

Study of Prevalence of Asymptomatic Bacteriuria in Gestationaldiabetes Mellitus

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ABSTRACT

To study the prevalence of asymptomaticbacteriuria in gestational diabetes mellitus. To screen the women with gestational diabetes mellitus for the prevalence of asymptomatic bacteriuria And to study the commonest organism which causes asymptomatic bacteriuria in gestational diabetes mellitus. Prevalence of asymptomatic bacteriuria among the women with gestational diabetes mellitus attending our antenatal clinic assessed using percentage with 95% confidence interval is18% (11.4 -26.5%) The commonest organism which causes the asymptomatic bacteriuria in gestational diabetes mellitus was assessed using percentage of occurrence to the total. 61% of asymptomatic bacteriuria in GDM is due to E.coli.

Keywords:diabetes mellitus, pyelonephritis, preeclampsia, anaemia and glucose intolerance.

1. INTRODUCTION

“Urinary tract infections have plagued mankind long before bacteria were recognized.” 1 Infection of urinary tract is one of the most common problems in pregnancy due to anatomical and physiological changes that take place in the genitourinary tract in pregnancy. It may be symptomatic or asymptomatic. “Asymptomatic Bacteriuria,” or asymptomatic urinary infection, is isolation of a quantitative count >10⁵ cfu/ml of bacteria in an appropriately collected urine specimen obtained from a person without symptoms or signs referable to urinary infection. 2 The prevalence of Asymptomatic Bacteriuria (ASB) in pregnancy varies from 2 -10% 3, 4 In 1962, Edward Kass was the first one to study in detail about ASB and he observed significant bacteriuria in 6% of asymptomatic pregnant women presenting for their first antenatal visit. Maternal and

fetal complications attributed to it are symptomatic urinary tract infection (UTI), pyelonephritis, preeclampsia (PE), anaemia, low birth weight (LBW), intrauterine growth retardation (IUGR), preterm labour (PTL), preterm premature rupture of membrane (PPROM) and post-partum endometritis. 5 , 6

The American College of Obstetrics and Gynecology recommends that a urine culture be obtained at the first prenatal visit for all pregnant women. 7 The American Academy of Family Physicians (AAFP) strongly recommends that all pregnant women be screened for asymptomatic bacteriuria using urine culture at 12 to 16 weeks gestation or at the first antenatal visit if after that time. Gestational diabetes is carbohydrate intolerance of variable severity with onset or first recognition during pregnancy and may or may not persist after delivery. (American Diabetes Association 2006). In the Indian context, screening is essential in all pregnant women as the Indian women have 11 fold increased risk of developing glucose intolerance during pregnancy compared to Caucasian women. 8 The recent data on the prevalence of GDM in India is 16.55%. 9 According to the Diabetes In Pregnancy Study group India (DIPSI) 75 gram oral glucose challenge test more than 140mg/dl is diagnostic.

Women with Diabetes Mellitus are considered immunocompromised and are therefore possibly more prone to develop infections of which the urinary tract is one of the most prevalent sites of infection. 10 , 11 Moreover women with Diabetes Mellitus and a Urinary Tract Infection are more susceptible to severe and rare complications of UTI such as Xanthogranulomatous Pyelonephritis. 12 , 13 Seeing these deadly complications of asymptomatic bacteriuria and increasing incidence of GDM in our population this study was carried out to identify these patients early, treat them with appropriate antibiotics and to emphasise the importance of screening in all pregnant women and especially in GDM. As always prevention is better than cure. Aim of good antenatal care is to ensure the wellbeing of both mother and child.

2. MATERIALS AND METHODS

This study was conducted after getting ethical clearance from the University ethical committee. In the present study, the prevalence of asymptomatic bacteriuria in 100 pregnant women with GDM and singleton pregnancy attending the antenatal clinic was calculated and they were given appropriate treatment based on urine culture and

sensitivity reports to prevent the complications of asymptomatic bacteriuria. Apart from GDM, other factors like age, parity and socioeconomic class during pregnancy also were evaluated as a risk factor for asymptomatic bacteriuria.

TYPE OF STUDY: Prospective study

STUDY POPULATION: 100 pregnant women with singleton pregnancy having GDM based on the inclusion and exclusion criteria.

