were blood agar, MacConckey agar and Cystein Lactose Electrolyte Deficient (CLED) Agar (supplied by Lab M, USA). Antibiotic sensitivity discs, single antibiotic-impregnated discs, Combi screen 10sl urinalysis (provided by Analyticon Biotechnologies AG, Germany).

Laboratory Glassware were properly washed with specific detergent and washed with water, then it had dried, The dried glasswares were later sheathed in aluminum foil and sterilized for 3 hours in hot-air sterilizing ovens with a temperature at 160˚C.

4.3 Macroscopic Examination

At first, the urine samples were examined macroscopically by observing the color, the aspect, the deposit and the presence of blood clots or debris. Then the samples were divided into three portions, for

microscopic analysis, culture, and chemical analysis. This method was done to avoid contamination of the urine samples.

4.4 Microscopy

About 5 ml of each well-mixed urine sample was centrifuged at 3000 Rpm for 10 minutes. A drop of properly mixed sediment placed on a glass slides, covered with cover slips and examined under light microscope using both ×10 and ×40 objective lenses to detect pus cells which shows the presence of bacteria, presence of motile bacteria, trichomonas vaginalis, Schistosoma ova, white blood cells, red blood cells, casts of red blood cells and white blood cells, hyaline granular casts, crystals and yeast-like cells.

Urine samples with 10 pus cells/mm3 or more regarded as pyuria. Drops of the urine were applied to microscope slides, allowed to air dry, stained with Gram stain, and examined microscopically (primary gram staining).

The presence of at least one bacterium on gram stain is considered significant. Quality control was done with control strain of Staphylococcus aureus (for gram positive organisms) and Escherichia coli (for gram negative organisms).

The supernatant of the centrifuged urine tested with Combi screen 10 urinalysis strips. The presence of nitrite and leukocyte esterase in the urine is suggestive of infection, also the presence of pus cells more than 5 per high power field (HPF)**.**

4.5 Culturing of Bacteria from Urine Samples

From the sterile non-centrifuged urine containers, a sterile disposable calibrated loop delivering 0.01 ml of urine used to streak into the CLED agar plates from one end of the plate to the other end, and then used to streak it across the line to spread it sideways.

By using the disposable sterile calibrated loops, the specimens was streaked onto Blood agar plate (BAP) and MacConkey agar plate (MAC) using the four-way streak method for colony characterization, identification, and antibiogram. Both plates were be incubated at 37°C for 24 hours.

After 24 hours, CLED agar plates observed for confluent growth which shows significant bacteriuria, if not confluent, the colonies were counted and multiplied by the size of the inoculums of the calibrated loop which is 1/100. The bacterial value that equal to or greater than $10^5$was considered as significant ASB.

For cultures with no or insignificant bacterial growths, incubation was continued for a further 24 hours before the conclusion of the insignificance. A repeated urine sample collection was done for contaminated ones. Colonies from BAP and MAC were characterized if mucoid or not and for evidence of lactose fermentation.

After a description of colonies, Gram stain was performed from pure colonies (Secondary gram stain). Gram-negative bacilli were more likely to

be Escherichia coli, Klebsiella, Pseudomonas or Proteus while gram-positive cocci were more suggestive of Staphylococcus species.

Biochemical tests were performed from the pure colonies for identification according to standard procedure.

Escherichia coli is motile, indole positive, citrate negative and triple sugar iron agar (TSIA) reaction is acid/acid-slope/butt. Klebsiella is gram negative bacilli, indole negative, non-motile, slow urease positive. Staphylococcus saprophyticus is gram positive cocci in clusters, catalase positive but coagulase negative.

The antibiogram determination was performed using pure colonies from the CLED agar plates.

Organisms showing significant bacteriuria of 10^5CFU/ml or more were inoculated into peptone water to match 0.5 McFarland turbidity standards (1.5 X 10^8 bacteria/ml) before plating on Muller Hinton Agar. Commercially organized antimicrobial discs of known minimum inhibitory concentrations (MIC) were placed aseptically over the surface of the sensitivity agar after drying adequately and pressed down with sterile forceps to make enough contact with the agar.

The plates were incubated within temperature 37ºC for 24 hours, and the zones of growth inhibition were estimated. The sensitivity to a particular antibiotic was determined if the diameter of its zone of inhibition

by a drug was greater than or equal to 4 mm less than that of the control culture.

The antimicrobial sensitivity discs were used: Amoxycillin-clavulanate, Imipenem, Ceftazidime, Ceftriaxone, Cefotaxime, Cefuroxime, Cefaclor, Norfloxacin, Ciprofloxacin, Nitrofurantoin, Amikacin and Sulfamethoxazole-Trimethoprim.

Chapter 5

Results

A total of 113 pregnant women were examined for ASB; A clean voided midstream urine sample was collected from each expectant mothers. The mean age of pregnant women involved in this study was 27.91 ± 5.13 - ranged from 18-39 years. The predominant groups of participants were 2nd trimester (49.55%), multiparous (52.2%) and of the Intermediate socioeconomic level (59.3%) based on (Kuppuswamy's SES Scale for 2016) Online Tool.

Of the analyzed urine samples, **38 (33.6 %)** were positive for significant bacteriuria (CFU $\geq 10^5$/mL).

E. coli was the most predominant organism **(71%)** followed by **Staphylococcus aureus (29%).**

Nitrofurantoin, Amikacin and Imipenem were the most sensitive antibiotics (100% sensitivity), Regarding Staph. Aureus species, Nitrofurantoin, Ciprofloxacin, Imipenem and Amikacin showed 100% sensitivity, while with 60% sensitivity to cefuroxime, and 66% of isolates were resistant to Cefaclor.

There was statistically significant relation between Socioeconomic Level and ASB **(P-value: 0.024)**.

There was highly statistically significant relation between the direction of washing genitals, sexual activity per week and Number of changing under wear per week and ASB **(P-value = <0.001)**.

Table 1: Sociodemographic factors:

	Frequency	**Percentage%**
Age (years)		
18-25 Years	42	37.2
26-35 Years	50	44.2
36-40 Years	21	18.6
Gestational Age		
First trimester	31	27.4
Second trimester	56	49.6
Third trimester	26	23.0
Parity		
Primigravida	37	32.7
Multiparous	59	52.2
grand multipara	17	15.0
Educational Level		
Student	14	12.4
High school	23	20.4
Bachelor	76	67.3
Socioeconomic Level		
Low	25	22.1
Intermediate	67	59.3
High	21	18.6
Direction of wash genitals		
Back to Front	72	63.7
Front to Back	41	36.3
Number of changing under wear		

(week)		
once / week	14	12.4
2-3 times / week	68	60.2
Daily	31	27.4
Number of sexual intercourse (week)		
once / week	52	46.0
2-3 times / week	50	44.2
Daily	11	9.7

