

Urinary Tract Infections v/s Other Infections and their Obstetrics Complications in Pregnant Patients, Admitted in Tertiary Care Hospital in Jaipur, Rajasthan, India

ABSTRACT

Numerous hormonal and mechanical changes in the body occur during pregnancy [1,2]. Ninety percent of pregnant women experience ureteric dilatation, which increases the risk of vesicoureteric reflux and urine stasis. The dilatation begins in the sixth week of gestation and peaks between the 22nd and 24th weeks [3]. Furthermore, during pregnancy, glycosuria and aminoaciduria offer a great growing medium for bacteria in urine stasis sites. Pregnant women are more likely to experience UTIs due to these changes, their already narrow urethra, and the difficulty they have maintaining hygiene because of their enlarged tummies. Other infections also occur during pregnancy but their frequency is less than UTI (urinary tract infection) therefore we conducted a Prospective observational study to prove which type of infection is more common and their obstetrics complications during pregnancy.

Material and Methods: This is a Prospective observational type of study which was conducted in departments of medicine, obstetrics and gynaecology and nephrology at Mahatma Gandhi Medical College & Hospital in Jaipur Rajasthan over a period of 18 months from June 2022 to December 2023 following receipt of institutional ethics committee approval. In our study 250 pregnant patients who were admitted in the medicine wards, nephrology wards, obstetrics & gynecology wards, and ICUs with symptoms and signs suggestive of infections; age more than 18 years and gave written informed consent were included where as those who passed away before it would have been determined whether they were infected or not were not included.

Methods of Collection of Data: (including sampling procedure)

1. History
2. Clinical examinations both general and systemic
3. Investigations routine blood investigations, fever profile, cultures and sensitivity.
4. Radiological examinations and other imaging modalities if required with abdominal shielding.

Statistical Analysis: After being input into a Microsoft Excel sheet, all of the data was moved to SPSS software version 17 for analysis. Frequency and percentages were used to present qualitative data.

Results: In our present Prospective observational study the most common age group in study population was from 20 to 24 years (41.7%) followed by ages 25 to 29 years (40%) and then 30 to 35 years (18.3%). We found that most of the study population had a gestational age of 1 to 12 weeks (61.66%) followed by ages 13 to 28 weeks (31.66%) and 6.7% were more than 28 weeks. Similarly majority of the study population had parity two (46.7%) followed by parity one (43.3%), parity three (6.7%) and parity four (3.3%). The most common presenting clinical feature in the study population was fever (accounting 62%) followed by Cough (34%), Headache (32.8%), Nausea (30.8%), Petechiae (26%), Diarrhea (26.8%) and Pain in abdomen (26.4%), the most common type of infections amongst study population was UTI (22.4%) followed by Acute gastroenteritis (21.6%),

URTI (18%), Malaria (11.2%) and LRTI (8.4%) Dengue (8%), HBV (6%), Vaginal Candidiasis (5.6%) and HIV (4.8%). We observed that the most common obstetric complications amongst study population was Preterm delivery (15%) thereafter PROM (9%), Abortion (5%), LBW (4%) and IUD (1%), normal vaginal delivery was the most common mode of delivery followed by LSCS (28.2%) and Instrumental delivery (2.6%), most of the study population had birth weight of 2 to 3 kg (66.7%) followed by 3 to 4 kg (25%) and less than 2 kg (8.3%).

Discussion: The most common clinical manifestations of pregnant women with infections were fever followed by cough and headache. The most prevalent kind of infections amongst study population was UTI followed by acute gastroenteritis, URTI. Normal vaginal delivery was the majorly done mode of delivery followed by LSCS and instrumental delivery. The commonly found obstetrics complication in the study population was Preterm delivery followed by PROM and abortion, low birth weight (LBW) and intra uterine death (IUD). Most of the study population pregnancy resulted in babies that had birth weight of 2 to 3 kg followed by 3 to 4 kg and less than 2 kg.

Conclusion: Pregnancy is a state in which the mother's adaptive immunity gradually declines as the pregnancy progresses and with advancing maternal age and related comorbidities, making the mother more susceptible to infections and illnesses.