STUDY SETTING: Department of Obstetrics and Gynaecology, SreeBalaji Medical College and Hospital, Chrompet, Chennai.

STUDY PERIOD: December 2013- December 2015

INCLUSION CRITERIA:

- Singleton pregnancy
- Women having gestational diabetes at gestational age above 12 weeks.
- Women who are willing to participate in this study

EXCLUSION CRITERIA:

- Pregnant women having overt diabetes
- Women diagnosed to have anemia.
- Women with h/o intake of any antimicrobials in this pregnancy
- H/o increased frequency of urine, burning micturition (symptoms of cystitis)
- H/o preterm delivery, recurrent UTI, PROM, PPROM, IUGR in previous pregnancy.
- History of Gestational Diabetes Mellitus in the previous pregnancy
- Women with multiple pregnancy

METHODOLOGY:

All women who meet the inclusion and exclusion criteria were taken into the study

after signing an informed written consent. Detailed history was taken and thorough general physical examination was done at the onset of the study. 100 women attending the antenatal clinic at Sreebalaji medical college and hospital with GDM according to DIPSI guidelines (OGCT >140 g/dl) was taken for the study.

Sample collection:

The subjects were instructed to collect clean catch midstream specimen urine after proper periurethral to perineal toileting with tap water. With labia held apart midstream urine was collected in a sterile universal container and sent to the central Microbiology laboratory without any delay.

STATISTICAL ANALYSIS:

Demographic variables in categorical/dichotomous were given in frequencies with their percentages. Bio chemical variables were given in mean and standard deviation. Prevalence of asymptomatic bacteriuria among the women with gestational diabetes mellitus attending our antenatal clinic assessed using percentage with 95% confidence interval. To study the commonest organism which causes the asymptomatic bacteriuria in gestational diabetes mellitus was assessed using percentage of occurrence to the total. To correlate whether factors like socioeconomic class, parity and age has any influence on the infection Using chi square test. FBS and OGCT values differences between no growth and positive was calculated using student independent t - test. Simple bar diagram, Multiple bar diagram and Box plot were used to represent the data. $P < 0.05$ was considered statistically significant.

3. RESULTS

Majority of this study sample -54% belonged to age group between 20 and 25 years, 38% women aged between 26 and 30, 8% were between 31 and 35 years.

