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PREVALENCE OF SYMPTOMATIC AND ASYMPTOMATIC BACTERIURIA AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE CLINICS AT MATERNITY AND CHILDREN HOSPITAL IN BURAIDAH-ALQASSIM

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Abstract

Background: *Urinary tract infections (UTIs) are considered as the most common bacterial infections among pregnant women. Symptomatic and asymptomatic bacteruria (ASB) are the two types of UTIs occurring in pregnant women.*

Objectives: *To measure the prevalence of symptomatic and asymptomatic bacteruria among pregnant women attending antenatal care clinics at Maternity and Children Hospital in Buraidah.*

Methods: *A cross-sectional study combining the use of questionnaires and laboratory investigations was conducted among 288 pregnant women with a confirmed diagnosis of UTIs either symptomatic or asymptomatic during the period from June to July 2018.*

Results: *Among 288 women, the highest percentage of them were from the age group 'above 30', (46.5%).Most of the cases had one or more urinary symptoms during their current pregnancy (88.2%). A total of 8.9% (12) of the cases had confirmed bacteruria according to their urine culture and sensitivity report. Bacteruria was statistically significant for the women who had parity 4 to 7 and BMI 31 and above, (p-value<0.05) as compared to women with lower parity. No other comparison was statistically significant.*

Conclusion: *The prevalence of bacteriuria among pregnant women was found to be almost 8.9% .The higher parity and high BMI of the women significantly increase the risk of bacteruria.*

Keywords: *Bacteruria, Pregnant women, Antenatal care, Prevalence, Saudi Arabia.*

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INTRODUCTION:

Urinary tract infections (UTIs) are considered to be the most common bacterial infections among pregnant women affecting up to 20% of expectant mothers [1,2], because of changes in the urinary tract that occurs during pregnancy [3,4]. The other reasons contributing to UTIs during pregnancy are the shorter anatomy of the urethra, easy contamination of the urinary tract with faecal flora, physiological changes and poor personal hygiene [5].

Urinary tract infections have two main presentations; symptomatic and asymptomatic bacteruria [6]. Symptomatic UTI could be associated with a diversity of clinical signs and symptoms including dysuria, pyuria and strong urge to urinate frequently [7, 8], whereas, asymptomatic bacteruria (ASB) exists without symptoms but urine culture shows significant growth of pathogen (more than 10^5 bacteria/ml) [9]. ASB ranges from 2% to 10% during pregnancy [10] and is the main risk factor for the development of UTIs because of stasis of urine, and the bacteria in the urinary tract from relative obstruction, that is caused by the physiological changes during pregnancy [11]. Additionally, glycosuria, proteinuria, and aminoaciduria found in pregnancy, also facilitate bacterial growth [11].

UTI increases the risk of low-birth-weight infants (weight <2,500 g), prematurity (<37 weeks of gestation), or both [12]. Early detection and treatment is important not only to forestall acute pyelonephritis and chronic renal failure in the mother but also to reduce the serious poor outcome of offspring [13]. Hence, this study was designed to measure the prevalence of symptomatic and asymptomatic bacteruria among pregnant women attending antenatal care clinics at maternity and children hospital in Buraidah. Thus, timely and effective treatment, of pregnant women with bacteruria, will help in reducing the fetomaternal risk, which can result in poor obstetric outcome.

MATERIALS AND METHODS:

A cross-sectional study aimed at finding the prevalence of symptomatic and asymptomatic bacteruria among pregnant women attending antenatal care clinics at Maternity and Children Hospital in Buraidah, al-Qassim region, Saudi Arabia, was conducted during the period from June to July 2018. The research protocol was reviewed by the Ethical committee of the Regional ethical committee in Al- Qassim and granted ethical clearance. Verbal and written informed consent was taken from the participants after adequate provision of information regarding the study requirements, purpose and risks. Data obtained was kept anonymous for purpose of confidentiality.

Inclusion and exclusion criteria: All pregnant women aged 18–42 years attending the antenatal clinics at Maternity and Children Hospital in Buraidah during the study period with the confirmed diagnosis of UTI at any gestational age were included in the study. Women aged more than 42 years or younger than 18 years, or any missing or incomplete data, recent use of antibiotics (within 2 weeks before), previously treated for bacteruria or associated with medical conditions like chronic hypertension, pre-existing renal disease, or and any other medical disorder were excluded from the study.

