

## Prevalence of Asymptomatic Bacteriuria in Patients with Preterm Labor

Hossam Aldin Hussein Kamel, Mostafa Hussein Mohammed Hegab,

Ahmad Al-saeed Al-sehrawey, Hassan Mohammed Hassan

Department of Obstetrics and Gyencology, Faculty of Medicnie – Al-Azhar University

### ABSTRACT

**Background:** asymptomatic bacteriuria (ASB) during pregnancy is the primary cause of acute pyelonephritis, preterm labor, low birth weight fetus, etc., if left untreated. Adequate and early treatment reduces the prevalence of these obstetric complications.

**Objectives:** this study aimed to determine the prevalence of ASB during pregnancy and determine the association between asymptomatic bacteriuria and spontaneous preterm birth.

**Patients Methods:** this was a case control study of 120 preterm pregnancies and 40 term pregnancies among those attending El-Galaa Teaching Hospital, Obstetric Emergency Unit to evaluate the incidence of ASB and determine the association between asymptomatic bacteriuria and spontaneous preterm birth from March 2016 to March 2017. Urine analysis and culture with antibiotic sensitivity were performed .

**Results:** out of the 160 patients studied, ASB was observed in 7 patients (6 cases in preterm group (5%) and 1 case in full term group (2.5%) with no significant difference between the two groups (p-value> 0.05), the incidence of ASB in preterm labor was quite lower 5%. *E. coli* was the most common pathogen (55.14%) followed by proteus 28.57 followed by *klebsiella* (14.28%).

**Conclusion:** all pregnant women should be screened by urine culture to detect asymptomatic bacteriuria at their first visit to prevent overt urinary tract infections (UTI) and other complications in both mother and fetus.

**Keyword:** preterm labor, urinary tract infections, asymptomatic bacteriuria

### INTRODUCTION

Asymptomatic bacteriuria in pregnancy is defined as the presence of

≥ 1,00,000 organisms per milliliter (ml) of urine taken from a clean catch mid-stream urine specimen with no symptoms referable to the genito-urinary tract. However ASB often is the primary cause of complications such as pyelonephritis, preterm labor, low birth weight fetus, maternal Sepsis , anemia and prenatal death<sup>[1]</sup>.

Treatment of ASB has been shown to reduce the rate of pyelonephritis in later part of pregnancy and therefore regular screening for and appropriate treatment of ABU has become a standard of obstetrical care<sup>[2]</sup>.

Urinary Tract Infections (UTI) is the microbial invasion and subsequent multiplication on part or entire urinary tract<sup>[3]</sup>.

Pregnancy causes numerous changes in the physiology of a woman's system. Various anatomic and physiological changes which include dilatation of the renal pelvis and ureters in as early as the eighth week of pregnancy<sup>[4]</sup> and displacement of the bladder itself superiorly and anteriorly are responsible for ASB.

Also, smooth muscle relaxation induced by progesterone may also play a role. As a consequence of smooth muscle relaxation peristalsis of the ureters are decreased, bladder capacity is increased which in turn lead to urinary stasis<sup>[5]</sup>. Henceforth, screening and treatment of ASB prerequisite to be incorporated as routine antenatal care for an integrated approach to safe motherhood and newborn health. Bacteriuria

occurs commonly in pregnancy, typically during early pregnancy. Without treatment, as many as 30 to 40

percent of pregnant women with asymptomatic bacteriuria will develop symptomatic urinary tract infection (UTI). The smooth muscle relaxation and subsequent ureteral dilatation that occurs in pregnancy are thought to facilitate the ascent of bacteria from the bladder to the kidney, accounting for the greater risk of pyelonephritis. Additionally, untreated bacteriuria may be associated with an increased risk of preterm birth, low birth weight, and perinatal mortality<sup>[6]</sup>.

### PATIENTS AND METHODS

This was a case control study in 120 preterm pregnancies and 40 term pregnancies among those attending El-Galaa Teaching Hospital, Obstetric Emergency Unit to evaluate the incidence of ASB from March 2016 to March 2017.

- Urine samples were collected employing the clean-catch, mid-stream technique after a proper local hygiene procedure.

- Samples were transported to the laboratory and processed within ONE hour of collection.

- All urine samples were subjected to the standard complete urine analysis procedure.

