European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 9, Issue 7, Summer 2022

ORIGINAL RESEARCH

Prevalence Of Asymptomatic Bacteriuria In The Three Trimesters Of Pregnancy In A Tertiary Care Hospital Of North India

[1]Dr Gaurav Kumar, [2]Dr Ranvijay Singh, [3]Dr Snehanshu Shukla, [4]Dr Anand Shukla, [5]Amit Kumar Singh, [6]Dr Satyajeet Verma, [7]Dr D.K.Singh

[1]Assistant Professor, [3]Associate Professor, Department of Microbiology, RDASMC, Ayodhya, Uttar Pradesh, India

[2]Assistant Professor, [7]Professor, Department of Blood Bank, RDASMC, Ayodhya, Uttar Pradesh, India

[4] Associate Professor Department of Pediatrics RDASMC, Ayodhya, Uttar Pradesh, India

[5]Amit Kumar Singh, Professor, Department of Microbiology, ASMC, Basti, Uttar Pradesh, India

[6]Dr Satyajeet Verma, Professor, Department of Surgery, RDASMC, Ayodhya, Uttar Pradesh, India

Correspondence:
Dr Snehanshu Shukla
Associate Professor, Department of Microbiology, RDASMC, Ayodhya, Uttar Pradesh, India
Email: shuklasnehanshu@gmail.com

ABSTRACT

Introduction: Asymptomatic bacteriuria in pregnancy can lead to complications like urinary tract infections (UTI), pyelonephritis, pre-eclampsia, toxaemia, low birth weight, intra uterine growth retardation, preterm labour, preterm premature rupture of membrane and post-partum endometritis. There is insufficiency of data regarding prevalence, causative organism and antibiotic sensitivity pattern in all three trimesters of pregnancy. Thus to prevent the complications screening for ASB has been suggested for all pregnant women attending antenatal clinics.

Aims: To determine the prevalence of asymptomatic bacteriuria in three trimesters of pregnancy at a tertiary care hospital of north India.

Materials and Methods: All asymptomatic pregnant females attending the antenatal clinic at district hospital of Barabanki were included in the study except those with symptoms of UTI such as dysuria, urgency, frequency & fever. Isolation and identification were done as per standard laboratory protocol. Antimicrobial susceptibility test was done as per CLSI guidelines.

Results: In this study, 900 pregnant females were screened for ASB out of which 87 (9.6%) were culture positive.The prevalence of ASB was 10.24% (39 out of 381) in primigravida, 10% (30 out of 300) in secundigravida and 5.55% (9 out of 162) in gravida 3 and 15.78% (9 out of 57) in gravida 4. Theculture positivity associated with the gestational agewas found to be 24.13% (21) in the 1st trimester, 34.48% (30) in the 2nd trimester and 41.37% (36) in the 3rd trimester. Majority (75.87%) of the culture positive isolates were gram negative viz, E.coli(34.48%), Klebsiella(24.14%) and Proteus(17.24%).

Conclusion: Routine antenatal urine cultures should be done periodically in every trimester in order to screen ASB and appropriate treatment should be provided along with general health education regarding personnel hygiene and habits to avoid further complications

specially to the 1st trimester OPD patients as they are found to be the most affected group in this study.

Keywords: Asymptomatic bacteriuria, UTI, Multipara, E. coli

INTRODUCTION

Asymptomatic bacteriuria(ASB) is defined as a significant bacterial count (>10^5 organisms or colony forming units present per millilitre) in the urine of a person without symptoms[1]. Various anatomical and physiological changes that include dilatation of pelvis and ureters in as early as eighth week of pregnancy and displacement of the bladder itself superiorly and anteriorly are responsible for ASB[2]. Other factors facilitating bacterial growth include differences in urine pH, osmolality and pregnancy induced glycosuria and aminoaciduria[3].

Asymptomatic bacteriuria in pregnancy can lead to complications like urinary tract infections (UTI), pyelonephritis, pre-eclampsia, toxaemia, low birth weight, intra uterine growth retardation, preterm labour, preterm premature rupture of membrane and post-partum endometritis[4,5]. Symptomatic bacteriuria is easy to diagnose and treat but ASB which is more common in pregnancy is not[6].ASB as a cause of preterm delivery and low birth weight has been well documented[7,8]. There is insufficiency of data regarding prevalence, causative organism and antibiotic sensitivity pattern in all three trimesters of pregnancy. Thus to prevent the complications screening for ASB has been suggested for all pregnant women attending antenatal clinics[9].