Keywords: UTI; URTI; LRTI; LSCS; PROM; LBW; IUD

1. INTRODUCTION

Pregnant women are more likely to get a UTI if they are older, have had more children, have more sexual relations each week, have diabetes, have recessive sickle cell anemia, have a history of UTIs, have impaired immun systems, or have abnormalities in their urinary tract. [4,5].

Bacterial organisms, which cause this disease, include *Escherichia coli*, Klebsiella pneumoniae, Proteus, Acinetobacter, Saprophyticus, Staphylococcus, Streptococcus Group B and Pseudomonas aeruginosa. [4-7]. Pregnancy raises the risk of UTIs. Previous studies indicate that there is a chance of UTI starting by the sixth week. The peak of this chance occurs between 22 and 24 weeks of gestation. The likelihood of infection is likely higher in pregnant women due to the bladder's increased capacity, expansion, and enlarged ureter [4,8] the course of bacteriuria is altered by anatomical and physiological changes that occur during pregnancy, and pregnant women are more vulnerable to UTI complications such as pyelonephritis [9]. Evidence suggests that adaptive immune responses are compromised, which could account for the decreased clearance of viruses [10-13]. Additionally, evidence points to an enhanced innate response, which could be a compensatory immunological mechanism protecting the fetus and the pregnant mother as well as a lower vulnerability to the initial infection [10,12,14]. Certain infectious pathogens cannot pass through the placental barrier and enter the fetal circulation during pregnancy due to its exceptional efficiency. However, TORCH agents can result in prematurity, chronic postnatal infection, intrauterine growth retardation (IUGR),

or fetal loss by crossing the placenta [15]. The effects on the growing fetus are often severe, even if the mother's illness is typically modest. The virulence of the organism, placental damage, the severity of the maternal illness, and the gestational age at the time of infection all influence how severe the condition is [16].

2. MATERIALS AND METHODS

The present Prospective observational study was conducted at Mahatma Gandhi Medical College & Hospital in Jaipur Rajasthan over a period of one and half year (June 2022 to December 2023) after getting approval from institutional ethics committee. In this study 250 pregnant patients admitted in medicine, nephrology, obstetrics & gynecology wards and ICUs with symptoms and signs suggestive of infections; with age more than 18 years and have had given written informed consent were included whilst those who succumbed to death before the presence or absence of infection could have been established and those not consenting to participate in the project were excluded.

2.1 Methods of Collection of Data:- (Including Sampling Procedure)

1. History
2. Clinical examinations both general and systemic
3. Investigations routine blood investigations, fever profile, cultures and sensitivity.
4. Radiological examinations and other imaging modalities if required with abdominal shielding.

2.2 Statistical Analysis

After being input into a Microsoft Excel sheet, all of the data was moved to SPSS software version 17 for analysis. Frequency and percentages were used to present qualitative data.

2.3 Sample Size Estimation:

The sample size was estimated based on hospital records for the previous one year.

The number of pregnant women admitted for medical reasons was 3000 of which 25% were admitted due to infections causes. The sample size was calculated to be 250 based on the following formula.

$$n = NZ^2P(1-P)/d^2(N-1) + Z^2P(1-P)$$

Where n = sample size

N = population size = 3000
 Z = critical level of normal distribution
 For 95% confidence level
 P = expected population = 0.25
 d = precision 0.05

The sampling was done by systematic random sampling.

3. RESULTS AND DISCUSSION

250 pregnant women who showed indications of infection were included in this prospective observational study on their inclusion and exclusion criteria matched.

Table 1. Age distribution in the study population

Age group	Frequency of infection	Percent
20 to 24 years	104	41.7
25 to 29 years	100	40
30 to 35 years	46	18.3
Total	250	100

As noted in the above table, the age group amongst the study population was 20 to 24 years (41.7%) followed by 25 to 29 years (40%) and 30 to 35 years (18.3%).