Sampling techniques and sample size: A convenient sampling technique was used. A pilot study was conducted prior to data collection for the purpose of validation. Based on the results of the pilot study, the sample size was calculated. The sample size was calculated using the following equation: $N=(Z)^2 * PQ /(D)^2$, where, N is the sample size, $(Z)^2$ is the critical value (a constant that equals to 1.96) which corresponds to 95% confidence level, P is based on the assumption that the prevalence of symptomatic and asymptomatic bacteruria among pregnant women is 25 % from previous studies (P = 0.25), q is 1-P and d is degree of accuracy required 5% (d = 0.05). Hence, the final sample size was $(1.96)^2$ x 0.25 x (1-0.25) / $(0.05)^2$ = (3.8416) x 0.11 x (0.75) / 0.0025 = 288.

Data collection: Pregnant females were interviewed using a pre-coded, pre-tested, self-administered questionnaire to collect and record maternal, social, demographic and obstetric data related to UTIs, medication history, family history of hypertension and diabetes and symptoms of UTIs.

Laboratory investigation and urine analysis: From each participant, a blood sample was collected and tested for complete blood count (CBC) and blood glucose levels. Urine samples were collected from the participants and examined macroscopically by observing the colour, aspect, deposit and blood clots or debris. Each sample was divided into three portions for microscopic analysis, culture and dipstick test. Microscope examination was done to detect pus cells, Trichomonas vaginalis, white cell count, red blood cells, casts and crystals. A culture was done for the specimens on the agar plates following a standard procedure and a dipstick test was also done to determine pathological changes in participant's urine. The patients were diagnosed with

UTI based on the results of their urine analysis and culture report. It's a routine hospital protocol to perform simple urine analysis in all women presenting in antenatal clinic whether symptomatic or not. If there are pus cells in simple urine analysis they go for culture and sensitivity to confirm the diagnosis. All women with confirmed diagnosis were asked about their clinical presentation regarding the symptoms of UTI like burning micturition, frequency, urgency etc.

Statistical analysis: Data entry was done by using an electronic survey (Google Survey) and all participants participated in data entry and validation. The continuous variables were presented in Mean ± Standard deviation, Minimum, Maximum and Median values. Frequencies and percentages were used to describe the categorical variables. Proportion z-test (two-tailed) was done to compare the bacteruria and non-bacteruria group in terms of age groups. The same test was done to compare the cases with the urinary problem and without urinary problem in terms of education level, BMI and parity. The analysis was performed using the Statistical Package for Social Science (SPSS), version 23.0 (IBM, Armonk, NY, USA).

RESULTS:

A total of 288 pregnant women were included in the current study. The highest percentage of them were from the age group 'above 30', 134 (46.5%). Half of the cases had at least college level education. The number of previous pregnancies was ranged from 1 to 13 with the highest number of cases having three previous pregnancies, 63 (21.9%). Most of the women 173 (60.1%) did not experience a miscarriage. Most of the pregnant women (164, 56.9%) were from the middle-class family. More than 60% of the pregnant women were overweight or obese. Gender of the fetus was almost equally distributed in male and female. More than half of the cases had three or more antenatal visits during their current pregnancy. Most of the cases (254, 88.2%) had one or more urinary symptoms during their current pregnancy as shown in table 1.