- While, physical examination was carried out on the whole sample, after centrifugation the supernatant portion was subjected to chemical testing and the sediment part was re suspended and examined microscopically.

- Any urine sample showing pus cell count  $\geq 10$  pus cells/HPF was further subjected to culture procedure.
  - These selected samples were cultured on appropriate culture media and viable bacterial cell count was done utilizing the micro calibrated loop ( $1\mu$ ) method.
  - For any sample showed a viable colony count  $10^5$  CFU/ml, the isolated organism was identified by Colony morphology. - Gram stain.- Biochemical reaction.-
  - Antibiotic sensitivity was performed by the standard disc diffusion method according to the **CLSI**.
- Results were tabulated and analyzed by using Epi Info program. -

## RESULTS

Table (1): Incidence of ASB and the prevalence of positive urine cultures in preterm and full term groups:

	preterm group	Full term group	total	Ch.sq	P-value
Positive bacteriuria	6	1	7		
Negative bacteriuria	114	39	153	0.04	0.6811 NS
Total	120	40	160		

As shown in table (1): The incidence of asymptomatic bacteriuria (ASB) in group I preterm group (cases) was 5% (6/120cases) while the incidence of ASB in group II full term group (control group) was 2.5 % ( 1/40) with no statistical significant difference between the two groups (p-value  $>0.05$ ).

**Table (2):** Different micro-organisms isolated from cases with asymptomatic bacteriuria (n=7):

Organism	Cases group (n=120)	Control group (n= 40)	Total	Ch.sq	P-value
E.coli	3	1	4	0.68 7	1
Klebsiellapneumoniae	1	0	1	0.75	1
Proteus	2	0	2	0.56	1
Total	6	1	7		NS

As shown in table (2) E.coli was isolated from 57.14 of positive cases, while proteus was isolated from 28.57% of positive cases while Klebsiellapneumoniae was isolated from 14.28% of positive cases.

**Table (3):** bacterial sensitivity to different antimicrobials of positive cases (n=7)

Antibiotic	Number of sensitive cases	percent
Nalidixic acid	7	100
Cefoperazone	7	100
Gentamycin	7	100
Ciprofloxacin	7	100
Norfloxacin	7	100
Nitrofurantoin	7	100
Amoxicillin+clavulinic acid	0	0
Trimethoprim +sulphamethoxazole	7	100
Ofloxacin	4	57.14
Imipenem	4	57.14
Amikacin	7	100
Ampicillin /sulbactam	4	57.14
Cefepime	4	57.14

As shown in table (3), nalidixic acid, cefoperazone, gentamycin, ciprofloxacin, norfloxacin, trimethoprim and sulphamethoxazole were considered the most effective antibiotics against the most common organisms causing asymptomatic bacteriuria in this study however nitrofurantoin and Ampicillin /sulbactam are sensitive to E.coli and this antibiotics are most safe during pregnancy.

## DISCUSSION

The present study reveals that the prevalence of ASB among pregnant women attending El-Galaa Teaching hospital obstetric emergency unit as 5% in patient with preterm labor and 2.5% in patient with term deliveries , (p-value $> 0.05$ ) with no significant difference between the two groups .

Similar prevalence of ASB 6.1% , 7.5% ,9.8%, among antenatal women was reported by *Ahmad et alin* Kashmir, India<sup>[7]</sup> ,*Saraswathi and Aljabriin* Hyderabad, India<sup>[8]</sup> , *Marahatta et alin* Kathmandu ,Nepal<sup>[9]</sup>, respectively.However higher prevalence of ASB 11.2%, 13.7% and 16%, 16.1%, 21%, 29.1%, 38.3% and 45.3%, was revealed by *Chitrlekha et alin* Chennai, India<sup>[10]</sup>, *Saeed and Tariqin* Karachi, Pakistan<sup>[11]</sup>,*Ansari and Rajkumariin* Hyderabad, India<sup>[12]</sup>,*Abdul Kairun et alin* Adama,

Ethiopia<sup>[13]</sup>,*Akinloye et alin* Nigeria<sup>[14]</sup> ,*Rahimkhani et alin* Tehran Iran<sup>[15]</sup> , *Rizvi et alin* Aligarh, India<sup>[16]</sup>and *Imade et alin* Benin City Edo state<sup>[17]</sup>, Nigeria respectively.

