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The Study of Association of Urogenital Infections as a Risk Factor for Spontaneous Preterm Labour

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Conflicts of Interest: Nil.

Abstract

Background

Prematurity is the condition where the fetus enters the extra uterine life with biological immaturity. Maturation is defined as the process of completing full development or growth [1]. The embryo and fetus matures intrauterine until organ systems supports the extra uterine life. Thus the degree of maturity is the foremost and main determinant for morbidity and mortality of the neonate. Born too soon babies are more prone for neurological disability, learning disabilities, injury to organs, death, chances of chronic illness and lifetime disability than the term newborns. Since there is no good direct measure for degree of maturity, gestational age calculated during pregnancy is used as a proxy measure of it[1].

Methods

After clearance from the hospital ethics committee, this case– control study was undertaken in the Department of Obstetrics and Gynaecology at Kilpauk Medical College and Hospital Chennai from April 2016 to September 2016. Written informed consent was obtained from the women explaining it to them in their language they best understand. Minimum sample size of women with 7 % prevalence of genito urinary infections among antenatal cases not having preterm labor and 30 % prevalence of genito urinary infections among antenatal cases in preterm labor, with a confidence limit of 95 % and a power of 80 was calculated 50 sample size for both study and control groups.

Aims & Objectives

To find out the association of urogenital infection as a risk factor for spontaneous preterm delivery

Results

In our study, of the case group 50 women were in 21–30 years of age group and no of women in <21 yrs 60% (30/50) of these were primigravida, multiparous 36% (18/50) and women with previous one abortion is 4% (2/50). In control group of 50 women 48 belonged to 21 to30 yrs age group and 2 of 50 <21 years of age. The control group contained 54% (27/50) of prime gravida, 38% (19/50) were multigravida and 8% (4/50) with previous one abortion.

Conclusion

I conclude that, in my study, those patients with high vaginal swab positivity are associated with a significant increase in the incidence of preterm labour. In other words vaginal infection was 2.80 times more in women with preterm labor compared to those in control group. And urinary infection is 4 times higher in women with preterm labour compared to those in control group, which indicates a significant association of urogenital infections in preterm labor. Urogenital infections contribute significantly to the preventable causes of

preterm labor

Key factors

Pre term labour & Urogenital Infection.

Introduction

Preterm labour may be defined as onset of regular uterine contractions associated with cervical changes i.e. cervical effacement and dilatation between the period of fetal viability and before 37 completed weeks of gestation (WHO, 2003; ACOG, 2012).

Incidence

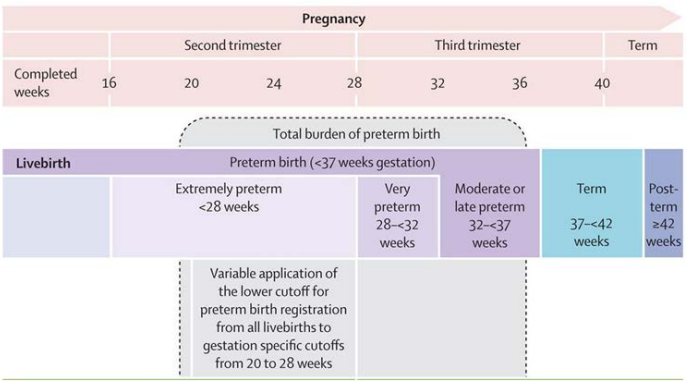
Incidence of preterm birth was 12% of all deliveries and accounts for majority of neonatal deaths and nearly half of all cases of congenital neurological disability, including cerebral palsy (Ross and Eden, 2009). Of all preterm births that occur, 40 - 45% result from onset of labour, 25-30% result from PPROM and 30 - 35% are medical decisions to terminate pregnancy.

PTBs resulting from labour or PPROM are referred to as spontaneous PTB. [2]

Sub Categories of Preterm

There are two sub-categories of preterm

Based on gestational age:



PTBs are divided into different categories .

The period of viability varies in different countries. It varies from 20 weeks to 28 weeks. In India the period of viability is 28 weeks. Hence its categorised as

* Late preterm (34-36 weeks)
* Moderate preterm (32-33 wks)
* Very preterm (28-31 wks)

Based on causes and risk factors

(1) Spontaneous preterm delivery which means spontaneous onset of labour. It also denotes onset of labour following preterm prelabour rupture of membranes (PPROM)

(2)Provider-initiated premature delivery which means Planning for induction of labour or planning elective lower segment caesarean delivery before 37 completed weeks of gestation for maternal or fetal indications. It may be emergency or elective for either as a life saving for mother or fetus, or for any other non medical reasons.

