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THE PROPORTION OF PREGNANCY-ASSOCIATED ASYMPTOMATIC BACTERIURIA IN AL-KARKH HOSPITAL

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ABSTRACT

The aim of the research determines the prevalence and the causative organisms of asymptomatic bacteriuria among pregnant women. A retrospective analysis was performed of the routine prenatal screening (urine culture tests) of 200 women. In this study, the low prevalence of bacteriuria among pregnant women. In view of the lack of information regarding asymptomatic bacteriuria in pregnancy, as asymptomatic bacteriuria causes various serious maternal and fetal complications, every patient attending ANC OPD should be screened for asymptomatic bacteriuria. By screening and early detection of asymptomatic bacteriuria, we can minimize these complications.

KEYWORDS: Pregnancy, asymptomatic bacteriuria.

INTRODUCTION

Urinary tract infection (UTI) is the most common bacterial infection during pregnancy. The incidence of UTI varies, depending on the local prevalence of asymptomatic bacteriuria, whether it is treatable or not. Asymptomatic bacteriuria (ASB) is a major risk factor for the development of urinary tract infections (UTIs) during pregnancy.[1] Asymptomatic bacteriuria refers to the presence of bacteria in urine; it is a condition in which urine culture reveals a significant growth of pathogens that is greater than 105 bacteria/ml, but without the patient showing symptoms of urinary tract infection (UTI).

Pregnancy enhances the progression from asymptomatic to symptomatic bacteriuria, which could lead to pyelonephritis and adverse obstetric outcomes such as prematurity, low birth weight, and higher fetal mortality rates.[2]

Urinary tract infections are a common occurrence in pregnancy. The physiological and anatomical changes associated with pregnancy predispose to UTIs. They are of two types: symptomatic and asymptomatic. Asymptomatic bacteriuria (better terminology being screening bacteriuria) is a microbiological diagnosis where the actively multiplying bacterium is isolated in a number greater than 105 CFU/ml from the urine of a person suffering from no symptoms of UTI. Risk of ASB increases with low socioeconomic status, multiparity, increasing maternal age and previous history of UTI.[3] Patients may often seek treatment for symptomatic UTIs but asymptomatic bacteriuria has a high probability of being left untreated and is associated with diverse maternal and fetal complications. Fetal complications include low birth weight and associated perinatal morbidity and mortality. Several studies suggest an association between asymptomatic bacteriuria and increased prevalence of symptomatic UTI and pyelonephritis which in turn can lead to preterm labor. It has also been indirectly linked to preeclampsia and anemia. Hence, it is recommended to regularly screen and treat asymptomatic bacteriuria.[4]

Several screening methods have been tried to diagnose asymptomatic bacteriuria but none have been shown to be highly sensitive or specific in pregnant women and hence urine culture remains the gold standard for diagnosis. The most common organism causing ASB in pregnancy is E. coli though it is also known to be caused by other organisms such as Staphylococcus, Proteus, Citrobacter, and Klebsiella. The sensitivity of organisms to various antibiotics may vary from region to region or even from time to time. Hence the most common organisms causing asymptomatic bacteriuria and their antibiotic susceptibility in a region need to be studied at regular intervals for effective treatment of pregnant women.[5]

Background

Urinary tract infection (UTI) during pregnancy could be either symptomatic or asymptomatic. A UTI may manifest as asymptomatic bacteriuria, acute cystitis or pyelonephritis. Untreated bacteriuria during pregnancy is associated with adverse maternal and perinatal outcomes. Globally asymptomatic bacteriuria affects 2 – 10% of all pregnant women.[6]

Adverse maternal outcomes include symptomatic cystitis and development of pyelonephritis (in up to 30%) and preterm labor and delivery. Pyelonephritis in the pregnant patient leads to septicemia in 10 - 20% of cases and acute respiratory distress syndrome in 2%. The associated adverse fetal outcomes include prematurity, low birth weight, and increased perinatal mortality. In addition, there are increased maternal risks reported for pre-eclampsia,

anemia, chorioamnionitis and post-partum endometritis in patients with significant bacteriuria. Fetal risks include fetal growth retardation, stillbirth, mental retardation, and developmental delay. It is postulated that direct bacterial endotoxin damage is responsible.[7]

Under normal circumstances, the relatively acidic pH, high osmolality and high urea concentration in urine are generally bacteriostatic to most bacteria. Furthermore, in an anatomically normal urinary tract, infection is prevented by the unobstructed antegrade flow of urine. The physiological changes, both hormonal and mechanical that occur in the urogenital tract during pregnancy, increases the potential for colonization by pathogenic bacteria. During pregnancy, the bladder volume increases and detrusor tone decreases. Additionally, progesterone relaxes ureteric smooth muscle causing dilatation of ureters, which is further aggravated due to pressure from the expanding uterus.[8]