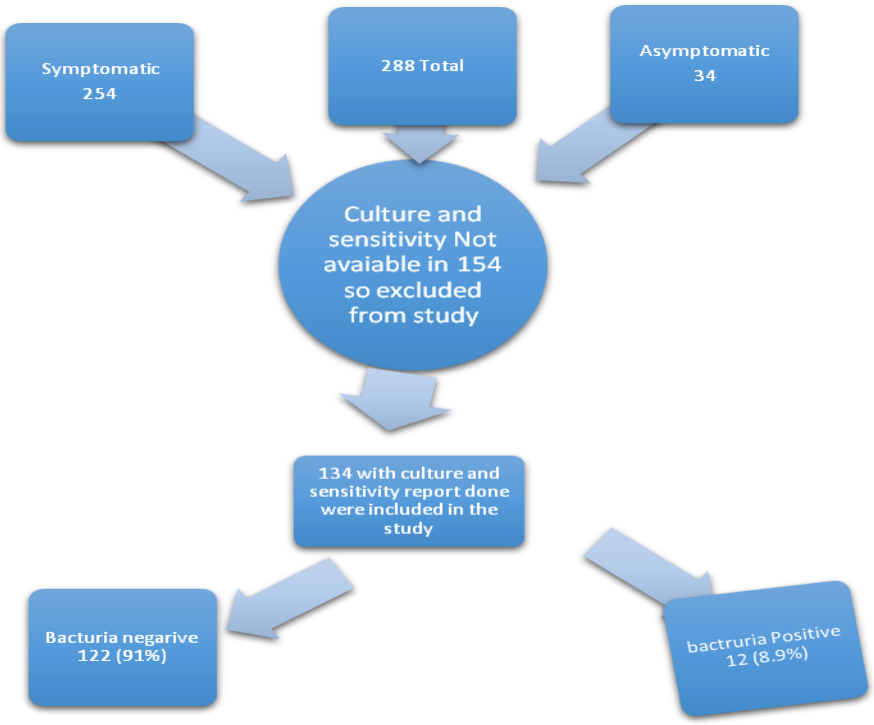

FIGURE-FLOW CHART FOR RESULTS:

The frequencies and percentages of urinary symptoms observed in this study were presented in table 2. The most frequent symptoms of rigors and chills, experienced by 142 (49.3%) of the cases followed by nausea/ vomiting, experienced by 130 (45.1%) of the cases. The least frequent symptom was 'polyuria', which only 20 (6.9%) pregnant woman suffered from (Table 2).

A total 0f 12 out of 134 cases (8.9%) cases had confirmed bacteruria according to their urine culture report. However, the majority (154, 54.4%) did not have urine culture done, which means the real number of bacteruria cases may be higher than 12. Comparison of bacteriuria cases vs non-bacteriuria cases (122/134=91%) was done in terms of all urinary symptoms observed in this study. The most frequent symptom in the bacteruria group was polyuria (58.3%) and in non-bacteruria group was nausea and vomiting (56.8%) However, the incidence of all these symptoms were statistically similar between bacteruria and non-bacteruria cases ($p > 0.05$), (Table 3).

The comparison between bacteriuria and non-bacteriuria cases in terms of age groups was done by z-test and revealed no statistically significant differences ($p>0.05$) (Table 4). Education level, BMI and parity were also compared with respect to presence and absence of the urinary problem and it was found that BMI 31 and above and parity 4-7 were more likely to be asymptomatic compared to their counterparts ($p < 0.05$). No other comparison was statistically significant (Table 5).

DISCUSSION:

Bacteruria either symptomatic or asymptomatic is a worldwide medical problem among pregnant women, which has a serious outcome on both the mother and her fetus. UTIs commonly occur in pregnancy, due to the morphological and physiological changes that take place in the genitourinary tract [3,4,11]. Urine culture is the gold standard screening technique for the diagnosis of ASB during pregnancy [14,15]. The most common causative organism is Escherichia coli responsible for 75-90% of bacteriuria during pregnancy; other common organisms include Klebsiella pneumonia, Pseudomonas and Staphylococcus Saprophyticus [16].

In our study, bacteriuria appears predominant in women aged more than 30 years (46.5%) which is similar to a study done by Turpin et al [17]; whereas, in studies done by Elzayat M et al [18], Sujatha R et al [19], Khan S et al [20], and Alghalibi et al [21], the occurrence of ASB was seen more among women aged between 20 and 30 years. Advanced maternal age (of ≥35years) was reported as a risk factor for asymptomatic bacteriuria [22]. According to Gilstrap LC et al, approximately 20% of women aged 20-65 years suffer from at least one attack per year and 50% develop a urinary tract infection within their lifetime [23].

In this study, the prevalence of bacteriuria was higher in multigravida women as only 19.4% women had their first pregnancy which was similar to the findings of studies done by Sujatha et al [19], and Roy et al [24]. A higher rate of UTIs was found in the third trimester in our study, whereas, studies done by Roy et al., [24] reported high rates of infection detection in the second trimester. A study done by Kass explains that there is a rare acquisition of bacteriuria after the second month of pregnancy [25] which is contradictory to the findings of our study.

