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The Prevalence Of Asymptomatic Bacteriuria In Pregnant Women And Association With Fetal And Maternal Outcome

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Abstract:
Background: *Urinary tract infection is the most common bacterial infection during pregnancy and can lead to significant maternal and perinatal morbidity. There is increasing evidence suggesting that asymptomatic bacteriuria (ASB) is associated with an increased rate of transformation into cystitis or pyelonephritis if not treated in the initial period. The great majority of studies performed so far concerning women diagnosed with ASB have focused on screening techniques and assessing the risk factors. Not many studies have been conducted regarding the fetal and maternal outcomes of asymptomatic bacteriuria in our settings. To fill these lacunae, the current study was under taken*
Materials and Methods*: This prospective cohort study was done on all antenatal patients diagnosed with asymptomatic bacteriuria by urine examination who attended the Obstetrics, Gynaecology and Infertility outpatient clinic and those who were admitted as an inpatient in the department of Obstetrics, Gynaecology, and Infertility. KIMSHEALTH, Thiruvananthapuram. The study was conducted over a period of 1.5 years from 1st January 2021 to 30th June 2022. A total of 272 pregnant women were screened for asymptomatic bacteriuria and followed up to delivery.. Their babies were also followed up during the early neonatal period to study the neonatal outcome of babies born to mothers with a history of ASB during the antenatal period.*
Results*: The prevalence of asymptomatic bacteriuria in the present study is 16.5 percent. The most common organism causing ASB in this study was Escherichia coli 44.4 percent followed by 24.4 percent Streptococcus agalactiae. the results of drug sensitivity revealed that the most common isolate, Escherichia coli showed 73.3 percent sensitivity to Nitrofurantoin followed by 50 percent Cefixime and Cefuroxime, 12.5 percent to Ampicillin. The highest incidence of bacteriuria was detected between 13 weeks to 19 + 6 weeks of gestation, 48.9 percent. Mostly seen in lower socioeconomic group. In this study, the majority of culture-positive women were primigravida 75.6 percent, and was statistically significant with a p-value of 0.019.*
Conclusion: *Asymptomatic bacteriuria is a very commonly encountered medical condition in pregnant women and its quiet frequent in anemic women. Untreated ASB does pose a potential threat to the development of pyelonephritis, anemia, gestational hypertension, FGR in babies, preterm labor, and PPROM. The most common organism detected in the isolate in our study was Escherichia coli and it was noted to be most sensitive to Nitrofurantoin. Preterm labor was also quite common in those with ASB.*
Key Word*: Asymptomatic bacteriuria: Pregnancy:Preterm labour: Urinary tract infections*

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I. Introduction

Pregnancy causes numerous physiological and hormonal changes which make women more susceptible to infections in comparison to other lifetime circles [(1)]. Urinary tract infections are the most common bacterial infections during pregnancy and can lead to significant maternal and perinatal morbidity. They can manifest as asymptomatic bacteriuria, acute urethritis, acute cystitis, or pyelonephritis [(2)].

Urinary tract infections in pregnancy are classified as either asymptomatic or symptomatic. Asymptomatic bacteriuria is defined as the presence of actively multiplying bacteria in the urinary tract excluding the distal urethra in patients without any obvious urinary symptoms. Symptomatic urinary tract infections are divided into lower tract (acute cystitis) or upper tract (acute pyelonephritis) infections. Cystitis is defined as significant bacteriuria with associated bladder mucosal invasion, whereas pyelonephritis is defined as significant bacteriuria with associated inflammation of the renal parenchyma, calyces, and pelvis[(3)].

ASB accounts for 2-10% of pregnancies in affluent countries (Whalley and Cunningham 2000)[4]. Its incidence worldwide varied from 5-10% and depends on age, parity, race, and socioeconomic status [2]. The prevalence of ASB varies from 47% (range 2-11%) and is similar to that observed in non-pregnant women[5].

Asymptomatic bacteriuria can be seen in the general population but by virtue of short urethra and being in close proximity to the vagina, women are more prone to UTI and more so during pregnancy [2]. Although pregnancy does not predispose a woman to the acquisition of ASB, it does predispose her to acute upper urinary tract infection or pyelonephritis[5]. Pregnancy is a unique state with anatomic and physiological urinary tract changes. While ASB in non-pregnant women is generally benign, pregnant women with bacteriuria have an increased susceptibility to pyelonephritis[3].

The renal pelvis and ureters begin to dilate as early as the 8th week of gestation and the bladder itself is displaced superiorly and anteriorly. Mechanical compression from the enlarging uterus is the principle cause of hydroureter and hydronephrosis, but smooth muscle relaxation induced by progesterone may also play a role. Smooth muscle relaxation results in decreased peristalsis of the ureters, increased bladder capacity, and urinary stasis. Differences in urine pH and osmolality and pregnancyinduced glycosuria and aminoaciduria may facilitate bacterial growth[3].

The reduced immunity during pregnancy and the stasis due to ureteral dilatation, not only encourages the growth of organisms but also allow progression to pyelonephritis [2]. These changes enhance the colonization of the urinary tract by organisms such as Escherichia coli, Klebsiella, Proteus, Enterobacteriaceae, Pseudomonas aeruginosa, Enterococcus species, and Staphylococcal species which may cause ASB among pregnant women. [6]. The presence of 100,000 or more colonyforming units of a single bacteriuria per milliliter of two consecutive clean catch urine specimens or a single catheter specimen in absence of urinary symptoms and signs has been taken as significant in making a diagnosis of asymptomatic bacteriuria [6].

Pyelonephritis develops in 20-40% of pregnant women with untreated ASB. 40-80% of pregnancy complications caused by acute pyelonephritis could be prevented by treating asymptomatic bacteriuria. The risk of progression to pyelonephritis is reduced to less than 5% with the eradication of bacteriuria by adequate treatment. Acute severe infection of the kidneys causes transient renal dysfunction which ultimately leads to acute renal failure [4].

The relatively high prevalence of asymptomatic bacteriuria in pregnancy, the significant consequences for women and pregnancy, the reported adverse effects in pregnancy outcome plus the ability to avoid sequelae with treatment, justifies screening of pregnant women for the presence of bacteriuria using a protocol based on urine tests and urine culture and adequate treatment of all cases of ASB[2].

In making the diagnosis of asymptomatic bacteriuria, technically two consecutive samples are ideally collected. This helps to reduce the incidence of false positive results. The gold standard diagnostic test to diagnose bacteriuria is the culture of urine. However, the culture test is relatively expensive and time-consuming and may not be feasible to carry out the test universally in all pregnant mothers, especially in low-resource settings. The available screening methods are: testing of urine for pyuria, nitrites, and dipstick methods and a positive test would indicate the need for diagnostic urine culture. These tests are simple and less expensive. In a developing country like India, it is important to use a screening method that is simple and cost-effective [2].

The choice of the antibiotic to be used must be made based on the urine culture test, stage of gestation, maternal clinical condition, and characteristics of the antibiotic such as pharmacokinetics, and maternal and fetal toxicity. With regard to the treatment protocol, the single-dose protocol is currently preferred. After negative urine culture tests, all patients must carry out a complete urine test each month till the termination of pregnancy.[7]

Renal and urinary tract disorders are frequently encountered in pregnancy. Some precede pregnancy such as nephrolithiasis whereas, in some women, pregnancy-induced changes may predispose to the development or worsening of urinary tract disorders such as pyelonephritis and some renal pathology is unique to pregnancy such as pre-eclampsia. With good prenatal care, however, most women with these disorders will likely have no long-term sequelae.

The urinary system undergoes several remarkable changes in pregnancy. Kidney size grows approximately 1cm longer on radiograph and resembles hydronephrosis on sonogram or IVP which is more marked on the right side. The size returns to normal during the postpartum period. It can be confused with obstructive uropathy, retained urine can lead to collection and stasis thereby resulting in more virulent renal infections. Evidence of functional renal hypertrophy becomes apparent very soon after conception. Glomeruli are larger although cell numbers do not grow. pregnancy-induced intrarenal vasodilatation develops and both afferent and efferent resistances decline. This leads to greater effective renal plasma flow and glomerular filtration.

After the uterus completely rises out of the pelvis, it rests on the ureters. This laterally displaces and compresses them at the pelvic brim. Above this level, elevated intraureteral tonus results and ureteral dilatation is impressive. It is right-sided in 86 percent of women. This unequal dilatation may result from cushioning provided to the left ureter by the sigmoid colon and perhaps from greater right ureteral compression exerted by

the dextrorotation of the uterus. The right ovarian vein complex which is remarkably dilated during pregnancy lies obliquely over the right ureter and may also contribute to right ureteral dilatation[8].

Progesterone likely has some additional effect. Van Wagenen and Jenkins (1939) described continued ureteral dilatation after the removal of the monkey fetus but with the placenta left in situ. The relatively abrupt onset of dilatation in women at mid-pregnancy however seems more consistent with ureteral compression. Ureteral elongation accompanies distention and the ureter is frequently thrown into

curves of varying size, the smaller of which may be sharply angulated. These so-called kinks are poorly named because the term connotes obstruction. They are usually single or double curves that, when viewed in a radiograph taken in the same plane as the curves, may appear as acute angulations. Another exposure at right angles nearly identifies them to be gentle curves.

Despite these anatomical changes, complication rates associated with ureteroscopy in pregnant and non-pregnant patients do not differ significantly. There is also some vesicoureteral reflux during pregnancy. Because of these physiological changes, the risk of upper urinary infection rises. Also, imaging studies done to evaluate urinary tract obstruction may occasionally be erroneously interpreted[8].

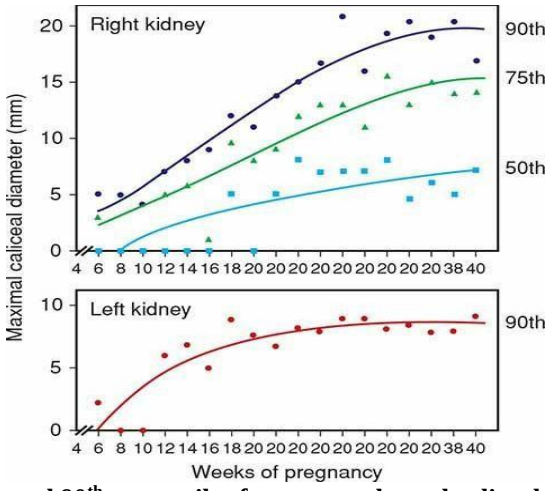


FIGURE 1: - the 50th, 75th, and 90th percentiles for maternal renal caliceal diameters measured using sonography in 1395 pregnant women from 4-42 weeks gestation. Dilatation of urinary tract during pregnancy: proposal of a curve of maximal caliceal diameter by gestational age[8]

The bladder shows few significant anatomical changes before 12 weeks gestation. Subsequently however increased uterine size, the hyperemia that affects all pelvic organs, and hyperplasia of the bladder muscle and connective tissues elevate the trigone and thicken its intraurethral margin. Continuation of this process to term produces marked deepening and widening of the trigone.

The bladder mucosa is unchanged other than an increase in the size and tortuosity of its blood vessels. Bladder pressure in primigravidas increases from 8cm H_2O early in pregnancy to 20cm H_2O at term. To compensate for reduced bladder capacity, absolute and functional urethral lengths increased by 6.7 and 4.8mm respectively.

Concurrently maximal intraurethral pressure rises from 80 to 93cm H_2O and thus continence is maintained. Still, at least half of women experience some degree of urinary incontinence by the third trimester. Indeed, this is always considered in the differential diagnosis of ruptured membranes.

In near-term nulliparas, in whom the presenting part often engages before labor the entire base of the bladder is pushed ventral and cephalad. This converts the normally convex surface into a concavity. As a result, difficulties in diagnostic and therapeutic procedures are greatly accentuated. Moreover, pressure from the presenting part impairs blood and lymph drainage from the bladder base, often rendering the area oedematous, easily traumatized, and possibly more susceptible to infection[8].

Coming to both the glomerular filtration rate (GFR) and renal plasma flow increase early in pregnancy. The GFR rises as much as 25 percent by the second week after conception and 50 percent by the beginning of the second trimester. This hyper filtration results from two principal factors. First, hypervolemia-induced haemodilution lowers the protein concentration and oncotic pressure of plasma entering the glomerular microcirculation. Second, renal plasma flow increases by approximately 80 percent before the end of the first trimester. Elevated GFR persists until term, even though renal plasma flow declines during late pregnancy. Primarily as a consequence of this elevated GFR, approximately 60 percent of nulli paras during the third-trimester experience urinary frequency, and 80 percent experience nocturia.[8]

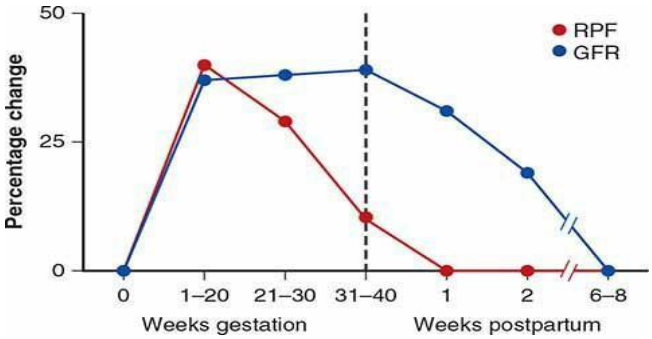


FIGURE 2: - Percentage increment in glomerular filtration rate (GFR) and renal plasma flow (RPF) across gestation and in the puerperium[(8)].