This study is to estimate the prevalence of asymptomatic bacteriuria& the causative organisms among female attending antenatal clinic in all the three trimesters of pregnancy in district hospital, Barabanki, Uttar-Pradesh.

MATERIALS AND METHODS

STUDY DESIGN

The present study is a prospective cohort study which was carried out in the department of microbiology, Mayo Institute of Medical Sciences, Barabanki, U.P. The duration was of six months from April to September, 2016.

SAMPLE SIZE

Nine hundered asymptomatic pregnant females attending the antenatal clinic at district hospital of Barabanki were consecutively selected after approval from the institutional ethical committee. Informed consent was taken from all the patients and data such as age, parity and duration of gestation were obtained by filling the standard questionnaires.

SELECTION CRITERIA

All asymptomatic pregnant females were included in the study except those with symptoms of UTI such as dysuria, urgency, frequency & fever. Other exclusion criteria are as mentioned below:

- Vaginal bleeding
- Antibiotic intake in last two weeks
- Pregnancy with diabetes mellitus
- Known congenital anomaly of urinary tract
- Pregnancy induced hypertension

SAMPLE COLLECTION

Trimester history was taken by the enrolled subjects. Patients were counselled regarding the collection of “clean catch” mid-stream urine and a sample of 30-50 ml was

requested.Samples were collected in a sterile wide mouthed container (capacity 100 ml) with a lid.

SAMPLE PROCESSING

The samples were cultured on CLED, MacConkey and blood agar within 2 hours of collection. A standard platinum 2mm loop was used for inoculation. The culture was done under standard protocols using semiquantitative method. Microscopic examination of uncentrifuged urine samples was done for detection of pus cells, epithelial cells, crystals, fungal elements and RBCs. Culture plates were incubated at 37° C for 24 hours. Prolonged incubation was done for further 24 hours in case of no growth. Sample cultures with $>10^5$CFU/ml were taken positive. In cases of no growth after 48 hours of incubation the urine was interpreted as sterile, whereasreported as insignificant growth if colony count $<10^5$CFU/ml. Mixed growth of two or more organisms was also considered as contamination. Antibiotic susceptibility test was performed by Kirby-Bauer disc diffusion method using standard CLSI guidelines. Drugs considered safe during pregnancy such as penicillin, ampicillin, amoxiclav, amikacin, cefotaxime, gentamycin, imipenem, cotrimoxazole, clindamycin, vancomycin, ciprofloxacin,cefazoline, ceftazidime and nitrofurantoin were used for sensitivity testing.

OBSERVATIONS &RESULTS

In this study, 900 pregnant females were screened for ASB out of which 87 (9.6%) were culture positive. The age range among the screened females was 19-35 years. Maximum ASB positive casesi.e. a total of 57% were in the age group 22-25 years. Only 17% case were below the age of 22 years and only 26% cases were aged above 25 years (Chart 1).

Of all screened women 42.3% (i.e. 381 females) were primigravida, 33.33% (i.e. 300 females) were secundigravida, 18% i.e. 162 females were gravida-3 and 6.3% i.e. 57 females were gravida-4. The prevalence of ASB was 10.24% (39 out of 381) in primigravida, 10% (30 out of 300) in secundigravida and 5.55% (9 out of 162) in gravida 3 and 15.78% (9 out of 57) in gravida 4. Hence there is a higher prevalence in multigravida as compared to primigravida. The ASB positive distribution in different gravida as found in this study is shown in Chart2.

Among screened women, 135(15%) were in their 1st trimester, 354(39.3%) were in their 2nd trimester and 411 (45.67%) were in their 3rdtrimester.Theculture positivity associated with the gestational agewas found to be 24.13% (21) in the 1st trimester, 34.48% (30) in the 2nd trimester and 41.37% (36) in the 3rd trimester.

Majority (75.87%) of the culture positive isolates were gram negative viz,E.coli(34.48%), Klebsiella(24.14%) andProteus(17.24%).Among gram positive isolates incidence of *Staphylococcus aureus* and *Enterococcusfecalis* were found tobe 17.24% and 6.9% respectively (Chart-3). Growth of *Candida species* was noted in 5 cases. 9(3%) isolates exhibited insignificant growth and 3 (10.34%) isolates of ASB positive samples showed significant pus cell association in wet-mount.

