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IDENTIFICATION، PRESENTATION AND RISK FACTORS OF BACTERIURIA DEVELOPMENT IN PREGNANT WOMEN DURING THE ANTENATAL VISITS: A CROSS SECTIONAL

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Abstract

Both symptomatic and asymptomatic UTIs are common in pregnant women, and both have been linked to detrimental effects on both the mother and the fetus. However, screening for ASB during pregnancy is rarely considered as a critical aspect of antenatal care in underdeveloped countries. Early detection and treatment of ASB can drastically reduce Pyelonephritis incidence and prevent premature labor by up to 20%. estimate prevalence of bacteriuria (symptomatic and asymptomatic) in the study participant and investigate the common risk factors.
Material and method: the study included 50 pregnant females who attend the outpatient's clinic of Baghdad medical city.
Asymptomatic bacteriuria was common in pregnant women that approach prevalence of studies carried in African and Egypt. In this study, prior UTIs, parity and anemia had a significant association with bacteriuria. Education at a high level and post-coital urination provided protection. The most common uropathogen isolated from the pregnant women was E. coli. It is important to give education and adequate treatment for urinary tract infections. It is also suggested that this subject be the subject of a community-based study. Early pathogen screening and appropriate treatment for infected cases should be used because the symptoms are a good predictor of urinary tract infection during pregnancy.

Keywords: asymptomatic bacteriuria, urinary tract infection, UTI, pregnancy.

INTRODUCTION

Bacteriuria can be defined as presence of bacterial growth (105 colony forming units/mL) in urine that could be asymptomatic, symptomatic or urinary tract infection (1). Pregnant women frequently have symptomatic and asymptomatic UTIs, both of which have been associated to harmful outcomes for the mother and the baby.

Pregnant women who have bacteriuria may be more likely to deliver premature babies or babies with low birth weight, which could increase new-born mortality and morbidity. Without treatment, up to 20-30% of expectant mothers with ABU may experience symptomatic urinary tract infections (cystitis and pyelonephritis) throughout the course of the pregnancy. Acute pyelonephritis had been associated with development of chronic renal illness, pre-eclampsia, sepsis and anaemia (2).

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Cause of UTI in pregnancy:

Pregnancy had an anatomical, physiological, and functional changes effect on the urinary system, the gravid uterus presses against the ureters that obstacle urine flow and raising the risk of recurrent bacteriuria and acute pyelonephritis due to stagnation of urine. Other contributing variables include hormonal and immunological changes including increased progesterone secretion that causes immunity to decline and stasis. Pregnant women's urine microorganism development is promoted by physiological proteinuria and glycosuria (3).

Asymptomatic bacteriuria (ASB):

A significant quantitative count of bacteria in the urine without signs of an upper urinary tract/kidney infection (acute pyelonephritis) or lower urinary tract infection (acute cystitis) is referred to as asymptomatic bacteriuria (ASB) (UTI). The Prevalence of ASB in premenopausal about 2-10% (4), and pregnant women 6.1-10.6% (5) and raise to reach 30% in developing countries (6). Age, sex, sexual activity, and the existence of genitourinary disorders all have variable effects on the frequency of asymptomatic bacteriuria.

Pregnancy alone does not necessarily predispose to the development of asymptomatic bacteriuria depending on the prevalence rate of asymptomatic bacteriuria in pregnant women in compare to non-pregnant women. It has been hypothesized that pregnancy causes a 1% increase in the frequency of bacteriuria, starting from 0.8% of women with bacteriuria in the 12th gestational week to 2% at the end of pregnancy (7), so the risk of developing the condition increases with the length of pregnancy.

Early detection and treatment of ASB can reduce Pyelonephritis incidence significantly and preterm labour can be avoided by up to 20%, however, screening for ASB during pregnancy is rarely seen as a necessary part of antenatal care in underdeveloped nations (8).

The most common bacteria isolated from patients with asymptomatic bacteriuria is Escherichia coli. Enterobacteriaceae, Pseudomonas aeruginosa, Enterococcus species, and group B streptococcus are only a few of the many infectious organisms (9).

Risk factor of bacteria:

The prevalence of bacteriuria rises with age, from around 1% in those between the ages of 5-14 years to more than 20% in those over the age of 80 years in healthy females. Other risk factors include presence of genitourinary abnormalities, Anaemia, sexual activity, lower socioeconomic classes, prior UTI history, multiparty, and gestational age (10).