In the present study, a total of 12 cases had confirmed bacteriuria among 134 pregnant women tested, giving an overall prevalence of approximate 8.9%. Various recent studies including observational studies from developing countries, found the prevalence ranged between 4-10% [19,26,27]. The studies which were conducted in the past either focused on symptomatic bacteriuria or ASB but we have compared the prevalence of both of them. Both symptomatic and asymptomatic bacteriuria has been reported among 17.9% and 13.0% pregnant women, respectively by Hamdan HZ et al [28]. Regarding asymptomatic bacteriuria, the prevalence varies from one community to another. The asymptomatic bacteriuria was reported as 4.3% among Filipino pregnant women [29], 2-7% in USA [30], 4-7% in Canada [31], 10% in Egypt [18], 12% in rural areas in Bangladesh [32], 16% among Spanish pregnant women [22] and reached up to as high as 78.7% in a population from Nigeria that included Staphylococcus aureus as an uropathogenic organism [33].

The prevalence rate of symptomatic bacteriuria was found to be as low as 1.7% in a study held at Western Region of Saudi Arabia among pregnant women attending their first prenatal visit in two tertiary centers in Jeddah [32]. This rate is much lower than the previously reported from Saudi Arabia regarding symptomatic bacteriuria; 14.2% bacteriuria in pregnant women from the eastern region (in 1989), 15.8% of bacteriuria was reported in 1991 from the Western region [34,35]. The reason for this wide difference in the range can be attributed to the several

factors such as the geographical variation, socio-economic status, ethnicity of the subjects, setting of the study (primary care, community-based, or hospitals), and the variation in the screening tests (urine dipstick, microscopy, and culture) can be attributed to the variation in these studies. Race-specific rates show significant variation, as well as there is variation within same race living in different geographical areas or with socio-economic status.

In the present study, the comparison between bacteriuria and non-bacteriuria cases in terms of age groups and education level revealed no statistical significance but a statistically significant relationship was observed in terms of parity and BMI. Less urinary problems were observed among women who had BMI 31 and above and parity 4 to 7. The results of our study were consistent with a study done by Hagos K et al. They also found a significant association between parity and the presence of UTI [36]. Elzayat M et alfoundcontradictory results in terms of parity and similar with respect to age, educational level [18].

Urine culture was considered as one of the most sensitive tests used in detection with clean-catch midstream urine. The current findings highlighted the need for constant monitoring of susceptibility of specific pathogens in different populations to commonly used antimicrobial which will significantly assist clinicians in the rational choice of antibiotic therapy to prevent misuse or overuse of antibiotics.

Some limitations are present in our study that should be recognized. First of all, the data related to sexual activity, personal and genital hygiene were not taken into consideration as some studies [18,37,38] found a statistically significant result with these characteristics. Secondly, the exact prevalence of bacteriuria cases may be higher than 8.9% as majority of them did not have their urine C/S done. Positive cases with bacteriuria were not followed-up to determine their adverse outcomes and lastly, the study was only limited to the women attending the antenatal care clinic in Buraidah,al-Qassim region, Saudi Arabia. Hence, more prospective studies related to this health problem should be conducted to maintain the data from time to time and also to overcome the above-mentioned limitations.

CONCLUSION:

The prevalence of bacteriuria among pregnant women was found to be almost 8.9%. BMI and parity of the women significantly influences the risk of bacteriuria. The women with high BMI and high parity are more liable to have asymptomatic bacteriuria. This group should be targeted for screening in pregnancy. A priority should be made to allow screening of all pregnant women for bacteriuria at their first prenatal visit and those who are positive should be followed up closely because about 1/3rd will experience a recurrence to avoid serious complications. Early detection and treatment are essential to reduce the morbidity and mortality of mother as well as fetus.