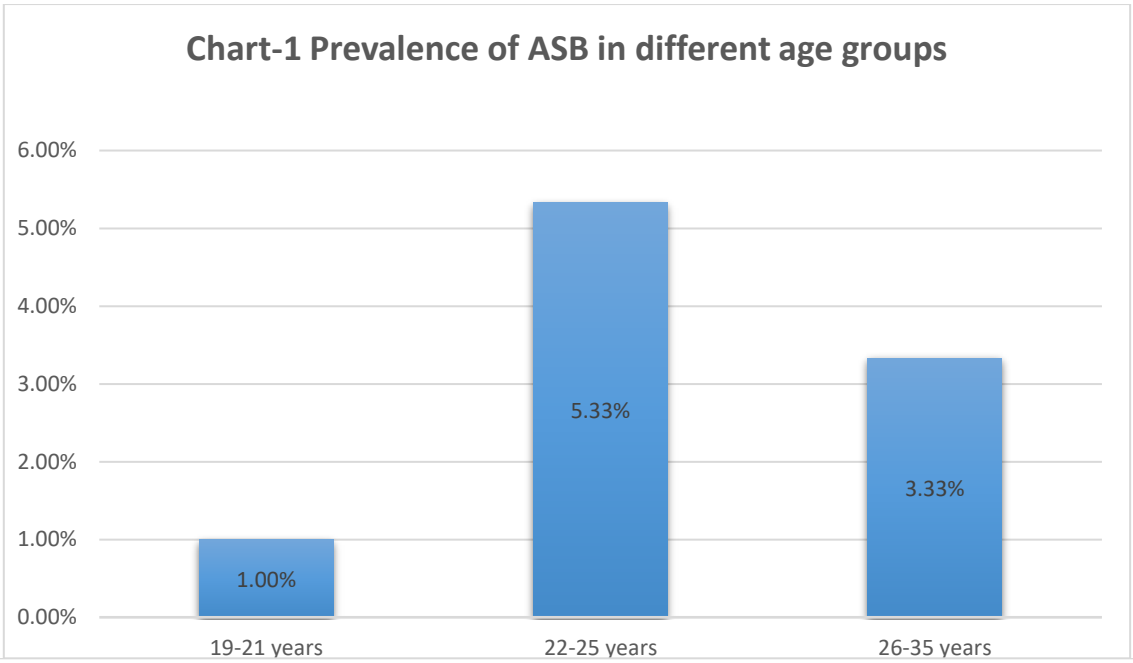


Chart-1 Prevalence of ASB in different age groups
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
1.00%
5.33%
3.33%
19-21 years
22-25 years
26-35 years