During the puerperium, a marked GFR persists in the first postpartum day, principally from the reduced glomerular capillary oncotic pressure. A reversal of the gestational hypervolemia and haemodilution, still evident on the first postpartum day, eventuates by the second week postpartum. Studies suggest that relaxin may mediate both increased GFR and renal blood flow during pregnancy. Relaxin boosts renal nitric oxide production which leads to renal vasodilation and lowered renal afferent and efferent arteriolar resistance. This augments renal blood flow and GFR. Relaxin may also increase vascular gelatinase activity during pregnancy, which leads to renal vasodilation, glomerular hyperfiltration, and reduced myogenic reactivity of small renal arteries.

One unusual feature of pregnancy-induced changes in renal excretion is the remarkably increased amounts of nutrients lost in the urine. Amino acids and water soluble vitamins are excreted in much greater amounts.[(8)]

Changes in renal function test Serum creatinine levels decline during normal pregnancy from a mean of 0.7 to 0.5mg/dl. Values of 0.9ml/dl or greater suggest underlying renal disease and prompt further evaluation. Creatinine clearance in pregnancy averages 30 percent higher than 100 to 115mL/min in nonpregnant women. This is a useful test to estimate renal function, provided that complete urine collection is made during an accurately timed period. If this is not done precisely, results are misleading.

During the day pregnant women tend to accumulate water as dependent edema and at night while recumbent, they mobilize this fluid with diuresis. This reversal of the usual non-pregnant diurnal pattern of urinary flow causes nocturia, and urine is more dilute than in non-pregnant women. Failure of a pregnant woman to excrete concentrated urine after withholding fluids for approximately 18 hours does not necessarily signify renal damage. The kidneys in these circumstances function perfectly normally by excreting mobilized extracellular fluid of relatively low osmolality[(8)].

Glucosuria during pregnancy may not be abnormal. The appreciably increased GFR, together with the impaired tubular resorptive capacity for filtered glucose, accounts for most cases of glucosuria. Chesley (1963) calculated that about a sixth of pregnant women will spill glucose in their urine. That said although common during pregnancy, when glucosuria is identified, a search for diabetes mellitus is pursued.

Haematuria frequently results from contamination during collection. If not, it most often suggests urinary tract disease or infection. Haematuria is common after difficult labor and delivery because of trauma to the bladder and urethra.

Proteinuria is typically defined in non-pregnant subjects as a protein excretion rate of more than 150mg/d. Because of the aforementioned hyperfiltration and possible reduction of tubular reabsorption, proteinuria during pregnancy is usually considered significant once a protein excretion threshold of at least 300mg/d is reached. Higby and co-workers (1994) measured protein excretion in 270 normal women throughout pregnancy. Mean 24- hour excretion for all three trimesters was 115mg and the upper 95 percent confidence limit was 260ml/d without significant differences by trimester. They showed that albumin excretion is minimal and ranges from 5 to 30mg/d. proteinuria increases with gestational age, which corresponds with the peak in GFR[(8)].

The three most commonly employed approaches for assessing proteinuria are the qualitative classic dipstick, the quantitative 24-hour collection, and the albumin/creatinine or protein/creatinine ratio of a single voided urine specimen. The pitfalls of each approach have been reviewed by Conrad (2014b) and Branham (2016) and their colleagues. The principal problem with dipstick assessment is that it fails to account for renal concentration or dilution of urine. For example, with polyuria and extremely dilute urine a negative or trace dipstick could be associated with excessive protein excretion. The 24-hour urine collection is affected by urinary tract dilatation. The dilated tract may lead to errors related both to retention and timing. To minimize these pitfalls the patient is first hydrated and positioned in lateral recumbency for 45 to 60 minutes. After this, she is asked to void, and her 24-hour collection begins. During the final hour of collection, the patient is again placed in the lateral recumbent position. But at the end of this hour, the final collected urine is incorporated into the total collected volume.

Lastly the protein/creatinine ratio is a promising approach because data can be obtained quickly and collection errors are avoided. Disadvantageously the amount of protein per unit of creatinine excreted during 24 hours is not constant, and the thresholds to define abnormality vary. Nomograms for urinary microalbumin and creatinine ratios during uncomplicated pregnancies have been developed[(8)].

Urinary tract infections are the most frequent bacterial infections complicating pregnancy. Although ASB is the most common, symptomatic infection includes cystitis or it may involve the renal calyces, pelvis, and parenchyma to cause pyelonephritis. Organisms that cause urinary infections are those from the normal perineal flora.

Approximately 90 percent of Escherichia coli strains that cause nonobstructive pyelonephritis have adhesins such as P and S fimbriae. These are cell-surface protein structures that enhance bacterial adherence and thereby virulence. Data suggest that pregnant women have more severe sequelae from urosepsis. One possible underlying factor is the T-helper cell Th1/Th2 ratio reversal of normal pregnancy. Even if pregnancy itself does not enhance these virulence factors, urinary stasis vesicoureteral reflux and diabetes predispose to symptomatic upper urinary infections.

In the puerperium, several risk factors predispose to urinary infections. Bladder sensitivity to intravesical fluid tension is often diminished due to labor trauma or epidural analgesia. Bladder sensations can also be obscured by discomfort from vaginal or perineal injury. Normal postpartum diuresis may worsen bladder overdistention and catheterization to relieve retention often leads to urinary infection. Postpartum pyelonephritis is treated in the same manner as antepartum renal infections[(8)].

Asymptomatic bacteriuria is defined as persistently and actively multiplying bacteria more than or equal to 10^5 bacteria per milliliter (ml) within the urinary tract without any obvious symptoms [(6)]. The incidence of bacteriuria in pregnant women is approximately the same as that in nonpregnant women, it varies from 2 to 7 percent and it is characteristically population-dependent. The highest incidence is in African-American multiparas with sickle-cell trait and the lowest is in affluent white women of low parity. Recurrent bacteriuria is more common during pregnancy. Asymptomatic infection is also more common in diabetics.

Bacteriuria is typically present at the first antepartum visit. An initial positive urine culture result done as a part of prenatal care should prompt treatment. After this, fewer than 1 percent of women develop a urinary tract infection.

A clean-voided specimen containing more than 100,000 organisms/mL is diagnostic. It may be prudent to treat when lower concentrations are identified because pyelonephritis develops in some women despite colony counts of only 20,000 to 50,000 organisms/mL. Most studies indicate that if asymptomatic bacteriuria is not treated, approximately 25 percent of infected women will develop a symptomatic infection during pregnancy. In a more recent study, only 2.4 percent of treated women developed pyelonephritis. Eradication of bacteriuria with antimicrobial agents prevents most of these serious infections.

The American Academy of Pediatrics and the American College of Obstetricians and Gynecologists (2017) as well as the U.S. Preventive Services Task Force (2008), recommend screening for bacteriuria at the first prenatal visit. Standard urine cultures may not be cost-effective when the prevalence is low. Less expensive screening tests such as the leukocyte esterase/nitrite dipstick are cost-effective when the prevalence is less than or equal to 2 percent. Also, a dipstick culture technique has excellent positive and negative predictive values. With this, a special agar-coated dipstick is first placed into urine and then serves as the culture plate. Because of a high prevalence of 5 to 8 percent at Parkland Hospital, most women are screened by traditional urine culture. Susceptibility determination is not necessary because initial treatment is empirical.

In some but not all studies covert bacteriuria has been associated with preterm or low birthweight infants. It is even more controversial whether the eradication of bacteriuria decreases these complications. Evaluating a cohort of 25,746 motherinfant pairs, Schieve and co-worker (1994) reported urinary tract infection to be associated with greater risks for low-birth-weight infants, preterm delivery, pregnancy-associated hypertension, and anemia. These findings vary from those of others. Notably in most studies cohorts with asymptomatic infection are not evaluated separately from those with acute renal infection. One Cochrane database review noted insufficient data to answer this question[(8)].

Additionally, the incidence of pyelonephritis is higher than in the general population, likely as a result of physiologic changes in the urinary tract during pregnancy. It typically occurs during early pregnancy, with only approximately a quarter of cases identified in the second or third trimesters. Bacterial endotoxins initiate a cascade of toxic inflammatory mediators that cause local circulatory disturbances in the placenta. This placental insufficiency leads to abortions, stillbirths, IUGR, and low birth weight babies.

Bacterial products initiate complex immunological, endocrinological, and biochemical processes, culminating in adverse maternofetal outcomes. In patients with ASB, bacterial endotoxins and lipopolysaccharides are chronically released. This leads to continuous and sustained damage to the red cell membranes, causing early cell destruction and anemia with ASB which is refractory to hematinic and responds promptly with antimicrobials. IL-1 directly decreases erythropoietin secretion. IL-1 and TNF- α act through

interferon- γ, to suppress the response of the erythroid marrow to erythropoietin. Hepcidin is a protein synthesized by the liver in chronic infection and inflammation. It suppresses iron absorption from the gut and release of iron from its storage sites[4]

Most of the women whose urine is colonized are asymptomatic and hence never receive treatment, while few go on to develop frank symptoms and signs of urinary tract infection. The reason for the asymptomatic clinical state has been related to the absence of Type 1 fimbriae found in certain strains of bacteria, particularly E. coli. This fimbria is immunogenic and its presence initiates the immune/ inflammatory response, which leads to the development of symptoms whereas its absence leads to the absence of symptoms [6]

Bacteremia occurs in 15-20% of cases of pyelonephritis; Escherichia coli is the most prevalent causative microorganism in asymptomatic bacteriuria, accounting for more than 80% of uncomplicated UTIs. Patients with renal scarring due to pyelonephritis are at increased risk for the development of hypertension.

Gram-negative bacteria possess endotoxin within their cell wall. Endotoxin mediated damage includes that of capillary endothelium, diminished vascular resistance, and changes in cardiovascular output. When the active component of endotoxin i.e., lipid A is released into maternal circulation it precipitates a cascade response of pro-inflammatory cytokines, histamines, and bradykinins that may lead to more serious complications like septic shocks, disseminated intravascular coagulation, respiratory insufficiency and Adult Respiratory Distress Syndrome (ARDS).

Systemic infections like pyelonephritis caused by ascending and bacterial infections from the lower urinary tract reach the decidua, chorion, and fetus. Bacterial endotoxins initiate a cascade of toxic inflammatory mediators that cause local circulatory disturbances in the placenta. Untreated asymptomatic bacteriuria is associated with obstetric problems such as preeclampsia, preterm labor, IUGR, and low birth weight infants. Urinary tract infection triggers premature rupture of membranes by the release of bacterial endotoxin which provokes PROM either directly or through a prostaglandin-mediated cascade. PROM with secondary chorioamnionitis and endometritis leads to the inability of the inflamed uterus to contract effectively thus causing subinvolution.

Bacterial products like mucinase and pro-inflammatory factors promote the breakdown of the cervical plug and the spread of infection to the fetus. ASB causes PROM and the spread of infection to the fetus. As the fetal neonatal immunological system is less developed, the fetus is readily prone to infections and acts as a culture media for organisms. Thus, organisms of low virulence, commensals, and otherwise non-pathogenic organisms readily colonize and multiply in the fetus causing septicemia. Cytokines produced in relation to maternal infections are harmful to the developing fetal brain. An increase in IL-6 is associated with long-term neurological consequences and bronchopulmonary complications in the fetus. The amniotic fluid infection leads to periventricular leukomalacia and bronchopulmonary dysplasia in the neonate[4].

Coming to treatment bacteriuria responds to empirical treatment with any of the several antimicrobial regimens listed below. Although selection can be based on in vitro susceptibilities, an empirical oral treatment for 10 days with nitrofurantoin macro crystals, 100mg at bedtime, is usually effective. Satisfactory results are also achieved with a 7-day oral course of 100mg given twice daily. Single-dose antimicrobial therapy is less successful. The important caveat is that, regardless of the regimen given, the recurrence rate is approximately 30 percent. This may indicate covert upper tract infection and the need for longer therapy.

