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Incidence of Chorioamnionitis in preterm deliveries at Northern Indian hospital: A prospective study

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Abstract

Background: Objective: Preterm birth is a major obstetric problem, which is associated with high perinatal mobidity and mortality. Genital infection is postulated to play an important role in preterm delivery. We planned to study genital infections as a cause of preterm delivery. **Subjects and Methods:** This study was conducted in Department of Obstetrics and Gynecology, Kamla Nehru State Hospital for Mother and Child IGMC Shimla, on 200 women attending antenatal outpatient department over one year. After history and investigations, blood samples were taken for TLC &CRP. High vaginal swab was sent for culture and Nugent scoring for bacterial vaginosis. Placenta was sent histo-pathological examination. Tissue samples from each placenta and roll of membranes from rupture point to placental margin were sent for bacterial culture. **Results:** History of preterm birth is a significant risk factor for preterm delivery. Increased TLC and Positive vaginal culture were significantly associated with preterm delivery. CRP was not found significantly associated with preterm delivery. Presence of clue cells and gram negative bacilli on vaginal smears as a marker of bacterial vaginosis had significant association with preterm birth. Histological evidence of chorioamnionitis in placenta as well as grade of chorioamnionitis was associated with preterm delivery. **Conclusion:** Genital infections, in the form of bacterial vaginosis and chorioamionitis, are significant causes of preterm delivery.

Keywords: Early preterm, Chorioamnionitis, Period of gestation, Preterm delivery.

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Introduction

Preterm birth is a major obstetric problem, which is associated with high perinatal mobidity and mortality.[1,2] The incidence of pretem in developed countries is about 10 percent but in many developing countries it is more than 15 percent. World Health Organisation has mentioned in one of its reports that there are 15 million preterm births globally and one million perinatal mortalities annually.[2] There are multiple factors causing premature birth including multiple pregnancy, preterm prelabor rupture of membranes, preeclampsia, APH, miscellaneous and intra uterine infection /chorioamnionitis. Chorioamnionitis is inflammation of chorion, amnion and placenta. Clinically we can ascertain by uterine tenderness, abdominal pain, maternal tachycardia, foul smelling discharge, FHS more than 160/bpm, WBCs more than 15000/cu mm and positive C-reactive protein. Subclinical or histological chorioamnionitis is based on microscopic evidence of inflammation. It is well established that genital infection plays an important role in preterm delivery. Early preterm deliveries are typically associated with histological chorioamnionitis. Infection ascends from vagina to uterus and bacteria that invade choriodecidual space releases endotoxins and exotoxins which activates transcription factors which produce cytokines and chemokines TNF within the deciduas and fetal membranes which stimulate prostaglandin and metalloproteases. These leads to uterine contractions and lysis of membranes causing their ruptureand preterm delivery. Morbidity and mortality in preterm neonates correlates with their gestational age at birth.[3,4]

Aims and Objectives

To study genital infections as a cause of preterm delivery.

Subjects and Methods

It is a prospective observational study conducted in Department of Obstetrics and Gynecology, Kamla Nehru State Hospital for Mother and Child IGMC Shimla, on 1000 women attending antenatal outpatient department over one year. Study group included 100 cases admitted with Spontaneous preterm labour and 100 control cases in labour at term. Those who met the inclusion criteria were included in cases.

Inclusion criteria

1) Singleton Pregnancy.
2) Gestational age 28 weeks - 36 weeks 6 days.
3) Spontaneous onset of preterm.

Exclusion criteria

1) Gestation less than 28 weeks.
2) Multiple pregnancy.
3)Fetal malformation and intrauterine death.
4) Premature rupture of membrane and chorioamnionits.
5) Pregnancy with medical disorders.

Controls

Inclusion criteria

1) Gestational age ≥ 37 weeks.
2) Singleton pregnancy.
3) Intact membranes.

Exclusion criteria

1) Gestation age <37 weeks.
2) Rupture membrane.
3) Multiple pregnancy.
4) Obvious chorioamnionitis.
5) Fetal malformation and intrauterine death.
6) Pregnancy complicated with medical disorders or obstetric complications.

Patients were admitted and detailed history was taken then examination was done. Blood samples were taken for TLC &CRP. High vaginal swab was sent for culture sensitivity and vaginal secretions were taken on glass slide, heat fixed and then sent for gram staining to look for microorganisms and to diagnose bacterial vaginosis by Nugent scoring. Antibiotics were given to all cases as protocol5. Following delivery placenta was sent histo-pathological examination. Tissue samples from each placenta and roll of membranes from rupture point to placental margin were sent to microbiologist. Microbiologist and Pathologist were not provided any clinical information.