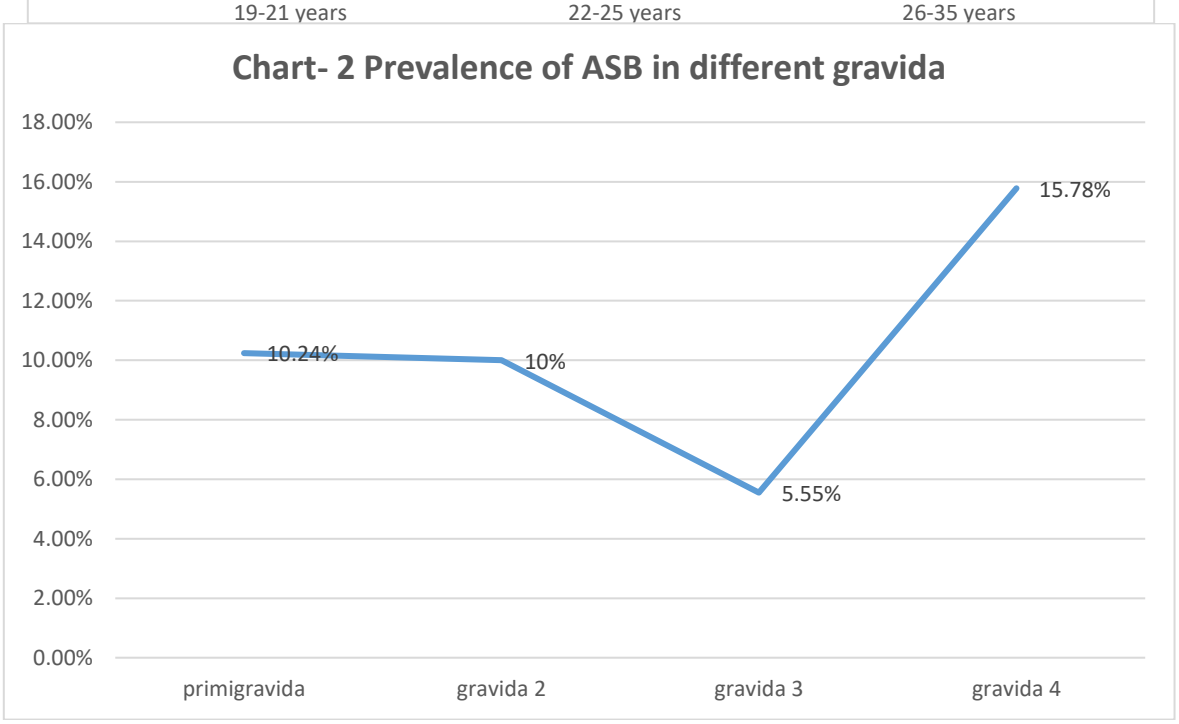
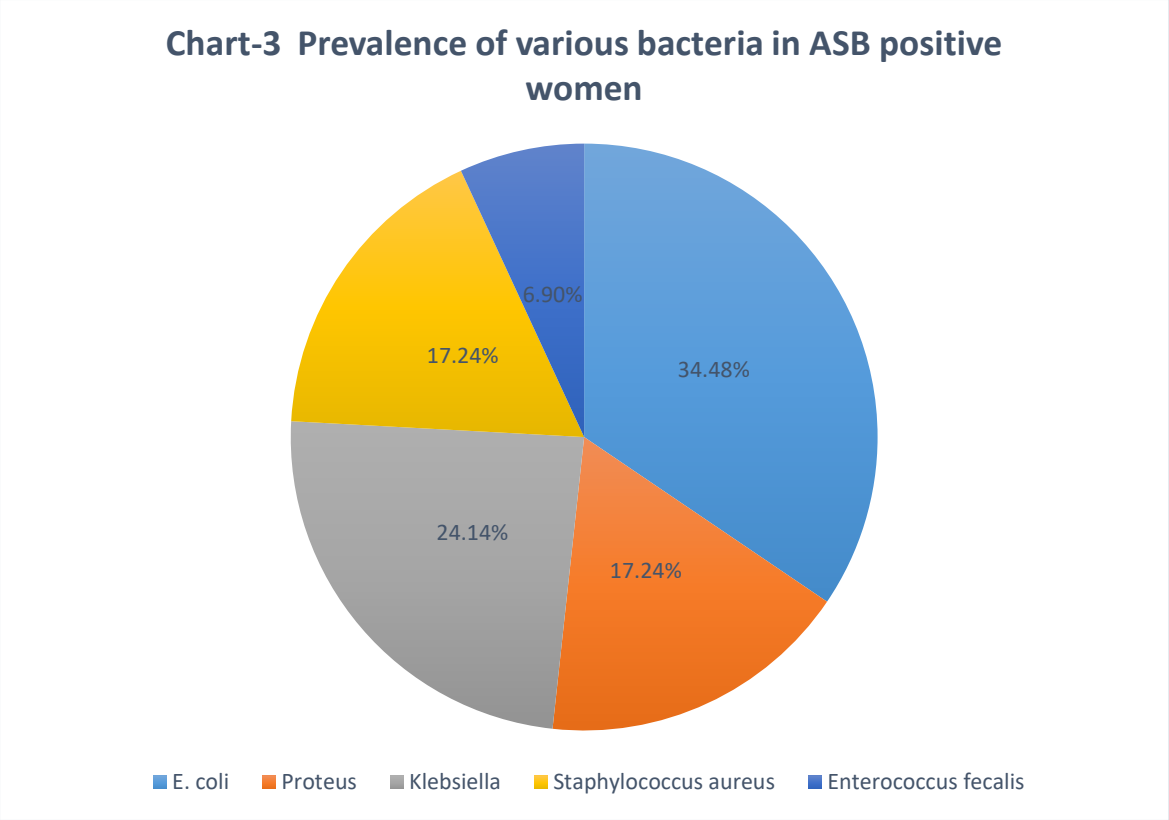


Chart- 2 Prevalence of ASB in different gravida
18.00%
16.00%
14.00%
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
10.24%
10%
5.55%
15.78%
primigravida
gravida 2
gravida 3
gravida 4



The antimicrobial drug susceptibility pattern is shown in Table1. *E.coli* was the most common isolate with 90% susceptibility to imipenem and nitrofurantoin. 80% of the *E.coli* isolates were susceptibletogentamycin, amikacin, ciprofloxacin, cotrimoxazoleand the cephalosporins, 50% to vancomycin, 40% to amoxiclav and clindamycin and 30% to ampicillin and penicillin. The next common organism was *Klebsiella spp.*which showed a 100% susceptibility to imipenem and nitrofurantoin, 80% to amikacin, ciprofloxacin and cephalosporins, 60% to amoxiclav and 20% to ampicillin and penicillin.