As seen in the above table, in the study population majority subjects had gestational age of 1 to 12 weeks (61.66%) followed by 13 to 28

weeks (31.66%) and more than 28 weeks (6.7%).

Table 2. Gestational age amongst study population

Gestational Age	Frequency of infection	Percent
1 to 12 weeks	154	61.66
13 to 28 weeks	79	31.66
More than 28 weeks	17	6.7
Total	250	100

Table 3. Parity status amongst study population

Parity	Frequency of infection	Percent
One	108	43.3
Two	117	46.7
Three	17	6.7
Four	8	3.3
Total	250	100

As observed in the above table, the study population had more commonly parity two (46.7%) followed by parity one (43.3%), parity three (6.7%) and parity four (3.3%).

It can be noted in the above table, that the most common clinical features that presented included fever (62%) followed by Cough (34%), Headache (32.8%), Nausea (30.8%), Petechiae (26%), Diarrhea (26.8%) and Pain in abdomen (26.4%)

We can observe that the most common type of etiologies of infections in the study population was UTI (22.4%) followed by Acute gastroenteritis (21.6%), URTI (18%), Malaria (11.2%) and LRTI (8.4%) Dengue (8%), HBV (6%), Vaginal Candidiasis (5.6%) and HIV (4.8%)

As seen from the above table, the most common obstetrics complications encountered amongst the study population was preterm delivery (15%) followed by PROM (9%), abortion (5%), LBW (4%) and IUD (1%).

We can observe from the above table, that normal vaginal delivery was the most common mode of delivery followed by LSCS (28.2%) and Instrumental delivery (2.6%).

As seen in the above table, babies had a birth weight ranging from 2 to 3 kg (66.7%) followed by 3 to 4 kg (25%) and less than 2 kg (8.3%).

Table 4. Clinical presentations amongst study population

Clinical features	Frequency	Percent
Fever	155	62
Diarrhea	67	26.8
Vomiting	45	18
Nausea	77	30.8
Cough	85	34
Pain in abdomen	66	26.4
Burning Micturition	54	21.6
Increased frequency of Urination	54	21.6
Arthralgia	41	16.4
Petechiae	65	26
White Discharge	19	7.6
Headache	82	32.8
Itching/pruritis	55	22
Difficulty in breathing	49	19.6
Abdominal distension	39	15.6
Hematemesis	4	1.6
Melaena	15	6
Altered sensorium	7	2.8
Hemoptysis	18	7.2
vesicular eruption	7	2.8

Table 5. Various etiologies of infections amongst study population

Infections	Frequency	Percent
Dengue	20	8
Malaria	28	11.2
Leptospirosis	15	6
Acute gastroenteritis	54	21.6
Enteric fever	13	5.2
UTI	56	22.4
URTI	45	18
LRTI	21	8.4
HAV	4	1.6
HBV	15	6
HCV	3	1.2
HEV	7	2.8
HIV	12	4.8
varicella zoster	7	2.8
TORCH group	3	1.2
Vaginal Candidiasis	14	5.6

Table 6. Obstetrics Complication amongst study population

Obstetrics Complication	Frequency	Percent
Abortion	13	5
PROM	23	9
LBW	10	4
IUD	3	1
Preterm	38	15
No complications	165	66
Total	250	100

