Association between Urinary Tract Infections and Preterm Labour: A Case-Control Study

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Abstract

Introduction: Preterm labor is a significant cause of neonatalmorbidity and mortality. Urinary tract infections and Genital infections are related with increased incidence of preterm labor. This prospective case–control study was performedto see the association between preterm labor andurinary tract infections. *Patients and Methods:* A case control study was undertaken in a tertiary care centre. The study compriseof 162 subjects, which were further divided into cases and control with a ratio of 1:2. Cases n=54 and control group was n=108. All subjects were evaluated by detailed history , examination and following laboratory tests were done. Complete blood count (CBC), Urine Routine – Albumin, Sugar, Microscopy, Urine culture and sensitivity. Statistical analysis were done using SPSS version 20.0 Armonk, NY, USA. *Results:* In our study mean age of Patientsin cases was 23.29±2.96years and control was 23.98±3.59years. Urine culture was positive in 24.07% (n=13) in case group and 7.4% (n=8) in control group.The difference was statistically significant (pvalue-0.0031). *E.coli* was the most common organism in urine culture among both the groups. Most of organisms were sensitive for Gentamycin, Cotrimazole, Imipenem and Piperacilin in both groups. *Conclusion:* The present study shows significant association between Urinary tract infections and preterm labor. Urinary tract infections was 3.2 times more in preterm labor compared to term labor patients. Identification and treatment of Urinary tract infections at the earliest can prevent preterm labor and maternal morbidity.

Keywords: Preterm Labour; Urinary Tract Infections.

Introduction

Preterm labour is defined as the commencement of labour before 37 completed weeks of pregnancy and is a leading cause ofneonatal morbidity and mortality worldwide [1]. WHO hasestimated that 9.6 % of all births (about 13 million) in 2005 were preterm. Africa and Asia accounted for almost 11 million, whereas Indian incidence stands upto 13% [2]. The etiology of pretem labor often it is multifactorial. Evidence suggests that infection plays a role inpathogenesis of preterm labour and delivery. Urinary tract infections and Genital infections are related with increased incidence of preterm labor [3 4]. Urinary tract infections in pregnancy classified as Asymptomatic Bacteruria, Acute cystitis and Acute pyelonephritis. In pregnancy, significant physiological and anatomical changes occur in urinary tract leading to urinary stasis, compromised ureteric valves and vesicoureteric reflux, which facilitates bacterial colonisation and ascending infection. Hence, Asymtomatic Bacteruria is very common in pregnancy and risk ofacute pyelonephritis in 30-40% of untreated cases [5]. Identification of magnitude of urinary tract infection in preterm labor is very essential in India because of high prevalence [6].

Early diagnosis and treatment of Urinary tract infection may prevent preterm labor. This prospective case control study was performed to see the association between preterm labor and urinary tract infections.

Materials and Methods

The present study was conducted in the Department of Obstetrics and Gynaecology at a tertiary care centre. The study was approved by the hospital ethics committee, informed written consent of all the subjects were taken. Total of 162 subjects were divided into 2 groups cases (n=54) preterm labour between 28-37 weeks of gestation attending the labour ward and control (n=108) case of normal term pregnancy in labour attending the labour ward.

The Inclusion Criteria

1. Age group between 20-35 yrs. of age. Age groups matched.

2. All patients with preterm labour / normal term pregnancy in labour.Gestational age confirmed by LMP/USG in first trimester.

3. Preterm labour was documented according to ACOG criteria A) Regular uterine contractions occurring at a frequency of at least 1 in every 10 minutes, synchronizing with pain. B) Cervical dilatation greater than 1 cm.

4. Threatened preterm labour described as 4 uterine contractions in 20 minutes or 8 in 60 min + cervical dilation and <1 cm.

5. Preterm premature rupture of membrane.

Exclusion Criteria Included

1. Multiple pregnancy,

2. Ante preterm hemorrhage,

3. Pregnancy induced hypertension and

4. Patient who had received antibiotic within a span of 1 week.

Criteria for full term patients: Total of 108 normal term pregnancy in labour who crossed gestational age of 37 weeks were selected without any complications. All women were evaluated by detailed history and examination and fallowing laboratory tests were done.