The reported prevalence of ASB was 30%, 4.8%, 9.9% and 3.3-6.1% among pregnant women in Yemen, United Arab Emirates (UAE), Qatar and Iran respectively<sup>[18]</sup>.

This variation in studies can be attributed to several factors such as geographical variation, socio-economic status, ethnicity of the subjects, setting of the study (primary care, community based, or hospital), and the variation in the screening tests (urine dipstick, microscopy, and culture). Race-specific rates show significant variation, as well as there is variation within the same race living in different geographical areas or with socio-economic status. Thus, it is important to evaluate the prevalence of ASB in a specific population<sup>[14]</sup>.

*E. coli* was the most common pathogen (55.14%) followed by proteus 28.57 followed by klebsiella (14.28%).

*E. coli* has been identified as the most common pathogen isolated among pregnant women in this study, which was consistent with *Adeghateet al* they found that *E. coli* causes 70-95% of both upper and lower UTIs<sup>[19]</sup>. Also this study consistent with study done by *Abdul Kairun et al.*; they found that The most common isolated organism was *E. coli* followed by Klebsiella spp, *Proteus mirabilis*, whereas the least found bacteria was *P. aeruginosa*<sup>[13]</sup>. The data collected from different places around the world showed that *E. coli* is still commonest pathogen in ASB like our study. *Marahatta et al.*<sup>[10]</sup>, *Chitralkha et al.*<sup>[11]</sup>, *Ahmad et al.*<sup>[8]</sup> and *Rizvi et al.*<sup>[17]</sup>.

During pregnancy there is increase in levels of amino acids and lactose which particularly encourages *E. coli* growth. It could also be due to infection by fecal contamination due to poor hygiene during pregnancy<sup>[20]</sup>. *E. coli* is the most common etiologic agent in asymptomatic and symptomatic bacteriuria of pregnancy<sup>[18][21][22]</sup>.

The antibiotic sensitivity patterns in this study show that most of the bacterial isolates were 100% sensitive to nitrofurantoin, nalidixic acid, cefoperazone, gentamycin, ciprofloxacin, norfloxacin, trimethoprim –sulphamethoxazole, while 57.14% sensitive to, ampicillin/sulbactam, cefepime, ofloxacin, and resistant to amoxicillin and clavulanic acid. However, these antibiotics have limited use in pregnancy; Nitrofurantoin was found to be most safe effective drug observed in this study.

Prescription of antibiotics without laboratory guidance as well as over-the-counter sales of antibiotics without prescription is also a probable factor for increased bacterial resistance to antimicrobial agents (amoxicillin and clavulanic acid). In conclusion, the present study showed that the incidence of ASB in preterm labor at El-Galaa Teaching hospital obstetric emergency unit is 5%. Nitrofurantoin was the most effective and safe antibiotic.

Women with ASB may have serious consequences on both mother and fetus. Therefore, it

is important to screen all antenatal women for asymptomatic bacteriuria at their first prenatal visit, preferably in first trimester, and those who are positive should be followed up closely after treatment because about one-third will experience a recurrence<sup>[18]</sup>. All the sequelae of ASB during pregnancy could be reduced by antimicrobial treatment early in pregnancy. It is time that we have a look at this strategy for improving the healthcare and for reducing the maternal and fetal morbidity and mortality<sup>[23]</sup>.