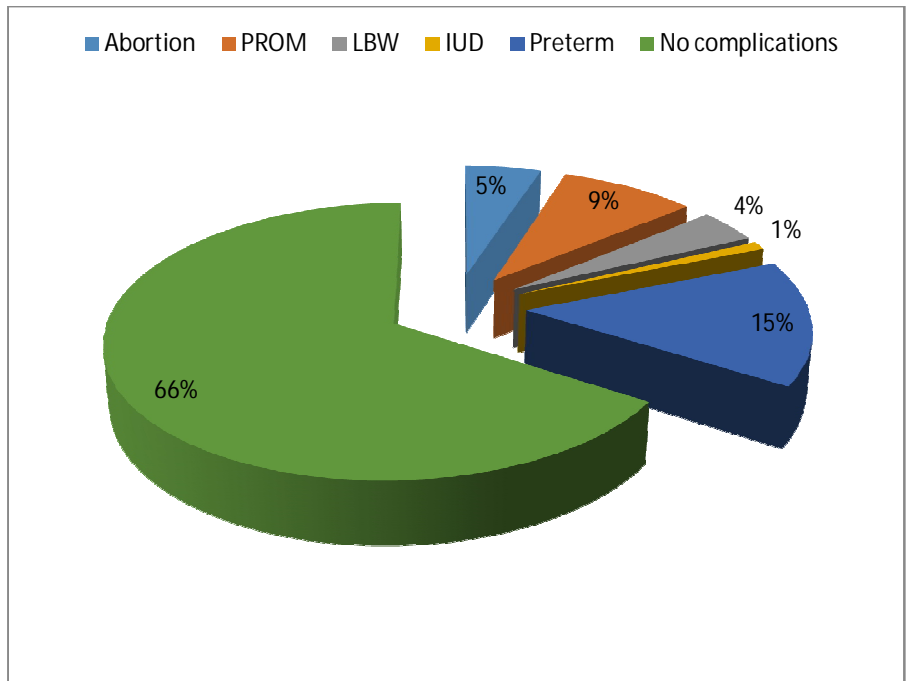


Fig. 1. Obstetrics complication
Table 7. Mode of delivery amongst study population

Mode of delivery	Frequency	Percent
Instrumental	7	2.6
LSCS	71	28.2
NVD	173	69.2
Total	250	100

