

Study of Symptomatic Urinary Tract Infections During Pregnancy

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Received: 08-11-2022 / Revised: 08-12-2022 / Accepted: 20-12-2022

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Conflict of interest: Nil

Abstract:

Introduction: Urinary tract infection (UTI) is one of the most distressing problems faced during pregnancy producing profound psychological effect on the pregnancy what is being encountered by family physicians. In general 15% of women suffer at least one attack of UTI sometime during their lifetime. A significant bacteriuria is the major risk factor for developing symptomatic urinary tract infection during pregnancy, hypertension, preeclampsia, LBW, fetal wastage and prematurity.

Materials and Methods: The present study titled as "Study of Symptomatic Urinary tract infections during Pregnancy" is descriptive study conducted in the department of Obstetrics and Gynaecology, MKCG Medical College, Berhampur, Odisha from October 2018 to November 2021. All the selected 110 cases were subjected urine culture and sensitivity after routine antenatal check-up. All the symptomatic patients are followed up in all the three trimesters by urine culture to detect any relapse or reinfection by same or different organisms respectively.

Observation: Symptomatic UTI occurs most commonly in age group of 21-30 yrs in 75 cases (68.2%), of blood group of 'O' in 64 cases (58.2%). According to mode of presentation, maximum cases i.e 96 cases (87.2%) presented with frequency, 89 cases (81%) with dysuria whereas 56 cases (51%) with fever with rigor and chill. The maximum numbers are detected as colony count in urine culture of having value $> 10^5$ CFU/ml in 98 cases (89.1%). In response to treatment among all cases of symptomatic UTI with culture positive report, 82 cases (74.5%) treated by Nitrofurantoin, 16 cases (14.5%) by Amoxicillin+Clavulanic acid, 4 cases (3.6%) 68 cases (61.8%) are of small for gestational age (SGA), 25 cases (22.7%) are complicated with preterm contraction, 15 cases (13.6%) with leaking of membrane. The Neonatal asphyxia is highest in 30 cases (27.3%), 74 cases (67.2%) are within 2-2.5 kg birth weight. So low birth weight as the most common complications followed prematurity in 66 cases (60%) IUGR in 19 cases (17.2%). E Coli is the most common organism isolated in 76 cases (69.1%) strongly sensitive (SS) to Amoxicillin+Clavulanic acid; Klebsiella is strongly sensitive (SS) to Amoxicillin, Cefuroxime, Amoxicillin+Clavulanic acid and Piperacillin+Tazobactm; Proteus species is strongly sensitive (SS) to Amoxicillin, Amoxicillin+Clavulanic acid and Piperacillin + Tazobactm,

Conclusion: Symptomatic urinary tract infection during pregnancy causes both maternal and fetal complications. The maternal complications encountered in this study are PPRM, PPH, anemia, puerperal pyrexia, breast complications, preterm contractions. The fetal complications encountered in are Low birth weight, prematurity, intra partum asphyxia, IUGR. Majority of cases are having colony count $> 10^5$ CFU/ml among the symptomatic cases studied. E. Coli and Staphylococcus are treated with Nitrofurantoin as first line of drug followed by reculture and retreatment as required. So any evidence of symptomatic urinary tract infection should be diagnosed as early as possible by urine culture and to be treated judiciously to prevent and improve maternal and perinatal outcome of each and every pregnancy.

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Introduction

Urinary tract infection (UTI) is one of the most distressing problems faced during pregnancy, producing profound psychological effect on the pregnancy what is being encountered by family physicians. In general 15% of women suffer at least one attack of UTI at some point during their lifetime. In case of pregnant women the figure is as high as 8% out of which 20% to 40% are symptomatic who require antimicrobial therapy by age of 24. [1] The most common population at risk for both symptomatic and asymptomatic urinary tract infection is sexually active women.[2] UTI in pregnancy is commonly presented as urinary frequency, dysuria, fever with rigor and chills, suprapubic tenderness is associated with preterm contractions sometimes due to release of prostaglandin.[3] Tremendous change in the diagnostic procedures of UTI and management plan has improved the living status of pregnant women, who are more vulnerable to this infection. Urine culture remains the gold standard of diagnosis of UTI. In most of the symptomatic urinary tract infections bacterial colony count remains $> 10^5$ CFU/ml.[4] A significant bacteriuria is the major risk factor for developing symptomatic urinary tract infection during pregnancy, hypertension, preeclampsia, LBW, fetal wastage and prematurity. UTI in pregnancy can take the forms of asymptomatic bacteriuria, acute