MATERIAL AND METHODS

Study design:
A Cross sectional study include 50 pregnant females who attending the out patients clinic of Baghdad teaching hospital for different cause, during the duration of March 2022 to May 2022,

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f including different age range from 16-45 yrs.
Inclusion criteria: any pregnant female who willing to participate.
Exclusion criteria: skill cell disease patients, anatomic or function genitourinary abnormalities and patients who used antibiotic for the last 72 hour before the visit. Data collecting:
All patients who visit the out-patients clinic were questioned about presence or absence of UTI symptom as such as burning sensation, suprapubic pain, frequent urine, and fever
Then direct interviewing the patients was done to get information on age, educational level, occupation, residency, socioeconomic status, gynecological history(number of pregnancy, trimester, ANC visits), medical history (DM, anemia, past history of UTI), presence of UTI symptom (fever, burning sensation during urination, suprapubic pain, urgency, frequency) and Health habits (post-coital urination, direction of swiping .
The "clean catch" procedure was explained to the study subjects on how to collect 10-15 mL of typical midstream urine.
They were told to wash their hands, wash their genitalia with water, wipe them dry with a sterile gauze pad, and collect the middle urine into a universal urine container with a wide opening and a screw top while holding their labia apart.
Following that, the containers outside was labeled with the study participants' identification number, the collection date, and the collection time.
Within 30 minutes of collection, the sample was preserved in a refrigerated box and transferred to the laboratory

Urine culture:
The streaking method was used to inoculate the aseptically collected and thoroughly mixed urine sample onto CLED media, blood agar, and Mac Conkey agar (Oxoid, Ltd., UK) using a standard calibrated wire loop with a capacity to hold 0.001 ml of urine.
For 18 to 24 hours, the inoculation plates were incubated aerobically at 37°C. Based on the characteristics of their colonies, bacteria were initially isolated.
For instance, Proteus spp. produced eye-catching swarming colonies on the blood agar plate while E. coli produced lactose-fermenting mucoid colonies on Mac Conkey agar.
Then, an isolated colony from a subculture was put into several biochemical media to further identify the bacterial organism down to the species level.
In essence, a number of biochemical tests were used to identify Gram-negative bacteria, including Kligler's Iron Agar (KIA), Sulphur Indole Motility (SIM) media, citrate, oxidase, and urease tests. Catalase and coagulase tests were used to identify Gram-positive bacteria.
The number of bacteria per milliliter (CFU) in the original urine sample was calculated by first counting the confirmed colony on CLED media and multiplying that amount by 1000. After 24 hours of incubation, a single isolated bacterium was injected into nutrient agar slant and kept in a refrigerator for isolation bacterial maintenance.
Statistical analysis:
Using the SPSS version 25.0 software, the data was interrupted, and frequency, percentage, and histogram figure were used to explain the data.
To examine the relationship between qualitative variables, utilize the chi-square test.
A logistic regression analysis was used to determine the elements that contribute to a positive culture.

RESULT

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The study include 50 pregnant females with different age groups, the mean of age was 29.36 ± 8.56, with lowest age of 16 years and highest age 45 years. The preva-lence of asymptomatic bacteriuria was 14% and symptomatic bacteriuria was 64% of participants. The most common detected bacteria was E-coli (41%) followed by klebsilla, as presented in figure 1.