Figure 1: AGE DISTRIBUTION

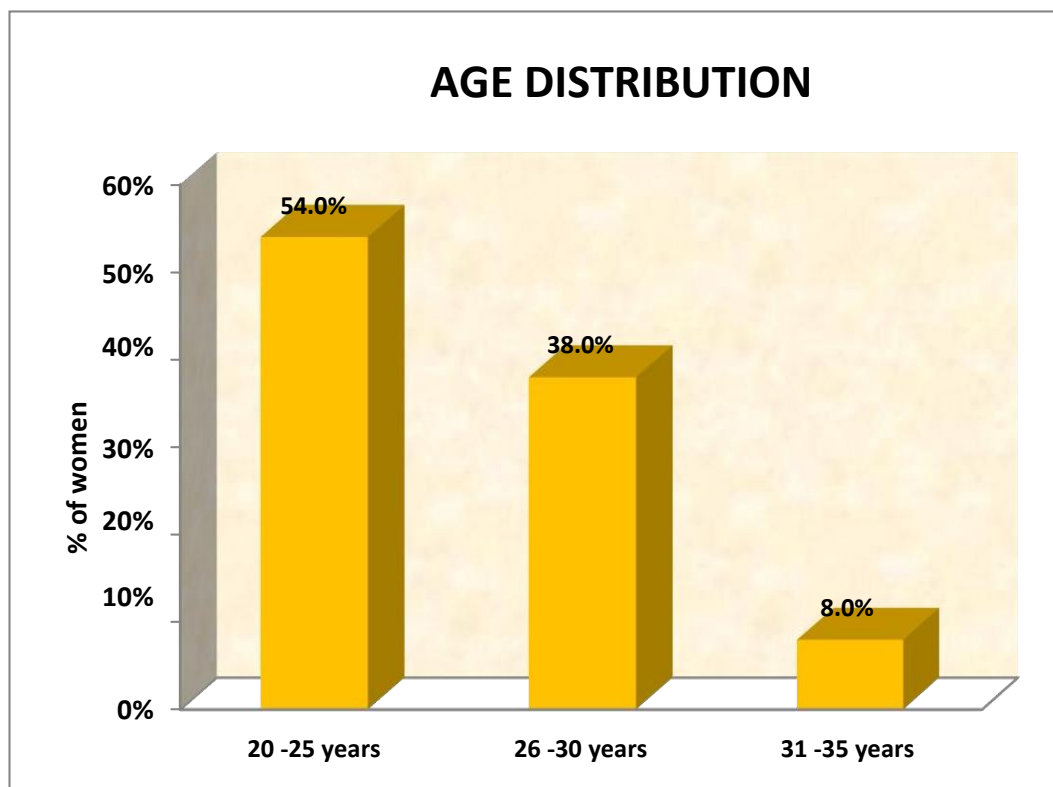


Table 1: DISTRIBUTION OF WOMEN ACCORDING TO GRAVIDA

Gravida	No. of women	%
I	42	42.0 %
II	37	37.0 %
III	19	19.0 %
IV	2	2.0%
Total	100	100. 0%

42% of these study samples were primigravida, 37% second gravida, 19% third gravida and only 2% were fourth gravida.

Figure2: RESULTS OF THE URINE CULTURE IN GDM AND THE DISTRIBUTION OF ORGANISMS

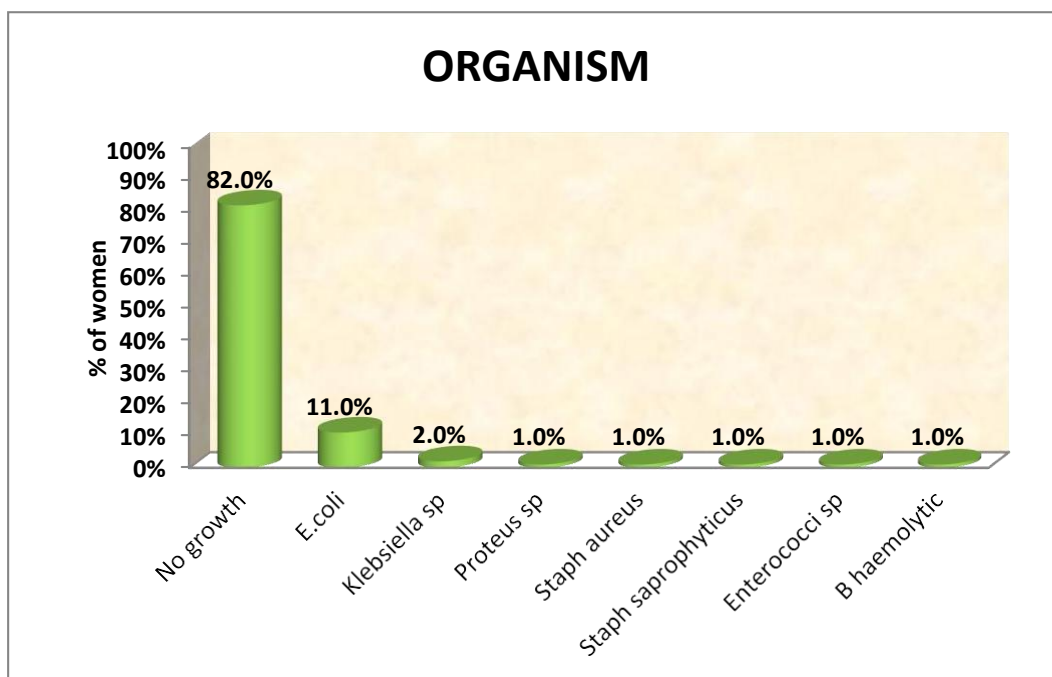


Table2: PATTERN OF DISTRIBUTION OF ORGANISMS CAUSING ASYMPTOMATIC BACTERIURIA IN GDM

Organism	No. of women	%
E.coli	11	61.0 %
Klebsiellasp	2	11.0 %
Proteus sp	1	5.6%
Staph aureus	1	5.6%
Staph saprophyticus	1	5.6%
Enterococci sp	1	5.6%
B haemolytic streptococcus	1	5.6%
Total	18	100.0%

Among the positive urine cultures 61% is due to E.coli, 11% due to Klebsiella species, 5.6% caused by Proteus species, 5.6% Staph aureus, 5.6% Staph saprophyticus, 5.6% Enterococci species and 5.6% caused by B heamolytic streptococcus.