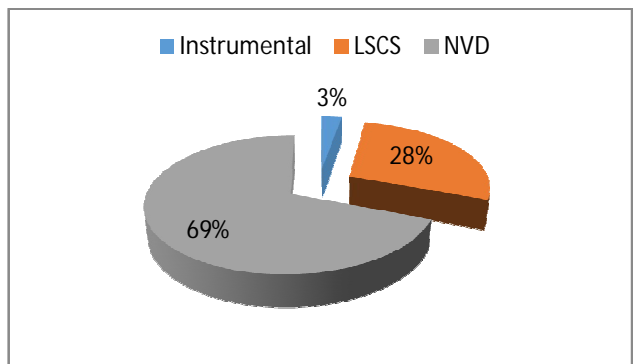


Fig. 2. Mode of delivery

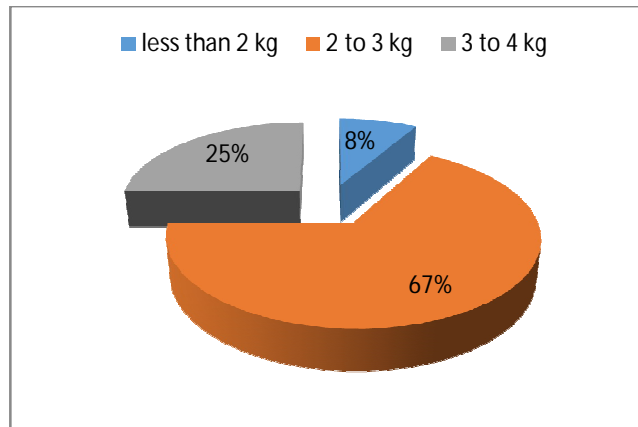


Fig. 3. Birth weight

In the present study, the most prevalent clinical characteristics in the study population were was fever (62%) followed by cough (34%), headache (32.8%), nausea (30.8%), petechiae (26%), diarrhea (26.8%) and pain in abdomen (26.4%). This study is in accordance with the observations made by Parvaiz A. Koul in which fever and cough were the most common clinical features. In our study majority of patients had UTI, Acute gastroenteritis, respiratory tract infections, malaria, dengue in which the common manifestations is fever, cough, headache, the most prevalent infections in the study population was UTI (22.4%) followed by Acute gastroenteritis (21.6%), URTI (18%), Malaria (11.2%) and LRTI (8.4%), Dengue (8%). HBV (6%), vaginal candidiasis (5.6%) and HIV (4.8%). In a study conducted by Soleymanizadeh et al. on 1500 pregnant women in the city of Bam, the incidence of UTI was 12.3%. 3.7% of the 900 pregnant women in the city of Gorgan who participated in a different study by Mobbasheri et al. had a UTI. This study is in accordance with the observations made by S Sangeetha et al. This study is in accordance with the observations made by Punjabi et al., where majority of pregnant women had vaginal candidiasis (67%) It differs from observations made by Jeyasingh et al., where majority of pregnant women had Trichomoniasis of 47.2%. Pregnant women have a risk of severe malaria that is three times as high as that among nonpregnant women; a median maternal mortality of 39% has been reported in studies in the Asia–Pacific region. In this study, the most common obstetrics complications was Preterm delivery (15%) followed by PROM (9%), Abortion (5%), LBW (4%) and IUD (1%). Preterm labor and delivery are brought on by bacteriuria. It is thought that the production of bacterial endotoxins either

directly or via a cascade mediated by prostaglandins causes labor. This findings was in agreement with a study conducted by Prasanna Byna et al., in which preterm labour was observed in 18% of the patients with bacteriuria and seven percent in control group [17]. The association between bacteriuria and preterm labour was statistically significant (P value of 0.03) and it correlates with the study done by Sheiner et al. [18].

Table 8. Babies birth weight in the study population

Birth Weight	Frequency of infection	Percent
less than 2 kg	21	8.3
2 to 3 kg	167	66.7
3 to 4 kg	63	25
Total	250	100

These findings were in agreement with the study conducted by Prasanna Byna et al., in which maternal PROM was seen in 14% patients with bacteriuria and 5% patients in the control group. ¹⁶ The association between bacteriuria and PROM was also statistically significant P value 0.03 which was in correlation with other studies done by Jain et al. [19] and Sheiner et al. [18]. PROM is a known complication of the bacteriuria which results in preterm labor, chorioamnionitis, endometritis, fetomaternal sepsis ultimately leading to adverse fetomaternal outcomes [20].

Also our observations were in agreement with the study conducted by Prasanna Byna et al., as association between bacteriuria & IUGR was found to be statistically significant (with P=0.03) and it correlates with the study previously

conducted by Jain et al. This highlights the necessity for early diagnosis and aggressive management of bacteriuria in pregnancy [19]. We also observed that our findings were similar with the study conducted by Prasanna Byna et al., where low birth weight babies were found in 20% of the bacteriuria group and 8% of control group [17]. And a significant relation between bacteriuria and low birth weight babies ($P=0.04$) which also correlates with the study done by Jain et al. ¹⁸The significant low birth weight babies in our study is attributed to higher incidences of preterm and IUGR in the bacteriuria group.

4. CONCLUSION

In our study fever followed by cough and headache were the common presenting complaints of the pregnant women with infections with most common cause being UTI followed by acute gastroenteritis and URTI. Normal vaginal delivery was the common mode of delivery followed by LSCS and instrumental delivery. The most common obstetrics complications observed was Preterm delivery followed by PROM and abortion, LBW and IUD. Normal vaginal delivery was the most common mode of delivery followed by LSCS and Instrumental delivery, most of the study population babies had a birth weight of 2 to 3 kg followed by 3 to 4 kg and less than 2 kg. The pregnancy is a condition where adaptive immunity of mother reduces with progression of gestational age. With increasing maternal age, associated with comorbidities, this immune status decline progressively so the mother becomes more vulnerable to infections and diseases.

5. RECOMMENDATIONS

All pregnant women should be evaluated at primary care centers thoroughly during their antenatal visits for parity status, any associated risk factors, comorbidities and diseases, by which we can promptly diagnose, manage and reduce varieties of infections, complications and foeto-maternal morbidity and mortality in early stages of pregnancy.

6. LIMITATIONS

- a) We need to include larger sample size
- b) also need to give weightage to third trimester proportion
- c) It was a single centre study therefore results can not be generalised to a large population

- d) Due to financial constraints study could not be done on large scale.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

CONSENT

As per international standards or university standards, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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