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Original research article

Evaluation of the prevalence of urinary tract infection during pregnancy: An institutional study

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Abstract

Introduction: The main risk factor for symptomatic urinary tract infection during pregnancy is asymptomatic bacteriuria. It has been advised to screen for and diagnose bacteriuria during pregnancy.

Materials and Methods: The study had a cross-sectional design and was descriptive in nature. All patients who presented for their first antenatal appointment in a row and gave their agreement to participate in the trial were enrolled. One hundred and ten patients participated in the study. Following proper counselling and instruction, participants' urine was collected. Every sample underwent thorough urine analysis tests. Individuals who had positive bacteriuria urine culture results had treatment in accordance with the antibiotic sensitivity pattern.

Results: The prevalence of asymptomatic bacteriuria among our obstetric patients was 10.7%. The prevalence was higher among women aged between 16-20 years (33.3%) and 31-35 years (12.1%). Prevalence was also higher among para 2 and in 2nd and 3rd trimesters. However, the influence of these demographic parameters, parity and gestational age on prevalence rate of asymptomatic bacteriuria was not statistically significant. The bacterial pathogens causing asymptomatic bacteriuria were predominantly coliforms (Klebsiella and E. coli) accounting for 45.5% and staphylococcus saprophyticus (27.3%).

Conclusion: The need for routine prenatal screening for asymptomatic bacteriuria is highlighted by the relatively high prevalence of the illness in this centre. In our limited resource scenario, urine analysis techniques may be more cost-effective for screening for asymptomatic bacteriuria due to their fair sensitivity and high specificity.

Keywords: Pregnancy, urinary tract infections, bacteriuria, parity etc

Introduction

Pregnancy complications like bacteriuria are frequent and significant. The significance of both symptomatic and asymptomatic bacteriuria in pregnancy, as well as its pathophysiology and natural history, have all been well examined. Several systematic studies have evaluated the safety and effectiveness of the antimicrobial treatments used to treat symptomatic urinary tract infection (UTI) and asymptomatic bacteriuria during pregnancy. [1].

Although a range of 2-11% has been documented, bacteriuria in pregnancy is generally prevalent at 4-7%. Age, sexual activity, parity, and sickle cell trait all contribute to an increase in prevalence. Lower socioeconomic position, a history of recurrent urinary tract infections, diabetes mellitus, and structural or functional abnormalities of the urinary system are additional risk factors for bacteriuria during pregnancy. [2-4]. African-American multiparas with sickle cell trait have been found to have the highest prevalence, while rich white women with low parity have the lowest rate. According to several sources, the prevalence rate among pregnant Nigerian women ranges from 4.1% to 14.1%. Bacteriuria is often evident around the time of the first prenatal appointment, and only 1-2% of pregnant women experience the condition after a negative pregnancy test. [5-7].

Asymptomatic bacteriuria during pregnancy puts the mother and unborn child at a significant risk for a number of issues. In 30-40% of patients as the pregnancy progresses, overt urinary tract infection is one of the maternal problems. The foetus is nonetheless at risk for premature birth, low birth weight, and possibly foetal wasting whether or not symptoms of a urinary tract infection manifest themselves. [8]. There is also very little to no question about the necessity of early screening for asymptomatic bacteriuria in obstetric patients. The illness is both diagnosable and largely curable. Because its effects are also avoidable, testing for asymptomatic bacteriuria is justified and ultimately economical.

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Research is still being conducted around the world in an effort to find the best screening technique to identify asymptomatic bacteriuria. A screening test should have high sensitivity in addition to specificity, be quick, easy, and economical [9]. The best screening test is generally agreed to be quantitative urine culture of a midstream clean-catch specimen. Nevertheless, a urine culture is expensive, requires specialised equipment and trained workers, all of which might not be present in settings with limited resources. As a result, further bacteriuria screening techniques have been developed and applied. [10].
In general, there is not enough information available locally to assess the use of less expensive and time-consuming screening techniques for bacteriuria in pregnancy. This is partially due to the fact that most maternity departments in this setting do not routinely test for asymptomatic bacteriuria despite the overwhelming data proving its benefits in reducing symptomatic urinary tract infection and the accompanying negative pregnancy outcome. [11].
This study is therefore designed to determine the prevalence of asymptomatic bacteriuria in our centre. The results of this study will be helpful information on the prevalence, pattern, the implicated bacteria and their sensitivity patterns along with the risk factors related with UTI in our environment because there is a lack of data from this area. In order to promote early diagnosis and rapid treatment with safe and adequate antimicrobials to potentially avoid the additional difficulties, it is also expected that the study's findings will demonstrate the necessity of routinely screening pregnant women for UTI.