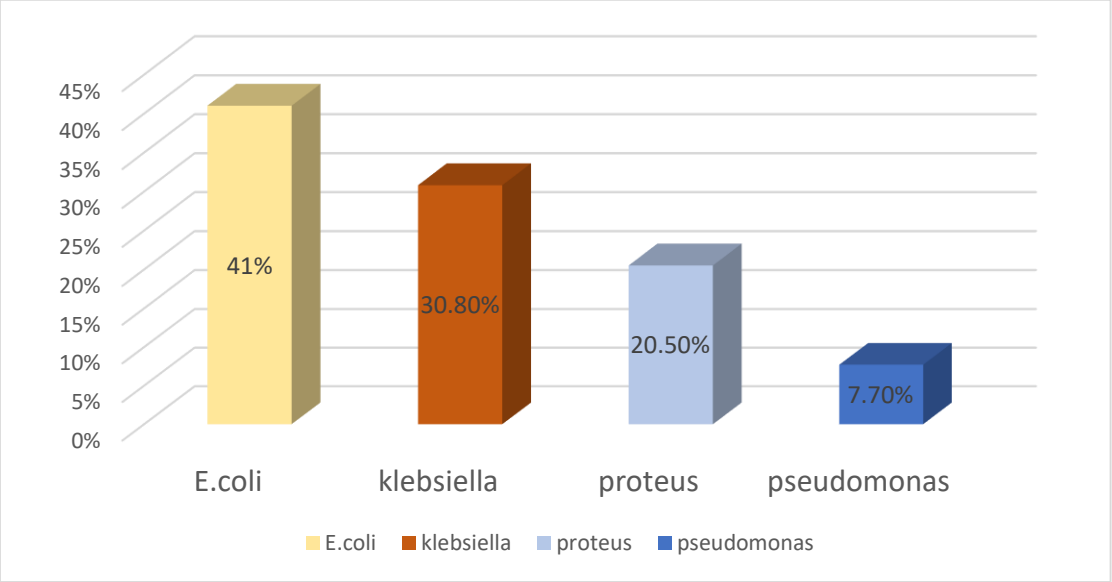

Figure 1: distribution of detected bacteria.

Regarding age distribution 36% were aged 31-40 yrs. and 32% were aged 21-30 yrs., those with negative culture were 11 of participant, 36.4% of them were aged 31-40 yrs. while those with positive culture were 39 participant, 35.9% of then were aged 31-40 yrs. No statistical significant association between age group and devel-opment of bacteria p (0.9). The Age group 31-40 had was a risk of bacteriuria in participant (odd ratio 40.02, p 0.03).

The primary educated participant were constitute 30% followed by 26% who were college or higher educated. Highly educated participant were forming 63.6% of those with negative culture were those with primary education forming 35.9% of positive culture, no statistical significant association between educational level and development of bacteria (p 0.09). Primary educational level was risk factor for posi-tive culture (odd 1.74, p 0.02).

84% of participant were housewives, 60% living in urban area and 38% had moder-ate socioeconomic status, with no statistical significant association between occupa-tion, residency and socioeconomic status with positive culture, as presented in table 1.

Table 1: **Sociodemographic data of participant an their relation to culture result**

		Negative (11)	Positive (39)	Total	p	Odd ratio (CI)	p
Age	< 20 yrs.	3(27.3%)	7(17.9%)	10 (20%)	0.9†	Reference	

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	21-30 yrs.	3(27.3%)	13(33.3%)	16 (32%)		0.3(0.62-139.13)	0.1
	31-40 yrs.	4(36.4%)	14(35.9%)	18 (36%)		4.02(1.3-1230.46)	0.03*
	≥ 41 yrs.	1(9.1%)	5(12.8%)	6 (12%)		0.41 (0.16-434.02)	0.29
Educational level	Non-educated	1(9.1%)	13 (33.3%)	14 (25%)	0.09†	0.80 (0.74-13601.77)	0.06
	primary school	1(9.1%)	14 (35.9%)	15 (30%)		1.74 (2.19-7922.90)	0.02*
	secondary school	2(18.2%)	6 (15.4%)	8 (16%)		1.39 (0.72-2709.22)	0.07
	college or higher educational	7(63.6%)	6 (15.4%)	13 (26%)		Reference	
Occupatio	housewife	9(81.8%)	33 (84.6%)	42 (84%)	0.83†	0.28 (0.01-4.31)	0.36
	employee	2(18.2%)	6 (15.4%)	8 (16%)		reference	
Residency	urban area	8(72.7%)	22 (56.4%)	30 (60%)	0.48†	1.03 (0.12-8.40)	0.97
	rural area	3(27.3%)	17 (43.6%)	20 (40%)		Reference	
Socioeconomic status	low	0(0.0%)	17 (43.6%)	17 (34%)	0.004*†	0.3 (0.1-3.5)	0.98
	moderate	4(36.4%)	15 (38.5%)	19 (38%)		0.39 (0.02-6.58)	0.52
	high	7(63.6%)	7 (17.9%)	14 (28%)		Reference	
	Total			50 (100%)			

*p-value ≤ 0.05
† Chi- square test

34% of patients were in 2nd trimester, no statistical significant association between gestational

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age and positive culture result (p 0.8). Regarding the parity of patients, 38% were having 3-4 child, 54.5% of those with negative culture were having 2-2 child, while 41% of those with positive culture were having > 4 children, a statistical significant association between parity number and positive culture result, also pa-tients who had > 4 children regarded as a risk factor for bacteriuria (odd 2.4, p 0.03).

The antenatal care of patients was poor, 74% had no antenatal care and no statistical significant association with positive culture result, as presented in table 2.

Table 2: gynecological data of patients and their relation to culture result.

