

## When to Screen and when to Treat Asymptomatic Bacteriuria in Pregnancy

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### Abstract

Although pregnancy is considered as normal event in female's life, complications of it are inevitable. Lot of psychological and physiological changes take place during all trimesters of pregnancy. As these changes are going on; pregnant women become more vulnerable to various kinds of diseases, consequently women and fetus health will be affected. As known prevention is better than cure, also caring is more holistic than curing. Pregnant females are two times more commonly affected than non-pregnant females for the same reasons of urinary stasis and progesterone effect in pregnancy. Urinary tract infection (UTI) during pregnancy could be either symptomatic or asymptomatic. A UTI may manifest as an 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. Many factors such as age, underlying medical conditions, gestational age, level of education, personal hygiene, socioeconomic status, and the commitment to antenatal care are important variables should be illustrated while assessing either symptomatic or asymptomatic bacteriuria in pregnant women. *Escherichia coli* is the most responsible etiologic agent in both symptomatic and asymptomatic bacteriuria and urine culture is the best golden tool for diagnosis. Untreated bacteriuria during pregnancy is associated with adverse maternal and perinatal outcomes.

Treatment of either symptomatic or asymptomatic bacteriuria is controversial issue as maternal- fetal health will be affected. The use of antibiotics relies on the outcomes referred to mother and fetus. It is cost effective to screen for bacteriuria if the prevalence rate is 2% or more. It is mandatory to screen all pregnant women for the presence of bacteriuria at their first prenatal visit, preferably in the first trimester and those who are positive should be followed up closely after treatment because as many as one third will experience a recurrence.

**Keywords:** Antenatal Care; Socioeconomic Status (SES); Pregnancy; Asymptomatic and Symptomatic Bacteriuria

### Introduction

Asymptomatic bacteriuria is common among women and increases in prevalence with sexual activity, short urethra, pregnancy and easy contamination of the urethra with faecal flora [1]. Asymptomatic bacteriuria is confirmed with positive culture of bacteria containing more than 10<sup>5</sup> CFU/ml of clean catch, mid-stream urine (MSU) of a patient without symptoms of urinary tract infection (UTI) [2]. Pregnant females are two times more commonly affected than non-pregnant females for the same reasons of urinary stasis and progesterone effect in pregnancy [3]. On the other hand despite of the causative agent, some studies showed there is no difference in incidence of bacteriuria between pregnant and non-pregnant females. However, the incidence of acute pyelonephritis among pregnant women with bacteriuria is increased which makes pregnancy as risk factor and pregnant ladies as risk group [4].

Various workers examining the prevalence of bacteriuria among pregnant women have reported varying percentage prevalence rates of bacteriuria. It has been observed that the prevalence of bacteriuria among non-pregnant women was from 8 - 10% and the percentage prevalence rate among pregnant women could be as high as 15% [5]. Registration of pregnant women to antenatal clinic

early in 1<sup>st</sup> trimester is necessary to detect and treat underlying asymptomatic bacteriuria to avoid complications later in pregnancy. High prevalence of bacteriuria observed in the first trimester could be as a result of underlying asymptomatic urinary infection before pregnancy ensued or at onset of pregnancy due to changes associated with it. Asymptomatic bacteriuria in pregnancy may cause complications such as pyelonephritis, hypertensive disease of pregnancy, anaemia, chronic renal failure, premature delivery and foetal mortality [6,7].

### Anatomical and pathophysiological considerations associated with UTIs in females and during pregnancy

Usually the anatomical description of the female urinary tract represented by wide and short urethra and proximity from the anus makes females more suspected to have UTIs in their life which could be considered as first suspected scenario explaining the disease process. However, as pregnancy is going on through the third trimester, the enlarged uterus makes prolonged pressure over the urinary bladder which result in decreased motility and increased urine stasis over time, eventually might increase the chances of bacterial growth which could be the second scenario of the pathophysiological consequence for susceptibility more re-

lated to pregnancy. As early as the eighth week of pregnancy the renal pelvis and ureters begin to dilate and the bladder itself is displaced superiorly and anteriorly [8]. The principle cause of hydroureter and hydronephrosis is the mechanical compression from the enlarging uterus 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. Bacterial growth may be facilitated by differences in urine pH and osmolality and pregnancy-induced glycosuria and aminoaciduria [9].

Through middle of the second trimester all physiological changes of pregnancy that affect the urinary tract already happened, thus at the week eighteen of gestational age is the preferred time for conducting the routine urine culture as the best diagnostic test for bacteriuria [10]. To detect bacteriuria different examinations are used which include complete urinalysis, leukocyte esterase activity, a nitrite test, and urine cultures. Still a midstream urine culture is considered the best diagnostic test [11]. Screening for ASB in pregnant women has been shown to be cost effective when compared with treating UTI and pyelonephritis without screening [12].