5.1 Urine culture and bacterial count

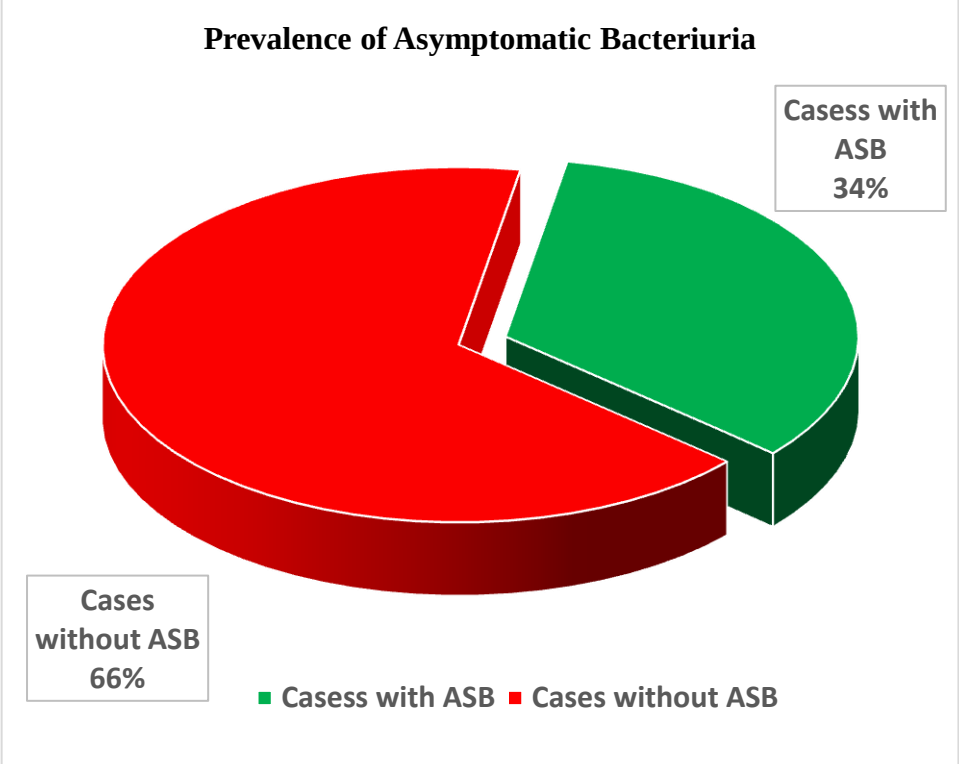

Figure 5: Patients with and without ASB

Out of 113 pregnant females that were included in the study, **38 (34%)** were having significant bacteriuria, while **75 (66%)** were negative cases.

5.2 Data of the patients

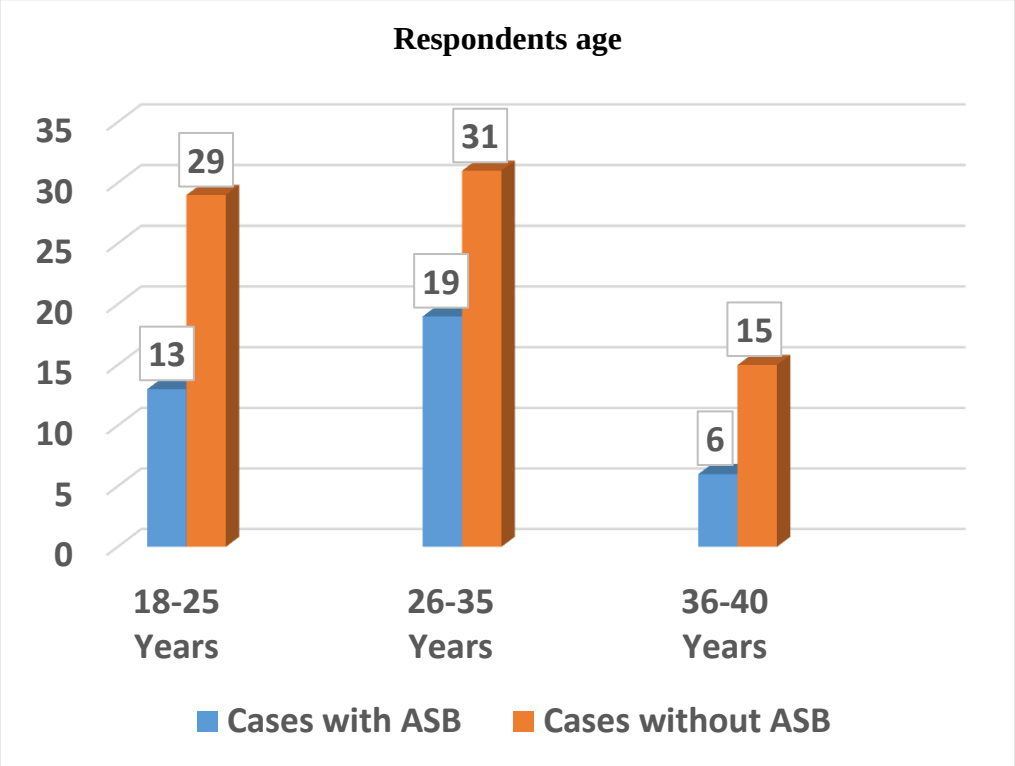

Figure 6: Relation between age groups and ASB

The age of the participants ranged from 18-39 years with a mean of 27.91 ± 5.13 years. ASB appears predominant in women aged between 26-35 years, 19 cases (50%), followed by those between 18-25 years old 13 cases (34%) and 6 cases (16 %) in women more than 36 years.There was no statistically significant difference between the age groups with **P-value: 0.669**.

5.3 Relation between Parity and ASB

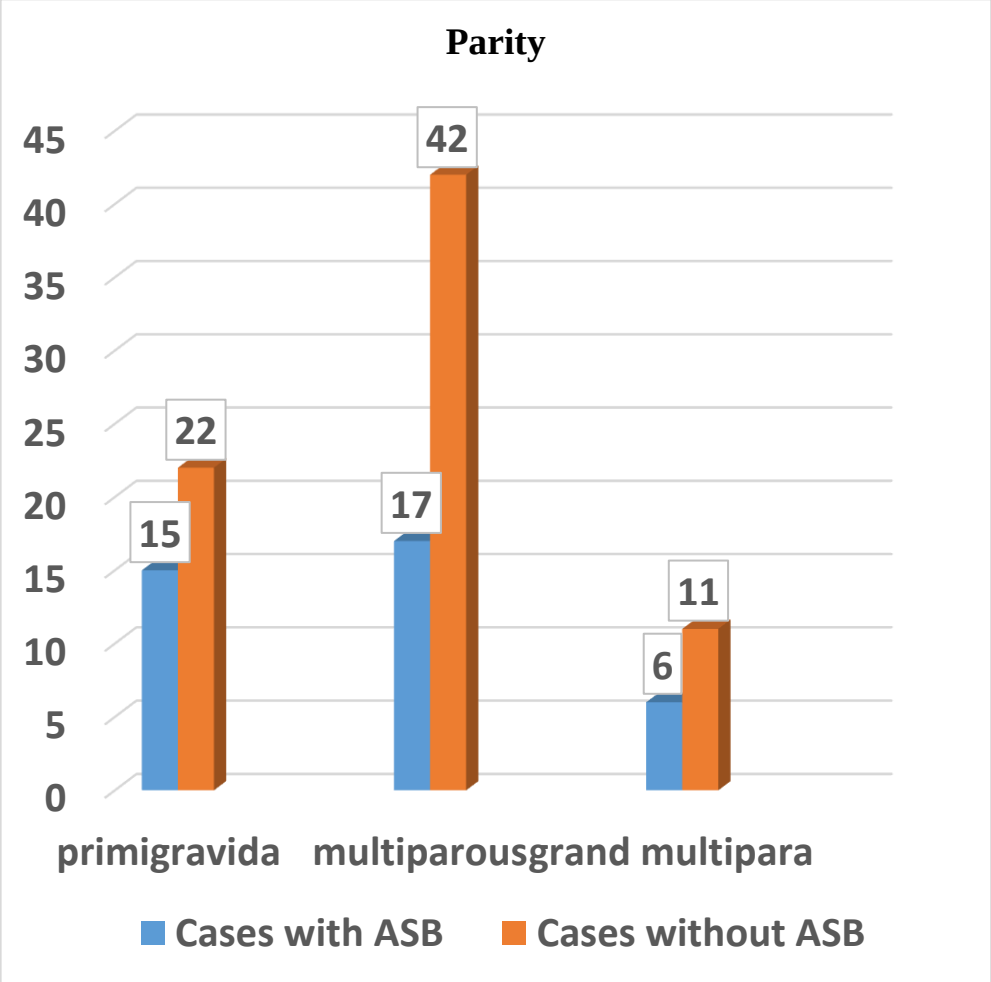

Figure 7: Relation between Parity and ASB

The Parity of the participants ranged from 0 - 5 with a mean of 1.69 ± 0.42, ASB appears predominant in the multiparous group (44.7 %) more than in primigravida group (39 %). No statistically significant difference found between the Parity and ASB with **P-value: 0.490**.