Table-1 Antibiotic susceptibility profile of various bacterial growth obtained

	E. coli (30) % (n)	**Proteus (15) % (n)**	**Klebsiella (21) % (n)**	**Staphylococcus aureus (15) % (n)**	**Enterococcus fecalis (6) 5 (n)**
Imipenem	90% (27)	80% (12)	85.71% (18)	100% (15)	100% (6)
Nitrofurantoin	90% (27)	80% (12)	85.71% (18)	100% (15)	100% (6)
Gentamycin	80% (27)	-	42.85% (9)	-	-
Amikacin	80% (24)	40% (6)	42.85% (9)	80% (12)	-
Ciprofloxacin	80% (24)	-	85.71% (18)	80% (12)	100% (6)
Cefazoline	50% (15)	-	71.43% (15)	-	100% (6)
Ceftazidime	80% (24)	60% (9)	71.43% (15)	80% (12)	-
Cefotaxime	80% (24)	60% (9)	-	80% (12)	-
Penicillin	30% (9)	20% (3)	28.57% (6)	20% (3)	50% (3)
Ampicillin	30% (9)	40% (6)	42.85% (9)	20% (3)	100% (6)
Amoxiclav	40% (12)	40% (6)	42.85% (9)	60% (9)	100% (6)
Cotrimoxazole	80% (24)	60% (9)	57.14% (12)	40% (6)	-
Clindamycin	40% (12)	-	42.85% (9)	-	-
Vancomycin	50% (15)	40% (6)	42.85% (9)	-	100% (6)

There was no growth seen in the follow up cultures after a proper treatment of 7 days in 18 samples, however due to lack of communication 11 cases could not be followed up and cultured.

DISCUSSION

The prevalence of ASB in this study is 9.6% which is similar in various other studies [8, 10-15]. Differences in prevalence may occur due to difference in educational status, social habits, environment and individual anatomical and physiological differences of the screened females. The socio economic status and personnel hygiene may also majorly contribute to this difference. Most affected age group was found to be 22-25 years (57%) and the next affected group is 26-35years (26%) which correlates with the other studies [10,11,16]. Thus the maternal age from 22-35 years is a high risk group for UTI development in pregnant women. This high incidence of ASB in the young reproductive age group is due to early pregnancy and multiparity in our country, especially in the rural area.

Several studies have shown that advancing age as a risk factor for acquiring ASB in pregnancy because of glycogen deposition and reduction in the lactobacillus with age which promote bacterial adherence and invasion by pathogens making them more susceptible. Prevalence decreased in successive pregnancy uptil the third (G1=10.24% > G2=10% >G3=5.55%) then there was a shoot rise in the G4 ASB prevalence (15.78%), but the overall prevalence is more in multigravida (31.33%) which is similar to various studies [10,11,17,18]. In this study prevalence in 1st trimester was more (15.55%) which is similar to the study done by R. Sujatha and Yahodara*et al* and [11,19].

The bacterial isolates in this study are generally a part of the periurethral flora. *E.coli* was the commonest organism found i.e. 34.48%, this corresponds to many other studies[10,16,20].This study shows that imipenem and nitrofurantoin have the highest (89.65%) susceptibility patterns for all extracted organisms, followed by ciprofloxacin and cephalosporins, followed by amoxiclav, then ampicillin and in the last penicillin. The drug susceptibility pattern is similar to other studies [10,11,19,21]. The variations in the antibiotic sensitivity pattern can be due to self-medication and drug abuse.This further can be due to low cost and easy availability of drugs.