All these factors lead to urinary stasis, dysfunctional ureteric valves, and vesicoureteric reflux, which facilitates bacterial colonization and ascending infection. Seventy percent of pregnant women develop glycosuria and this in combination with the physiological lowering of urine osmolality will further facilitate bacterial colonization. It has been demonstrated through randomized trials that antimicrobial treatment of asymptomatic bacteriuria during pregnancy will decrease the risk of subsequent pyelonephritis from 20–35% to 1–4% and the risk of having a low birth weight baby from 15% to 5%4.[9]

The antenatal urine culture routine for all pregnant women is costly and not feasible in many parts of the developing world. Selection of mothers for screening with risk factors may reduce the necessity of urine culture for all pregnant women and may be used as an appropriate alternative strategy of management. Gestational diabetes, past urinary tract infection, multiparity, advanced maternal age, lower education level, advanced gestational age, and lower socioeconomic status have been reported as risk factors in some of the studies, and conflicting results have been obtained from different studies.[10] Quantitative culture is the gold standard for diagnosis of bacteriuria. However, a pregnant woman with a positive dipslide test is very likely to have a definitive diagnosis of asymptomatic bacteriuria, whereas a negative result effectively rules out the presence of bacteriuria. When tested with dipsticks, only 2% of pregnant women with asymptomatic bacteriuria will not receive antibiotic treatment when necessary and fewer than 1% of pregnant women without asymptomatic bacteriuria would be classified as positive.

However, dipsticks that measure nitrites and leukocyte esterase have low sensitivity for use in screening for asymptomatic bacteriuria during pregnancy. No information is available from Sri Lanka on the prevalence of asymptomatic bacteriuria in pregnant women. Hence this prospective study was conducted to determine the prevalence of asymptomatic bacteriuria, risk factors, their degree of association, and aetiological agents in a selected group of Sri Lankan pregnant women.[11]

The prevalence of asymptomatic bacteriuria varies according to age, sex, sexual activity and the presence of genitourinary abnormalities. Asymptomatic bacteriuria is commonly detected in women aged up to 60 years at a rate of 3% to 5%. Asymptomatic bacteriuria is more common in patients with diabetes and the elderly.[12] As many as 25% to 50% of elderly women and 15% to 40% of elderly men in long-term care facilities are bacteriuria. Asymptomatic bacteriuria is rare in healthy young men, but its prevalence increases substantially after the age of 60 years. Menwith diabetes does not appear to have an increased prevalence of bacteriuria compared with non-diabetic men.

Causes of increased susceptibility to asymptomatic bacteriuria among older people can be attributed to declining cell-mediaautoimmunity, increased bacterial receptivity of uroepithelial cells, neurogenic bladder dysfunction, changed bladder defenses from obstructive uropathy, reduced prostatic and vaginal antibacterial factors, urinary and vaginal pH, hormones, and urinary and fecal incontinence that favor bacteriuria.[13]

The association of asymptomatic bacteriuria with symptomatic urinary tract infection (UTI) is likely attributable to host factors that promote both symptomatic and asymptomatic urinary infection, rather than symptomatic infection being attributable to asymptomatic bacteriuria. The risk factors for developing symptomatic UTI have not been well defined and the consequences of asymptomatic bacteriuria in diabetic patients are controversial.[14] Glucosuria enhances bacterial growth in vitro, but this finding could not be confirmed in vivo in diabetic patients. It is also unknown if asymptomatic bacteriuria precedes symptomatic bacteriuria in these patients. It appears that in patients with diabetes, asymptomatic bacteriuria does not lead to severe complications, and it has therefore been recommended that screening for asymptomatic bacteriuria is unnecessary in diabetic patients. Some studies have reported increased mortality associated with asymptomatic bacteriuria in the elderly, but other studies did not confirm this finding.

Clinical studies of older residents in long-term care facilities have shown no benefits from screening or antimicrobial treatment for asymptomatic bacteriuria. Premenopausal, non-pregnant women with asymptomatic bacteriuria experience no adverse effects and usually clear bacteriuria spontaneously. However, these women are more likely to experience subsequent symptomatic UTI than women who do not have asymptomatic bacteriuria.[15]

Asymptomatic bacteriuria is characterized by the presence of a significant quantity of bacteria in a urine specimen properly collected from a person without symptoms or signs of UTI. Quantitative criteria for identifying significant bacteriuria in an asymptomatic person are at least 100,000 colony-forming units (CFU)/mL of same species bacteria in midstream clean-catch urine specimens in a single specimen for men or in two consecutive specimens for women, and at least 100 CFU/mL of same species from singlecatheterised urine specimens in men or women (Nicolle 2005). The leukocyte esterase and nitrite tests are often used in primary care settings to evaluate urinary symptoms; however, these tests are not useful in diagnosing asymptomatic bacteriuria because pyuriadetection is not specific for UTIs. Urinalysis by microscopic examination for bacteria remains a useful test for the identification of bacteriuria.[16]

Globally, bacteriuria in pregnancy occurs in between 2% and 10% of pregnancies but is sometimes asymptomatic. Asymptomatic bacteriuria (ASB) is a subclinical infection, said to be present when the urine culture reveals the growth of pathogens greater than 105 bacteria/ml but without symptoms of UTI in the patient.