5.4 Relation between Gestational age and ASB

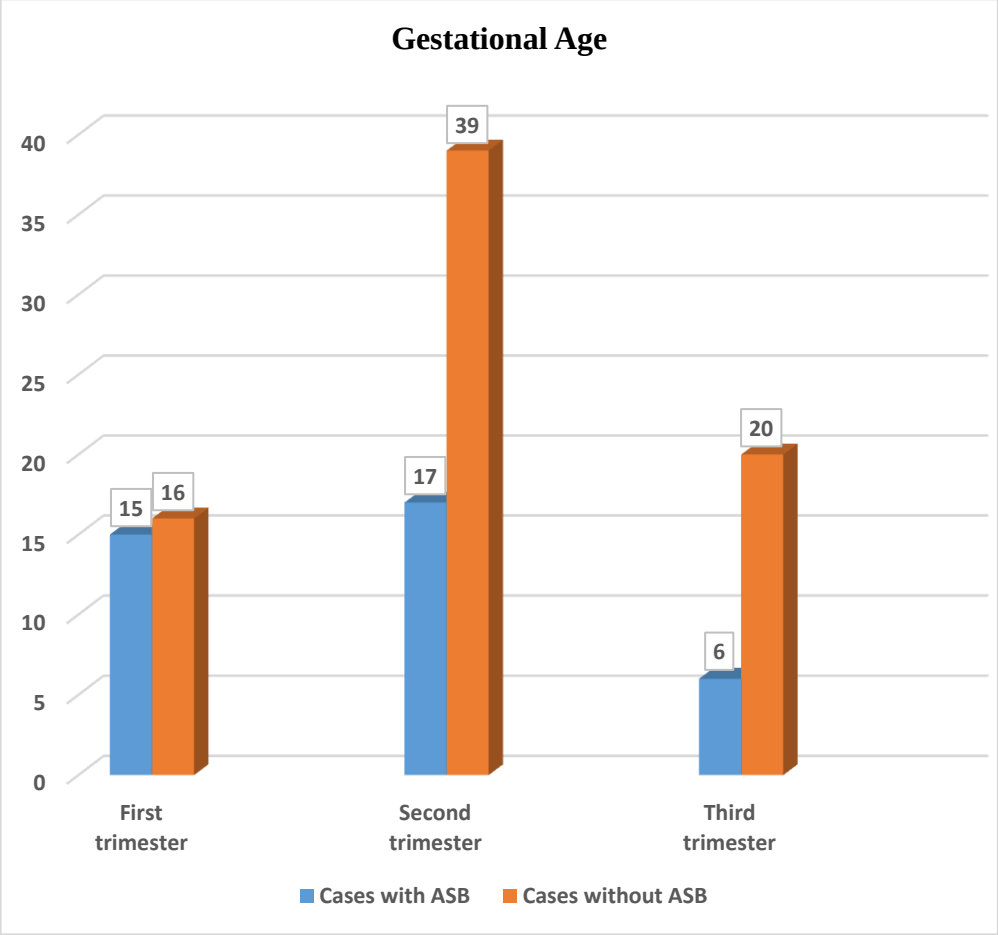

Figure 8: Relation between Gestational age and ASB

The Gestational age of the participants ranged from 6 - 40 weeks with a mean of 29.23± 7.13 weeks**,** ASB appears predominant in the 2nd trimester group (45 %) more than in1st trimester (39 %) and 3rd trimester group (16 %). There was no statistically significant relation between the gestational age and ASB with **P-value: 0.101.**

5.5 Relation between Educational Level and ASB

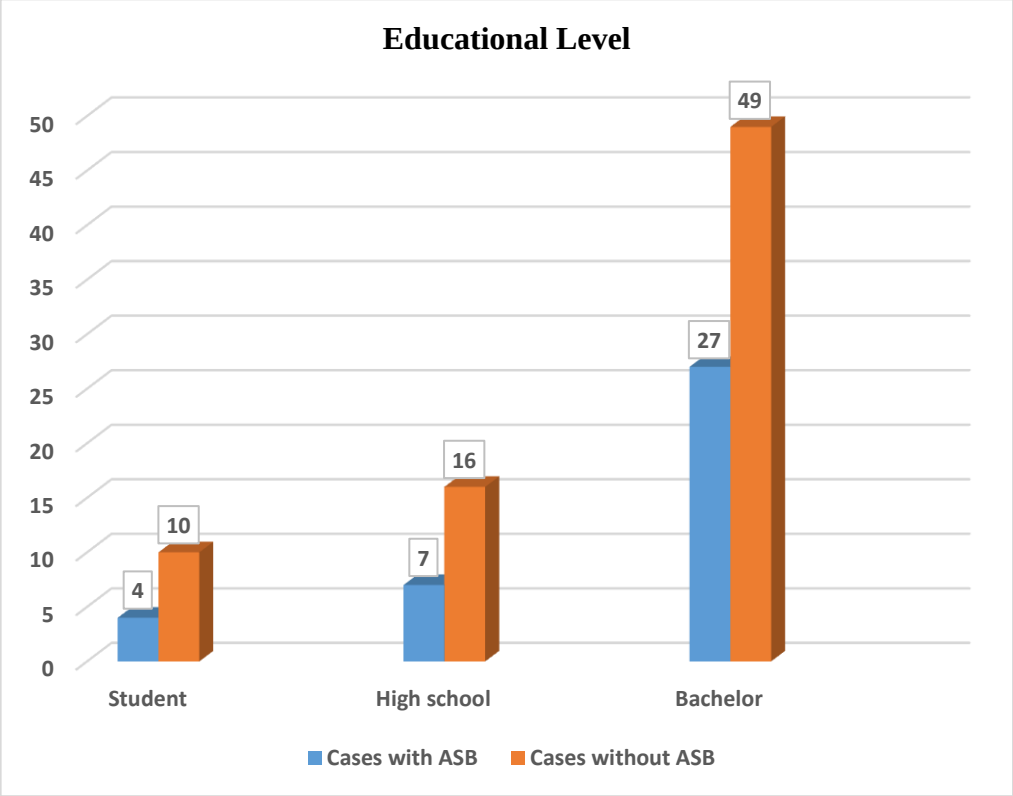

Figure 9: Relation between Educational Level and ASB

ASB appears predominant in women with Bachelor level **(71%)** more than other High school **(18%)** and student (11%). There was no statistically significant relation between the Educational Level and ASB with **P-value: 0.824**.