		Negative(11)	Positive (39)	Total	p	Odd ratio (CI)	p
Gestational age	1st trimester	2 (18.2%)	10 (25.6%)	12 (24%)	0.8†	Reference	
	2nd trimester	6 (54.5%)	21 (53.8%)	27 (34%)		2.95 (0.307-28.48)	0.38
	3rd trimester	3 (27.3%)	8 (20.5%)	11 (22%)		1.44 (0.25-8.33)	0.66
Parity	0-2	6 (54.5%)	8 (20.5%)	14 (28%)	0.04*†	Reference	
	3-4	4 (36.4%)	15 (38.5%)	19 (38%)		2.95 (0.61-14.08)	0.17
	>4	1 (9.1%)	16 (41.0%)	17 (34%)		2.4 (1.21-127.01)	0.03*
Antenatal care	no	7 (63.6%)	30 (76.9%)	37 (74%)	0.4†	Reference	
	yes	4 (36.4%)	9 (23.1%)	13 (26%)		0.61 (0.12-3.008)	0.53
	Total	11	39	50			

*p-value ≤ 0.05
† Chi- square test

74% of participant report positive previous UTI, 54.4% of negative culture had no positive

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history of previous UTI, and 82.1% of positive culture had positive previ-ous history, a statistical significant association between previous history of UTI and positive culture result (p 0.02). Only 6% of participant were diabetic and had a posi-tive culture, but was not statistically approved (p 0.46).

Regarding anemia, 77% had anemia, 72.8% of patients with negative culture and 76.9% of those with positive culture had anemia, a statistical significant association between anemia and positive culture result, p 0.004, also anemia regarded as a risk factor for bacteriuria (odd 3.9, p 0.02).

Only 38% of participant perform post-coital urination, 81.8% of those with negative culture are urinate post-coital, where as 74.4% of those with positive culture aren't, if patient not urinated Post-coital demonstrate as a risk factor for positive culture (odd 1.1, p 0.009).

The direction of wiping during genital was forward in 48% of patients and back-ward in 32% of them, 81.8% of those with negative culture were wiping backward, a statistical significant association between direction of wiping and positive culture (p 0.04). Presence of UTI symptom have been associated with positive culture result (p 0.02), and regarded as a risk factor (odd 2.1, p 0.03), as presented in table 3.

Table 3: medical history data of patients and their relation to culture result.

		Negative (11)	Positive (39)	Total	p	Odd ratio (CI)	p
past history of UTI	no	6 (54.4%)	7(17.9 %)	13(26%)	0.02* †	Reference	
	yes	5 (45.6%)	32 (82.1%)	37(74%)		0.58 (0.02-15.84)	0.75
DM	no	11 (100%)	36 (92.3%)	47(94%)	0.46†		
	yes	0 (0.0%)	3 (7.7%)	3(6%)		0.4 (0.1-4.6)	0.98
Anemia	no	8 (72.8%)	9 (23.1%)	17(34%)	0.004* †		
	yes	3 (27.2%)	30 (76.9%)	33(77%)		3.9 (2.12-21542.0)	0.02*
Post-coital urination	no	2 (18.2%)	29 (74.4%)	31(62%)	0.001* †		
	yes	9 (81.8%)	10 (25.6%)	19(38%)		1.1(0.0001-0.31)	0.009 *

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direction of wiping	forward	2 (18.2%)	22 (56.4%)	24(48%)	0.04*†		
	backward	9 (81.8%)	17 (43.6%)	26(32%)		1.10 (0.85-1133.88)	0.06
UTI symptom	no	6 (54.4%)	7 (17.9%)	13(26%)	0.02*†		
	yes	5 (45.6%)	32 (82.1%)	37(74%)		2.1 (1.39-1274.39)	0.03*
	Total			50(100%)			

DISCUSSION

UTI is a common condition occur during pregnancy due to physiological changes and pressure of the baby on urinary tract system, Women who have a urinary tract infection may exhibit symptoms or not show any signs at all. Untreated UTI can be progressed to pyelonephritis which commonly associated with serious complication as preterm labor and neonatal death.

The prevalence asymptomatic bacteriuria was 14% which was higher than Elzayat et al (11) and Nteziyaremye et al (12) studies (10%, 3.7%, respectively) and similar to Rukweza et al. (13), higher prevalence of ASB was observed in studies carried out in Nigeria (14), Ethiopia (15) and India (16). These differences among and within nations may be brought about by variations in the socioeconomic status of the study partic-ipants as well as cultural and religious practices surrounding intimate contact and personal cleanliness (17).