uncomplicated cystitis, urethritis, pyelonephritis.[5] Many studies have advised antenatal screening of pregnant women for the presence of symptomatic infections on three grounds. First one is association with obstetric complications like prematurity, second one is to detect patients with renal abnormality and third one is to predict the development of pyelonephritis. [6,7] The present study aims to utilize the urine culture sensitivity (including colony count) for establishing diagnosis of UTI with symptoms, isolating the causative organisms and the treatment response of these organisms to the sensitive antimicrobials used, as per sensitivity.

Materials and Methods

The present study titled as "Study of Symptomatic Urinary tract infections during Pregnancy" is descriptive study conducted in the department of Obstetrics and Gynaecology, MKCG Medical College, Berhampur, Odisha from October 2018 to November 2021. Out of 420 pregnant women, who were screened from the pregnant women attending the OPD and Labour room of this Department for any complains of urinary tract infections and out of those who presented with symptoms (110 numbers) were included in this study. They were subjected to history taking and meticulous clinical examination and all routine investigations of pregnancy. Then all these cases were subjected to urine

culture and sensitivity and colony count. The method adopted in our department for this study is '**Standard Loop Method**'. The plate is incubated at 37°C for 24-48 hours and the number of colonies are counted or estimated. And this number is used to calculate the number of viable bacteria per ml of urine. The antibiotic which is relatively safe during pregnancy, depending upon sensitivity is implicated for that particular patient in a standard regimen and response is observed. Then the treated cases are subjected for urine culture and sensitivity within one week of completion of antibiotic course. If the pregnant women is cured of the infection as evidenced by both clinical and bacteriological evidence, she is advised the methods of prevention of UTI during pregnancy. If she is not found to be cured of symptoms or bacteriological cure after a course of antibiotics, repeat urine culture is done and according to sensitivity, repeat course of antibiotics are given. Within one week of completion of second course of antibiotics she is evaluated for cure, both symptomatic and bacteriological. If she is not being cured she is subjected for re-culture and retreatment.

All the symptomatic patients are followed up in all the three trimesters by urine culture to detect any relapse or reinfection by same or different organisms respectively.

Observation:

A total no of 110 cases of pregnant women with symptomatic UTI were included in this study. It occurs most commonly in age group of 21-30 yrs in 75 cases (68.2%), < 21 yrs in 25 cases (22.8%) and > 30 yrs in 10 cases (9.0%). In accordance to gravidity, 67 cases (60.9%) belonged to primigravida whereas 43 cases (39.1%) belonged to multigravida. This infection is found in blood group of "O" in 64 cases (58.2%), "A" in 34 cases (30.9%), "B" in 9 cases (8.2%) and "AB" in 3 cases (2.7%) According to mode of presentation, maximum cases i.e 96 cases (87.2%) presented with frequency, 89 cases (81%) with dysuria whereas 56 cases (51%) with fever with rigor and chill. Among all cases studied, maximum cases i.e 63 cases (57.2%) have shown normal weight gain whereas 47 cases (42.8%) presented with poor weight gain.