5.6 Relation between Socioeconomic Level and ASB

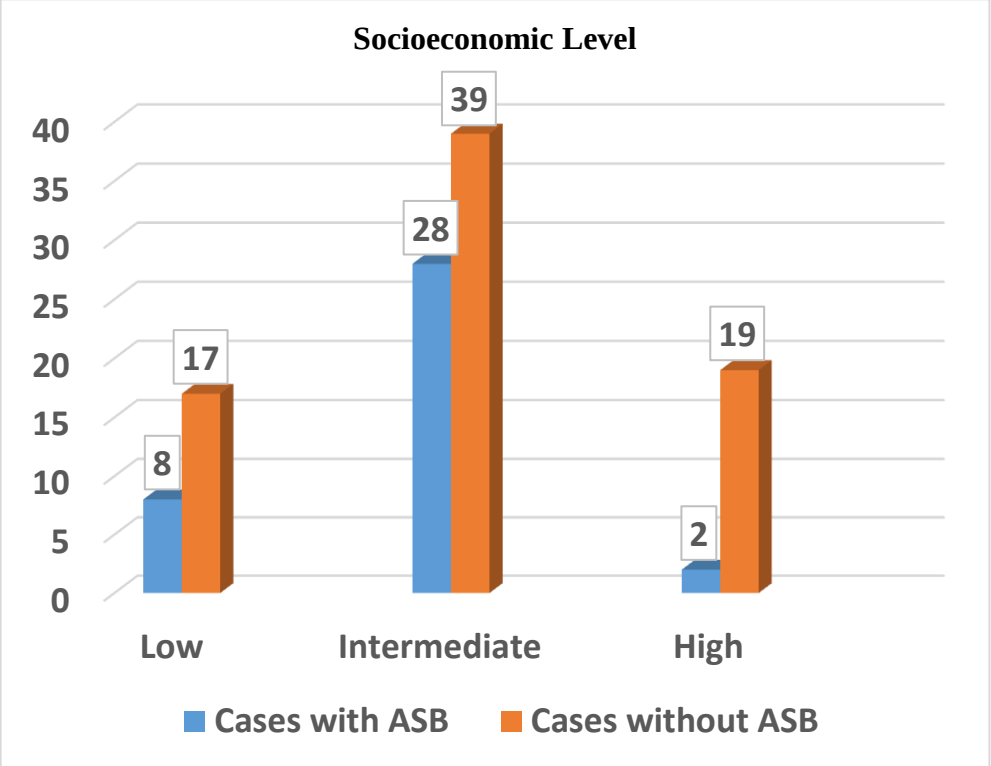

Figure 10: Relation between Socioeconomic Level and ASB

ASB appears predominant in women with Intermediate Socioeconomic Level followed by cases with low Socioeconomic Level. There was statistically significant relation between the Socioeconomic Level and ASB with **P-value: 0.024**.

5.7 Relation between Direction of washing genitals and ASB

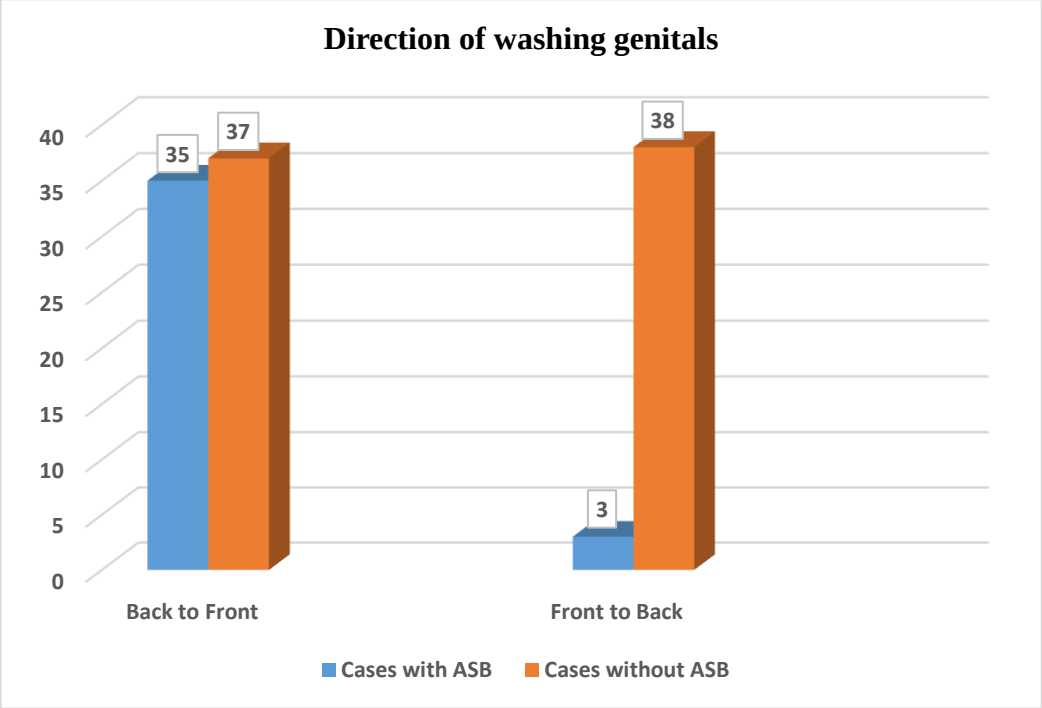

Figure 11: Relation between Direction of washing genitals and ASB

ASB appears predominant in women reported washing their genitals from back to front after defecation more than women who reported washing their genitals from front to back. There was statistically significant relation between the direction of washing genitals and ASB with **P-value < 0.001**.

5.8 Relation between Number of changing underwear/week and ASB

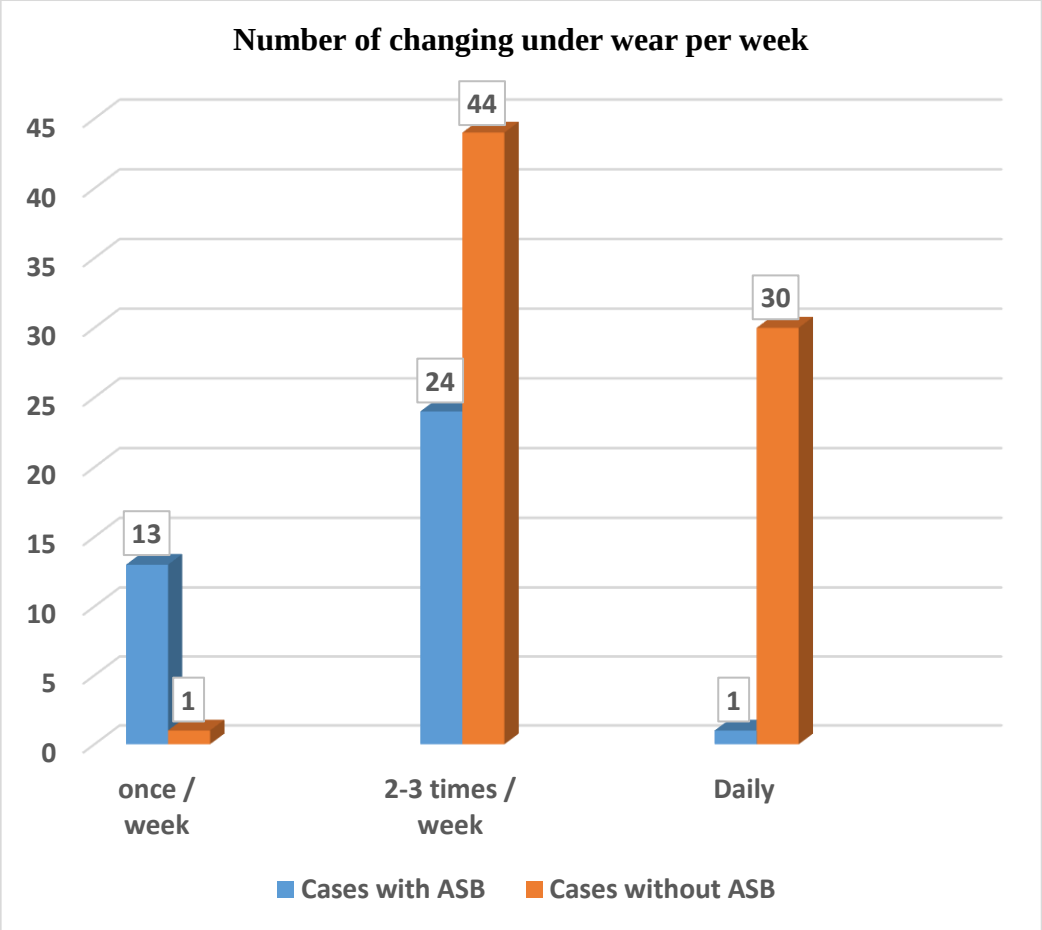

Figure 12: Relation between changing underwear (week) and ASB

ASB appears predominant in women who are changing underwear 1-3 times per week more than women who are changing underwear more than three times or daily per week. There was highly statistically significant relation between Number of changing underwear (week) and ASB with **P-value < 0.001**.