Nugent score

Table 1: Nugent Score.

Lactobacilli	Score	Gardnerella	Score	Curved g-bacilli	Score	Sum=N
≥ 30	0	0	0	0	0	0
5-30	1	<1	1	<1	1	3
1-4	2	1-4	2	1-4	1	5
<1	3	5-30	3	5-30	2	8
0	4	≥30	4	≥30	2	10

Interpretation of Nugent Score

If N score is And Then Report:
0 -3 Smear isNOT consistent
4-6 Clue cells not present
4-6 Clue cells are present smear is consistent with BV
=or .[7]

After delivery placenta, umbilical cord and Chorion was seen for acute inflammatory changes by Pathologist and graded according to modified grading system by Salafia et al.

Grade 1 Presence of one focus of 5polymorphnuclearleucocytes.
Grade 2 More than one focus of grade 1 or 5-20 polymorphonuclear leucocytes.
Grade 3 Multiplefoci of grade2.
Grade 4 Acute diffuse inflammation.

Fetal outcome was measured by weight, APGAR and number of newborn admitted to nursery. Maternal outcome was seen by signs and symptoms of chorioamnionitis and hospital stay.

Results

In both groups maximum number were in age group 21-30 years. Mean age in group was 24.68 and in controls were 25. 47years.

Table1: Distribution of women according to Age.

Age(years)	Cases			Controls		
	Group 1 (28-<32 weeks)	Group 2 (32-37) weeks		Group 1	Group 2	
<20	6 (18.7%)	5 (7.2%)	0.088	11 (11%)	6 (6%)	0.203
20-30	24 (75%)	56 (82.4%)	0.390	80 (80%)	89 (89%)	0.077
>31	2 (6.3%)	7 (10.4%)	0.508	9 (9%)	5 (5%)	0.267
Total	32	68		100	100	

Table 2: Distribution of women according to Socio-economic Status.

Socio-economic Status	Cases			Controls		
	Group 1 (28-<32 weeks)	Group 2 (32-37) weeks		Group 1	Group 2	
Class 1	2 (6.2%)	5 (7.3%)	0.840	7 (7%)	5 (5%)	0.550
Class 2	4 (12.45%)	12 (17.6%)	0.512	16 (16%)	26 (26%)	0.082
Class 3	10 (31.5%)	19 (27.9%)	0.732	29 (29%)	34 (34%)	0.445
Class 4	13 (40.5%)	24 (35.2%)	0.605	37 (37%)	29 (29%)	0.228
Class 5	3 (9.2%)	8 (11.8%)	0.712	11 (11%)	6 (6%)	0.203
Total	32	68		100	100	

Table 3: History of previous abortion/preterm.

History of Abortion/ Preterm	Cases			Controls		
	Group 1(28-<32 weeks)	Group 2 (32-37) weeks		Group 1	Group 2	
Abortion	6 (18.7%)	10 (14.7%)	0.605	16 (16%)	18 (18%)	0.706
Preterm	8 (25%)	7(10.3%)	0.054	15 (15%)	6(6%)	0.036*
None	18 (56.4%)	51 (75%)	0.058	69 (69%)	76(76%)	0.266
Total	32	68		100	100	

Table 4: Total Leucocyte Count Values(TLC).

Total Leucocyte Count (/mm3)	Cases			Controls		
	Group 1 (28-<32 weeks)	Group 2 (32-37) weeks		Group 1	Group 2	
<12000	14 (43.8%)	48 (70.6%)	0.009*	62 (62%)	67 (67%)	0.4
≥12000	18 (56.2%)	20(29.4%)	0.4	38 (38%)	33(33%)	
Total	32	68		100	100	

Table 5: C-Reactive Protein Values (CRP)

C-reactive Protein (CRP)	Cases			Controls		
	Group 1 (28-31.6 weeks)	Group 2 (32-36.6) weeks		Group 1	Group 2	
>6	7 (21.85%)	8 (11.6%)		15 (15%)	12 (12%)	
<6	25 (78.15%)	60(88.3%)	0.186	85 (85%)	88(88%)	0.5
Total	32	68		100	100	

Table 6: Vaginal swab culture.