Thus, after initial therapy, periodic surveillance is necessary to prevent recurrent urinary infections[8]. The single dose treatment by antibiotics like Amoxicillin (3g),Ampicillin (2g) Cephalosporin (2g), Nitrofurantoin (200mg) and Trimethoprim-sulfamethoxazole 320/1600mg. In few clinical situations we can give 3 days and 10 days course of antibiotics. In treatment failure Nitrofurantoin can be used for 21 days. In bacterial persistence or resistance Nitrofurantoin 100mg at bedtime for remainder of pregnancy. [8]

J. Akerele did a semi-quantitative screening for asymptomatic bacteriuria in the first trimester of 500 consecutive pregnant women in Benin City, Nigeria to study the prevalence of Asymptomatic bacteriuria in pregnant women. Of the 500 women screened, 433 clinical specimens showed significant bacteriuria, representing an incidence of 86.6%. Of this number, 38(7.4%) were mixed bacterial colonies while 395(91%) were single bacterial colonies. Staphylococcus aureus (29.8%), Escherichia coli (29.1%), and Klebsiella pneumoniae (21.5%) were the most frequently isolated pathogens. The high incidence of bacteriuria in pregnancy correlated significantly ($p < 0.05$) with the observed high proportion of pyuria. On average, sensitivity of the pathogens was ciprofloxacin 99.7%, ceftazidime 81.6%, co trimoxazole 79.4%, Augmentin 71.4%, nalidixic acid 61.7%, nitrofurantoin 61%, gentamycin 56.9% and ampicillin 25.4%. Staphylococcus aureus was the most sensitive, while Proteus mirabilis was the least sensitive among the pathogens. Rational therapy of asymptomatic bacteriuria in pregnant women may prevent associated risks such as pyelonephritis and pre-eclampsia [7].

Eyal Sheiner, Soroko University Medical Centre, Be'er-Sheva, Israel, studied the association between asymptomatic bacteriuria during pregnancy, among patients in whom antibiotic treatment was recommended and perinatal outcomes assessed. Out of 199,093 deliveries, 2.5% (n=4890) were in patients with asymptomatic bacteriuria. E.coli was the most common pathogen associated with asymptomatic bacteriuria, representing 78.6%

of the cultures with specified growth. Patients with asymptomatic bacteriuria were more likely to deliver preterm (PTD, 13.3% vs 7.6% odd ratio (OR)=1.9, 95% confidence interval CI 1.7-2.0; P<0.001). Asymptomatic bacteriuria was independently associated with PTD (adjusted OR= 2.6; 95% CI 1.5-1.7; P<0.001), fertility treatments, hypertensive disorders, recurrent abortions, diabetes mellitus, IUGR, polyhydramnios, and oligohydramnios, PROM and labor induction in multivariable analysis with backward elimination. Perinatal mortality rates (1.5% vs 1.4%; P=0.707) as well as low 5 min Apgar scores (0.8% vs 0.6%; P=0.065) were comparable between the groups. The study concluded that ASB is an independent risk factor for preterm delivery [(9)].

A study on the prevalence, etiology, and comparison of screening methods of ASB in pregnancy was done by K Mukherjee, in Bangalore, India. Out of the 250 pregnant women, 21 (8.4%) had significant bacteriuria. A high percentage of asymptomatic bacteriuria was seen in 2nd trimester (42.86%) and primi gravidas (52.38%). E.coli (57.14%) was the most common organism. Among screening, gram staining of un centrifuged urine had a sensitivity of 85.71%. Nitrite and leukocyte esterase tests alone showed a sensitivity of 71.42%. However, the combination of these two tests, either test positive,showed sensitivity and negative predictive values of 90.47% and 99.09% respectively [(5)].

A study of risk factors and consequences of ASB in pregnant women and the feto-maternal outcome by Byna P showed that antenatal complications like anemia (35%), PROM (14%), preterm labor (18%), IUGR (14%), preeclampsia (5%) and pyelonephritis (3.5%) were higher in culture positive group when compared to control group. There was an increased risk of mid-trimester abortions (4%) and an increased rate of cesarean section (48%) in culture-positive cases compared to controls. Puerperal complications like maternal wound infections (5%), puerperal fever (14%), and UTI (10%) were more in culture-positive cases when compared to controls. In the present study, fetal complications like low APGAR (19%), LBW (20%), and neonatal infections (8%) were higher in culture positive group compared to the control group proving a significant association with ASB [(4)].

Vandana N studied the prevalence, screening methods, and maternal and perinatal outcomes associated with ASB, and in that study, the prevalence of ASB was 13.33%. Compared with urine culture, the nitrite test had a sensitivity of 73.33%, specificity was 98.46% and the total diagnostic accuracy was 95.11%. The presence of pyuria (pus cells>6/HPF) showed a sensitivity of 53.33%, specificity was 96.92%. The total diagnostic accuracy was 91.11% combining both nitrite test and pyuria and considering either one or both as positive, the sensitivity was 86.67%, the specificity was 95.90% and the total diagnostic accuracy was 94.67%.in this study, there was no statistically significant relationship between asymptomatic bacteriuria and anemia, preeclampsia, preterm labor, and IUGR[(2)].

Emami .A did a systematic review and Meta-analysis on the antibiotic-resistant profile of asymptomatic bacteriuria in pregnant women in Iran. They did a comprehensive systematic search on all international databases including Scopus, PubMed, Web of Science, Medline, and Cochrane library for 19 years. This meta analysis was registered by a predefined protocol in PROSPRO and carried out as per PRISMA guidelines. Relevant articles were included in the analysis which reported the susceptibility pattern of antimicrobial resistance related to ASB in pregnant women with no acute diseases. The overall prevalence and related 95% confidence interval for resistance in different asymptomatic infections were estimated by the inverse variance method. The random effect model was used in case of considerable heterogeneity. The results of this analysis demonstrated different resistance rates against studied classes of antibiotics. Nitrofurantoin resistance in E.coli, Klebsiella species, Pseudomonas aeruginosa and Staphylococcus aureus isolates were estimated
0.22 (95%CI: 0.15-0.30), 0.40 (95%CI:0.26-0.54), 0.81 (95%CI0.59-0.97), 0.34(0.11-0.63) respectively. Subgroup analysis showed the highest resistance in E.coli isolates in Asia and Africa against Cefotaxime and Ampicillin, respectively. The study concluded that increasing resistance rate in urinary tract infection (UTI)-related agents is a risk factor that endangers both mother and fetus. Health care providers should consider screening as a radical part of infection control strategies. Due to the low resistance rate to Nitrofurantoin, this drug can be a good choice for UTI treatment in pregnancies but is should be used with caution[(1)].

Smaill FM studied the antibiotics for the treatment of asymptomatic bacteriuria in pregnancy. Their objective was to assess the effect of antibiotic treatment for ASB on the development of pyelonephritis and the risk of low birthweight and preterm birth. They searched the Cochrane Pregnancy and Childbirth Group's Trials Register (19 March 2015) and reference lists of retrieved studies. 14 studies involving almost 2000 women were included. Antibiotic treatment compared with placebo or no treatment reduced the incidence of pyelonephritis (average risk ratio (RR) 0.23, 95% CI 0.13 to 0.41, 11 studies, 1932 women, very low-quality evidence). Antibiotic treatment was also associated with a reduction in the incidence of low birthweight babies (average RR 0.64, 95% CI 0.45 to 0.93, 6 studies, 1437 babies, low-quality evidence) and preterm birth (RR 0.27, 95% CI 0.11 to 0.62, 2 studies, 242 women, low-quality evidence). A reduction in persistent bacteriuria at the time of delivery was seen (average RR 0.30, 95% CI 0.18 to 0.53, 4 studies, 596 women). There were very limited data on which to estimate the effect of antibiotics on other infant outcomes and maternal adverse effects were rarely described.

Overall, all 14 studies were assessed as being at high or unclear risk of bias. While many studies lacked an adequate description of methods and the risk of bias could only be assessed as unclear, in almost all studies there was at least one domain where the risk of bias was judged as high. Evidence for pyelonephritis, preterm birth, and birthweight less than 2500grams was assessed as of low or very low quality. They concluded that while antibiotic treatment is effective in reducing the risk of pyelonephritis in pregnancy, the estimate of the effect is very uncertain because of the very low quality of the evidence. The reduction in low birth weight and preterm birth with antibiotic treatment is consistent with theories about the role of infection in adverse pregnancy outcomes, but this association should be interpreted with caution given the very poor quality of the included studies[(10)].

Jain V studied asymptomatic bacteriuria and the obstetric outcome following treatment in early versus late pregnancy in north Indian women. It was a prospective cohort study conducted at a tertiary care teaching hospital in north India. RR with 95% CI was used to describe the association between ASB and outcome of interest. ASB was found in 17 percent of pregnant women till 20 weeks and in 16 percent between 32 to 34 weeks gestation. Increased incidence of preeclampsia (RR 3.79, 95% CI 1.80-7.97), PPROM (RR 3.63, 95% CI 1.63-8.07), preterm labor (RR 3.27, 95% CI 1.38- 7.72), IUGR (RR 3.79, 95% CI 1.80-79), low birth weight (RR 1.37, 95% CI 0.71-2.61) was seen in late detected women (32-34 weeks) as compared to ASB negative women, whereas no significant difference was seen in early detected women (till 20 weeks) as compared to ASB negative women. The conclusion was that early detection and treatment of ASB during pregnancy prevent complications. Therefore screening and treatment of ASB may be incorporated as routine antenatal care for safe motherhood and healthy newborn[(11)].

A cross-sectional study was undertaken in a teaching hospital in Lagos, Nigeria by Olamijulo JA to determine the prevalence of ASB among antenatal women. The commonest bacterial isolates and the antibiotic sensitivity pattern among 556 pregnant women were studied. The prevalence of ASB was 14.6% and Klebsiella was the commonest micro-organism (39.2%) isolated. ASB was significantly associated with marital status, BMI, and parity. There was a significant relationship between urinary nitrites and ASB. The isolated organisms showed remarkable resistance to commonly prescribed antibiotics such as amoxicillin, cloxacillin, and trimethoprim but good sensitivity to ofloxacin, gentamycin, and ceftazidime. These facts have implications for the management of ASB in pregnancy[(12)].

Quiroga-feuchter G did a study to determine the frequency of ASB among pregnant women attending antenatal care at a family medicine clinic at Ciudad Obregon, Sonora. A longitudinal study was carried out and it included 72 pregnant women with a gestational age of 24 weeks or less and they were followed up for 4 months. Every patient had a monthly urine culture during the follow-up period.

Among the 72 pregnant women, 16.7% developed symptomatic urinary infections during the follow-up and 25% had at least one positive urine culture without urinary symptoms, being classified as ASB, thus receiving treatment. The frequency of positive urine cultures was common in the first and fourth months of follow-up. They concluded that urine culture is an important component of prenatal care and helps in identifying a significant number of urinary tract infections, which would go otherwise undetected[(13)].

II. Material And Methods

This prospective cohort study was done on Patients attending the Obstetrics department of KIMS health, Trivandrum Kerala for a period of one and half years .

STUDY SITE: Department of Obstetrics, Gynecology, and Infertility, KIMSHEALTH, Thiruvananthapuram.

STUDY POPULATION: All antenatal patients diagnosed with asymptomatic bacteriuria by urine examination who attended the Obstetrics, Gynaecology and Infertility outpatient clinic and those who were admitted as an inpatient in the department of Obstetrics, Gynaecology, and Infertility.

STUDY DURATION: The study was conducted over a period of 1.5 years from 1st January 2021 to 30th June 2022.

STUDY DESIGN: A prospective cohort study.

SAMPLE SIZE ESTIMATION:

Required sample size (n),

$$n = \frac{Z_{1-\alpha/2}^{2}\, p(1-p)}{d^2}$$

Z= 1.96(for 95% confidence interval)

P= 13.33% (Prevalence of antenatal mothers with asymptomatic bacteriuria) [(1)] q =1-p

Allowable error, d = 4%

$$\text{Then, } n = \frac{(1.96)^2 \times (0.1333) \times (1-0.1333)}{0.0016}$$

Required sample size n =2

INCLUSION CRITERIA:

1. Pregnant women who attended the ANC for the first visit.
2. Pregnant women who gave consent for participating in the study.

EXCLUSION CRITERIA:

1. Pregnant women with symptoms of urinary tract infections like lower abdominal pain, fever, burning micturition, frequency of micturition, and dysuria.
2. Patients with a history of UTI in the past 1 year or during this pregnancy.
3. Patients with diabetes, chronic hypertension, and other pre-existing medical disorders.
4. Patients who had taken antibiotics in the last 6 months.

METHODOLOGY**:** All antenatal mothers who satisfied the inclusion criteria were enrolled in the study after obtaining informed consent during their first antenatal visit to KIMSHEALTH. Using a well-structured pro-forma which included details regarding the demography, complaints (UTI symptoms), period of gestation, obstetric history, and past medical history was collected. Complete general examination and obstetric examination were carried out during their OP visit.