Pathogenesis

Preterm birth is multi factorial in origin. The risk factors like ischemia and infection cause the stimulation of fetal hypothalamic pituitary axis and it plays a major role in prematurity in addition to interaction of all three immune, paracrine, and endocrine systems.

Premature labour occurs as a result of three natural processes occurring concurrently prior to 37 weeks of gestation. These 3 natural processes start in a cyclical manner resulting in an increased uterine contraction, fetal membrane activation and cervical ripening .

Inclusion criteria: Only women with singleton pregnancy were included in this study. Case group I included the antenatal patients who was admitted in the labor ward with threatened preterm labor and in preterm labor with or without rupture of membranes after 28 weeks and before 37 completed weeks of gestation. Control group II consisted of antenatal women visiting antenatal Outpatient department of the hospital for routine antenatal check-up at completed or more than 37 weeks of gestation with or without history of preterm labor and matched to the case group with respect to age(teenage pregnancy, pregnancy at 20–30 years, and

pregnancy after 30 years) and parity (primigravida or multigravida).

Exclusion criteria: Women with twin pregnancy or higher-order pregnancy, and women with antepartum hemorrhage were excluded from the study. Preterm labor was documented according to ACOG criteria (1997) as four uterine contractions in 20 min or eight in 60 min plus progressive change in the cervix; cervical dilatation greater than 1 cm; and cervical effacement 80 % or greater at gestation 37 completed weeks. Threatened preterm labor was described as four uterine contractions in 20 min or eight in 60 min plus cervical dilatation less than 1 cm; and cervical effacement less than 80%. Leaking, i.e., rupture of membranes was diagnosed by per speculum examination and confirmed by litmus paper (change of colour from red to blue). All women were evaluated by detailed history compiled with special emphasis on previous history of preterm labor, previous bad obstetric history and urogenital infections. Gestational age was calculated from date of last menstrual period using Naegeles formula or by first ultrasound in the first trimester of pregnancy. All women underwent general physical, systemic, and obstetrical examinations. Samples from posterior fornix of vagina were taken with two sterilized swabs under direct vision using Cusco/Sims speculum before first vaginal examination and were studied for gram stain characteristics and culture-sensitivity by standard methods. Mid stream urine sample was sent for cytology and culture-sensitivity. Sample for aerobic culture sensitivity was sent immediately to the Microbiology Department of the hospital and taking all aseptic precautions; these samples were inoculated on blood agar and MacConkey's agar using semi-quantitative method of inoculation. The culture plates were incubated at 37 degree Celcius for a duration ranging from 24 to 48 hours. Isolates were identified by standard methods.

Women admitted with preterm labor were put on tocolytics (where required), or steroids therapy (\34 weeks of gestation), and antibiotics (cephalosporins) were started in women with ruptured membranes. Reports of the urine and high vaginal swab cultures were collected and recorded.

Results and Discussion

In our study, of the case group 50 women were in 21–30 years of age group and no of woman in <21 yrs 60% (30/50) of these were primigravida, multiparous 36% (18/50) and women with previous one abortion is 4% (2/50). In control group of 50 women 48 belonged to 21 to 30 yrs age group and 2 of 50 <21 years of age. The control group contained 54% (27/50) of prime gravida, 38% (19/50) were multigravida and 8% (4/50) with previous one abortion, there was no statistically significant difference in relation to age distribution between cases group (mean=26.50, SD=1.85) and control group (mean=25.38, SD=2.07) with a p value of <0.05 as per unpaired t test. And also no statistically significant difference in relation to parity status between cases group (majority primi – 60.00%) and control group majority primi – 54.00% with a p value of <0.05 as per Fishers exact test. Therefore we fail to reject the null hypothesis that there is no difference in age distribution between the study groups. Case group has 9 unbooked women compared with control group which was statistically insignificant (P 0.2679). There was no statistical difference (P 0.6805) in the socioeconomic status of the two groups. In the case group 33 women and in control group 32 women belonged to upper middle and lower middle class of socioeconomic scale.7 women in my study were of lower socioeconomic class. No Statistical significance of

age, parity, booking status and employment status was not noted in my study.

There is a statistically significant difference in relation to pregnancy BMI status between cases group (majority normal pregnancy BMI – (62.00%) and control group (majority normal pregnancy BMI – 78.00%) with a p value of <0.05 as per Fishers exact test. Therefore we reject the null hypothesis that there is no difference in pre pregnancy BMI status between the study groups.