5.9 Relation between sexual activity (week) and ASB

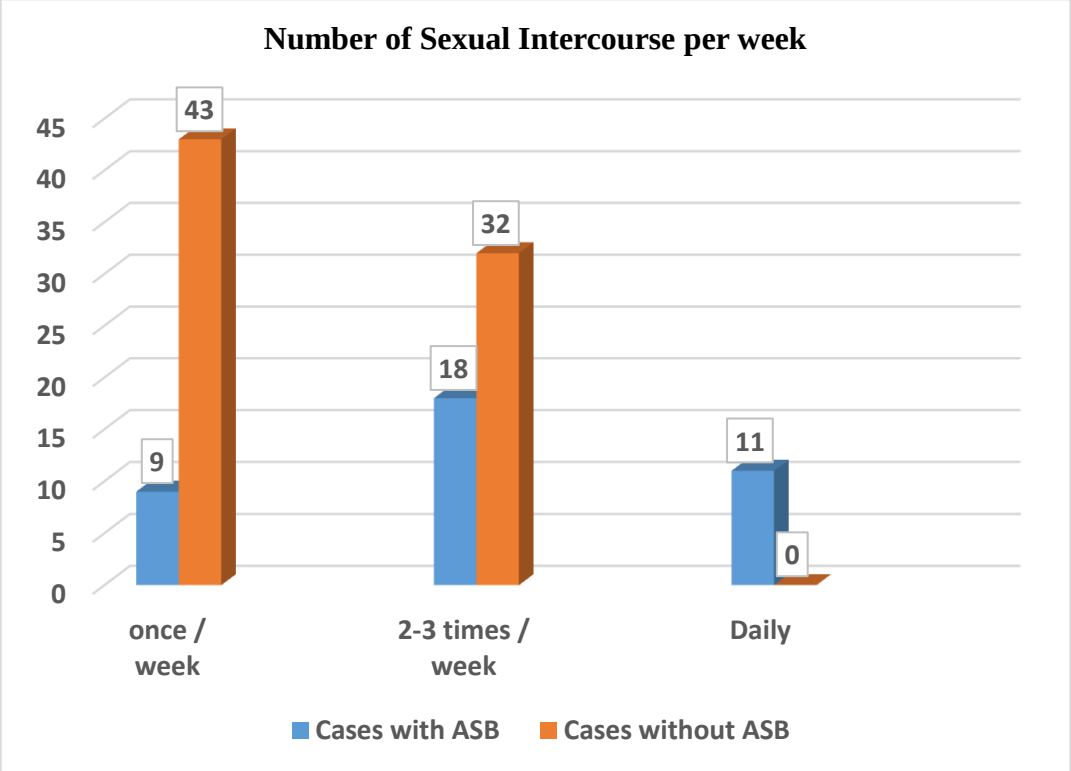

Figure 13: Relation between sexual activity (week) and ASB

ASB appears predominant in women with sexual intercourse activity more than Two to Three times or daily per week more than women with sexual intercourse activity less than two times per week. There was statistically significant relation between sexual activity per week and ASB with **P-value < 0.001.**

5.10 Diagnosis of asymptomatic bacteriuria

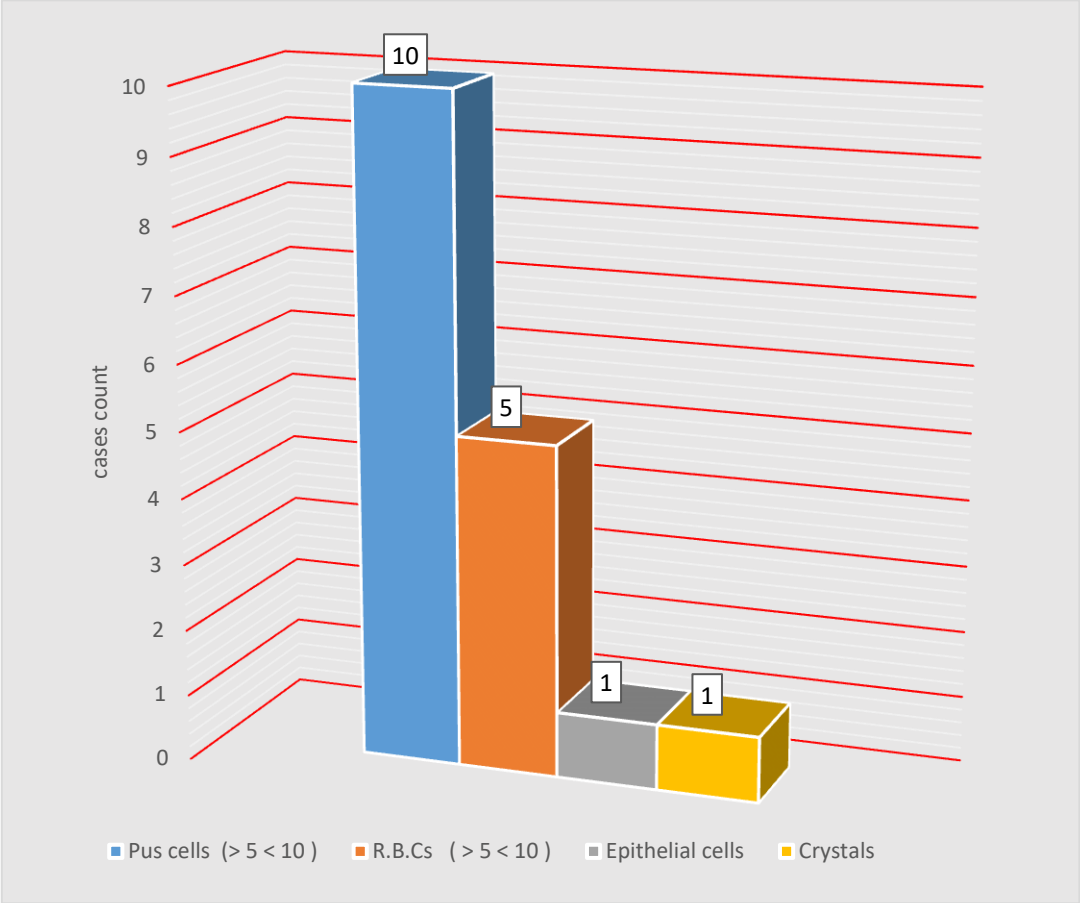

Figure 14: Microscopic examination of culture positive urine samples

Out of the 38 positive cases of ASB, ten cases (26%) cases have pus cells (more than 5 and less than 10) / high power field five case (13%) has RBCs, one case (2.6%) with epithelial cells and one case (2.6%) with crystals.