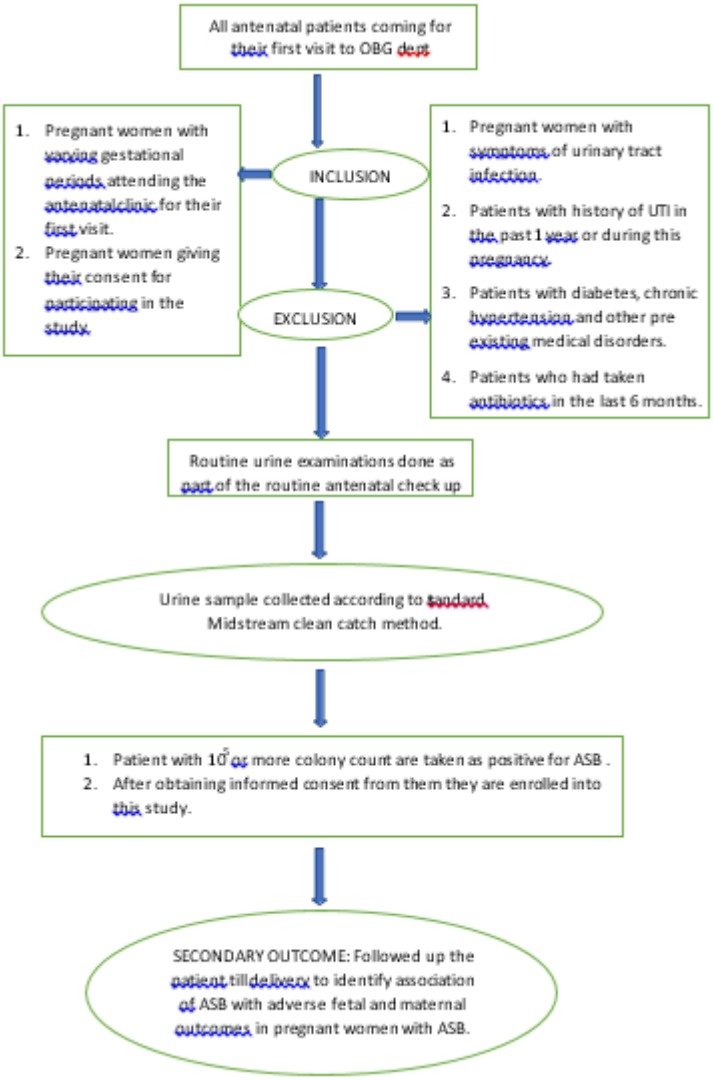
During their first antenatal visit as part of the routine antenatal investigations, urine samples were collected according to the standard Midstream clean catch method from all the pregnant women and immediately transported to the laboratory for routine urine analysis, microscopy and culture. A colony count of 10^5 or more pure isolates was considered positive for significant bacteriuria.

All antenatal patients with ASB provide the primary outcome of this study which was to assess the prevalence of ASB in the pregnant population. They were started on appropriate antibiotics to prevent the progression of the disease to cystitis or pyelonephritis and they were followed up till delivery to assess the secondary outcome of this study. Both the intrapartum and post-partum condition of the mother and baby was assessed to know about the maternal and fetal outcome.

PRIMARY OUTCOME**:** Prevalence of antenatal mothers with asymptomatic bacteriuria

SECONDARY OUTCOME**:** The adverse fetal and maternal outcomes in pregnant women with asymptomatic bacteriuria.

DATA COLLECTION METHODS**:** All the data collected were entered by the principal investigator in an interviewer-administered questionnaire. This proforma contains relevant clinical history, examination findings, and investigation details.



STATISTICAL METHODS: -

All data were entered into MS Excel and analyzed using the statistical software SPSS version 20 for windows. Continuous variables were expressed as Mean ± Standard Deviation and categorical variables were expressed as frequency and percentages. Comparison of study variables with the outcome (presence/absence of bacteriuria) was done using the Chi-square test. A p-value of less than 0.05 was considered statistically significant.

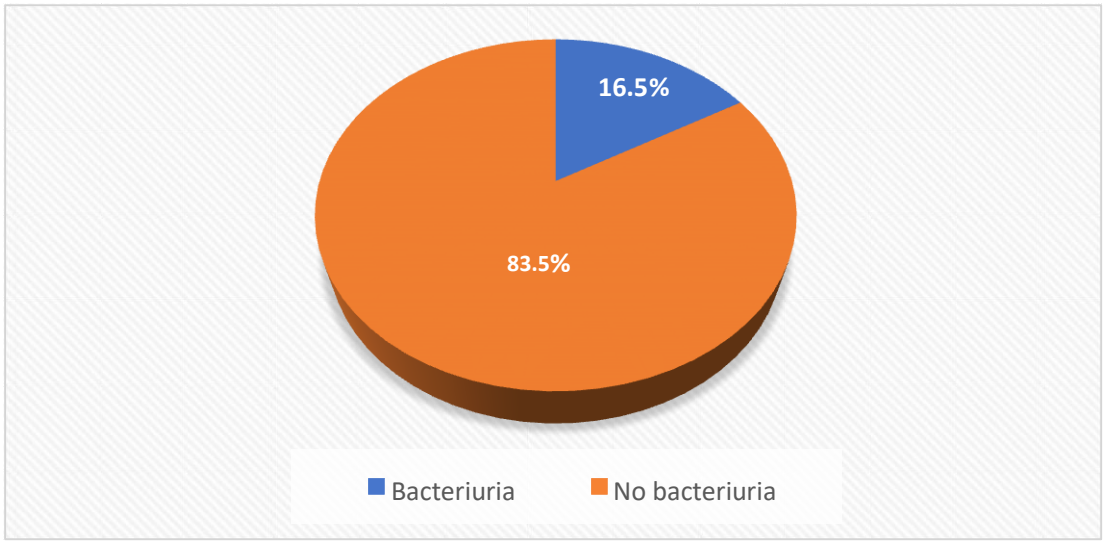
III. Result

All pregnant women total of 272 cases were screened for asymptomatic bacteriuria and followed up to delivery in the Department of Obstetrics Gynaecology and Infertility. Their babies were also followed up during the early neonatal period to study the neonatal outcome of babies born to mothers with a history of ASB during the antenatal period.

TABLE 1
PREVALENCE OF BACTERIURIA

	BACTERIURIA	Frequency	Percent
1	Bacteriuria	45	16.5
2	No bacteriuria	227	83.5
	Total	272	100.0

FIGURE 4- PREVALENCE OF ASYPMTOMATIC BACTERIURIA



Of the 272 antenatal mothers studied 16.5 percent ie 45 patients tested positive for ASB whereas 227 were negative for the disease.

CHARACTERISTICS OF THE STUDY POPULATION

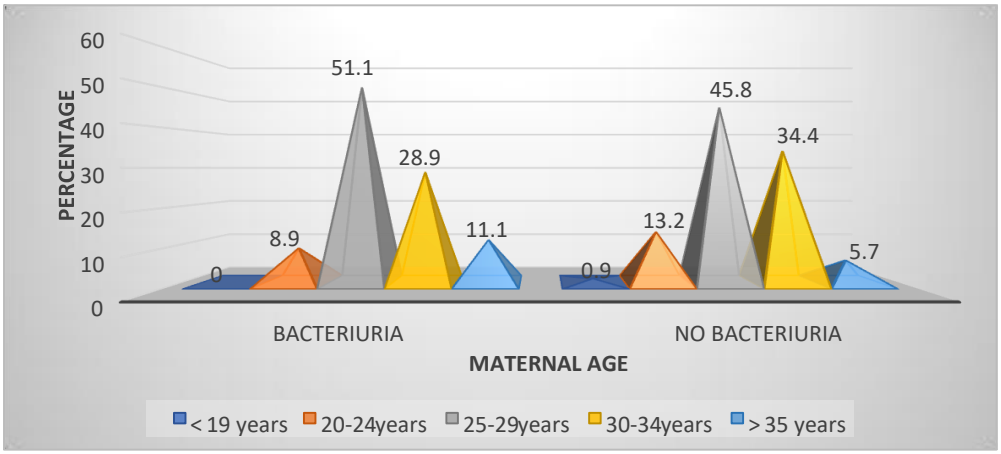
AGE

In this study, the mean age of the study population was 28.94 ± 3.82 years and the age distribution varied from 19- 45 years. The highest number of culture-positive cases were in the age group 25-29 years, 51.1 percent followed by 28.9 percent in the range 30-34 years and 11.1percent more than 35 years.

TABLE 2
COMPARISON OF MATERNAL AGE

AGE	BACTERIURIA	NO BACTERIURIA	TOTAL	P VALUE
19 years	0	2	2	
	0	0.9%	0.7%	
20- 24 years	4	30	34	
	8.9%	13.2%	12.5%	
25-29 years	23	104	127	
	51.1%	45.8%	46.7%	0.530
30-34 years	13	78	91	
	28.9%	34.4%	33.5%	
More than 35 years	5	13	18	
	11.1%	5.7%	6.6%	
TOTAL	45	227	272	

FIGURE 5- ASSOCIATION OF ASB WITH MATERNAL AGE



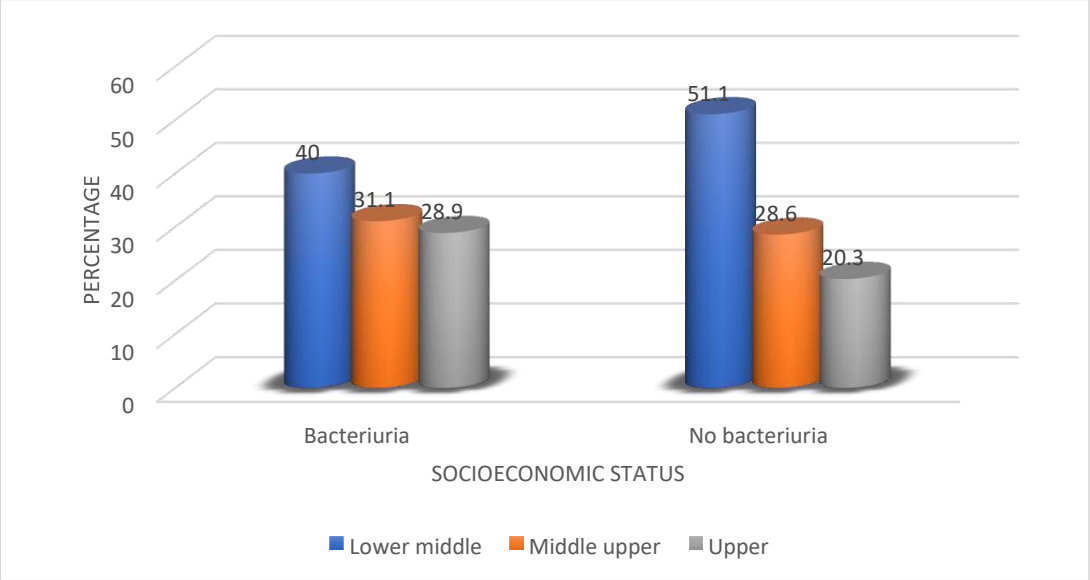
SOCIOECONOMIC STATUS

In this study majority of women, 40 percent with culture positive belonged to lower middle-class socio-economic status and 31.1 percent belonged to upper middle class followed by 28.9 percent in the upper-class socioeconomic status.

TABLE 3
COMPARISON OF SOCIO-ECONOMIC STATUS

SES	BACTERIURIA	NO BACTERIURIA	TOTAL	P VALUE
Lower middle class	18	116	134	0.316
	40%	51.1%	49.3%	
Middle upper class	14	65	79	
	31.1%	28.6%	29%	
Upper class	13	46	59	
	28.9%	20.3%	21.7%	
TOTAL	45	227	272	

FIGURE 6- ASSOCIATION OF ASB WITH SOCIOECONOMIC STATUS



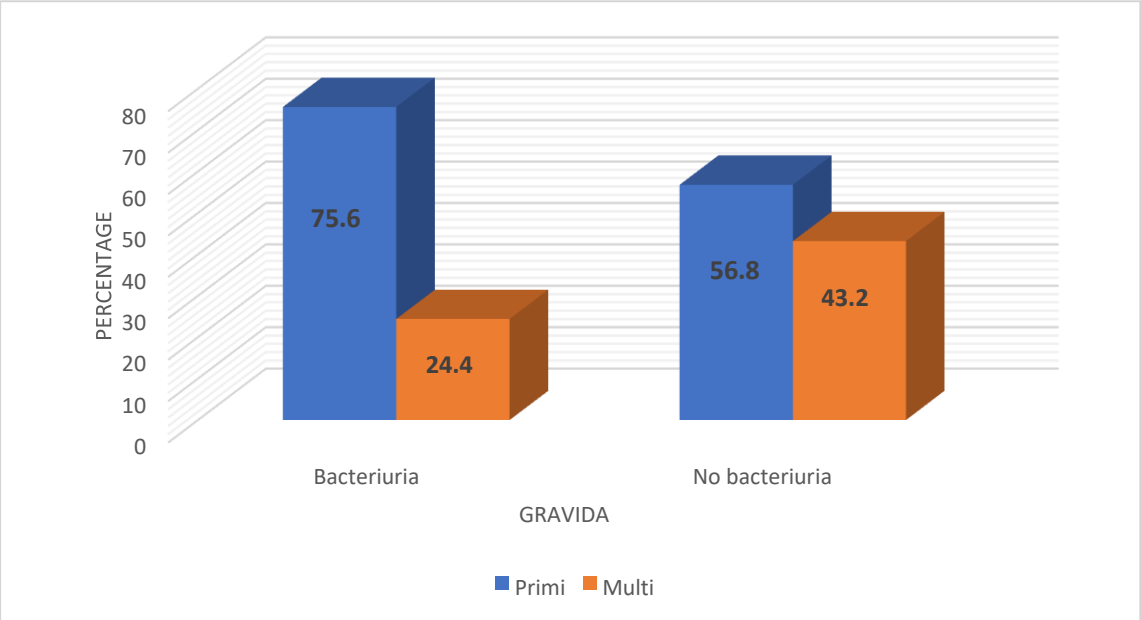
OBSTETRIC SCORE

When the obstetric score was studied 75.6 percent of the antenatal mothers were primi gravid and 24.4 percent were multi-gravid patients.