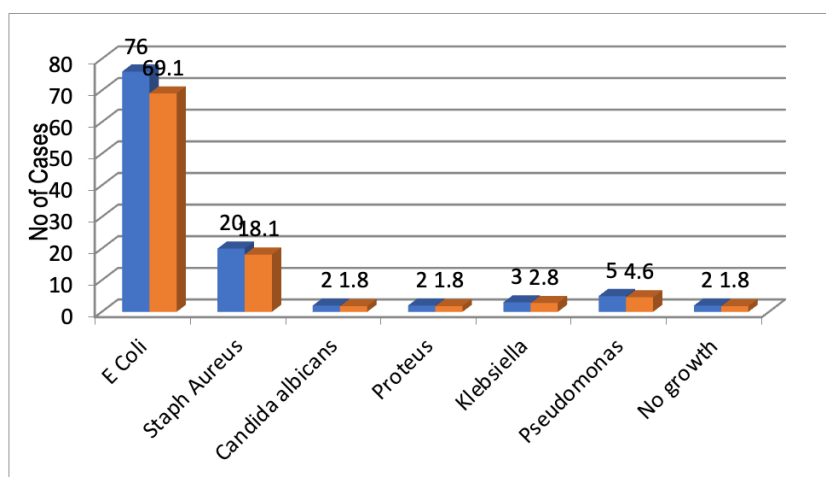


Figure 1: Organism Isolated from Urine Culture

E coli is isolated in 76 cases (69.1%), the maximum followed by S. aureus in 20 cases (18.1%), Pseudomonas in 5 cases (4.6%), Candida albicans in 2 cases (1.8%), Proteus in 2 cases (1.8%), Klebsiella in 3 cases (2.8%) and no growth in 2 cases (1.8%) over 48 hrs of inoculation. (Figure-1)

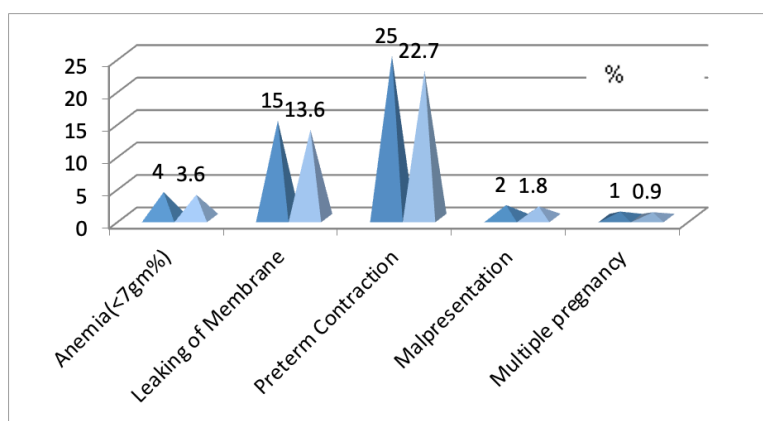
Table 1: Colony Count in Urine Culture

Colony Count(CFU/ml)	No of Cases	%
<10 ²	2	1.8
10 ² -10 ⁵	8	7.3
>10 ⁵	98	89.1
No growth	2	1.8

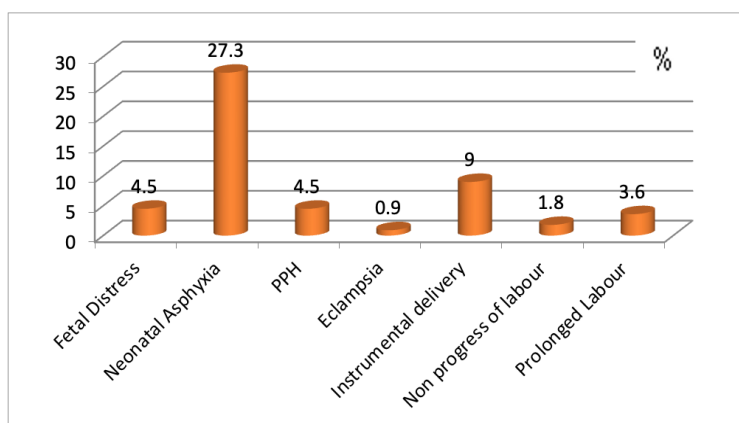
The maximum numbers are detected as colony count in urine culture of having value > 10⁵ CFU/ml in 98 cases (89.1%) followed by 10²-10⁵ CFU/ml in 8 cases (7.3%) and < 10² CFU/ml in 2 cases (1.8%).(Table-I) In response to treatment among all cases of symptomatic UTI with culture positive report, 82 cases (74.5%) treated by Nitrofurantoin, 16 cases(14.5%)by Amoxicillin+Clavulonic acid, 4 cases(3.6%) by Amoxicillin, 3 cases(2.7%) by Cefuroxime, 2 cases(1.8%)

by Fluconazole and one case(0.9%) by Piperacillin+Tazobactam.