1. Complete blood count (CBC),

2. Urine Routine – Albumin, Sugar, Microscopy,

3. Urine culture and sensitivity. Data collected were incorporated into Microsoft excel and imported into SPSS version 20.0 Armonk, NY, USA for statistical analysis.

Results

This prospective case control study was executed in 162 subjects. They were divided into case group consists of 54 preterm labor patients and control group consists of 108 term labor patients. The clinical profile of patients shown in Table 1. We have matched for age and parity. Clinical profile was almostsimilar in both groups. In both groups majority of women were between 20 and 30 yrs. Mean age was 23.29±2.96 years in case and 23.98±3.59 years in control group. Majority of women in cases were unbooked (70.37%). Table 2 represents the complete blood count in both the groups. Haemoglobin was observed to be slightly less in cases mean SD=9.10±1.26 as compared to control mean SD=9.79±1.15. Urine microscopy was positive in 29.62% (n=16) in case group and 9.25% (n=10) in control group. The difference was statistically significant (p<0.0001). Urine culture was positive in 24.07% (n=13) in case group and 7.4 %(n=8) in control group. The difference was statistically significant(p<0.0031). Urine culture 3.2 times more in case group than in control group. Five

Table 1: Clinical profile

Clinical profile	Cases	Control
No. of Patients	54	108
Mean age of Patients (years)	23.29±2.96	23.98±3.59
Parity status		
Primi	51.85% (n=28)	41.66% (n=45)
Multi Gravida	48.14% (n=26)	58.33 % (n=63)
Mean Gestational Age (weeks)	33.22±2.14	38.73±0.99
Booked	29.62% (n=16)	72.22% (n=78)
Unbooked	70.37% (n=38)	17.78% (n=30)

patients in case group who were positive for microscopy had no growth on culture. Two participants in control group who were positive for microscopy had non-significant bacteruriaon culture. *E. coli* was the commonest organism in both groups. Second commonest organism was *Klebsiella pneumonia* (Table 4). Two patients were normal on

microscopy in case group, but on culture one had E. coli growth and one had *Non Albicans candida* (*Candida tropicalis*). One patient in control group was positive for both *E. coli* and *Klebsiellapneumoniae*. Most of organisms were sensitive for Gentamycin, Cotrimazole, Imipenem and Piperacilin in both groups (Table 5).

Table 2: Complete blood count

Parameters	Cases	Control
Haemoglobin	9.10±1.26	9.79±1.15
Total count	11552.04±3178.47	11321.3±2547.622
Neutrophils	73.92±5.24	72.80±4.88
Lymphocyte	22.25±5.38	23.07±4.61
Eosinophil	2.46±1.10	2.78±1.31
Monocyte	1.42±0.85	1.33±0.95
Basophil	0	0.009±0.09

Table 3: Urine Microscopy and Urine Culture

Urine Microscopy	Case group	Control group	p-value
NAD	29.62%(n=16)	34.25%(n=37)	
Less than 5 pus cells/HPF	40.74%(n=22)	56.48%(n=61)	0.0001*
More than 5 pus cells/HPF	29.62%(n=16)	9.25%(n=10)	
Urine Culture	**Case group**	**Control group**	
No growth	62.96%(n=34)	71.29%(n=77)	
Non-significantbacteruria (NSB)	12.96%(n=7)	21.29%(n=23)	0.0031*
Culture positive	24.07%(n=13)	7.4%(n=8)	

*p<0.05 statistically significant

Table 4: Microorganism isolated from the urine sample

Microorganism	Case group	Control group
E. coli	12.96 (n=7)	6.48 (n=6)
E. Coli + Klebsiellapneumoniae	-	0.92 (n=1)
Klebsiellapneumoniae	7.4 (n=4)	0.92 (n=1)
Non-albicans Candida Infection	1.85 (n=1)	-
Staphylococcus aureus	1.85 (n=1)	-