TABLE 4
COMPARISON OF OBSTETRIC SCORE

GRAVIDA	BACTERIURIA	NO BACTERIURIA	TOTAL	P VALUE
PRIMI	34	129	163	0.019
	75.6%	56.8%	59.9%	
MULTI	11	98	109	
	24.4%	43.2%	40.1%	
TOTAL	45	227	272	

FIGURE 7- ASSOCIATION OF ASB WITH OBSTETRIC SCORE



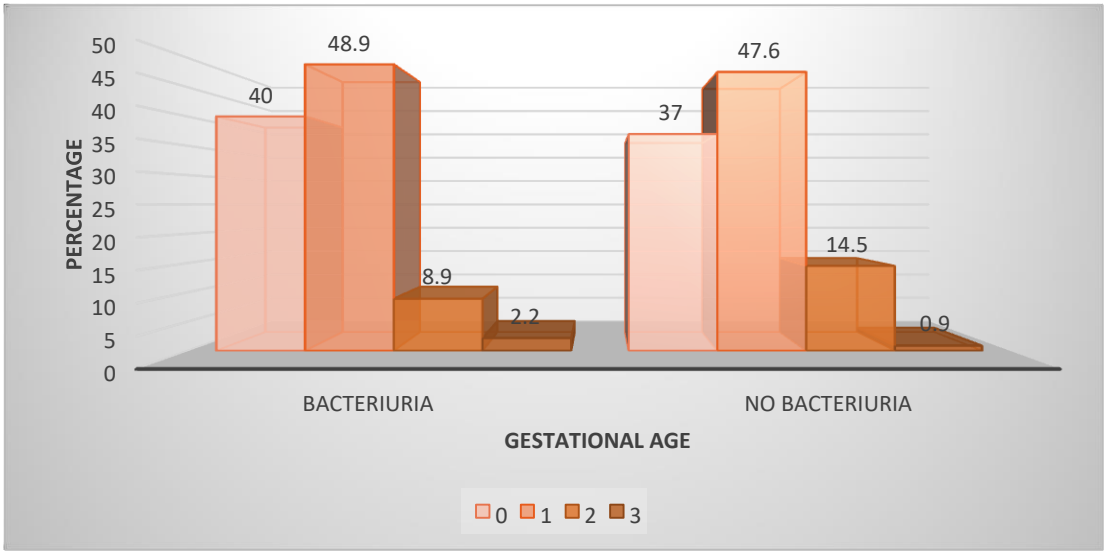
GESTATIONAL AGE

In this study, the mean gestational age was 14.84 ± 4.04 weeks and the range varied from 10 weeks to 32 weeks. The gestational age at the time of the study was between 13 weeks to 19 + 6 weeks in nearly 48.9 percent of patients with bacteriuria.

TABLE 5
COMPARISON OF GESTATIONAL AGE

GESTATIONAL AGE	BACTERIURIA	NO BACTERIURIA	TOTAL	P VALUE
0 (6- 12+6 weeks)	18	84	102	
	40%	37%	37.5%	
1 (12- 19+6 weeks)	22	108	130	
	48.9%	47.6%	47.8%	
2 (20- 26+6 weeks)	4	33	37	
	8.9%	14.5%	13.6%	0.660
3 (27- 33+6 weeks)	1	2	3	
	2.2%	0.9%	1.1%	
TOTAL	45	227	272	

FIGURE 8- ASSOCIATION OFASB WITH GESTATIONAL AGE AT DETECTION



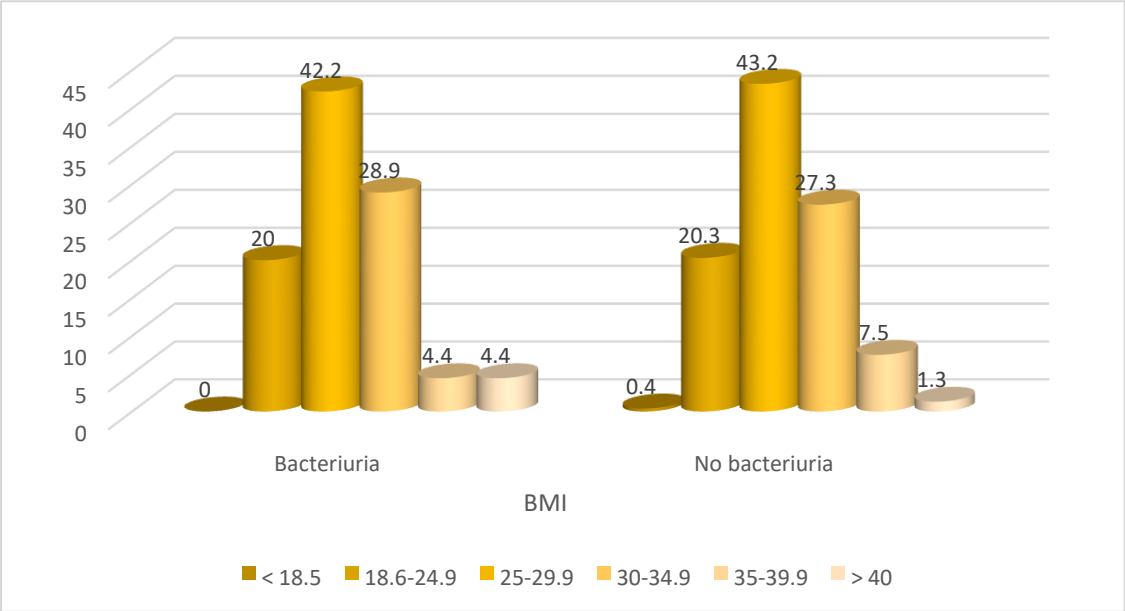
BMI

Among the patient studied for ASB 42.2 percent of them with bacteriuria belonged to the BMI group ranging between 25- 29.9.

TABLE 6
COMPARISON OF BMI

BMI	BACTERIURIA	NO BACTERIURIA	TOTAL	P VALUE
< 18.5	0	1	1	0.741
	0	0.4%	0.4%	
18.6- 24.9	9	46	55	
	20%	20.3%	20.2%	
25-29.9	19	98	117	
	42.2%	43.2%	43%	
30-34.9	13	62	75	
	28.9%	27.3%	27.6%	
35-39.9	2	17	19	
	4.4%	7.5%	7%	
>40	2	3	5	
	4.4%	1.3%	1.8%	
TOTAL	45	227	272	

FIGURE 9- ASSOCIATION OF ASB WITH BMI



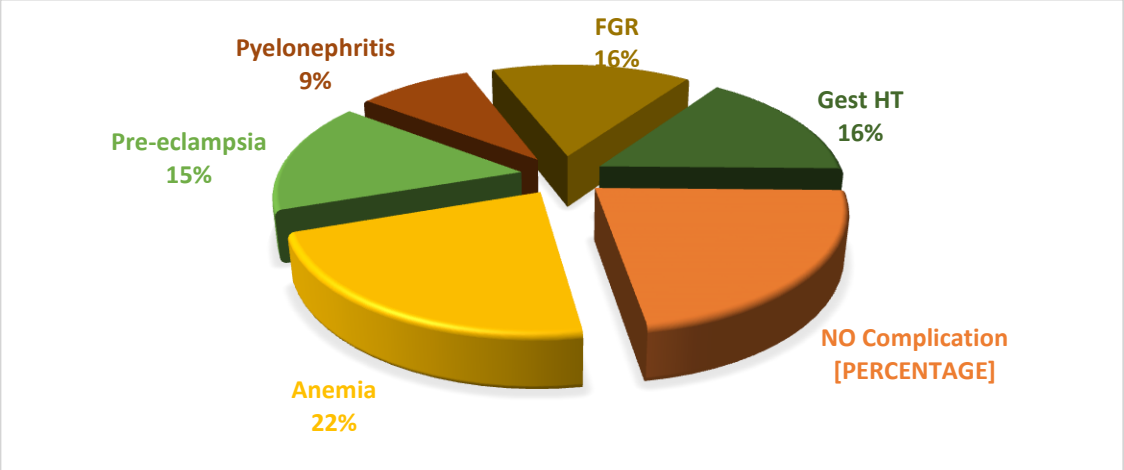
MATERNAL COMPLICATIONS

A variety of medical conditions were noted in these mothers which were associated with ASB. 22.2 percent had anemia, 15.6 percent had pre-eclampsia, gestational hypertension, and FGR, and 8.9 percent of these mothers had pyelonephritis which required treatment.

TABLE 7
COMPARISON OF MATERNAL COMPLICATIONS

MATERNAL COMPLICATIONS	BACTERIURIA	NO BACTERIURIA	TOTAL	P VALUE
Nil	10	161	171	
	22.2%	70.9%	62.9%	
Anemia	10	33	43	
	22.2%	14.5%	15.8%	
Pre-eclampsia	7	15	22	
	15.6%	6.6%	8.1%	
Pyelonephritis	4	4	8	<0.001
	8.9%	1.8%	2.9%	
FGR	7	8	15	
	15.6%	3.5%	5.5%	
Gestational hypertension	7	6	13	
	15.6%	2.6%	4.8%	
TOTAL	45	227	272	

FIGURE 10- ASSOCIATION OF ASB WITH DEVELOPMENT OF MATERNAL COMPLICATIONS



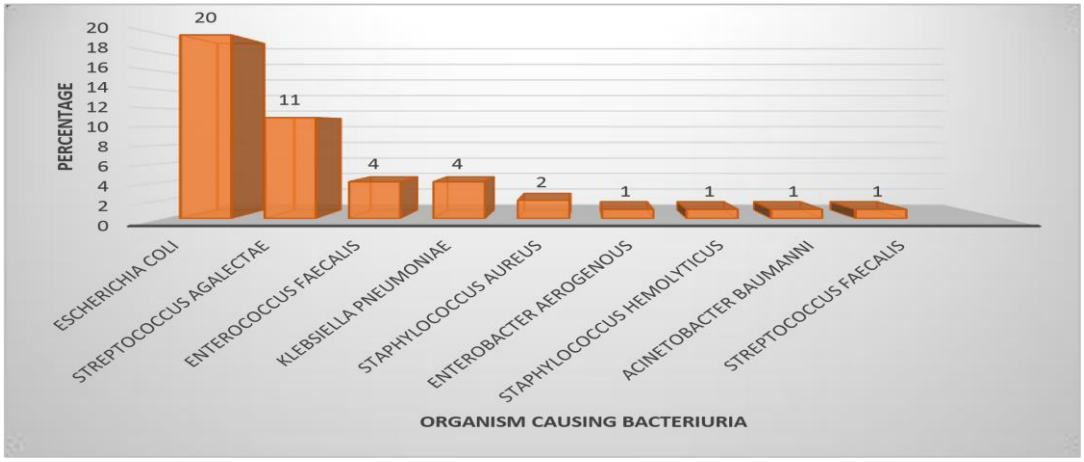
ORGANISMS CAUSING BACTERIURIA: -

The commonest bacterium which was detected in culture was Escherichia coli 44.4 percent followed by 24.4 percent Streptococcus agalactiae, 8.8 percent Enterococcus faecalis, and Klebsiella pneumoniae, 4.4 percent Staphylococcus aureus, 2.3 percent Enterobacter aerogenous, Staphylococcus hemolyticus, Acinetobacter baumanni, and Streptococcus faecalis.

TABLE 8
LIST OF ORGANISMS CAUSING BACTERIURIA

URINE C/S	Frequency	Percent
Escherichia coli	20	44.4
Streptococcus agalectae	11	24.4
Enterococcus faecalis	4	8.8
Klebsiella pneumoniae	4	8.8
Staphylococcus aureus	2	4.4
Enterobacter aerogenous	1	2.3
Staphylococcus hemolyticus	1	2.3
Acinetobacter baumanni	1	2.3
Streptococcus faecalis	1	2.3
Total	45	100.0

FIGURE 11- BAR DIAGRAM OF ASB CAUSING ORGANISMS



ANTIBIOTIC SENSITIVITY

The most common isolate Ecoli was found to show maximum sensitivity to Nitrofurantoin 73.3 percent followed by 50 percent sensitivity to Cefixime and Cefuroxime and 12.5 percent sensitivity to Ampicillin. The

second most common isolate Streptococcus agalactae showed maximum sensitivity to Amoxycillin at 100 percent followed by Ampicillin at 75 percent and Cefixime at 10 percent.

Enterococcus faecalis showed 20 percent sensitivity to Nitrofurantoin and 12.5 percent sensitivity to Ampicillin.

Klebsiella pneumoniae had 100 percent sensitivity to Fosfomycin, 16.7 percent sensitivity to Cefuroxime, and 10 percent sensitivity to Cefixime.