5.11 Causative organisms

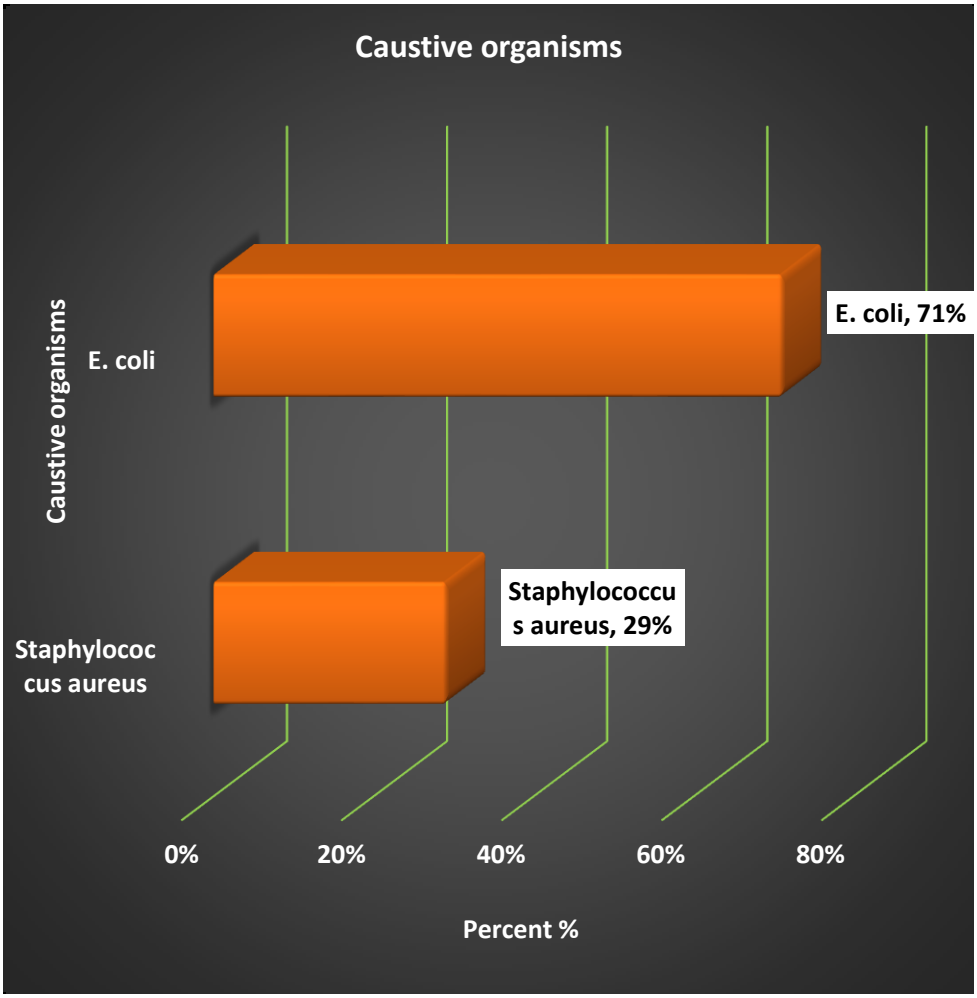

Figure 15: Distribution of uropathogens in culture positive cases

Concerning the distribution of uropathogens in **38** positive cases, **E. coli** was the most predominant organism **27 (71%)** and followed by **Staphylococcus aureus 11 (29%).**

5.12 Antimicrobial susceptibility

Table 2 : Susceptibility of isolated uropathogens to different antibiotics using discs diffusion method

Positive cases = 38 E. coli = 27 cases Staphylococcus aureus= 11 cases				
Antibiotic	**E. coli sensitive (No.)**	**Staph. Aureus sensitive (No.)**	**Total Sensitive organisms (No.)**	**Total Sensitivity (%)**
Amoxycillin-clavulanate (AUG)	**6**	**10**	**16**	**42%**
Ceftazidime (CAZ)	**17**	**10**	**27**	**71%**
Ceftriaxone (CRO)	**17**	**10**	**27**	**71%**
Cefotaxime (CTX)	**13**	**10**	**23**	**61%**
Cefurexime (CXM)	**13**	**8**	**21**	**55%**
Nitrofurantoin (F)	**27**	**11**	**38**	**100%**
Norfloxacin (NOR)	**17**	**10**	**27**	**71%**
Ciprofloxacin (CIP)	**17**	**11**	**28**	**74%**
Amikacin (AK)	**27**	**11**	**38**	**100%**
Sulfamethoxazole-Trimethoprim (SXT)	**17**	**10**	**27**	**71%**
Imipenem (IPM)	**27**	**11**	**38**	**100%**
Cefaclor (CL)	**6**	**7**	**13**	**34%**

Regarding E. coli isolates, nitrofurantoin, amikacin and imipenem were the most sensitive antibiotics (100% sensitivity), Regarding Staph. Aureus species, Nitrofurantoin, Ciprofloxacin, Imipenem and Amikacin showed 100% sensitivity, while with 60% sensitivity to cefuroxime, and 66% of isolates were resistant to Cefaclor.

Antimicrobial Susceptibility and Resistance:

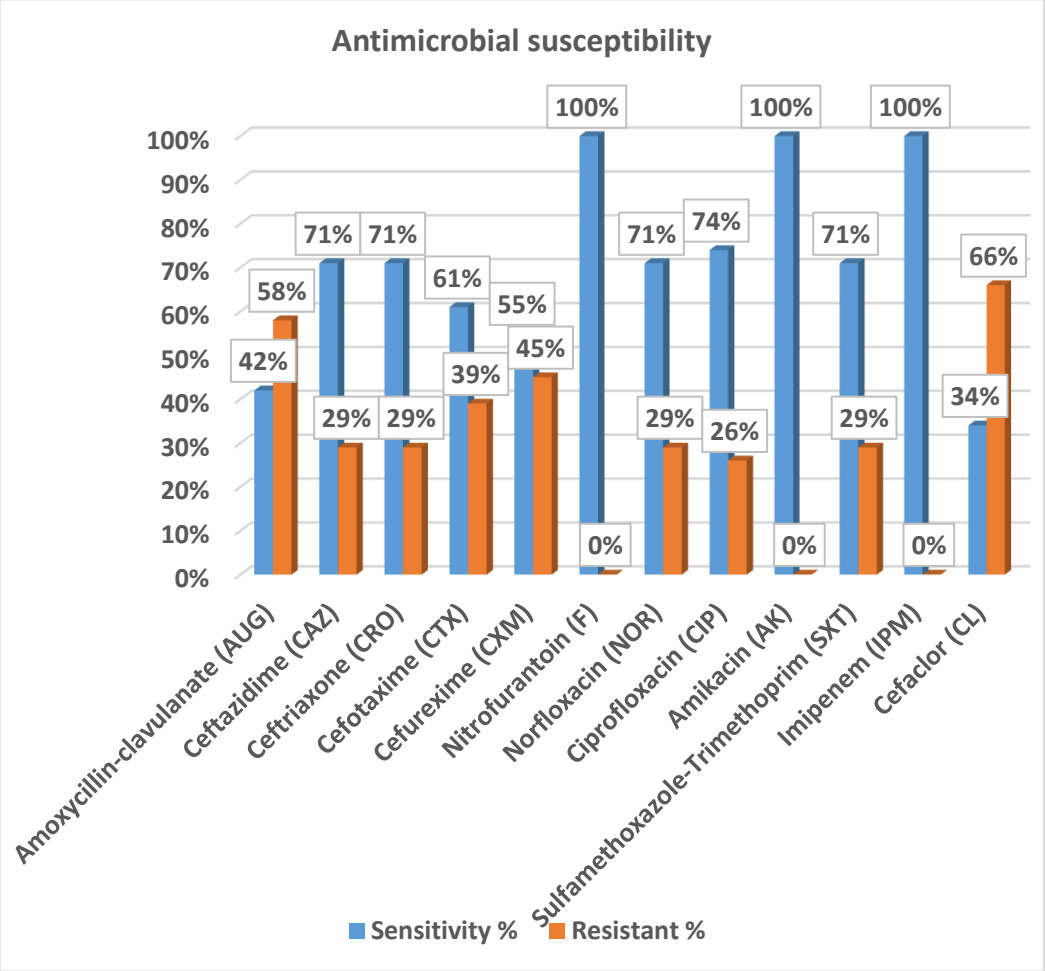

Figure 16: Antimicrobial Susceptibility and Resistance

Nitrofurantoin, Amikacin and Imipenem were the most sensitive antibiotics (100% sensitivity), Regarding Staph. Aureus species, Nitrofurantoin, Ciprofloxacin, Imipenem and Amikacin showed 100% sensitivity, while with 60% sensitivity to cefuroxime, and 66% of isolates were resistant to Cefaclor.