## Discussion

Antenatal care (also known as perinatal care) refers to the regular medical and nursing care recommended for women during pregnancy. "Prenatal Care" [13]. Urinary tract infections (UTI) affects all age groups, but women particularly pregnant women are more susceptible than men, due to short urethra, pregnancy, easy contamination of urinary tract with fecal flora and various other reasons [14]. Asymptomatic bacteriuria is defined as the presence of significant bacteriuria without the symptoms of an acute urinary tract infection and it seems to be associated more with pregnancy. Symptomatic urinary tract infections are divided into lower tract (acute cystitis) or upper tract (acute pyelonephritis) infections [15] and in terms of measurements asymptomatic bacteriuria is defined as bacterial growth of greater than or equal to 105 colony forming units per milliliter urine of the same organism, using midstream urine collection specimens, in the disappearance of symptoms of UTI [16-18].

The prevalence of bacteriuria in pregnancy is closely correlated to socioeconomic status (SES) [4]. Different studies have shown that characteristic problems related to infection control in developing countries include bad antibiotic prescribing practices, poorly functioning laboratory services, lack of surveillance data and sub-optimal design or construction of buildings and water and sanitation systems. Overcrowding of facilities and insufficient numbers of health workers are commonly noted. Increased bed numbers, nurse to patient ratios and bed space are known to have negative effects on infection transmission. Managers roles are not well specified, which contributes to the poor quality of services [19-21].

Wherever poverty found always combines with sickness and lack of awareness about basic principles of infection control and disease eradication worldwide and specifically in developing world. The prevalence of significant bacteriuria determined by a single catheterized urine at delivery was 2% in pregnant women of middle socioeconomic status (SES) compared to 6.5% in pregnant females of low socioeconomic status (SES) [22]. Another study showed that 60% of the affected women belonging to low SES while 40% belonging to middle class [23]. There is no significant relation to the level of education between the infected and uninfected patients [24]. A difference clearly identified in the prevalence of asymptomatic bacteriuria between the urban and rural citizens of the same nationality when they found prevalence of asymptomatic bacteriuria among Bangladeshi pregnant ladies living in London was 2.0% and 12% in rural areas in Bangladesh. Cleanliness is vital in promoting pregnant women health, in the opposite malpractice and bad personal hygiene certainly contributes to disease development as well the complications [25,26].

Both Asymptomatic and symptomatic bacteriuria require proper medical interventions as prolong the maternal-fetal health will be affected, however shifting from asymptomatic to symptomatic bacteriuria may happen dramatically in approximate of 10% of those with asymptomatic bacteriuria develop symptomatic bacteriuria during pregnancy [27]. Proper use of the antibiotic is essential in minimizing the complications; a study conducted by Verma, *et al.* 2016 [28] considered nitrofurantoin as the selected antibiotic against commonest pathogens causing the disease. In addition to the safety properties in pregnancy as well its bioavailability in urine makes it the drug of choice.

Shifting to symptomatic bacteriuria will result in serious upper urinary tract infection (pyelonephritis) which could lead to obstetrical and gynaecological complications as preterm delivery (prematurity), [29] which is also supported by the "Canadian's Communication Group Screening" when they titled bacteriuria as associated with 50% increase in the risk of premature delivery.

Low birth weight is another complication reported by Thomas, *et al.* 2011, [30] increase fetal mortality rate, [23] pre-eclampsia, [31] hypertension and anemia, [32] and post-partum endometritis [33]. So, time is crucial in diagnosis and treatment, therefore if asymptomatic bacteriuria is left untreated in pregnancy, it will result in up to 40% of pregnant women to develop UTI and about 25 - 35% of patients to develop acute pyelonephritis [34].

The right diagnosis will lead to right treatment, and early detection and appropriate treatment is the main concern as it will limit the infection rate to 3% [35]. The effect of age on the probability of being attacked seems to be pronounced, disproportional relation describes the relationship between age and incidence of

asymptomatic bacteriuria among pregnant ladies. A study showed that 55% of the affected ladies between the age group 26 - 30 years with the highest percentage, and 20% of the infected ladies of the age 35 years [24].

General health and underlying medical condition is a vital determinant and good predictor for the prognosis of both symptomatic and asymptomatic bacteriuria. Medical condition like diabetes mellitus and pregnancy increase the risk of pyelonephritis and renal impairment [36-38].