Figure 3: ASSOCIATION BETWEEN INFECTION AND GRAVIDA

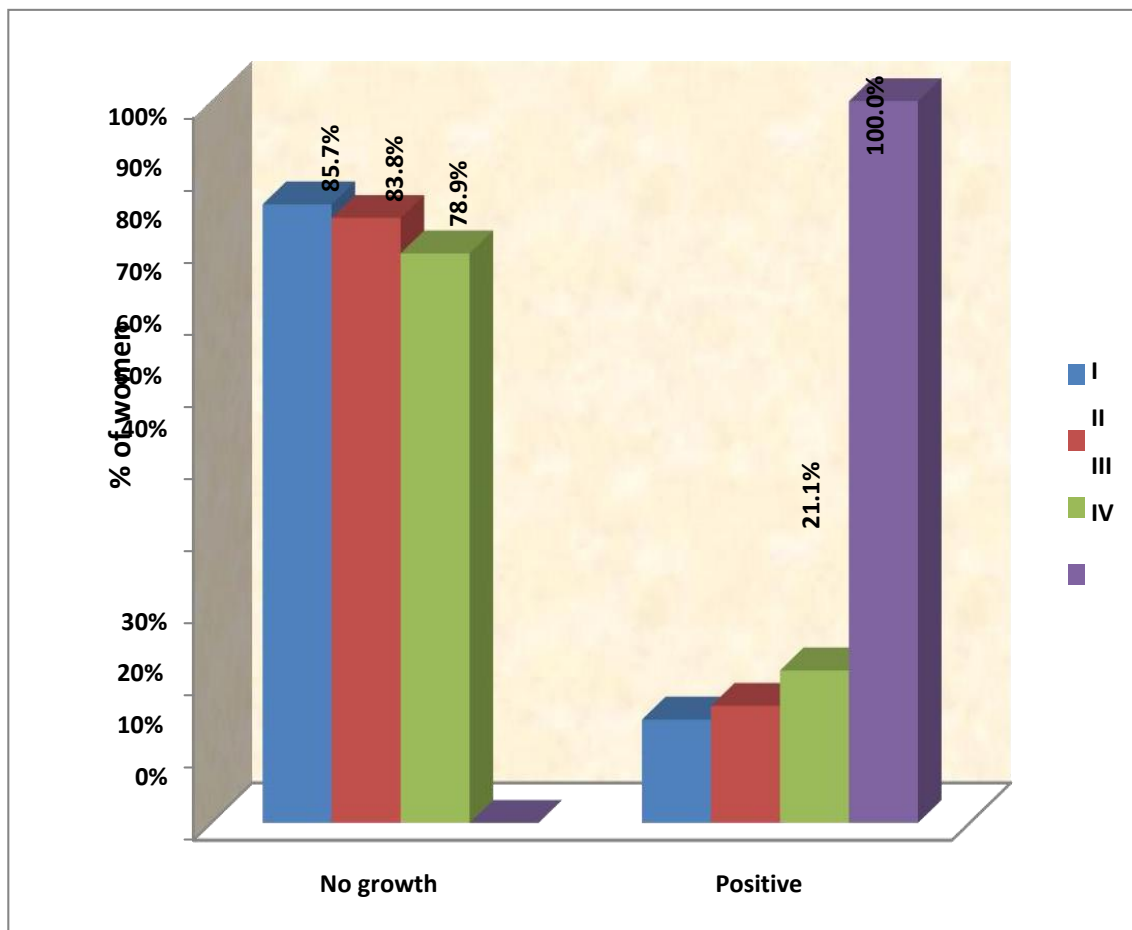


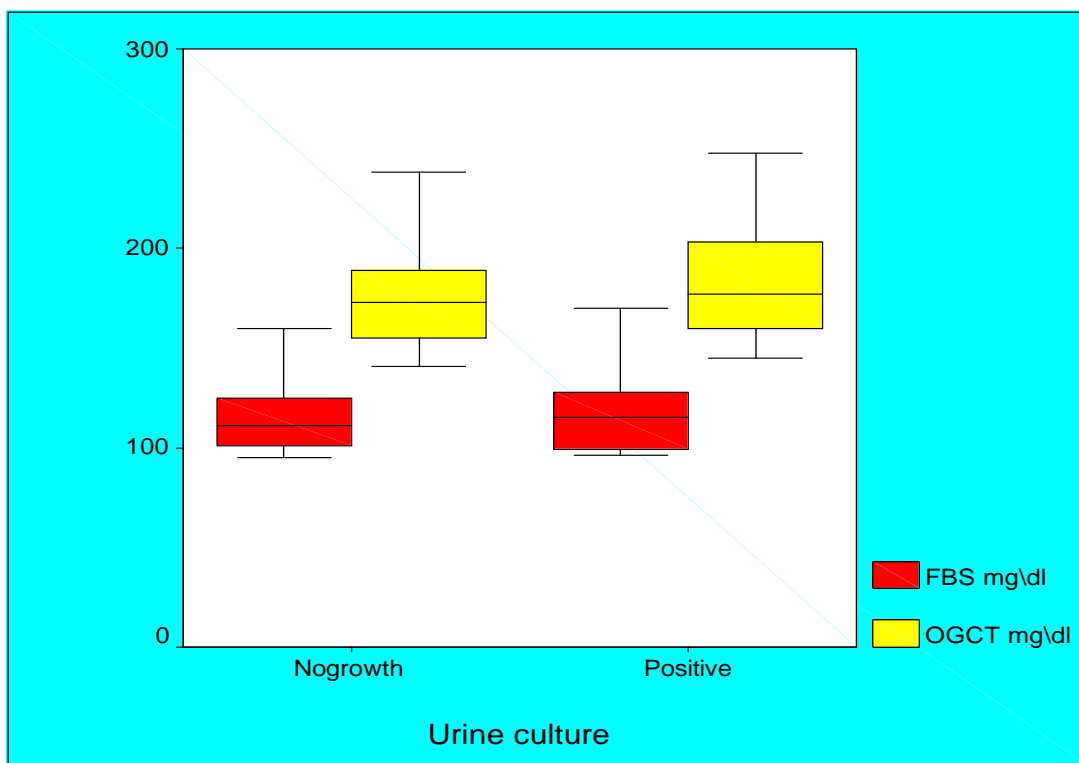
Table 3: ASSOCIATION BETWEEN INFECTION AND FBS & OGCT

Investigation	Urine culture	n	Mean	Std. Deviation	Student independent t-test

FBS mg\dl	No gro wt h	8 2	1 1 6 . 6 1	17.85 9	t=0.70p=0. 48 notsignifica nt
	Pos itiv e	1 8	1 2 0 . 1 1	23.88 4	
OGCT mg\dl	No gro wt h	8 2	1 7 5 . 0 2	22.51 7	t=1.51p=0. 13 not significant
	Pos itiv e	1 8	1 8 4 . 4 4	29.66 7	

The mean FBS value is higher 120.11 mg/dl in asymptomatic bacteriuria compared to only 116.61 mg/dl in other GDM women without bacteriuriaand also OGCT mean value is higher 184.44 mg/dl compared to only 175.02 mg/dl in GDM women without bacteriuria. There is an association between infection and FBS, OGCT. It was tested using student independent t -test. P value was higher; hence there is no statistical significance. Still there is an increasing trend in infection in women with higher blood sugars.

Figure 4: BOX PLOT COMPARES THE MEAN FBS AND OCGT VALUE AMONG INFECTION GROUP



This box plot shows that prevalence of asymptomatic bacteriuria was higher in GDM women with high values of blood sugars (both FBS and OGCT) compared to GDM women with lower blood sugar values.