TABLE 9
COMPARISON OF ANTIBIOTIC SENSITIVITY

URINE C/S	ANTIBIOTIC RX						Total
	Ampicillin	Nitrofurantoin	Amoxycillin	Fosfomycin	Cefixime	Cefuroxime	
Enterobacter aerogenous	0	0	0	0	1	0	1
	0	0	0	0	10%	0	2.2%
Escherichia coli	1	11	0	0	5	3	20
	12.5%	73.3%	0	0	50%	50%	44.4%
Streptococcus agalectae	6	0	4	0	1	0	11
	75%	0	100%	0	10%	0	24.4%
Staphylococcus aureus	0	1	0	0	1	0	2
	0	6.7%	0	0	10%	0	4.4%
Enterococcus faecalis	1	3	0	0	0	0	4
	12.5%	20%	0	0	0	0	8.9%
Klebsiella pneumoniae	0	0	0	2	1	1	4
	0	0	0	100%	10%	16.7%	8.9%
Staphylococcus hemolyticus	0	0	0	0	1	0	1
	0	0	0	0	10%	0	2.2%
Acinetobacter baumanni	0	0	0	0	0	1	1
	0	0	0	0	0	16.7%	2.2%
Streptococcus faecalis	0	0	0	0	0	1	1
	0	0	0	0	0	16.7%	2.2%
TOTAL	8	15	4	2	10	6	45
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

INDICATIONS FOR DELIVERY

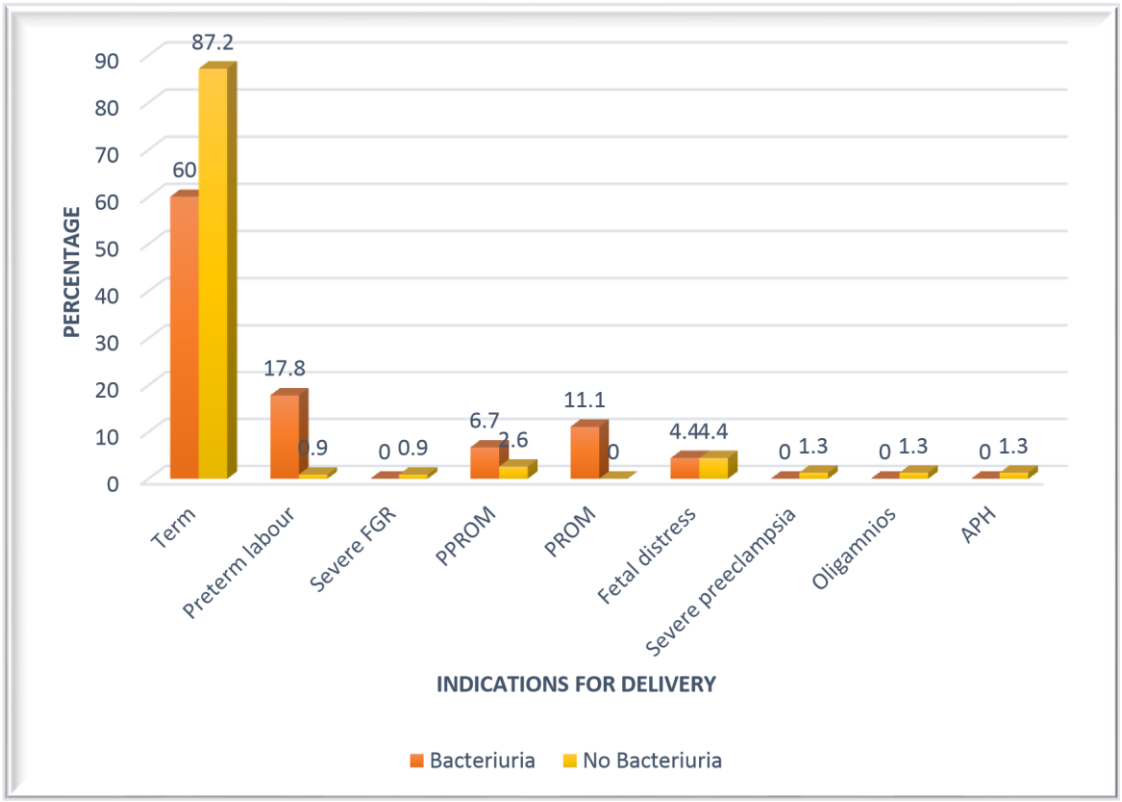
In this study, the indication for delivery in 17.8 percent of the patients had preterm labor followed by 11.1 percent PROM, 6.7 percent PPROM, and 4.4 percent had fetal distress.

TABLE 10
COMPARISON OF INDICATION FOR DELIVERY

INDICATION	BACTERIURIA	NO BACTERIURIA	TOTAL	P VALUE
TERM	27	198	225	<0.001
	60%	87.2%	82.7%	
PRETERM	8	2	10	
	17.8%	0.9%	3.7%	
SEVERE FGR	0	2	2	
	0	0.9%	0.7%	
PPROM	3	6	9	
	6.7%	2.6%	3.3%	
PROM	5	0	5	
	11.1%	0	1.8%	
FETAL DISTRESS	2	10	12	
	4.4%	4.4%	4.4%	

SEVERE PRE ECLAMPSIA	0	3	3
	0	1.3%	1.1%
OLIGAMNIOS	0	3	3
	0	1.3%	1.1%
APH	0	3	3
	0	1.3%	1.1%
TOTAL	45	227	272

FIGURE 12- ASSOCIATION OF ASB WITH INDICATION FOR DELIVERY



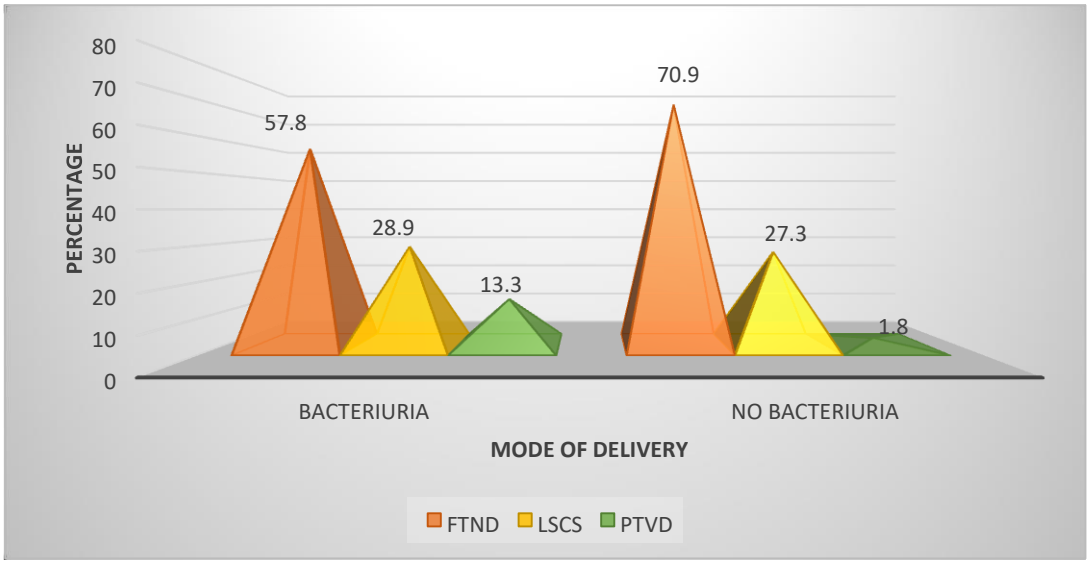
MODE OF DELIVERY

In this study among the patients with bacteriuria, only 13.3 percent had preterm deliveries whereas 57.8 percent underwent full-term normal delivery and 28.9 percent underwent cesarean section at term.

TABLE 11
COMPARISON OF THE MODE OF DELIVERY

MODE OF DELIVERY	BACTERIURIA	NO BACTERIURIA	TOTAL	P VALUE
FTND	26	161	187	0.001
	57.8%	70.9%	68.8%	
LSCS	13	62	75	
	28.9%	27.3%	27.6%	
PTVD	6	4	10	
	13.3%	1.8%	3.7%	
TOTAL	45	227	272	

FIGURE 13- ASSOCIATION OF ASB WITH MODE OF DELIVERY



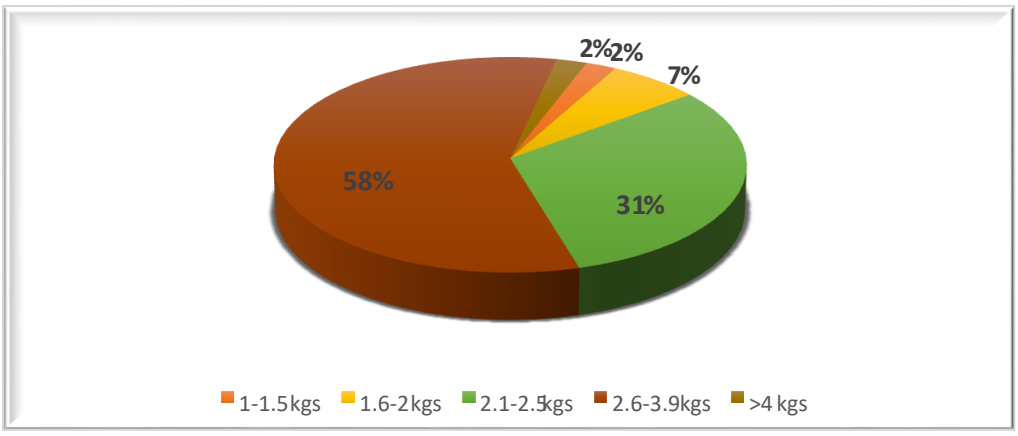
BIRTH WEIGHT

Among the babies born to mothers with a history of ASB 57.8 percent had birth weight between 2.6 – 3.9kg, followed by 31.1 percent between 2.1-2.5kg, 6.7 percent between 1.6-2kg, 2.2 percent had both extremes of birth weight i.e.) more than 4kg and less than 1.5kg.

TABLE 12
COMPARISION OF BIRTH WEIGHT

BIRTH WEIGHT	BACTERIURIA	NO BACTERIURIA	TOTAL	P VALUE
1-1.5 kg	1	1	2	
	2.2%	0.4%	0.7%	
1.6- 2 kgs	3	4	7	
	6.7%	1.8%	2.6%	
2.1-2.5 kgs	14	52	66	
	31.1%	22.9%	24.3%	0.055
2.6- 3.9 kgs	26	169	195	
	57.8%	74.4%	71.7%	
>4kgs	1	1	2	
	2.2%	0.4%	0.7%	
TOTAL	45	227	272	

FIGURE 14- COMPARISON OF BIRTH WEIGHT OF BABIES BORN



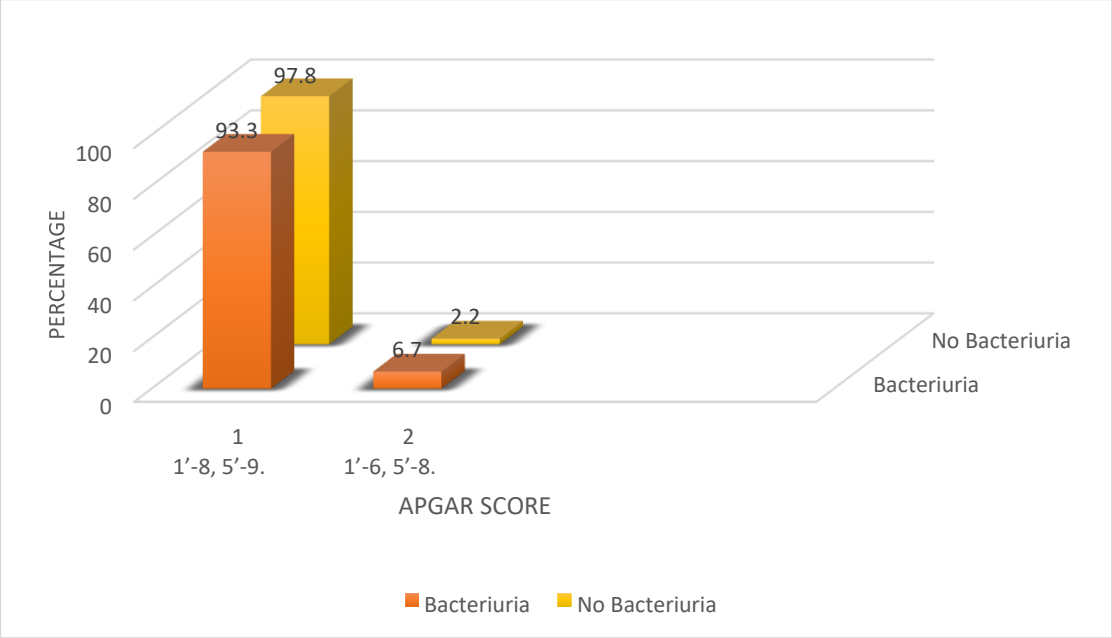
APGAR SCORE

Of the babies born to mothers with a history of bacteriuria 93.3 percent had an APGAR score of 1'-8, 5'-9, and only 6.7 percent had an APGAR score of 1'-6, 5'-8.