Table 5: Antibiotic sensitivity

Antibiotic	Cases		Control		Resistant	Sensitive
	Resistant	Sensitive	Resistant	Sensitive	p-value	
Ampicillin	14.81 (n=8)	1.85 (n=1)	5.55 (n=6)	0.92 (n=1)	0.1483	0.0289*
Cefazolin	9.25 (n=5)	-	2.77 (n=3)	2.77 (n=3)		
Cefuroxime	16.66 (n=9)	1.85 (n=1)	5.55 (n=6)	0.92 (n=1)		
Ceftazidime	1.85 (n=1)	3.70 (n=2)	2.77 (n=3)	2.77 (n=3)		
Clavulinic acid	1.85 (n=1)	5.55 (n=3)	1.85 (n=2)	3.70 (n=4)		
Gentamycin	1.85 (n=1)	14.81 (n=8)	-	2.77 (n=3)		
Ceftixone	1.85 (n=1)	-				
Cotrimazole	5.55 (n=3)	16.66 (n=9)	0.92 (n=1)	4.62 (n=5)		
Norflox	16.66 (n=9)	3.70 (n=2)	4.62 (n=5)	2.77 (n=3)		
Nitrofuratoin	-	7.40 (n=4)	-	1.85 (n=2)		
Ciprofloxacin	5.55 (n=3)	3.70 (n=2)	-	1.85 (n=2)		
Netimycin	-	9.25 (n=5)	-	1.85 (n=2)		
Imipenem	1.85 (n=1)	7.40 (n=4)	0.92 (n=1)	6.48 (n=7)		
Piperacilin	-	9.25 (n=5)	-	8.33 (n=9)		
Naldixic acid	3.70 (n=2)	-	-	1.85 (n=2)		

*p<0.05 statistically significant

Discussion

In the present study Primi status was 51.85% (n=28) in cases and 41.66% (n=45) in control, Multi Gravida status was 48.14% (n=26) in cases and 58.33 % (n=63) in control. The mean age of subjects was 23 years in both the groups with majority of the women having the status of unbooked (70.37%) in case group. The findings of our study were similar to that of verma*et al., 2014* [6]. Further, complete blood count was analyzed in cases and control (Table 2), a similar picture in both groups was observed. However haemoglobin was slightly less in case group as compared to control group, hence Complete blood count is not a predictor of asymptomatic bacteruria. The urine microscopy was found positive 3.2 times more in case group than in control group. A significant association was observed in more than 5 pus cells/HPF. However, there are very less studies which have discussed about complete blood count and urine microscopy [6,7]. The prevalence rate of Urinary tract infection in our study is 24.07% in case group compared to 7.4% in control group. *E. coli* was observed to be the commonest organism in both the groups. The results were in concordance with the studies published previously by verma *et al.* and patil *et al.* [6,7]. The overall prevalence of urogenital infection in study done by GhunageVrishali was 34 % [8]. Other studies have included genital infection along with urinary tract infections [6,7,8,9]. Study done by Alaa El Dien M S Hosney et al. showed no association between Urinary tractinfections and preterm labor [9]. Most of organisms were sensitive for Gentamycin, Cotrimazole,Imipenem and Piperacilinin both groups in our study, whereas organisms were sensitive to Cephalexin, Amoxicillin and clavulenic acid, Ciprofloxacin and Piperacillin in study done by Verma *et al.* [6]. Urine culture has traditionally been the gold standard screening assessment but,despite excellent sensitivity, laboratory time and costs are considerable and it takes 24-48 hours to obtain results. Urine microscopy and reagent strip analysis have been postulated as alternatives to culture but concerns remain over the efficacy of these technique [10]. In low resource setting we can use Urine microscopy as a screening test.

Conclusion

We conclude that in our study there is a significant association between Urinary tract infections and preterm labor. Urinary tract infections was 3.2 times more in preterm labor compared to term labor patients.Urinary tract infections is common in pregnancy due to anatomical and physiological changes. All pregnant women should be adequately screened for Urinary tract infections by Microscopy and culture should be done whenever necessary. Identification and treatment of Urinary tract infections at the earliest can prevent preterm labor and maternal morbidity.

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