Materials and Methods

Study design: A total number of 110 participants were enrolled for this cross sectional study, which was carried out at Department of Microbiology in collaborations with Department of Obstetrics & Gynaecology.
The pregnant women attending Obstetrics and Gynaecology outpatient department, at Mamata Medical College fulfilled the inclusion and exclusion criteria are selected.

Inclusion criteria: Antenatal visit of patients for regular antenatal check-up. Antenatal women who do not have any urinary complaints.

Exclusion Criteria: Patients with history of UTI in the past one year or during this pregnancy. Patients who had taken antibiotics in last 6 months. Patients who are not willing for participating in this study.

Clean catch method: The patient is asked to spread their labia, then clean the periurethral area with soap and water before collecting 30 ml of midstream urine specimen in a sterile bottle. The samples were delivered right away to the lab, where they were processed in an hour. In case of delay, the samples were refrigerated at 4°C. Firstly, 0.02 ml of potassium nitrate was added to 1 ml of the urine sample and incubated. After culturing the urine specimen for quantitative bacterial count, microscopic examination was carried out for the detection of leucocytes.

Microscopic examination for pus cells: Unspun urine is examined directly under microscope and pus cells per high power field were calculated. A count of 10 or more pus cells per high power field is an indication of urinary tract infection.

Identification of organisms: A smear was prepared from the culture selecting a single colony and stained by grams method. In case if gram positive cocci were found in clusters a coagulase test was performed by tube method to differentiate between pathogenic and non-pathogenic staphylococci. When gram positive cocci in pairs were isolated from MacConkey agar plate, bile solubility heat resistance and mannitol fermentation tests were carried out to confirm enterococci. When pink coloured or pale colonies on MacConkey agar plate were seen gram's staining was done. Motility was examined similarly a set of bio-clinical investigations were carried out to identify various gram-negative bacteria.

Statistical methods of analysis: All the data collected and analysed with SPSS statistical package Trial Version 20.0.

Result

The socio-demographic data of participantsis presented in Table 1. 10% belonged to less than 20-year age group followed by 64.54% who belonged to 20-30 year age group. Only 21.82% of the study participants were educated only up to the primary level., 57.280% had secondary school graduates and 24.3% had a bachelor degree

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Table 1: Analysis of socio-demographic characteristics of participants (sample size = 110)

Variables	Response	Frequency	Percentage (%)
Maternal age	< 20 years	11	10
	20-30 years	71	64.54
	> 30 years	28	25.46
Educational Status	Primary	24	21.82
	Higher Secondary	63	57.28
	University Degree	23	20.90
Occupation	Employed	37	33.64
	Unemployed	48	43.64
	Self employed	25	22.72

In relation to their occupation, the majority of the pregnant women 43.64% were housewives.

Table 2: Analysis of obstetric characteristics participants (sample size = 110)

Variables	Response	Frequency	Percentage (%)
Parity	Nulliparous	53	48.19
	Multiparous	57	51.81
Gravidity	Primigravidae	68	61.82
	Multigravidae	42	38.18
Antenatal visit	First visit	72	65.45
	Fourth visit	38	34.54
Gestational age	First trimester	36	32.73
	Second trimester	52	47.27
	Third trimester	22	20
Obstetric History	History abortion	8	7.28
	Intrauterine death	5	4.54

The data presented at Table 2 represent the past and present obstetric history of the study participants showing that(51.81%) were multiparous, (20%) were at 3rdtrimester of gestational age, (7.28%) of them had previous history of abortion, (4.54%) had history of intrauterine death.

Table 3: Analysis of prevalence of UTI among pregnant mothers(sample size = 110)

Variables	Frequency	Percentage	p-value
UTI Present	31	28.18	0.89
UTI Absent	79	71.82	0.77

The total number 110 of samples were analysed out of these 31 samples were diagnosed for urinary tract infections. Of the 31 pregnant women with UTI, 9 women were symptomatic for UTI.

Table 4: Incidence of asymptomatic and symptomatic urinary tract infection during pregnancy. (Sample size = 31)

Variables	Frequency	Percentage	p-value
Asymptomatic UTI	22	70.97	0.49
Symptomatic UTI	9	20.03	0.86

Approximately 22 pregnant women with UTI had asymptomatic UTI (70.97%) as the pattern of the UTI. The most frequently encountered organism per trimester was E.coli.

Table 5: Clinical history of pregnant women with UTI (sample size = 31)

Variables	Frequency	Percentage	p-value
History of genitourinary tract abnormality	1	3.22	0.94
History of diabetes mellitus	4	12.90	0.53
History of catheterization	2	6.45	0.27
History of UTI	5	16.13	0.61
History of other chronic disease	6	19.35	0.84

The results of table 4 showed that 16.13% of infected pregnant women had a previous history of UTI, 19.35%of them had history of chronic disease, 6.45% had history of previous catheterization.