TABLE 13
COMPARISON OF APGAR SCORE FOR THE NEW BORNS

APGAR	BACTERIURIA	NO BACTERIURIA	TOTAL	P VALUE
1 1'-8, 5'-9	42	222	264	0.105
	93.3%	97.8%	97.1%	
2 1'-6, 5'-8	3	5	8	
	6.7%	2.2%	2.9%	
TOTAL	45	227	272	

FIGURE 15- ASSOCIATION OF BABIES BORN TO ASB PATIENTS WITH THEIR APGAR SCORE



RESUSCITATION AND NICU ADMISSION

Out of the babies born to mothers with bacteriuria, 93.3 percent did not require any resuscitation or NICU admission, and only 6.7 percent of babies required resuscitation and NICU admission

TABLE 14
COMPARISON OF RESUSCITATION IN NEWBORNS

RESUSCITATION	BACTERIURIA	NO BACTERIURIA	TOTAL	P VALUE
NO	42	223	265	0.058
	93.3%	98.2%	97.4%	
YES	3	4	7	
	6.7%	1.8%	2.6%	
TOTAL	45	227	272	

FIGURE 16- ASSOCIATION OF NEED FOR RESUSCITATION IN BABIES BORN TO ASB PATIENTS

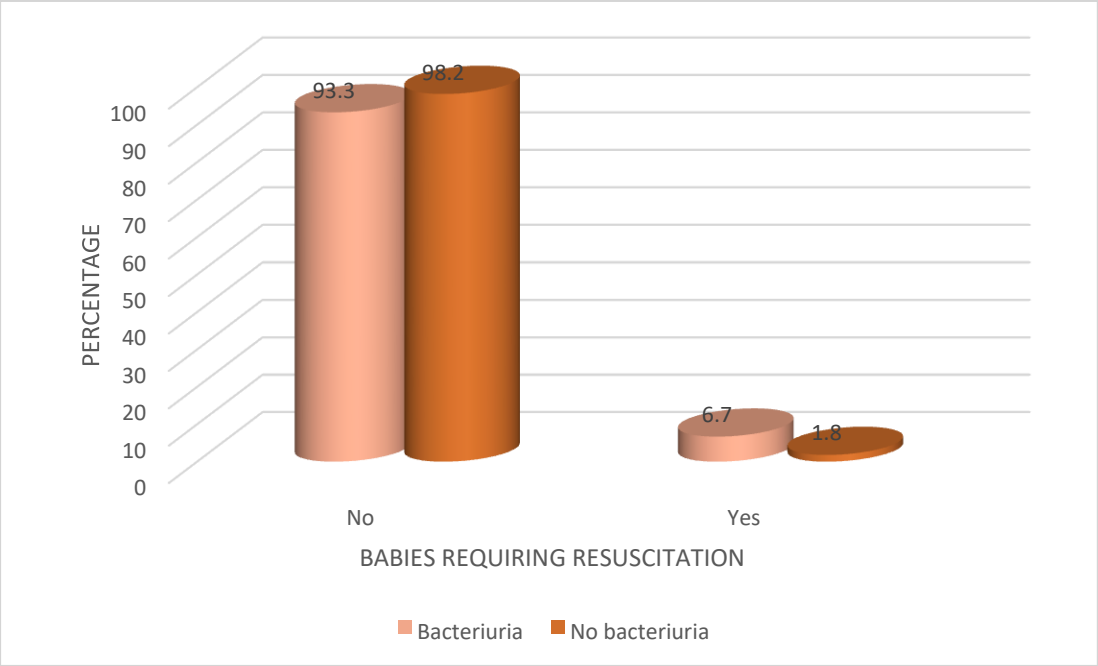
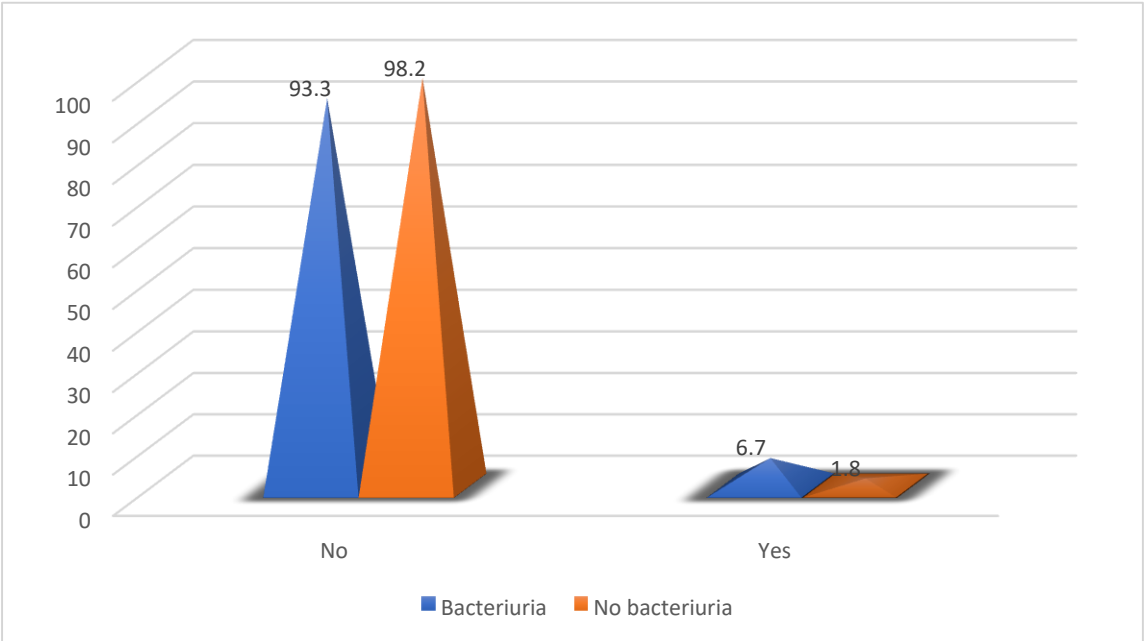


TABLE 15
COMPARISON OF NICU ADMISSION

NICU ADMISSION	BACTERIURIA	NO BACTERIURIA	TOTAL	P VALUE
NO	42	223	265	0.058
	93.3%	98.2%	97.4%	
YES	3	4	7	
	6.7%	1.8%	2.6%	
TOTAL	227	45	272	

FIGURE 17- ASSOCIATION OF NEED FOR NICU ADMISSION IN BABIES BORN TO ASB PATIENTS



IV. Discussion

A total of 272 pregnant women were screened for asymptomatic bacteriuria and followed up to delivery in the Department of Obstetrics Gynecology and Infertility. Their babies were also followed up during the early neonatal period to study the neonatal outcome of babies born to mothers with a history of ASB during the antenatal period.

The prevalence of asymptomatic bacteriuria in the present study is 16.5 percent. Globally the prevalence of ASB in pregnancy is said to vary between 4 percent to 23.9 percent.[2] A study by Aziz Marjan, conducted in Pakistan showed a prevalence of 6.2 percent in the study group and 2.85 percent in the control group[14]. Various Indian studies have shown the prevalence of ASB in pregnancy to vary from 7.4 percent to 11.8 percent. A study by Vandana N from India had a prevalence of 13.3 percent[2]. This wide variation in prevalence can be attributed to the varying socioeconomic characteristics of the population studied.

The majority of women in this study belonged to the age group of 25-29 years which was comparable in a patient with ASB and no bacteriuria. The p-value was 0.53 in this study hence no significant association was noted.

Most of the patients with ASB belonged to lower socioeconomic status 40 percent but the p-value was 0.315 percent hence no significant association. Study done by Byna et al also showed a higher incidence of bacteriuria among women of lower socioeconomic status[4] supporting our findings.

In this study, the majority of culture-positive women were primigravida 75.6 percent, and was statistically significant with a p-value of 0.019. This was similar to that of a study by Vandana N, 63.5 percent[2], whereas, in other studies by B Prasanna (62 percent), V Mallikarjun Rao (58.3 percent), and Okonko et al multigravida showed a higher incidence of bacteriuria[15-17].

The highest incidence of bacteriuria was detected between 13 weeks to 19 + 6 weeks of gestation, 48.9 percent. No statistical significance was noted in the gestational age at screening as the P value was not significant at 0.660.

The mean BMI was 28.6 and 42.2percent with bacteriuria belonged to the overweight range (25-29.9). No statistical significance was noted as the p-value was 0.741.

The medical conditions noted in mothers with a positive urine culture included anemia 22.2 percent, preeclampsia 8.9%, FGR 15.6%, Gestational hypertension 15.6 percent, and pyelonephritis 8.9 percent, and this showed statistical significance with a p-value of < 0.001. In a similar study by Byna P anemia was noted in 35 percent, preeclampsia in 5 percent, and pyelonephritis in 3.5 percent noted. In another study by Jain anemia was 22.4 percent, preeclampsia 5.2 percent, and pyelonephritis 1.7 percent noted and both studies had a significant association.[4, 11].

The most common organism causing ASB in this study was Escherichia coli, 44.4 percent followed by 24.4 percent Streptococcus agalactiae, 8.8 percent Enterococcus faecalis, and Klebsiella pneumoniae, 4.4 percent. Staphylococcus aureus, 2.3 percent, Enterobacter aerogenous, Staphylococcus hemolyticus, Acinetobacter baumanni, and Streptococcus faecalis. A similar study by Basumatory BK documented that Ecoli 56.75 percent was the most common pathogen isolated followed by Klebsiella 14.33 percent[18].

These findings correlate with the study by Lallar M in which Ecoli 69 percent was the most common organism but with a higher isolation rate, followed by coagulase-negative Staphylococcus and Staphylococcus aureus 11 percent followed by Klebsiella 4 percent and Enterobacter 5 percent cases[19]. In another study by Olamijulo JA done in Nigeria Klebsiella 39.2 percent was isolated as the most common pathogen[12].

In this study, the results of drug sensitivity revealed that the most common isolate, Escherichia coli showed 73.3 percent sensitivity to Nitrofurantoin followed by 50 percent Cefixime and Cefuroxime, 12.5 percent to Ampicillin. Streptococcus agalactae had 100 percent sensitivity to Amoxycillin, 75 percent to Ampicillin, and 10 percent to Cefixime. Enterococcus faecalis had 20 percent sensitivity to Nitrofurantoin and 12.5 percent sensitivity to Ampicillin. Klebsiella pneumoniae showed 100 percent sensitivity to Fosfomycin followed by 16.7 percent to Cefuroxime and 10 percent to Cefixime. Staphylococcus aureus showed 67 percent sensitivity to Nitrofurantoin.

In a similar study conducted by R Sujatha the most common isolate Ecoli showed maximum sensitivity to Cefipime at 100 percent followed by Ceftriaxone at 95 percent, Cefuroxime at 86 percent, Ampicillin at 61 percent and Amoxycillin clavulanic acid 70 percent sensitivity[20].

In the study of Basumatary BK, Nitrofurantoin, 87.88 percent showed the highest sensitivity followed by Norfloxacin at 79.89 percent and Amikacin at 77.96 percent. Nitrofurantoin in pregnancy appeared to be safe but the choice of antibiotics for the treatment should be guided by antimicrobial susceptibility whenever possible.[18]

Out of the 45 patients with bacteriuria 17.8 percent had undergone preterm labor and this showed statistical significance. This finding correlates with a study by Lallar M in which the likelihood of preterm labor in the cases was 14.5 times more than in the control group. Among the cases in that study, 31 percent of subjects had preterm labor whereas in the control group only 3 percent of subjects had preterm labor [19].

Based on the above observations we can conclude that preterm labor has a definite correlation with ASB in pregnancy.

11.1 percent of the culture patients had reported PROM and 6.7 percent had reported PPROM during the antenatal period following which they underwent delivery and this was clinically significant with a p-value of 0.001. In the study of Byna P PROM was seen in 14 percent of patients with ASB and 5 percent of the patient in the control group. PROM is an accepted complication of ASB which leads to preterm labor and thereby results in adverse fetomaternal outcomes [(4)].

In this study among the culture-positive patient, 57.8 percent of them underwent normal vaginal delivery at term and the rate of cesarean section was only 18.9 percent.

This correlation was found to be statistically significant and it can be attributed to the fact that all cases were detected early and treated hence the adverse outcome could be controlled.

No association could be drawn between LBW babies and ASB in pregnancy this could be attributed to the low incidence of FGR babies in this study. But in the study of Byna P LBW babies were seen in 20 percent of the ASB group and 8 percent of the control group. This correlation was also noted in the study of Jain V.[(4)]

Low APGAR score and NICU admission failed to show any association with ASB in pregnancy in the present study as the p-value was more than 0.05 hence no statistical significance could be drawn.

V. SUMMARY

A total of 272 pregnant women were screened for asymptomatic bacteriuria and followed up to delivery in the Department of Obstetrics Gynecology and Infertility. Their babies were also followed up during the early neonatal period to study the neonatal outcome of babies born to mothers with a history of ASB during the antenatal period.

The prevalence of asymptomatic bacteriuria in the present study is 16.5 percent. Globally the prevalence of ASB in pregnancy is said to vary between 4 percent to 23.9 percent. This wide variation in prevalence can be attributed to the varying socioeconomic characteristics of the population studied.