DISCUSSION

An autopsy sequence published in the 1940s discovered a connection between urinary tract infection (UTI) and diabetes mellitus. 12 and 13 In diabetes, the urinary tract is the most common source of infection. The prevalence of diabetic cystopathy and microvascular disease in the kidneys, as well as changes in host defense mechanisms, may all play a role in the higher occurrence of UTI in diabetic patients. 14 Urinary tract infections are the most prevalent bacterial infections, responsible for almost seven million office visits and one million emergency room visits, with 100,000 mothers, the elderly, and patients with spinal cord injury and/or catheters, multiple sclerosis, HIV, and diabetes being hospitalized. 15 Asymptomatic bacteriuria is becoming more prevalent as

people become older. According to Turpin et al⁶⁹, the highest prevalence of 13 percent ASB in pregnant women was observed in the age range 35–39 years, with the lowest rate of 0 percent in the age groups 15–19 years. In a study conducted by Ansari et al⁷⁰ in 2011, he examined 125 pregnant women, of which 113 (90.4%) were between the ages of 15 and 25, and 12 (9.6%) were between the ages of 26 and 35. There were 21 (16.8%) severe bacteriuria cases out of 125 women. In the 15-25 and 26-35 age ranges, culture positivity was observed in 17 women (15.04%) and 4 women (33.3%), respectively. Increased co morbid conditions, such as neurogenic bladder and increased residual urine volume or urinary reflux, may contribute to the high prevalence with increasing maternal age. Asymptomatic bacteriuria seems to be more common in multiparous women. 16

In a 2007 study of 580 antenatal mothers, Fatima et al discovered that 3.18 percent of Primigravida and 6.04 percent of Multigravida had asymptomatic bacteriuria ($p=0.0039$). In 2011, Obirikorang et al conducted a study on 200 pregnant mothers. Women that were primigravida were 35 (17.5%), with 3 (8.6%) reporting positive for bacteriuria, and multiparous women were 165 (82.5%), with 16 (9.7%) positive findings. Bad sanitation, a lack of general hygiene, and a reluctance to attend antenatal clinic on a daily basis are all factors that contribute to the increased incidence of ASB in those with a low socioeconomic status. 17-19 years old

In 2010, Alvarez et al discovered that gravidas with pregestational diabetes mellitus have a higher chance of asymptomatic bacteriuria than non-diabetic gravidas. It was a case-control sample that included 150 pregnant women with pregestational diabetes and 294 non-diabetic monitors. 20 When compared to non-diabetic gravidas, the prevalence of ASB was higher in pregestational diabetics (18 percent versus 8.2 percent, odds ratio [OR] 2.47, 95 percent confidence interval [CI] 1.37 to 4.45). The prevalence of ASB is higher in diabetics, according to several research conducted in non-pregnant diabetics. There aren't a lot of research papers on GDM.

Following an analysis of all the trials, 100 GDM women who had no signs of urinary tract infection after 12 weeks of pregnancy were selected. Women with diabetes who were not open about their condition were excluded from the study. 21-23 years In India, the prevalence of ASB during pregnancy is just 2-10%. However, the frequency of GDM (the current study) was measured using a percentage with a 95 percent confidence

interval of 18 percent (11.4 percent -26.5 percent), which is higher than the usual antenatal population. As a result, the relevance of screening of GDM women is highlighted.

CONCLUSION

This study results, taken together with existing literature, suggest that there is high prevalence of asymptomatic bacteriuria in women with gestational diabetes mellitus. India is marching forward as the diabetic capital of the world. Let us not burden even the unborn child of the GDM mother with infections in the form of ASB. We must prevent infections by screening the high risk groups, at the earliest.

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Ethical approval: The study was approved by the Institutional Ethics Committee

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Referernces

1. Nickel JC. Management of urinary tract infections: historical perspective and current strategies: Part 1 Before antibiotics. *J Urol* 2005;173:21 -6.
2. Rubin RH, Shapiro ED, Andriole VT, Davis RJ, Stamm WE. Evaluation of new anti-infective drugs for the treatment of urinary tract infection. *Clin Infect Dis* 1992; 15(Suppl 1):S216 –27.
3. Schnarr J, Smaill F. Asymptomatic bacteriuria and symptomatic urinary tract infections in pregnancy. *Eur J Clin Invest* 2008; 38 : 50 -7.
4. Christensen B. Which antibiotics are appropriate for treating bacteriuria in pregnancy? *J Antimicrob Chemother* 2000; 46 (S1) : 29-34.
5. Uncu Y, Uncu G, Esmer A, Bilgel N. Should asymptomatic bacteriuria be screened in pregnancy? *Clin Exp Obstet Gynecol* 2002; 29 : 281-5.
6. Antimicrobial therapy for obstetric patients. ACOG educational bulletin no. 245. Washington, D.C.: American College of Obstetricians and Gynecologists, March 1998;245:8 –10.
7. Dorn host A, Paterson CM, Nicholls JS, Wadsworth J, Chiu DC, Elkeles RS, Johnston DG, Beard RW. High prevalence of GDM in women from ethnic minority groups. *Diabetic Med*