Out of 110 cases 91 cases (82.7%) needed one course of antibiotic. Remaining 19 cases (17.3%) are given 2 courses of antibiotics out of which 17 cases (89.5%) are treated and 2 cases (10.5%) required third course of antibiotic. Out of 110 cases delivered, 68 cases (61.8%) are of small for gestational age (SGA), 42 cases (38.2%) are appropriate for gestational age. No case (0%) of large for gestational age is detected.

**Figure 2: Antepartum Complications**

Among antepartum complications detected, 25 cases (22.7%) are complicated with preterm contractions, 15 cases (13.6%) with leaking of membrane, 4 cases (3.6%) with anaemia (<7gm %), 2 cases (1.8%) with malpresentation, one case (0.9%) with multiple pregnancy. (Figure-II)

**Figure 3: Intrapartum Complications**

The Neonatal asphyxia is highest in 30 cases (27.3%) followed by fetal distress in 5 cases (4.5%), PPH in 5 cases (4.5%), eclampsia in 1 case (0.9%), instrumental delivery in 10 cases (9.0%), non-progress of labour in 2 cases (1.8%), and prolonged labour in 4 cases (3.6%).(Figure-III)

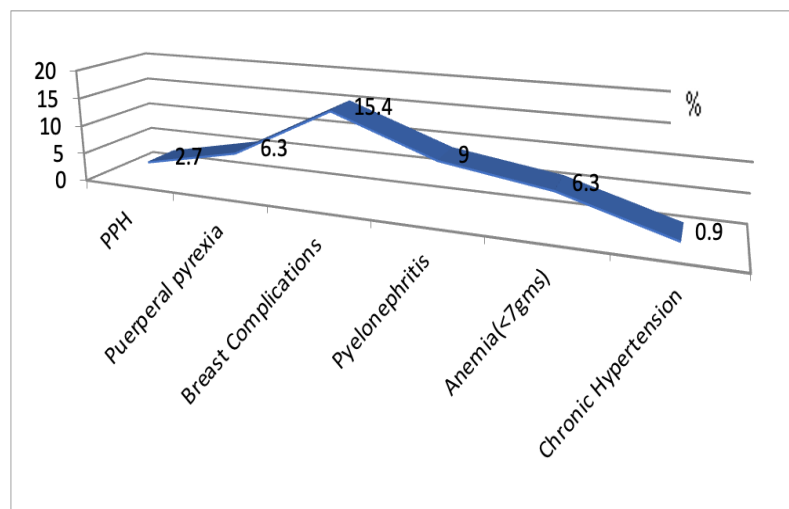


Figure 4: Postpartum Complications

Among postpartum complication, breast complications are seen in 17 cases (15.4%), puerperal pyrexia in 7 cases (6.3%), anemia (< 7 gm %) in 7 cases (6.3%), PPH in 3 cases (2.7%), pyelonephritis and chronic hypertension in one case (0.9%) each. (Figure-IV)

Among all; 74 cases (67.2%) are within 2-2.5 kg birth weight, followed by 22 cases (20%) in group of >2.5 kg and 14 cases (12.8%) in group of <2 kg. So low birth weight as the most common complication, followed prematurity in 66 cases (60%),

IUGR in 19 cases (17.2%), IUD in 4 cases (3.6%). Out of 110 cases, 91 cases (82.7%) delivered vaginally (includes 73 cases of NVD and 8 cases of instrumental delivery) and 19 cases (17.3%) delivered by LSCS. The Pre labor rupture of membrane is highest among indications of LSCS in 8 cases (47%). It follows 4 cases (23.5%) of fetal distress 2 cases (11.8%) each of previous CS with oligohydramnios and gestational hypertension with NPL. There was one case (5.9%) of previous CS with scar tenderness.