The majority of women in this study belonged to the age group of 25-29 years no significant association was noted.

Most of the patients with ASB belonged to lower socioeconomic status 40 percent but the p-value was 0.315 percent hence no significant association was present.

In this study, the majority of culture-positive women were primigravida 75.6 percent, and was statistically significant with a p-value of 0.019.

The highest incidence of bacteriuria was detected in early pregnancy less than 20 weeks gestation, 48.9 percent. No statistical significance was noted in the gestational age at screening as the P value was not significant at 0.660.

The mean BMI was 28.6 hence 42.2 percent belonged to the overweight range (25-29.9) but no statistical significance was noted as the p-value was 0.741.

Patients with ASB are at a higher risk of developing anemia, preeclampsia, pyelonephritis, gestational hypertension, and FGR as sequelae.

The most common organism causing ASB in this study was Escherichia coli 44.4 percent followed by 24.4 percent Streptococcus agalactiae, 8.8 percent Enterococcus faecalis, and Klebsiella pneumoniae, 4.4 percent Staphylococcus aureus, 2.3 percent Enterobacter aerogenous, Staphylococcus hemolyticus, Acinetobacter baumanni, and Streptococcus faecalis.

The results of drug sensitivity revealed that 33.3 percent of isolates were sensitive to Nitrofurantoin followed by 22.2 percent sensitivity to Cefixime, 17.8 percent sensitivity to Ampicillin, 13.3 percent sensitive to Cefuroxime, 8.9 percent sensitivity to Amoxycillin and 4.4 percent sensitivity to Fosfomycin.

17.8 percent had undergone preterm labor and this showed statistical significance.

Based on the above observations we can conclude that preterm labor has a definite correlation with ASB in pregnancy.

11.1 percent of the culture patients had reported PROM and 6.7 percent had reported PPROM during the antenatal period following which they underwent delivery and this was clinically significant with a p-value of 0.001.

In this study among the culture-positive patient, 57.8 percent of them underwent normal vaginal delivery at term and the rate of cesarean section was only 18.9 percent.

This correlation was found to be statistically significant and it can be attributed to the fact that all cases were detected early and treated hence the adverse outcome could be controlled.

In this study no association could be drawn between LBW babies and ASB in pregnancy this could be attributed to the low incidence of FGR babies in this study.

Low APGAR score and NICU admission failed to show any association with ASB in pregnancy in the present study as the p-value was more than 0.05 hence no statistical significance could be drawn.

VI. Conclusion

A total of 272 pregnant women were screened for asymptomatic bacteriuria and followed up to delivery in the Department of Obstetrics Gynecology and Infertility. Their babies were also followed up during the early neonatal period to study the neonatal outcome of babies born to mothers with a history of ASB during the antenatal period..

The prevalence of asymptomatic bacteriuria in the present study is 16.5 percent. Majority of the pregnant women belonged to the age group of 25-29 years and forty percent of them belonged to low socio economic group. Statistically significant values were seen in relation to Primi Gravida in our study, with a P value less .019. The incidence of bacteriuria was high in gestational age less than 20 week.(48.9%).

The other significant observation seen was, most common organism causing ASB in this study was Escherichia coli 44.4 percent followed by 24.4 percent Streptococcus agalactiae The results of drug sensitivity revealed that 33.3 percent of isolates were sensitive to Nitrofurantoin followed by 22.2 percent sensitivity to Cefixime, 17.8 percent sensitivity to Ampicillin.

17.8 percent had undergone preterm labor, 11.1 percent of the culture positive patients had reported PROM and 6.7 percent had reported PPROM during the antenatal period following which they underwent delivery and this were all clinically significant with a p-value of 0.001.

References

[1]. Emami A, Javanmardi F, Pirbonyeh N. Antibiotic Resistant Profile Of Asymptomatic Bacteriuria In Pregnant Women: A Systematic Review And Metaanalysis. Expert Rev Anti Infect Ther. 2020 Aug: 18(8):807-815.

[2]. Vandana N, Prabhu TRB, Meda S, Damodaran V. An Analytical Study To Evaluate The Prevalence, Screening Methods, And Maternal And Perinatal Outcome Associated With Asymptomatic Bacteriuria. IJOPARB. 2020;14-19.

[3]. Schnarr J, Smaill F. Asymptomatic Bacteriuria And Symptomatic Urinary Tract Infections In Pregnancy. Eur J Clin Invest. 2008;38:50–57.

[4]. Byna P, Muvva N, Kolli S, Shaik MV. A Study Of Risk Factors And Consequences Of Asymptomatic Bacteriuria In Pregnant Women And Fetomaternal Outcome. Int J Reprod Contracept Obstet Gynecol. 2015;4(5):1300– 1305.

[5]. K. Mukherjee, S Golia, C Vasudha, Babitha, Debojyoti Bhattacharjee, Goutham Chakroborthi. A Study On Asymptomatic Bacteriuria In Pregnancy: Prevalence, Etiology, And Comparison Of Screening Methods. Int J Res Med Sci.2014 Aug:2(3):1085-1091.

[6]. Izuchukwu KE, Oranu EO, Bassey G, Orazulike NC. Maternofetal Outcome Of Asymptomatic Bacteriuria Among Pregnant Women In A Nigerian Teaching Hospital. Pan Afr Med J.2017 Jan; 27:69;1937-8688.

[7]. Akerele J. Prevalence Of Asymptomatic Bacteriuria Among Pregnant Women In Benin City, Nigeria. J Obstet Gynaecol. 2001;21(2):141–144.

[8]. Barbara L. Hoffman, Brian M Carey, Gary Cunningham , Kenneth J Leveno, Steven L Bloom , Catherine Y Spon, Jodi S Dashe, Williams Obstetric 25th Ed. New York: Mc Graw-Hill:2018:Maternal Physiology, Renal, And Urinary Tract Disorder, 153-59, 2268-74.

[9]. Sheiner E, Mazor-Drey E, Levy A. Asymptomatic Bacteriuria During Pregnancy. J Matern-Fetal Neonatal Med Off J Eur Assoc Perinat Med Fed Asia Ocean Perinat Soc Int Soc Perinat Obstet. 2009 May;22(5):423–427.

[10]. Smaill FM, Vazquez JC. Antibiotics For Asymptomatic Bacteriuria In Pregnancy. Cochrane Database Syst Rev. 2019 Nov25;2019(11):CD000490.

[11]. Jain V, Das V, Agarwal A, Pandey A. Asymptomatic Bacteriuria & Obstetric Outcome Following Treatment In Early Versus Late Pregnancy In North Indian Women. Indian J Med Res. 2013 Apr;137(4):753–8.

[12]. Olamijulo JA, Adewale CO, Olaleye O. Asymptomatic Bacteriuria Among Antenatal Women In Lagos. J Obstet Gynaecol J Inst Obstet Gynaecol. 2016 Aug;36(6):722–5.

[13]. Quiroga-Feuchter G, Robles-Torres RE, Ruelas-Morán A, Gómez-Alcalá AV. Asymptomatic Bacteriuria Among Pregnant Women. An Underestimated Threat.

[14]. Rev Médica Inst Mex Seguro Soc. 2007;45(2):169–172.

[15]. Khattak AM, Khattak S, Khan H, Ashiq B, Mohammad D, Rafiq M. Prevalence Of Asymptomatic Bacteriuria In Pregnant Women. Pak J Med Sci. 2006 Apr;22(2):162.

[16]. Prasanna B, Naimisha M, Swathi K, Shaik MV. Prevalence Of Asymptomatic Bacteriuria In Pregnant Women, Isolates, And Their Culture Sensitivity Pattern. Int J Curr Microbiol App Sci. 2015;4(8):28-35.

[17]. Rao VM, Venkatesh BS, Rao SR. Asymptomatic Bacteriuria In Pregnant Women-Study At A Tertiary Maternity Care Hospital In Hyderabad. Int. J. Curr Microbiol. App Sci. 2018;7(5):1133-42.

[18]. Okonko Et Al. Incidence Of Urinary Tract Infection (UTI) Among Pregnant Women In Ibadan, South-Western Nigeria. African Journal Of Biotechnology.

[19]. 2009;8(23).P 6649-57.

[20]. Basumatary BK, Dutta BK, Choudhury N. Asymptomatic Bacteriuria Among Pregnant Women Attending Antenatal Clinic At A Tertiary Care Centre. IJRCOG. 2020 Feb 1;9(2):528-33.

[21]. Lallar M, Ul Haq A, Nandal R. Asymptomatic Bacteriuria: Predisposing Factors And Correlation With Preterm Labor In Low Resource Settings. Int J Reprod Contracept Obstet Gynecol. 2014;3(2):404.

[22]. Sujatha R, Nawani M. Prevalence Of Asymptomatic Bacteriuria And Its Antibacterial Susceptibility Pattern Among Pregnant Women Attending The Antenatal Clinic At Kanpur: JCDR. 2014 Apr;8(4): DC01-DC03

[23]. Schneeberger C, Kazemier BM, Geerlings SE. Asymptomatic Bacteriuria And Urinary Tract Infections In Special Patient Groups: Women With Diabetes Mellitus And Pregnant Women. Curr Opin Infect Dis. 2014;27(1):108–114.

[24]. Garnizov TM. Asymptomatic Bacteriuria In Pregnancy From The Perspective Of Public Health And Maternal Health Care: Review And Case Report. Biotechnol Biotechnol Equip. 2016;30(3):443–447.

[25]. Grio R, Porpiglia M, Vetro E, Uligini R, Piacentino R, Minì D, Et Al. Asymptomatic Bacteriuria In Pregnancy: A Diagnostic And Therapeutic Approach. Panminerva Med. 1994 Dec;36(4):195-197.

[26]. Wingert A, Pillay J, Sebastianski M, Gates M, Featherstone R, Shave K, Et Al. Asymptomatic Bacteriuria In Pregnancy: Systematic Reviews Of Screening And Treatment Effectiveness And Patient Preferences. BMJ Open [Internet]. 2019

[27]. Hazhir S. Asymptomatic Bacteriuria In Pregnant Women. Urol J. 2007 Winter;4(1):24-27.

[28]. Akinloye O, Ogbolu DO, Akinloye OM, Terry Alli OA. Asymptomatic Bacteriuria Of Pregnancy In Ibadan, Nigeria: A Re-Assessment. Br J Biomed Sci.
[29]. 2006;63(3):109–112.
[30]. Jayalakshmi J, Jayaram VS. Evaluation Of Various Screening Tests To Detect Asymptomatic Bacteriuria In Pregnant Women. Indian J Pathol Microbiol. 2008 Jul 1;51(3):379-81.
[31]. Lavanya SV, Jogalakshmi D. Asymptomatic Bacteriuria In Antenatal Women. Indian J Med Microbiol. 2002 Apr 1;20(2):105-6.
[32]. Kerure SB, Surpur R, Sagarad SS, Hegadi S. Asymptomatic Bacteriuria Among Pregnant Women. IJRCOG. 2013 Jun 1;2(2):213-7.
[33]. Leela KV, Ravinder T, Hemalatha S, Prabha P, Chandrasekaran K. Evaluation Of Screening Tests To Detect Asymptomatic Bacteriuria In Antenatal Women. Int J Curr Microbiol App Sci. 2017 Jan 15;6(1):168-74.
[34]. Glaser AP, Schaeffer AJ. Urinary Tract Infection And Bacteriuria In Pregnancy. Urologic Clinics. 2015 Nov 1;42(4):547-60.
[35]. Mittal P, Wing DA. Urinary Tract Infections In Pregnancy. Clinics In Perinatology. 2005 Sep 1;32(3):749-64.
[36]. Senthinath Et Al. Prevalence Of Asymptomatic Bacteriuria Among Antenatal Women In Rural Tertiary Care Hospital, Tamilnadu, India. Int J Curr Microbiol App Sci. 2013;2(1):80-5.
[37]. Ansari HQ, Rajkumari A. Prevalence Of Asymptomatic Bacteriuria And Associated Risk Factors Among Antenatal Patients Attending A Tertiary Care Hospital. J Med Allied Sci. 2011 Jul 31;1(2):74-78.
[38]. Chacko B, Sohi I. Early Onset Neonatal Sepsis. IJP. 2005 Jan;72(1):23-6.
[39]. Matuszkiewicz-Rowińska J, Małyszko J, Wieliczko M. State Of The Art Paper Urinary Tract Infections In Pregnancy: Old And New Unresolved Diagnostic And Therapeutic Problems. Archives Of Medical Science. 2015 Feb 28;11(1):67-77.
[40]. Tahir S, Tayyab M, Rasul S, Jabeen S, Gul A. Prevalence Of Asymptomatic Bacteriuria, Associated Risk Factors And Adverse Fetomaternal Outcome Among Antenatal Women Attending A Tertiary Care Hospital. Pak J Med Health Sci. 2015 Oct 1;9(4):1399-402.
[41]. Gayathree L, Shetty S, Deshpande SR, Venkatesha DT. Screening For Asymptomatic Bacteriuria In Pregnancy: An Evaluation Of Various Screening Tests In Hassan District Hospital, India. J Clin Diagn Res. 2010 Aug;4(4):2702-6.