1992;9:820-2.

8. Seshiah V, Balaji V, Madhuri S Balaji, Sanjeevi CB, Green A. Gestational Diabetes Mellitus in India. *J Assoc Physic of India* 2004;52:707–11.
9. Shah BR, Hux JE. Quantifying the risk of infectious diseases for people with diabetes. *Diabetes Care* 2003;26:510–13.
10. Loughlin KR. Management of urologic problems during pregnancy. *Urology* 1994;44:159 – 69. doi:10.1016/S0090-4295(94)80121-5.
11. Jennifer P, Cyril R, Piyumi P, Nimesha G, Renuka J. Asymptomatic bacteriuria in pregnancy: prevalence, risk factors and causative organisms. *Sri Lankan J Infect Dis.* 2012;1(2):42 -6.
12. Romero R, Oyarzun E, Mazor M, Sirtori M, Hobbins JC, Bracken M. Metaanalysis of the relationship between asymptomatic bacteriuria and preterm delivery/low birth weight. *ObstetGynecol* 1989;73:576–82
13. Bryan CS, Reynolds KL, Metzger WT. Bacteremia in diabetic patients: Comparison of incidence and mortality with non-diabetic patients. *Diabetes Care.* 1985;8:244–249.
14. Teppa RJ, Roberts JM. The uriscreen test to detect significant asymptomatic bacteriuria during pregnancy. *J SocGynecolInvestig* 2005; 12 : 50 -3.
15. Sridhar CB, Anjana S, Mathew JT. *Acute Infections.*
16. In: Ahuja MMS, Tripathy BB, Sam Moses GP, Chandalia HB, Das AK, Rao PV, editors. *RSSDI Text Book of Diabetes Mellitus.* Hyderabad, India: 2002. pp. 471–8. Chap-34.
17. Foxman B. Epidemiology of urinary tract infections: Incidence, morbidity and economic costs, *Dis. Mon.*2003;49:53–70.
18. Ankel F, Wolfson AB, Stapczynski JS. Emphysematous cystitis: A complication of urinary tract infection occurring predominantly in diabetic women. *Ann Emerg Med.* 1990;19:404–6.
19. Meiland R, Geerlings GE, Hoepelman AI. Management of bacterial urinary tract infections in adult patients with diabetes mellitus. *Drugs.* 2002;62:1859–68.
20. Fatima N, Ishrat S. Frequency and risk factors of asymptomatic bacteriuria during pregnancy. *Journal of the College of Physicians and Surgeons--Pakistan: JCPSP.* 2006 Apr;16(4):273 -5.
21. Omoregie R, Erebor JO, Ahonkhai I, Isobor JO, Ogefere HO. Observed changes in the prevalence of uropathogens in Benin City, Nigeria. *NZJ Med Lab Sci.* 2008 Aug;62(2):29 -31.
22. 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.
23. Rizk D. The prevalence and complications of urinary tract infections in women with

- gestational diabetes mellitus: Facts and fantasies. *International Journal of Diabetes and Metabolism*. 2002;10:29-32.
24. Alvarez JR, Fechner AJ, Williams SF, Ganesh VL, Apuzzio JJ. Asymptomatic bacteriuria in pregestational diabetic pregnancies and the role of group B streptococcus. *American journal of perinatology*. 2010 Mar;27(3):231 -4.
25. Danesh A, Pishva E, Mirbaha S, Arabzadeh A. The Prevalence of Asymptomatic Bacteruria in Pregnant Women with and without Gestational Diabetes. *Journal of Isfahan Medical School*. 2011 Feb 5;28(118).