Table 2: Sensitivity Patten of Organisms in Urine Culture(SS: Strongly Sensitive, MS: Moderately Sensitive, WS: Weekly Sensitive, NA: Not Applicable)

Sl No	Name of Antimicrobial Agent	E Coli	Klebsiella	Pseudomonas	Proteus	Candida
1	Nitrofurantoin	MS	WS	R	WS	NA
2	Amoxicillin	MS	SS	R	SS	NA
3	Cefuroxime	MS	SS	MS	Ws	NA
4	Amoxicillin+Clavulanic acid	SS	SS	SS	SS	NA
5	Fluconazole	NA	NA	NA	NA	SS
6	Piperacillin+Tazobactam	SS	SS	SS	SS	NA

E Coli is strongly sensitive (SS) to Amoxicillin+Clavulanic acid & Piperacillin+Tazobactam, moderately sensitive (MS) to Nitrofurantoin, Amoxicillin and Cefuroxime. Klebsiella is strongly sensitive (SS) to Amoxicillin, Cefuroxime, Amoxicillin+Clavulanic acid and Piperacillin+Tazobactm, weakly sensitive (WS) to Nitrofurantoin. Proteus species is strongly sensitive (SS) to Amoxicillin, Amoxicillin+Clavulanic acid and Piperacillin + Tazobactm but weakly sensitive (WS) to Cefuroxime and Nitrofurantoin. Pseudomonas is strongly sensitive (SS) to Amoxicillin+Clavulanic acid and Piperacillin+Tazobactum, moderately sensitive (MS) to Cefuroxime but resistant to Nitrofurantoin & Amoxicillin. All the Candida species are strongly sensitive (SS) to Fluconazole. (Table-II)

Discussion

Urine culture was carried out in 110 pregnant women with symptomatic urinary tract infections during period of October 2018 to November 2021 in MKCG Medical College, Berhampur; Odisha. In this study most common age group affected belongs to 21-30 yrs (68.2%) of age which is maximum and concordance to the study of Md. Sadequel et al as 63%.[8] It more commonly affects primigravida in 60.9% of cases as compared to multigravida, almost similar to Smith JW et al having 57% due to inadequate knowledge of personal hygiene and improper sexual practice.[9] It is found being commonest among 'O' blood group pregnant women in 58.2% cases, followed by group "A" in 30.9% cases, group B in 8.2% cases and group AB in 2.7% cases, concurrent to Wathne B et al having 58%,25%,12%,and 5% respectively.[10] Most common mode of presentation is frequency of urination (87.2%) cases followed by dysuria(81%) and fever with rigor & chill(51%). It is almost in agreement with Nkudic et al having frequency (80%), dysuria(67%) and fever with rigor & chill(60%).[11]

Maximum number of cases, 57.2% was presented with normal weight gain, remaining 42.8% presented with poor weight gain, due to chronic infection leading to anemia, similar to Layton R et al (36%).[12] E coli is isolated in majority of cases(69.1%), followed by 18.1% of cases of S. areus, 4.6% cases of Pseudomonas, 2.8% cases of Klebsiella, 1.8% cases of Candida albicans, 1.8% cases of Proteus and 1.8% cases of no growth. Similar results were obtained by Rahman MA et al revealing E Coli (75%), Staphylococcus (15%).[13]

Majority of cases (85.4%) are not in labor at the time of presentation out of which 63.9% of cases are without preterm contractions and 36.2% of cases are with preterm contractions. In this study 15% of cases are presented in labor, this is nearly similar to Savage WE et al revealing 70% being presented without preterm contractions and 21% of preterm contractions. [14] This higher figure is probably due to poor education regarding personal hygiene in southern Odisha. Out of all culture positive cases, 89.1% cases having colony count $>10^5$ CFU/ml in symptomatic urinary tract infection during pregnancy, 7.3% of these patients were of between 10^2 to 10^5 CFU/ml and 1.8% of cases have less than 10^2 CFU/ml which is not coinciding to Onifade AK et al, revealing 98% cases of patients showing $>10^5$ CFU/ml. [15] In response to treatment among all cases of symptomatic UTI with culture positive report, 82 cases (74.5%) treated by Nitrofurantoin, 16 cases(14.5%)by Amoxicillin+Clavulanic acid, 4 cases(3.6%) by Amoxicillin, 3 cases(2.7%) by Cefuroxime, 2 cases(1.8%) by Fluconazole and one case(0.9%) by Piperacillin+Tazobactum. This is not similar to the study conducted by Haddad et al having 81% sensitive to Nitrofurantoin as there is gradual increase of resistance.[16] Out of 110 cases 82.7% cases needed one course of antibiotic, 17.3% needed 2 courses of antibiotics out of which (89.5%)