Swab Culture	Cases			Controls		
	Group 1 (28-31.6 weeks)	Group 2 (32-36.6) weeks		Group 1	Group 2	
E.coli	10 (31.3%)	16 (23.6%)	0.411	26 (26%)	7 (7%)	0.0002*
Staph	1 (3.2%)	3 (4.4%)	0.758	4 (4%)	5 (5%)	0.734
Strepto	5 (15.7%)	4 (5.8%)	0.112	9 (9%)	7 (7%)	0.603
Candida	2 (6.3%)	5 (7.4%)	0.839	7 (7%)	6 (6%)	0.732
Sterile	9 (28.1%)	33 (48.6%)	0.053	42 (42%)	59 (59%)	0.016*
Mixed	3 (9.4%)	5 (7.4%)	0.729	8 (8%)	8 (8%)	1.000
Contaminants	2 (6.3%)	2 (2.9%)	0.430	4 (4%)	8 (8%)	0.233
Total	32	68		100	100	

Table 7: Gram staining of Vaginal Smears.

Swab Culture	Cases			Controls		
	Group 1(28-31.6 weeks)	Group 2 (32-36.6) weeks		Group 1	Group 2	
Clue Cells	7 (21.8%)	11 (17.2%)	0.271	23 (23%)	12 (12%)	0.040*
G+cocci	6 (8.74%)	8 (11.7%)	0.341	14 (14%)	18 (18%)	0.440
G-diplo	2 (6.2%)	2 (6.9%)	0.430	4 (4%)	3 (3%)	0.700
G-bacili	9 (28.1%)	13 (19.1%)	0.310	24 (24%)	12 (12%)	0.029
Commensals	4 (12.1%)	23 (33.8%)	0.025	21 (21%)	36 (36%)	0.043
Insignificant	4 (12.5%)	11 (16.2%)	0.631	14 (14%)	19 (19%)	0.340
Total	32	68		100	100	

Table 8: Reports of HPE of Placenta (Histo-pathological Examination).

Chorioamnionitis	Cases			Controls		
	Group 1(28-<32 weeks)	Group 2 (32-37) weeks		Group 1	Group 2	
Present	26 (81.1%)	23 (33.9%)	0.05*	49 (49%)	26 (26%)	0.0007*
Absent	6 (18.9%)	45(66.1%)	<0.05	51 (51%)	74 (74%)	
Total	32	68		100	100	

Table 9: Grade of Chorioamnionitis on HPE.

Grade of chorioamnionitis on HPE.	Cases			Controls		
	Group 1(28-31.6 weeks)	Group 2 (32-36.6) weeks		Group 1	Group 2	
Grade 4	9 (28.2%)	4 (5.9%)	0.002*	13 (13%)	2 (2%)	0.003*
Grade 3	8 (25%)	4 (5.8%)	0.006*	12 (12%)	4 (4%)	0.037*
Grade 2	4 (12.5%)	6 (8.9%)	0.567	10 (10%)	7 (7%)	0.446
Grade 1	5 (15.6%)	9 (13.2%)	0.748	14 (14%)	13 (13%)	0.598
Absent	6 (18.7%)	45 (66.1%)	0.000*	51 (51%)	74 (74%)	0.007
Total	32	68		100	100	

All subjects were classified according to the modified Kuppuswamy Socioeconomic status scale. Majority of study population falls in category 3 and 4.15 Cases had history of preterm while in control only 6 had history of preterm which was Significant but abortion had no much role in preterm.

Increased TLC was present in 38 subjects in cases and in 33 in controls, which was significant.

In cases only 15 had CRP >6 and in controls 12 subjects had >6 which was not significant.

E. Coli was present in 26 cases and 7subjects in controls. The difference was significant.42 subjects in cases had sterile culture and 59 in controls had vaginal culture sterile which was also significant.

In cases out of 100, 23 had clue cells as compared to 12 in controls which was significant.24 cases had gram negative bacilli and 12 control had gram negative bacilli ,which was also significant.

In cases, 49 had chorioamnionitis and in controls only 26 had evidence of chorioamnionitis histopathologically. This was significant statistically.

Out of 100 cases, 13 had Grade4 and 12 had Grade 3 chorioamnionitis while in control group only 2had Grade 4 and 4 subjects had Grade 3 chorioamnionitis. This difference was statistically significant.

Discussion

Preterm birth is associated with high perinatal morbidity and mortality.Evidence implicating infection in aetiology of preterm dates back to 1960's. Now it is well established that infection is a cause of preterm labour in about 40% of cases,[6-10] Even if membranes are intact genital infection plays an important role in preterm labour. Subclinical chorioamnionitis is more prevalent in preterm than in term deliveries. Women with previous history of preterm with subclinical chorioamnionitis are at higher risk for preterm. Vaginal swab culture and gram staining of vaginal smear must be taken in high risk cases so that early intervention may be done to avoid neonatal complications.

Conclusion

Genital infections, in the form of bacterial vaginosis and chorioamionitis, are significant causes of preterm delivery.

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