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Tables

Table 1: Count and Percent Statistics for Demographic Variables

Variable	Level	Frequency	Percent
Age (years)	Below 25	40	13.9
	25-30	114	39.6
	Above 30	134	46.5
Education	Primary or below	33	11.4
	Middle school	27	9.4
	High school	84	29.2
	College and above	144	50.0
Number of previous pregnancies	1	56	19.4
	2	51	17.7
	3	63	21.9
	4	41	14.2
	5	22	7.6
	6	11	3.8
	7	18	6.3
	8	9	3.1
	9	5	1.7
	10	5	1.7
	11	2	0.7
	13	1	0.3
Socioeconomic status	Lower class	9	3.1
	Middle class	164	56.9
	Upper class	115	39.9
Body mass index in kg/m^2	Underweight (< 18.5)	1	0.3
	Normal (18.5 – 24.9)	48	16.7
	Overweight (25.0 – 29.9)	88	30.5
	Obese (≥ 30)	87	30.2
Current pregnancy gestational age (months)	0	1	0.3
	1	7	2.4
	2	14	4.9
	3	16	5.6
	4	12	4.2
	5	36	12.5
	6	48	16.7
	7	47	16.3
	8	64	22.2
	9	43	14.9

No of previous miscarriages	0	173	60.1
	1	71	24.7
	2	28	9.7
	3	8	2.8
	4	4	1.4
	5	2	0.7
	6	1	0.3
	15	1	0.3
Gender of the fetus	Male	62	21.5
	Female	58	20.1
	Unknown	168	58.3
No of antenatal visits	One	73	25.3
	Two	64	22.2
	Three	78	27.1
	Four or more	73	25.3
Presence of urinary symptoms	Yes	254	88.2
	No	34	11.8

Mean age = 30.98 ± 5.88 years, Mean Gestational age = 6.34±2.14 months

Table 2: Clinical presentation/symptomatology of women

Symptoms	**N=254**	**%**
Dysuria	43	16.9
Nausea/vomiting	130	51.1
Fever	60	23.6
Suprapubic pain	30	11.8
Polyurea	20	7.87
Rigors and chills	142	55.9
Loin and groin pain	30	11.8

Many women have combination of symptoms so each one was counted separately

Table 3: Comparison of clinical presentation among women with bacteriuria (n=12) and those without bacturia. (n = 122)

Symptoms	**Group 1 Bacteruria +ve, N= (%)**	**Group-2 Bacteruria –ve N (%)**	**p-value**
Dysuria	1 (8.3)	20 (16.3)	0.467
Polyurea	7 (58.3)	61 (50)	0.584
Rigors and chills	1 (0.083)	9 (7.3)	0.343
Loin pain	1 (8.3)	13 (10.6)	0.8040
Suprapubic pain	5 (41.7)	60 (48.0)	0.677
Nausea and vomiting	6 (50.0)	71 (58.1)	0.589
Dehydration	2 (16.7)	19 (15.5)	0.913

p- value < 0.05 is significant.

Table 4: Summary of proportion between bacteruria and age groups (z test)

	Proportions (%)				
Age	**With bacteriuria(I)**	**Without a bacteriuria(J)**	**Difference (I-J)**	***Z***	**Probability (2-tailed)**
21-30	0.667	0.480	0.187	1.96	> 0.05
31-40	0.333	0.400	0.067	1.96	> 0.05
41-50	-	0.880	-	-	
51 and above	-	-	-	-	

Table 5: Summary of proportion between levels of education, levels of BMI, parity and Urinary Problem Groups (z test).

		Proportions (%)				
		With urinary symptoms (I)	**Without any urinary symptom (J)**	**Difference (I-J)**	***Z***	**Probability (2-tailed)**
Education	Illiterate	0.028	0.059	-0.031	1.96	> 0.05
	Primary	0.079	0.118	-0.039	1.96	> 0.05
	Secondary or higher	0.893	0.823	0.070	1.96	> 0.05
BMI	20 and below	0.016	-	-	1.96	-
	21-25	0.145	0.152	-0.007	1.96	> 0.05
	26-30	0.255	0.273	-0.018	1.96	> 0.05
	31 and above	0.361	0.424	-0.063	1.96	***< 0.05**
Parity	Less than 4	0.796	0.636	0.160	1.96	> 0.05
	4-7	0.192	0.333	-0.141	1.96	***< 0.05**
	8 and above	0.012	0.030	-0.018	1.96	> 0.05

*** p value < 0.05 (statistically significant)**