The most common detected bacteria was E-coli followed by Klebsiella pneumonia similar to the observation of (2, 11, 18). E-coli is a typical perineum microbe, and fail-ing to practice good hygiene can increase your risk of getting infected with it.

Gram negative bacteria also have a unique structure that allows them to connect to, grow inside of, and infiltrate the uro-epithelium (19). The preceding finding can be explained by the fact that urine during pregnancy becomes so acidic that it promotes the growth of E. coli ad well as variations in antibiotic usage and geographic loca-tion.

UTI is presented in all age groups of pregnancy with no association to specific age group, however, those with 31-40 years were at risk of increase UTI infection, the relation between age and positive culture is conflict according to Laari et al (20) those between 15-25 years are more reliable to UTI infection while Harshika et al (21) re-ported higher incidence of UTI among pregnant women who aged 25-35 years. Young age, null parity, and low socioeconomic status are all risk factors for UTIs in pregnancy.

Due to their lower socioeconomic status and ignorance of nutritional needs, younger expectant women are more likely to experience nutritional deficiencies (22), sample size and data setting could be cause of current observation.

illiterate or had primary educational level were forming large proportion, Study ob-serve that those with higher educational level had more negative culture test in compare other, however,

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it was not provide statistically. Primary education had been demonstrate as a risk factor of UTI, Tchente Et al (2) and Nteziyaremye et al (12) demonstrate that higher educational level was a protective factor. The women's so-cioeconomic standing may be shown by their educational level.

According to other studies, higher prevalence of ABU has been linked to lower ed-ucational attainment and low socioeconomic status. The residency and occupation was not a risk factor for UTI infection, the low economic status was associated with positive culture, which agonist (2, 11) finding.

Nearly one third of participant were in the second trimester, with no association to positive culture that is consistent with (2,11), who observe increase UTI in low socio-economic state patients and against (23). Butler et al (24) observe that higher social class women in the UK have a higher rate of UTI. The conflict between the studies may be explained by the differences in sample size, the various data sources, as well as over the counter usage of antibiotics.

Multiparty was associated with positive culture, pregnant with greater parity had the highest frequency of positive culture similar to (25) observation, those with > 4 parity had 2.4 times risk of development of UTI in compare other females. Other studies as (11,12) didn't found significant association with parity. High parity is thought to cause the descending of the pelvic organs and a widening of the urethral aperture, both of which affect the ascent of microorganisms (26).

Nearly two third of participant had positive previous history of UTI which is posi-tively associated with development of UTI (p 0.02). The current observation was also detected by (2, 11, 27) studies. It is well recognized that some patients are more susceptible than others to a urinary tract infection (genetic propensity and anatomi-cal predisposition) (28).

Despite that El-Kashif et al (18) found a statistical significant with DM, current study didn't find the same result. Due to the fact that DM typically suppresses the immune system and accelerates the progression of acute cystitis to acute pyelonephritis and renal abscess, in addition to the anatomical and physiological changes in the renal tract seen during pregnancy, UTI is the most frequently observed maternal infection (29).

Anaemic patients had 3.4 risk of getting UTI in compare to non-anaemic patients which also defined by (28), Both asymptomatic bacteriuria and pyelonephritis have been documented to be related with maternal anemia, but an association with hidden bacteriuria, but this has not been verified (5).

A statistical significant association between Post-coital urination and direction of wiping with development of UTI, (p 0.001 and 0.04), but only Post-coital urination was a protective factor from UTI. Another research project carried out in Cairo, Egypt, found that pregnant women who do not urinate after coitus are eight times more likely to develop ASB than those who do (30). Due to the fact that post-coital urination clears the urethra of microorganisms introduced during sexual contact, wiping from back to forward increase incidence of UTI due to transferring the bac-teria that commensal the bowel to genital tract.

Limitation of study:

The small sample size and study design was a limitation point in the study, this study did not examine the bacteria's susceptibility to antibiotics, but we are aware that this information is

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crucial for treating these women appropriately.

CONCLOUSION

Asymptomatic bacteriuria was common in pregnant women that approach preva-lence of studies carried in African and Egypt. In this study, prior UTIs, parity and anemia had a significant association with bacteriuria. Education at a high level and post-coital urination provided protection. The most common uropathogen isolated from the pregnant women was E. coli. It is important to give education and adequate treatment for urinary tract infections. It is also suggested that this subject be the subject of a community-based study. Early pathogen screening and appropriate treatment for infected cases should be used because the symptoms are a good pre-dictor of urinary tract infection during pregnancy

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