Chapter 6
Discussion

The prevalence of ASB during pregnancy in this study was found to be (34%), which is similar to the prevalence rate of (28.8%) had found in Nigeria ***(Kehinde et al., 2011).*** It is higher than the prevalence rates found in other studies ***(Rajaratnam et al., 2014; Tadesse et al., 2014b; Aminu and Aliyu, 2015).***

These vast dissimilarities between and within countries may mirror the differences related to the residents' characteristics such as socioeconomic levels, race-specific, and religious behaviors related to personal hygiene and sexual contact. It could also be due to different design of the studies or the various screening tests ***(Hanna et al., 2014).***

The causative organisms in this study were Escherichia coli and Staphylococcus aureus, which is comparable to findings of dominance by other authors; Escherichia coli (58; 67.4%) was the most causative organism by ***Goruntla, et al.*** also ***Onu et al*** showed that Staphylococcus aureus was the commonest organism isolated ***(Onu et al., 2015; Goruntla and , Sandhya Jampala , Vijayajyothi Mallela , Vishnuvandana Bandaru , Rajavardhana Thamineni, 2017).***

In contrast with other studies, Klebsiella was one of the most frequent causative organisms ***(Sujatha and Nawani, 2014; Khan et al., 2015; Olamijulo et al., 2016).***

This may be due to different personal hygiene. In addition, it could be due to the fact that uropathogenic agent differs during the different seasons,

E.coli is associated with invasive infection properties include exotoxins against host cells and adhesions, it is adherence by pili or fimbriae prevent it from urinary lavage.

ASB appears predominant in women with low and Intermediate Socioeconomic Level. There was statistically significant relation between the Socioeconomic Level and ASB with P-value: 0.024.

This correlates to the study done by ***Prasanna et al.,*** they stated that most of the patients belonged to low socioeconomic status i.e. 71%.

Same as ***Lavanya et al***. study, which revealed that incidence increased as socio economic status of the patients decreased.

This increased prevalence of ASB in those belonging to low socio economic status is due to poor sanitation, lack of general hygienic practice and failure to attend antenatal clinic ***(Lavanya and Jogalakshmi, 2002; Prasanna et al., 2015).***

ASB appears predominant in women who are bathing and changing underwear 1-3 times per week more than women who are bathing and changing underwear more than three times or daily per week. There was highly statistically significant relation between Number of changing underwear (week) and ASB with P-value < 0.001.

In agreement with recent study, there is many studies showed that There was relation between Number of bathing and changing underwear (week) and Asymptomatic bacteriuria, out of 17 positive ASB, 12 cases were usual less frequently changing underwear ***(Elzayat et al., 2017).***

ASB had a significant relationship with sexual activity, sexually active women are more likely to have ASB compared to less sexually active women. There was statistically significant relation between sexual activity per week and ASB with P-value < 0.001.

For the reason that sexual pressure thrust the bacteria from vagina up to the urethra, these results were supported by a broad agreement with these studies. ***(Amala and Nwokah, 2015). (Labi et al., 2015).***

Also, ASB had significant relationship with the direction of washing genitals after urination or defecation, It appears predominant in women reported washing their genitals from back to front more than women who reported washing their genitals from front to back , similar results [OR = 2.96] were reported by another study ***(Badran et al., 2015).*** It maybe because that wiping their anus from back to front, instead of the other way round, end up mechanical transportation of the bacteria from anal feces to their vaginas, causing UTIs.

A pregnant woman should clean her genitals properly after defecation, before and after intercourse; better to micturate after sexual

intercourse to wash the urethra, the proper direction of cleaning (or wiping) genitals is from front to back (away from the urethra).

Multiparous patients had the highest prevalence rate similar to the finding in another study. ***(Nisha et al., 2015).*** The reason mentioned before. ***(Shruthi, 2015). (Mbbs, 2012).*** ASB appears predominant in women aged between 20-30 years (10.5%), which is similar to another author. ***(Sujatha and Nawani, 2014). (Khan et al., 2015).***

The high sensitivity of the isolated organisms was to Nitrofurantoin, similar to considerable agreement reported from many studies ***(Khazal et al., 2013; Rajaratnam et al., 2014; Labi et al., 2015).*** other studies reported a non-significant odds ratio of 1.3 of a rare fetal malformation attributable to use of nitrofurantoin, the number of the studies involved are limited. ***(Schnarr, 2008).***

Staph. Aureus was sensitive to Nitrofurantoin, Amikacin, Imipenem and Ciprofloxacin, similarly in the study by ***Ali et al.,*** who reported that Staphylococcus aureus was the predominant isolates among gram-positives (n=18; 48.6% of gram-positive isolates, 31% of all isolates) non-susceptible to most of the antimicrobials tested; whereas most isolates were sensitive to nitrofurantoin (94.1%), norfloxacin (76.5%) and ciprofloxacin (70.6%) ***(Ali et al., 2018).***

The most of the urinary isolates were resistant to cephalexin, which is similar to that found among antenatal women in Lagos by Joseph and at

the De Soysa Maternity Hospital, Colombo by Perera Jennifer . ***(Jennifer et al., 2012). (Olamijulo et al., 2016).***

This study delivers important clinical guidance for ANC in Palestine that clinicians can follow these recommendations for diagnosis and treatment of asymptomatic bacteriuria within proper time and by using the most sensitive tests, Also to prevent ASB by educating their patients.

In addition, it has cost-benefits if early discovered ASB before progression to pyelonephritis. ***(Evans et al., 2005). (Hazhir, 2007).***

6.1 Conclusion

The Prevalence of ASB in pregnant women in Ramallah Governmental Hospital/Palestine was 34%. Escherichia coli and Staphylococcus aureus are the commonest organisms isolated. The direction of washing genitals and changing underwear more than three times or daily per week and sexual activity significantly influence the risk of ASB, also socioeconomic status significantly influence the risk of ASB, while sociodemographic did not significantly affect the risk of ASB among these pregnant women. ASB predominated in women with age group between 26-35 years, in the 2nd trimester more than other trimesters and in the multiparous women more than others.

Urine culture with clean-catch sampling from the midstream urine is the gold standard, and most sensitive test for its detection of ASB.

Early detection and treatment are of considerable importance not only to prevent maternal complications like acute pyelonephritis and chronic renal failure but also to reduce prematurity and fetal mortality.

The study found nitrofurantoin is the most efficient antimicrobial for most of the isolated pathogens. The prevalence of resistance by urinary isolates to nitrofurantoin is low in our study population.

6.2 Recommendation

Screening for ASB is imperative to be an essential part of antenatal care. We recommend a periodic screening at each trimester by urine culture.

Choose the appropriate antibiotic based on antibiotic sensitivity testing of uropathogens (control resistant strains in the future).

Nitrofurantoin is recommended to be used as it is safe, cheap, efficient and very beneficial in the treatment of ASB during pregnancy, it could replace cephalosporins (if isolates show the sensitivity it). ***(Grabe et al., 2015).***

We suggest more and larger studies to implement National screening policy for ASB in pregnant women in Palestine.

6.3 Limitation

- This research carefully prepared and conducted in few months which where not enough to observe the outcomes of ASB in Positive cases. So

further research should be carried out. Also, not sufficient to observe different hospitals and larger size of populations

- Including larger sapmles was really difficult, due to financial and time limitation

- Diabetes mellitus patients were excluded from the study population even though patents with DM approximately double the risk of ASB.

- Study Population sample represents a High risk group of pregnant women in Palestine.

- The other main limitation the researcher faced, women refused to give the researcher there urine sample. Even though all information regarding the study propose and Confidentiality of the data were described and despite that more than 40 samples refuses to share their samples.