Asymptomatic urinary tract infections (significant bacteriuria without obvious clinical manifestations) in pregnancy are not uncommon in Africa.[17] Several studies have shown varying prevalence rates even in the same country. This variation in the prevalence of asymptomatic bacteriuria is explained by differences in the population characteristics, differences in screening methodology and criteria for the diagnosis of asymptomatic bacteriuria in these studies.[18]

For instance, studies in Nigeria revealed prevalence ranging from 10.7% to 28.8% and 40% in the South West. They also reported between 18.2% and 78.7% in the South East and between 13.8% and 45.3% in the South-South region. In Ghana, the prevalence has been found to be 7.3% in a tertiary health institution in Kumasi, 9.5% in the same hospital five years later and 56.5% in Cape Coast. In a related study in the Cape Coast Metropolis, Siakwa

et al. (2014) found that 23.6% of pregnant women who had a positive urine culture did not have symptoms suggestive of urinary tract infection (UTI) at the time of testing. Most of these studies were conducted on account of the prevalence of asymptomatic bacteriuria and not on pregnancy outcomes.[19]

Asymptomatic bacteriuria is a condition in which urine culture of the patient reveals a significant growth of pathogens that is greater than 105 bacteria/ml, but without showing symptoms of urinary tract infection (UTI).[20] Pregnant women are more prone to UTI because of the maternal physiologic and anatomical factors which predispose to ascending infection. Such factors include urinary retention caused by the weight of the enlarging uterus and urinary stasis due to progesterone-induced vesicourethral reflux.[21] The apparent reduction in immunity of pregnant women appears to encourage the growth of both commensal and noncommensal microorganisms. The physiological increase in plasma volume during pregnancy decrease urine concentration and up to 70% of pregnant women develop glucosuria, which encourages bacterial growth in the urine.

These changes, along with an already short urethra (approximately 3-4 cm in females) and difficulty with the maintenance of hygiene due to a distended pregnant belly, increase the frequency of urinary tract infections (UTIs) in pregnant women. Infections result from ascending colonization of the urinary tract, primarily by existing vaginal, perineal, and fecal flora. Prevalence of UTI increases from 1-5% in non-pregnant females to 1-9.9% in pregnancy. As per IDSA (Infectious Disease Society of America), a global range of prevalence of asymptomatic bacteriuria ranges between 0-9.9%.[22] Pregnant women with asymptomatic bacteriuria are at high risk for fetal and maternal complications. The fetus is at high risk for prematurity, low birth weight, IUGR, and perinatal mortality. Maternal complications include overt UTI in (30-40%), acute cystitis (40%) and pyelonephritis (25-30%).[23] In many hospitals in developing countries, routine urine culture test is not carried out for antenatal patients. It is so probably due to cost implication and time factor for culture result (usually 48 hours period). But the true picture of such urine specimen cannot be fully assessed by any presumptive diagnostic test for UTI. None of the presumptive diagnostic tests can either quantify the extent of infection in such a patient or provide antimicrobial therapy which is usually seen in the case of culture test.

METHODS

This was a prospective cross-sectional study conducted from July 2017 to July 2018 in the Department of Obstetrics and Gynecology in Falkirk Hospital, 200 women were included in the study after taking their consent for participation.

Inclusion criteria

All pregnant women without symptoms of UTI.

Exclusion criteria

• Patients who did not give consent.

• Patients with a history of fever > 38-degree C, dysuria, urinary hesitancy, urgency, slow stream, incontinence, frequency, incomplete voiding, flank suprapubic/hypogastric pain.

• Those who have had a history of intake of antibiotics for any indication during the current pregnancy in the last month.

A detailed history including the demography, complaints (symptoms of UTI), a period of gestation of these patients were taken.

Statistical analysis

Descriptive statistical analysis has been carried out in the present study. Chi-square test has been used to find the significance of study parameters between two groups (contingency table Chi-Square statistic).