## REFERENCES

- 1- Gilbert NM, Macones(2013):** Urinary Tract Infection as a Preventable Cause of Pregnancy Complications: Opportunities, Challenges, and a Global Call to Action. *Glob. Adv. Health Med.*, 2 (5): 59-69.
- 2-Schnarr J and Smaill F (2008):** Asymptomatic bacteriuria and symptomatic urinary tract infections in pregnancy. *European Journal of clinical investigation*, 38: 50-57.2008.
- 3-Boye A, Siakwa PM, Boampong JN, Koffour GA, Ephraim RKD, Amoateng P, Obodai G, Penu D (2012):** Asymptomatic urinary tract infections in pregnant women attending antenatal clinic in Cape Coast, Ghana. *E3. J. Med. Res.*, 1(6): 074-083.
- 4-Fatima N, Ishrat S (2006):** Frequency and risk factors of asymptomatic bacteriuria during pregnancy. *JCPSP.*, 16(4); 273-275.
- 5-El-Sokkary M (2011):** Prevalence of Asymptomatic Bacteriuria in Antenatal Women with Preterm Labor at an Egyptian Tertiary Center. *J. Am. Sci.*, 7(4): 605-610.
- 6-Thomas M, Kalpana G, Stephen B, Charles J (2017):** Urinary tract infections and asymptomatic bacteriuria in pregnancy, <https://www.uptodate.com/.../urinary-tract-infections-and-asymptomatic-bacteriuria-in>
- 7-Ahmad S, Shakoo S, Salati SA, MuniemA(2011):** Prevalence of asymptomatic bacteriuria among pregnant women in Kashmir. *Sri Lanka J ObstetGynaecol.*, 33:158-62.
- 8-Saraswathi KS, AljabriF(2013):** Incidence of urinary tract infections in pregnant women in a tertiary care hospital. *Pharm Lett.*, 5:265-8.
- 9-Marahatta R, Acharya Dhungel B, Pradhan P et al.(2011):** Asymptomatic bacteriuria among pregnant women visiting Nepal Medical College Teaching Hospital, Kathmandu, Nepal. *Nepal Med Coll J.*, 13:107-110
- 10-Chitralkha S, Lakshmipriya R, Illamani V, Kiran M, Menezes GA(2013):** Prevalence of aerobic bacterial organism causing asymptomatic bacteriuria during second trimester pregnancy. *J Pharm Biomed Sci.*, 273: 26.
- 11-Saeed S, Tariq P(2011):** Symptomatic and asymptomatic urinary tract infections during pregnancy. *Int J Microbiol Res.*, 2:101-4.
- 12-Ansari HQ, Rajkumari A(2011):** Prevalence of asymptomatic bacteriuria and associated risk factors among antenatal women attending a tertiary care hospital. *J Med Allied Sci.*, 1:74-8.
- 13-abdukkairun N, Alemayehu E, Etana and Hailemichael T(2015):** Prevalence of asymptomatic bacteriuria during pregnancy in Adama city, Ethiopia

International Journal of Microbiology and Immunology Research ,3(5):058-063.

**14-Akinloye O, Ogbolu DO, Akinloye OM(2006):** Asymptomatic bacteriuria of pregnancy in Ibadan, Nigeria: a re-assessment. Br J Biomed sci., 63(3): 109-12.2006.

**15-Rahimkhani M, Khavari-Daneshvar H, SharifianR(2008):** Asymptomatic bacteriuria and pyuria in pregnancy. Acta Med Iran, 46:409-12.

**16-Rizvi M, Khan F, Shukla I, Malik A, Shaheen(2011)** Rising prevalence of antimicrobial resistance in urinary tract infections during pregnancy Necessity for exploring newer treatment options. J Lab Physicians ,3:98-103.

**17-Imade PE, Izekor PE., Eghafona NO, Enabulele OI, Ophori E(2010)**Asymptomatic bacteriuria in pregnant women. North Am. J. Med. Sci.,2:263-266.

**18-Moghadas AJ, IrajianG(2009):** Asymptomatic urinary tract infection in pregnant women. Iran J Pathol., 4(3):105-108.

**19-Adeghate J, Juhász E, Pongrácz J, Rimanóczy É, Kristóf K (2016):** Does Staphylococcus Saprophyticus

Cause Acute Cystitis only in Young Females, or is there more to the Story? A One-Year Comprehensive Study Done in Hungary. ActaMicrobiolImmunol Hung., 63 (1):57-67.

**20-Foxman B (2002)** Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. Am. J. Med., 113: 5S–13S.

**21-Jalali M, Shamsi M, Nasrin R and Kabir K (2014)** Prevalence of Urinary Tract Infection and Some Factors Affected in Pregnant Women in Iran Karaj City 2013. Middle-East J. Scientific Res.,20 (7): 781-785.

**22-Oladeinde HB, Omoregie R, Oladeinde BO (2015)** Asymptomatic urinary tract infection among pregnant women receiving ante-natal care in a traditional birth home in Benin City, Nigeria. Ethiop. J. Health Sci., 25(1):3-8.

**23-Demilie T, Beyene G, Melaku S, Tsegaye W (2012)** Urinary bacterial profile and antibiotic susceptibility pattern among pregnant women in north westethiopia. Ethiop J Health Sci., 22(2):121-8.