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Annexure1

نسبة البكتيريا الغير عرضية عند النساء الحوامل في فلسطين

اسم السيدة ان اردت :	عدد مرات الحمل السابقة:	هل تعاني السيدة من السكري □ نعم □لا
الوظيفة :	عدد مرات الاجهادات السابقة	هل تعاني السيدة من ارتفاع ضغط الدم □نعم □لا
العمر :	الولادة طبيعي/ عملية	هل عانيت سابقا من التهاب المسالك البولية □ نعم □لا ما هي الادوية التي تم استخدامها للعلاج.....
مستوى الدخل □ متدني □متوسط □عالي		
الديانة:	تاريخ أول يوم من آخر موعد الدورة:	هل تناول ادوية مضاد التهاب خلال 2 الأسبوعين الماضيين □ نعم □لا
مستوى التعليم :	ادوية او فيتمينات يتم استخدامها حاليا:	هل تعاني من HIV □ نعم □لا
عدد مرات الاتصال الجنسي خلال الاسبوع: □ يومين □ 2-3 في الاسبوع □ 1 في الاسبوع	هل تعيشين مع احد يعاني من TB Herpes Syphilis □ نعم □لا	هل انت مدخنة □ نعم □لا المدة منذ:..... الكمية خلال اليوم:
ماهي طريقة تنظيم الحمل المتبعة	هل تعاني من مشاكل في الكلى او المثانة □ نعم □لا	هل تشرب الكحول □ نعم □لا
طريقة التنظيف بعد استخدام الحمام □ من الأمام الي الخلف □ من الخلف الى الأمام	هل تعاني من الحرارة حالياً □ نعم □لا	عدد مرات الاستحمام و تغير الملابس الداخلية □ يوميا □ 2-3 مرات بالاسبوع □1 مرة بالاسبوع

Annexure2

موافقة مستنيرة على المشاركة في بحث علمي (Consent Form)

"عنوان البحث"

Prevalence of Asymptomatic bacteriuria among pregnant women attending antenatal Clinic at Ramallah Governmental Hospital/Palestine

- أسم الباحث : مجد عبد الحكيم ملحم
- مكان إجراء البحث: رام الله مراكز خدمة الحوامل / مستشفى رام الله الحكومي

- أختي المتطوعة: هذا البحث هو أحد الأبحاث الطبية التي تقوم بها كلية الدراسات العليا في جامعة النجاح الوطنية ، ويهدف إلى: معرفة مدى انتشار البكتريا الجرثومية عديمة الأعراض لدى النساء الحوامل اللاتي يحضرن عيادة الحوامل في مستشفى رام الله الحكومي / فلسطين

■ أرجو أن أبين ما يلي:

- إن مشاركتك في هذا البحث طوعية تماما، ومن شأنها إفادة المجتمع الفلسطيني وعملية البحث العلمي بشكل عام .
- في حال مشاركتك بالبحث، سيبقى اسمك طي الكتمان وسيذكر اسمك فقط على نموذج الموافقة، وسيتم التعامل مع العينة والمعلومات الخاصة بك بطريقة الترميز حماية لخصوصيتك، ويحق لك الانسحاب من البحث متى شئت من دون أي أثر يذكر عليك.
- لا توجد خطورة جراء مشاركتك في هذا البحث
- يجدر الإشارة إلى أن لجنة الدراسات العليا في كلية التخصص قد وافقت على إجراء هذا البحث، وتعتبر هي اللجنة المؤسسية المرجعية للبحوث والدراسات.

- موافقة المتطوع:

أنا المتطوع (الاسم) _____ قرأت المعلومات المذكورة أعلاه وفهمتها، وبناء عليه فإني أوافق على مشاركة عينة البول الخاص بي لخدمة البحث العلمي.

التوقيع التاريخ

للاستفسار والتواصل مع الباحث يرجى التواصل عن طريق:

هاتف: 0599378794

جامعة النجاح الوطنية

كلية الدراسات العليا

مدى انتشار البكتريا عديمة الأعراض لدى المراجعات الحوامل الاكثر عرضة للخطر في مستشفى رام الله الحكومي / فلسطين

اعداد

مجد ملحم

إشراف

د. عبد السلام الخياط

قدمت هذه الأطروحة استكمالاً لمتطلبات الحصول على درجة الماجستير في الصحة العامة بكلية الدراسات العليا في جامعة النجاح الوطنية في نابلس–فلسطين.

2020

مدى انتشار البكتريا عديمة الأعراض لدى المراجعات الحوامل الاكثر عرضة للخطر في مستشفى رام الله الحكومي / فلسطين

إعداد

مجد ملحم

إشراف

د. عبد السلام الخياط

الملخص

الخلفية عدوى المسالك البولية هي عدوى تصيب جزء من المسالك البولية تشمل الجزء العلوي أو السفلي من المسالك البولية. لا تسبب عدوى المسالك البولية في كل مرة علامات وأعراض، فقد تكون عرضية او لا عرضية إذا كان البول يحتوي على عدد كبير من البكتيريا (10 / bacteria CFUs 1ml)ولكن لا توجد أعراض، تُعرف هذه الحالة باسم البكتيريا اللاعرضية. يمكن أن تعزز الاصابة في البكتريا أثناء الحمل عدد من المضاعفات مثل التهاب الحويضة والكلية والخداج وانخفاض الوزن عند الولادة الهدف من الرسالة تحديد مدى انتشار الجرثومية اللاعرضية بين النساء الحوامل في مستشفى رام الله الحكومي/ فلسطين وكذلك السبب الأكثر شيوعًا لها. وأنماط حساسية البكتيريا للمضادات الحيوية البكتيرية. وتحديد العلاقة بين البكتريا اللاعرضية وعوامل الخطر كالمستوى الاجتماعي والاقتصادي والنظافة الشخصية وعوامل أخرى الاساليب :تم إجراء دراسة مقطعية على ما مجموعه 113 امرأة حامل مع عدم وجود علامات أو أعراض لالتهاب المسالك البولية. تم جمع عينات 10 – 15 مل من البول النظيف من منتصف عملية التبول باستخدام أكواب معقمة. تمت زراعة عينات البول باستخدام الطرق البكتريولوجية القياسية. تم تحديد مسببات المرض واختبار الحساسية للمضادات الحيوية. النتائج من بين 113 امرأة حامل، كانت 38 حالة (34٪) إيجابية للجرثومة اللاعرضية. توجد علاقة ذات دلالة إحصائية بين اتجاه تنظيف الأعضاء التناسلية وتغيير الملابس الداخلية والنشاط الجنسي أسبوعياً والاصابة في البكتريا اللاعرضية. كانت الإشريكية القولونية أكثر أنواع البكتيريا عزلًا تليها بكتيريا المكورة العنقودية الذهبية. أظهر نيتروفيورانتوين حساسية 100٪ بينما كانت 66٪ من العزلات مقاومة لـ سيفاكلور. الاستنتاجات: بلغت نسبة انتشار البكتريا اللاعرضية بين النساء الحوامل في مستشفى رام الله الحكومي / فلسطين 34٪. تعد

الإشريكية القولونية والمكورات العنقودية الذهبية أكثر الكائنات الحية المعزولة شيوعًا. الاختبار الأكثر حساسية لاكتشافه هو زراعة البول، حيث يؤثر اتجاه غسل الأعضاء التناسلية والنشاط الجنسي بشكل كبير على مخاطر البكتيريا اللاعرضية التوصيات: يجب فحص النساء الحوامل مبكرًا بحثًا عن البكتيريا اللاعرضية. أثناء الحمل عن طريق زراعة البول. يجب إعطاء العلاج المناسب للحالات الإيجابية حسب اختبارات الحساسية للمضادات الحيوية. يوصى باستخدام نيتروفيورانتوين كدواء من الدرجة الأولى لأنه آمن ورخيص وفعال ومفيد للغاية في علاج التهاب المسالك البولية أثناء الحمل.