are treated and 2 cases (10.5%) required third course of antibiotic which is not concurrent to Jamieson et al, reflecting 95% of cases requiring one course of antibiotic and only 5% of cases required reculture and retreatment with different antibiotics possibly due to Nitrofurantoin resistance.[17]

Among all, 67.2% are within 2-2.5 kg birth weight, followed by 20% in group of >2.5 kg and 12.8% in group of <2 kg, implicating UTI as a significant contributor for this outcome, concurrent to Laura A et al, reflecting 68% are in range of 2-2.5 kg. [18] So low birth weight as the most common complications followed prematurity in 66 cases (60%) IUGR in 19 cases (17.2%), IUD in 4 cases (3.6%) which is similar to Brumfitt W et al, having 62% of prematurity.[19] Out of 110 cases delivered, 61.8% are of SGA, 42 cases (38.2%) are appropriate for gestational age. No case (0%) of large for gestational age is detected which is similar to Fihn SD et al revealing 57% of SGA, 40% of normal for gestational and 3% of more than gestational age. [20] Commonest antepartum complication detected is preterm contraction (22.7%) which is similar to study done by Naeye RL. et al. Neonatal asphyxia is highest in 27% of cases, indicating increased incidence of intrapartum complications, similar to that of previous study having 30% of neonatal asphyxia. [21] Most common mode of delivery is vaginal (82.7%), followed by LSCS (17.3%), almost similar to Patton JP et al (75% of VD & 25% of LSCS). [22] Pre labour rupture of membrane is the most common indication for LSCS in the current study. E. Coli is strongly sensitive (SS) to Amoxicillin+Clavulanic acid & Piperacillin+Tazobactam. Klebsiella is strongly sensitive (SS) to amoxicillin, Cefuroxime, Amoxicillin+Clavulanic acid and Piperacillin+Tazobactm. Proteus species is strongly sensitive (SS) to amoxicillin, amoxicillin+clavulanic acid and Piperacillin + Tazobactm.

Pseudomonas is strongly sensitive (SS) to Amoxicillin+clavulanic acid and Piperacillin+Tazobactum. All the Candida species are strongly sensitive (SS) to Fluconazole. It is similar to the study conducted by M R Khatoun et al, showing E Coli is most sensitive to Amoxicillin+Clavulanic acid. [13]

Conclusion

In this study symptomatic urinary tract infection during pregnancy is found to be most commonly presented in primigravida in age group of 21-30 yrs (83%) 'O' blood group women. Majority of cases are having colony count > 10⁵ CFU/ml. E Coli and Staphylococcus are treated with nitrofurantoin as first line of drug. All the klebsiella and proteus were treated by Amoxicillin as first line of treatment. All pseudomonas are treated with Cefuroxime. Low birth weight is the most common complication, followed by prematurity, SGA, preterm contractions and neonatal asphyxia. Symptomatic urinary tract infection during pregnancy causes both maternal and fetal complications. The maternal complications includes PROM, oligohydraminos, PPH, anemia, Puerperal Pyrexia, Breast complications, preterm contraction, early labor, and last but not the least pyelonephritis. The fetal complications encountered are of prematurity. Intra partum complications included birth asphyxia, low birth weight baby and IUGR. It increases premature hospitalization and increases incidence of interference either in the form of instrumental delivery or emergency LSCS under adequate antibiotics coverage to avoid long term complications like recurrence and pyelonephritis. So any evidence of symptomatic urinary tract infection should be diagnosed as early as possible by urine culture and to be treated judiciously to prevent and improve maternal and perinatal outcome of each and every pregnancy.

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