Many studies have observed that most cases of asymptomatic bacteriuria occur during 3<sup>rd</sup> trimester (40%) of pregnancy [1]. Positive proportional relation can best describe the relationship between the gestational age and the incidence of disease occurrence, as the growing fetus makes prolonged pressure over the urinary bladder, this will result in frequent urination (urgency feeling and may incontinence) but without complete emptying of the bladder, urine stasis occurs over time and alters urine PH through decreasing level of acidity finally results in bacterial growth.

The dominant organism causing bacteriuria during pregnancy is the *Escherichia coli*, a study conducted by Ahmed, *et al.* 2011 [39] showed that the sensitivity pattern of all isolated organisms reflects that all were sensitive to ciprofloxacin and gentamicin. While it was found in another study that Piperacillin Tazobactam, amikacin and nitrofurantion to be the most effective antibiotics against the urinary isolates [1]. The upsurge in antibiotic resistant pattern could be due to antibiotic abuse and self-medication. Also, low cost and availability of drugs could be another contributing factor for antibiotic resistance [1].

Proper antibiotic treatment of ASB is effective in reducing the incidence of pyelonephritis and low birth weight, but there was no evidence of a reduction in preterm delivery [40].

Following the standards of personal hygiene during pregnancy and even in normal circumstances is an integral part of the prevention process.

It is important to explain all females about the proper way of cleaning the perianal-urogenital area, and risk of acquisition of UTI. The cleansing process to be started from the cleanest area to less clean area, which means the process goes from the front to back to avoid undesired irreversible transmission of organisms to the urinary tract. Prenatal (antenatal) visits are not less important, it is designed to promote the maternal wellbeing as well to limit the complications during pregnancy. The antenatal visits foster the ways of communication between the pregnant ladies and the health care providers through filling gaps and finding channels that encourage therapeutic communication to enforce health education; health promotion; disease prevention and social support [41]. The importance of the prenatal care comes from conducting urine screening in the first prenatal visit and during the third trimester of

pregnancy as secondary prevention to limit diseases and prevent further complications as it recommended by the American college of obstetrics and gynecology (ACOG) [42].

Restricted resources, easy accessibility to health facilities, and underlying general medical condition such as malnutrition, anemia, and even the pregnancy as it suppresses the immune system can induce risks [43].

Many limitations are present in health care system in dealing with infection control measures in developing world, misuse of antibiotics prescription, poorly functioning laboratory departments; and shortage of qualified nursing staff will lead to imbalance in nurses- patients ratio, and all involve in transmission of infection [19].

Change is an ongoing process always needed in parallel as the need for actions in the understanding and implementation of infection control measures [44].

Cost-effectiveness of the infection control measures should be considered in mind when making simple comparison between the various costs and outcomes of two or more different interventions. The cost of extended hospitalization due to infection is thought to exceed those of improving infection control measures. In the USA, reduction of infections by only 6% would offset the cost of an infection control programmer by savings from reduced hospitalization [44]. A study in India showed that care for longer stay, hospital acquired bacteraemia in a cardiac hospital cost US\$15,000 more per patient, when compared to patients who did not develop infection [45]. In Mozambique, single dose prophylactic antibiotics at emergency Caesarean section was found to cost less than a tenth of a post-operative, seven-day regimen, with no significant difference in infection rates [46].

Patient education is a part of the treatment required at all stages of disease process, and it always expected from the health care provider to enhance the patient to be an active agent and decision maker over the demands of her condition including active participation in the treatment plan.

### Clinical recommendations

1. It is mandatory to screen all pregnant women for the presence of bacteriuria at their first prenatal visit, preferably in the first trimester and those who are positive should be followed up closely after treatment because as many as one third will experience a recurrence [29].
2. Pregnant women who have asymptomatic bacteriuria should be treated with antimicrobial therapy for three to seven days [47,48].
3. Patients with two or more episodes of bacteriuria are followed up with monthly repeat cultures until delivery to ensure urine sterility during the pregnancy [49].

## Conclusion

Health promotion and screening as secondary prevention measure through an early detection and treatment is highly recommended to maintain maternal wellbeing, doing urine culture on regular basis during the pregnancy as indicated in antenatal care visits are integral part of the prevention process as well limiting obstetrical and gynecological complications during pregnancy. The 18th week of the gestation age is the optimal time for screening of bacteriuria. It is recommended to screen pregnant mothers early in their pregnancy and treat those with significant bacteriuria as this could significantly minimize adverse maternal and foetal outcomes.

Proper self-care and personal hygiene is the prevention key measure. Furthermore, focusing on the enhancement commitment to antenatal care visits, increase level of awareness and health education of pregnant women will help in prevention of complications to a great extent.

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