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 06, 2023

Table 6: Analysis of urine samples of pregnant women with UTI (sample size = 31)

Variables	Frequency	Percentage	p-value
Red Blood Cells	3	9.67	0.65
Proteins	8	25.80	0.58
Pus	12	38.70	0.42
Bacteria	31	100	0.39
Blood	4	12.90	0.83

The urine samples macroscopically were analysed and grouped into clear, amber and turbid amber. The results shown in Table 5 revealed that 100% presence of bacteria in UTI patients' urine analysis.38.70% samples had pus cells, 25.80% samples had protein and red blood cells were9.67%.

Table 7: Analysis of urine culture of pregnant women with UTI (sample size = 31).

Variables	Frequency	Percentage	p-value
Klebsiella pneumonia	3	9.67	0.67
Escherichia coli	9	29.03	0.38
Staphylococcus saprophyticus	2	6.45	0.69
Staphylococcus aureus	1	3.22	0.21
Enterococcus fecalis	2	6.45	0.84
Pseudomonas aeruginosa	3	9.67	0.61
Acinetobacter species	2	6.45	0.53
Total	31	100	

Seven organisms were isolated from the pregnant women with UTI namely; Eschericia coli, Enterococcus, Klebsiella pneumonia, Pseudomonas aeroginosa, Proteus mirabilis, Proteus vulgaris, and Streptococcus. The frequency of occurrence of these causative organisms presented in Table 7 describes the pattern of isolates 29.03% was E.coli the predominant organism isolated, 9.67% followed by Klebsiella pneumonia and Pseudomonas aeruginosa and Staphylococcus aureus 3.22% and Enterococcus fecalis, Acinetobacter species were6.45%.

Discussion

One of the main causes of miscarriages, early deliveries, and baby underdevelopment is urinary tract infection (UTI), a health issue that mostly affects women during pregnancy. Early infection treatment lowers the risk of complications, which could be extremely hazardous for the mother and the foetus. [1-3]. In this study, the prevalence of UTIs was 28.18%, these results were similar to the earlier published studies. This inconsistency and discrepancy in results may be caused by differences in the social norms and environmental backgrounds of the communities, as well as in the state of the economy, awareness of, and familiarity with the client's cleanliness requirements.

The prevalence of urinary tract infections was strongly influenced by parity and gestational age. These have already been reported. [3-5]. The majority of those at risk of developing a urinary tract infection were pregnant women in their third trimester of current pregnancy and those who were carrying more than one kid. Urinary stasis and urethral dilatation are caused by a number of anatomical and hormonal changes in pregnant women, which raises the risk of UTI. [5-7].

According to the findings, there is a substantial correlation between women's UTIs and their educational level when it comes to the education variable. In contrast, Anuli *et al.* [8] found no significant effect of education on the incidence rate of UTIs in their study. Our study revealed that housewives had the highest percentage of UTIs, despite the fact that there is no correlation between women's UTIs and their work. Due to scheduling issues, working women may be less likely to receive antenatal care at the health centre.

The results of the present study showed that Escherichia coli was the most pathogenic in the causes of infection among pregnant women, followed by Klebsiella Pneumoniae and Staphylococcus aureus. The emergence of this high percentage of bacteria may be due to the weakness of defence mechanisms in pregnant women during pregnancy that creates a good opportunity for UTIs. This result was consistent with Lee A C *et al.* [9] studies about the cause of infection being inconsistent with the rate of incidence. It may also be due to physiological, functional and structural changes that pregnant women undergo which make them more susceptible to various germs [10-13].

Also, due to the high levels of albumin and amino acids, pregnant women's urine is a favourable environment for the growth of the majority of infections. Moreover, pregnant women's weakened immune systems during their pregnancies render them more vulnerable to infections, particularly Staphylococcus aureus. Two studies from India and Sudan have reported Escherichia coli as the most common isolate and there is an increasing trend towards Klebsiella spp. as the most potent urinary pathogen. [14] The bacteria that cohabit in female reproductive systems and intestines are typically the responsible parties for the non-symptomatic bacteriuria in females. UTIs are caused by a variety of viral

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factors, including adhesions and inactivity brought on by the uterus [15, 16].

Conclusion

The study came to the conclusion that E coli is the most prevalent disease-causing agent and that pregnant women have a greater prevalence of UTIs than non-pregnant and unmarried women. The prevalence of UTIs among women and their age, educational level, and gravity were found to be significantly correlated. It is advised that individuals with unexplained causes of fever undergo routine screening for UTIs because UTIs can typically be both symptomatic and asymptomatic.

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