CONCLUSION

ASB if not treated can result in UTI, premature or low birth infants, pyelonephritis and higher foetal mortality rates. There is a 20-50 times more risk of developing pyelonephritis in women with ASB compared to women without ASB[13]. Hence routine antenatal urine cultures should be done periodically in every trimester in order to screen ASB and appropriate treatment should be provided along with general health education regarding personnel hygiene and habits to avoid further complications specially to the 1st trimester OPD patients as they are found to be the most affected group in this study. The antibiotics should be used empirically as per the culture results. Further researches regarding the complications caused associated with particular bacteria in ASB positive females is required to see the nature and extent of the problems that a particular bacteria can cause.

CONFLICT OF INTEREST

Nil

BIBLIOGRAPHY

1. Kass EH. Bacteriuria and pyelonephritis of pregnancy. Arch Intern Med.1960;105:194-8
2. FriedAM. Hydronephrosis of pregnancy: Ultrasonographic study and classification of asymptomatic women. Am J Obstet Gynecol1979;135:1066-70.
3. JeybalanA, LainKY. Anatomic and functional changes of the upper urinary tract during pregnancy. UrolClin North Am, 2007;34:1-6.

4. Delzel JE, Lefevre ML. Urinary tract infections during pregnancy. Am Fam Physician 2000;61:713-21
5. SchnarrJ, Smaill F. Asymptomatic bacteriuria and symptomatic urinary tract infections in pregnancy. 2008;38(2):50-7
6. Matuszkiewicz-Rowińska J, Małyszko J, Wieliczko M. Urinary tract infections in pregnancy: old and new unresolved diagnostic and therapeutic problems. Arch Med Sci. 2015;11(1):67-77.
7. Conolly A, Throp JM. Urinary Tract Infection in Pregnancy. UrolClin North Am. 1999;26(4):779-87.
8. Elder HA, Santamarina BAG, Smith SA, Kass EH. Use of sulfasymazine in the treatment of bacteriuria in pregnancy. Antimicrob Agents and Chemother 1966;6:142-8.
9. MacLean AB. Urinary tract infection in pregnancy. Int J Antimicrob Agents 2001;17(4): 273-7.
10. GirishbabuRJ, ShrikrishnaR, RameshST. Asymptomatic bacteriuria in pregnancy. Int J Biomed Res.2011;(3):740-2.
11. SujathaR, NawaniM. Prevalence of asymptomatic bacteriuria and its antibacterial susceptibility pattern among pregnant women attending the antenatal clinic at Kanpur, India. DOI: 10.7860/JCDR/2014/6599.4205
12. Imade PE, Izekor PE, Eghafona NO, Enabulele OI, Ophori E. Asymptomatic bacteriuria among pregnant women. N Am J Med Sci. 2010;2(6):263-266. doi:10.4297/najms.2010.2263
13. Celen S, Oruç AS, Karayalçin R, et al. Asymptomatic bacteriuria and antibacterial susceptibility patterns in an obstetric population. ISRN Obstet Gynecol. 2011;2011:721872.
14. Enayat K, Fariba F, Bahram N.Asymptomatic bacteriuria in pregnant women referred to OPD clinics in Sanandaj, Iran.IntBraz J Urol.2008;34(5):699-707
15. Gayathree L, Shetty S, Deshpande SR, Venkatesh DT. Screening for asymptomatic bacteriuria in pregnancy: an evaluation of various screening tests in Hassan District Hospital, India. JCDR 2010;4(4):2707-2706.
16. 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;137(4):753-758.
17. Roy SK, Sinha GR, Quodros MA. A study of bacteriuria in pregnancy. J ObstetGynaecol India.1987;24:244-51.
18. Obirikorang C, Quaye L. Asymptomatic bacteriuria among pregnant women attending antenatal clinic at the university hospital, Kumasi, Ghana. J MedBiomed Sci.2012;1(1):38-44.
19. Chandel LR, Kanga A, Thakur K, Mokta KK, Sood A, Chauhan S. Prevalance of pregnancy associated asymptomatic bacteriuria: a study done in a tertiary care hospital. J ObstetGynaecol India. 2012;62(5):511-514. doi:10.1007/s13224-011-0071-2
20. Khattak AM, Khattak S, Khan H, Ashiq B, Mohammad D, Rafiq M. Prevalence of asymptomatic bacteriuria in pregnant women. Pak J Med Sci 2006;22(2):162-6
21. Prasanna B, Naimisha M, Swathi K, Shaik MV. Prevalence of asymptomatic bacteriuria in pregnant women, isolates and their culture sensitivity pattern. IntJCurrMicrobiolAppSci(2015)4(8):28-35.