RESULTS

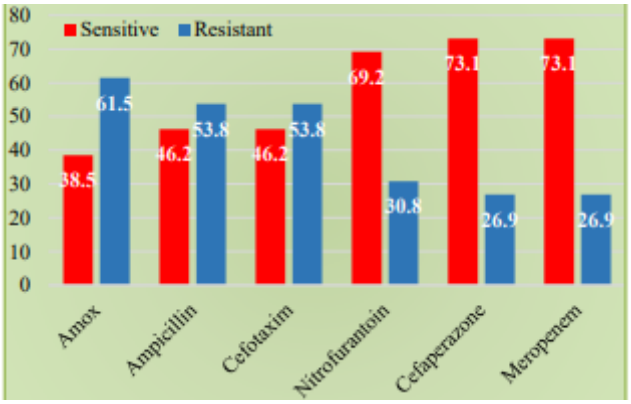
In this study, 200 pregnant patients were evaluated. urine samples were found to be contaminated and were excluded from the study.

123 women had sterile culture, 20 women had insignificant bacteriuria and culture was not repeated and they were considered in bacteriuric women and 21 women had significant growth on culture. 13 of the culture-positive women and 11 culture negative women were lost to follow up and final culture-positive women were 12 with the final proportion of asymptomatic bacteriuria being 13.7%.

With respect to socioeconomic status, 32% belonged to the upper middle class. 56% to the lower middle class, 10% to lower class and 2% to the upper lower class as per the

Kuppuswamy classification. Maximum percentage of bacteriuric women were seen in the lower middle (34,9%) followed by lower class (31,0%).

Out of 28 culture, positive women, maximum (26%) belonged to the 25-33-year age group. The most common bacterial isolate was Escherichia coli followed by Staphylococcus aureus.



Asymptomatic bacteriuria is associated with several maternal and fetal adverse outcomes and hence requires adequate diagnosis and treatment. The prevalence of asymptomatic bacteriuria worldwide is quoted around 2 to 11%.1

Proportion

The proportion in my study was found to be 13.7% which is similar to findings of Rajaratnam et al (13.2%) and slightly more than Jayachandran et al (11.6%).[24]

On the other hand, Sujatha et al quote a prevalence of 7.3% and in Chandel et al it is 7.34%. 4,6 Prasanna B et al reported a higher prevalence of 17%.

These variations between different studies may be due to the difference in the socioeconomic conditions and environmental conditions of the participants in different studies.

Parity

With respect to parity, there are conflicting results where Chandel LR et al found it to be more prevalent in Primigravidae (52.9%) and Sujatha R et al found it to be more prevalent in multigravidas (51%).[25] The present study found ASB more prevalent in multigravidas (64.3%). The difference, however, was not statistically significant.

Trimester

As per the present study, a higher incidence of ASB was seen in the third trimester of pregnancy (50%). Jayachandran AL et al, Nath et al, and Roy et al have all reported a higher incidence of ASB in the second trimester of pregnancy in contrast to this study. Yasodhara et al have reported a higher incidence of ASB in the first trimester of pregnancy. Udayagiri Venkata Rohini et al reports a higher incidence in the third trimester.[26]

Age

The incidence of ASB was found to be increasing with increasing maternal age with the greatest incidence in my study in the age group of 30-40 years. This is comparable to Prasanna B et al. Socioeconomic status Previous studies conducted such as Gayathree et al and Whally et al showed a higher occurrence of ASB in Low SES. In the present study, the occurrence was found to be higher in the Lower middle and lower social classes (Kuppuswamy classification).[27]

Risk factors

In the present study, 21 cases of pre-eclampsia were diagnosed during the 3rd trimester, and 8 cases were ASB positive and significant statistically. Findings in the study of Hill JA et al also found a similar association with preeclampsia and is a significant risk factor for ASB.14 There was no significant association between diabetes and ASB in the present study.

Progression to symptomatic UTI Development of symptomatic UTI as well as pyelonephritis was found to be statistically significant among culture positive cases in our study with 44% of the cases developing significant bacteriuria during the course of pregnancy and 7.41% having hospital admission for pyelonephritis.

In a study conducted by Jain et al, the occurrence of UTI or pyelonephritis was not found to be significantly higher among women with asymptomatic bacteriuria but Sreekumary et al found ASB a significant risk factor for developing UTI but not pyelonephritis.[28]

Preterm labor 28.2% had preterm labor in culture-positive cases whereas 19.48% in culture-negative cases had preterm labor. So preterm labor showed significant correlation with asymptomatic bacteriuria according to this study.

These findings are comparable to several studies such as Sreekumary et al and Jain V et al which also found a positive correlation between ASB and preterm labor.[29]

Premature rupture of membranes (PROM)There was no statistical significance between culture positive and culture negative cases who had premature rupture of membranes. This is, in contrast, to a study conducted by Jain V et al where the incidence of PROM was found to be significant.[30]

Low birth weight Culture positive women had a mean birth weight of 2.55kg, lower than culture negative women with a mean birth weight of 2.77kg. This finding is similar to previous studies showing a greater chance of LBW with asymptomatic bacteriuria. Present findings were similar to Jain et al but in Rajaratnam et allow birth weight was not found to be significant in culture-positive women.

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