The incidence of overweight and obese category of pre pregnancy BMI was significantly more in cases group compared to control group by a percentage difference of 20.00 percentage points (83% higher). This difference is significant with a p-value of 0.0297 as per Fisher's exact test. My observation is similar to the results of Cnattinqius et al.

Past history of preterm labor or abortion in previous pregnancy was seen in 20.1%) multigravida in Case group compared with 6.22% in Control group showing a significant association with p value of 0.0411 of the past history of abortion or preterm labor and the women going into preterm labor in the present pregnancy. Pandey et al., also reported that past history of preterm births was a significant contributory factor for preterm labor.

In a study by Chhabra and Patil, 14% of women with PTL had urine infection and 28% had cervical colonization. My preterm group showed urinary tract infection in 16% and genital tract infection in 28%, while 4 women had both cultures positive which is comparable to the observations by Chhabra and Patil. Commonest microorganism isolated in urine culture was E coli. and that in high vaginal swab was Enterococcus fecalis. In control group, urinary tract infection was seen in 4%, positive high vaginal swab culture in 10% and both in 2.1 % women.

In the case group, overall urinary tract infection was detected in 16.38% (8/50) which was 3.3 times more than that in the control group (5.77%, 2/50). This shows that women in preterm labor had 3.3 times more incidence of urinary tract infection than their counterparts with term pregnancy. My observations are similar to the results of Pandey et al. who reported urinary tract infection in 20.34 % of women in preterm labor and those of McPheeters et al. who reported 17.1% of urinary tract infection in women with preterm labor and 10.9% in women without preterm labor. In my study, positive high vaginal swab cultures were noted in 28.00% (14/50) in the Case Group and 10.38% (5/50) in Control Group. Lajos et al., reported the prevalence of endocervical colonization to be 14.20% in preterm labor or premature of membranes similar to that of this study.

Conclusion

I conclude that, in my study, that patients with high vaginal swab positivity are associated with a significant increase in the incidence of preterm labour. In other words vaginal infection was 2.80 times more in women with preterm labor compared to those in control group. And urinary infection is 4 times higher in women with preterm labour compared to those in control group, which indicates a significant association of urogenital infections in preterm labor. Urogenital infections contribute significantly to the preventable causes of preterm labor. We recommend that women coming for first antenatal check-up should be investigated for the presence of asymptomatic genitourinary infections. Making early diagnosis of urogenital infections and treating them adequately with the antimicrobials will go a long way in decreasing the incidence of preterm labour, preterm births and associated neonatal and maternal morbidities.

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Table: 1

Gestational Age - Groups	Cases	Controls	Cases %	Control %
≤ 28 weeks	2	0	4.00	0.00
29-32 weeks		0	26.00	0.00
33-36 weeks	35	0	70.00	0.00
37-40 weeks	0	50	0.00	100.00
Total	50	50	100	100

Table: 2

Previous History of Preterm Delivery	Cases	Controls	Cases %	Control %
Yes	10	3	20.00	6.00
No	40	47	80.00	94.00
Total	50	50	100	100
P value Fishers Exact Test			0.0411	

Table: 3

Urine Culture	Cases	Controls	Cases %	Control %
Positive	8	2	16.00	4.00
Negative	42	48	84.00	96.00
Total	50	50	100	100
P value Fishers Exact Test			0.0437	

Table: 4

Organism Isolated in urine	Cases	Controls	Cases %	Control %	P value Fishers Exact Test
Escherichia coli	5	2	10.00	4.00	0.2739
Enterococcus	1	0	2.00	0.00	0.5000
Staphylococcus aureus	2	0	4.00	0.00	0.2475
Nil	42	48	84.00	96.00	
Total	50	50	100	100	

Table: 5

High Vaginal Swab	Cases	Controls	Cases %	Control %
Positive	14	5	28.00	10.00
Negative	36	45	72.00	90.00
Total	50	50	100	100
P value Fishers Exact Test			0.0245	

Table: 6

Organism Isolated in HVS	Cases	Controls	Cases %	Control %	P value Fishers Exact Test
Escherichia coli	4	3	8.00	6.00	0.7180
Enterococcus	7	2	14.00	4.00	0.0952
Staphylococcus aureus	3	0	6.00	0.00	0.1212
Nil	36	45	72.00	90.00	
Total	50	50	100	100	

Table: 7

Presence of Urogenital Infection	Cases	Controls	Cases %	Control %
Both +ve	4	1	8.00	2.00
Urine +ve / HVS -ve	4	1	8.00	2.00
Urine -ve / HVS +ve	10	4	20.00	8.00
Both -ve	32	44	64.00	88.00
Total	50	50	100	100
P value Fishers Exact Test			0.0425	