Original article

Spontaneous preterm delivery and risk factors at Tribhuvan University Teaching Hospital

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Background: Preterm delivery is one of the major health problems in both, developing and developed countries because it is associated with increased perinatal morbidity and mortality.

Methods: This was an unmatched hospital based case control study. The cases were the postpartum women, who delivered after 22 weeks and before 37 completed weeks of gestation and the controls were those postpartum women, who delivered after 37 completed weeks of gestation. The estimated sample size for preterm delivery (case) were 64 and for term delivery (control) were 128, with case to control ratio being 1:2.

Results: There total number of deliveries during the study period was 1192. Of the total deliveries, 64 spontaneous preterm deliveries and 128 term deliveries were enrolled for the study, giving the prevalence of spontaneous preterm delivery = 5.5%. The previous preterm delivery, urinary tract infections in the index pregnancy and heavy physical activity during pregnancy showed strong independent risk for preterm delivery. The adjusted odds ratio for previous preterm delivery was 13.13, 95% CI 2.48-69.8 and P-value = .003. Similarly, adjusted odds ratio for urinary tract infection was 7.6, 95% CI 1.2-47.3 and p = .028. The farmers carried highest adjusted odds ratio of 14.8, 95% CI 2.8 – 78.2 and p = .001 and the adjusted odd ratio for small- scale business- women was 8.0, 95% CI 2.18 – 29.4 and p = .002.

Conclusion: The study concluded that previous preterm delivery, urinary tract infection and heavy physical activity during pregnancy were independent risk factors for preterm delivery.

Key words: Preterm delivery, urinary tract infection, physical activity, pregnancy.

Introduction

According to World Health Organizations, preterm delivery is defined as the delivery occurring at less than 37 completed weeks of gestation or less than 259 days from the first day of last menstrual period after the age of viability of the fetus, i.e. 22 weeks[1]. The lower limit of the definition is less clear, differs from country to country and varies from 20 to 28 weeks of gestation depending upon the neonatal care facility available in the country. This unconsensus in acceptability of the lower limit of the definition leads to variation in incidence of preterm delivery in different places. The overall incidence is cited as 7-10%[2].

The exact cause of preterm labor and preterm birth are unknown. Certain maternal systemic diseases including urogenital infections, and congenital uterine anomalies are taken as causes for preterm delivery in some cases. Till now the identifiable fetal causes for preterm births have been congenital anomalies, intra uterine growth retardation, intra uterine fetal death and fetal infections with TORCH (Toxoplasma, Rubella, Cytomegalo virus, Herpes and other viruses) and chorioamnionitis[3].

Preterm delivery has been a major concern for patients, obstetricians as well as for pediatricians because it is the most common cause of perinatal mortality and morbidity.

The most serious and common outcome of preterm births is neonatal respiratory distress syndrome, intraventricular haemorrhage, necrotising enterocolitis, neonatal infections, and metabolic complications like hypoglycemia, electrolyte

imbalance and neonatal jaundice. In addition it is responsible for nearly half of all cases of congenital neurological disability, including cerebral palsy[4].

With lots of expences in neonatal care, survival has improved but which is again challenged by life long neurological impairment[5].

Till date tocolytics are the only remedy in present obstetrical practice in order to prolong the pregnancy only for the 24-48 hours to allow adequate effect of steroids given for fetal lung maturity. Moreover other mechanical efforts like cervical encirclage also have been tried but have not proved to be effective.

Investigators have been trying to predict preterm births by various means as for example frequent pelvic examinations and cervical length assessment, measurement of cervical length by USG, estimation of fibronnectin, which is drained from fetal membrane into vaginal secretions, home monitoring of uterine activity and cervical swab for culture and sensitivity. All these measures may only help to predict preterm births not prolong the duration of pregnancy.

Recently, researchers have given more importance to the primary prevention of preterm births by detecting the modifiable or reducible risk factors. The reduction or modification of such risk factors may be an essential step in primary prevention programs for preterm births.

Therefore, this study aims to explore the common risk factors for spontaneous preterm delivery in women delivering at Tribhuvan University Teaching Hospital, Department of Obstetrics and gynecology.

Material and Methods

An unmatched hospital based case- control study was conducted in Tribhuvan University Teaching Hospital, department of Obstetrics/Gynecology during December 2004 to July 2005.The cases were the pregnant women who with spontaneous onset of labor, delivered before 37 completed weeks of gestational age and after 22 weeks of gestation by LMP or by USG. And the controls were the women with singleton pregnancy, who delivered after completion of 37 weeks of gestational age calculated by LMP or by USG at the same place, as did the cases during the same time period. The preterm deliveries, which for fetal and maternal indications, were induced or underwent cesarean section before the onset of spontaneous onset of labor were excluded from the study. The sample size was calculated by using Epi-info computer software. The total numbers of subjects were 192. The 64 spontaneous preterm deliveries and 128 term deliveries were entered for analysis as cases and controls respectively with case to control ratio of 1:2. The data analysis was carried out using SPSS computer software. Logistic regression analysis was done to calculate crude and adjusted odd's ratios.

Results

The total number of deliveries in the hospital during the study period was 1192. The numbers of spontaneous preterm deliveries were 64, who were enrolled in study as the cases. For the controls 128 term deliveries were enrolled in the study. All the enrolled cases and controls were entered for analysis, as there were no refusals. So the total numbers of study samples were 192.

The prevalence of spotaneous preterm delivery in the study hospital during the study period was 5.5 % (n = 64) of the total delivery (n=1192).

The distribution of gestational age in weeks in both preterm and term delivery groups:

Of the 64 cases of preterm deliveries, 32-36 weeks of gestational age comprised the majority 78%, this was followed by 29 – 31 weeks group (13%) and less than 28 weeks was the least 9%, *(Figure 1).*

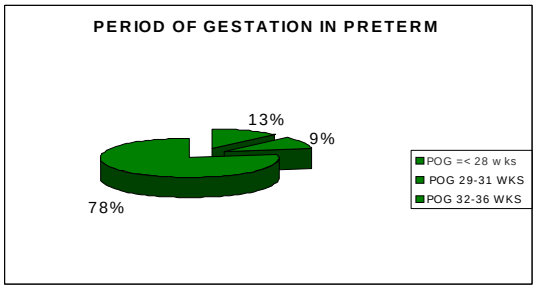

Fig. 1 The gestational age in weeks in preterm delivery.

In term delivery group, most were of 37 to 40 weeks of gestation and very few were 43 weeks and above *(Figure 2).*

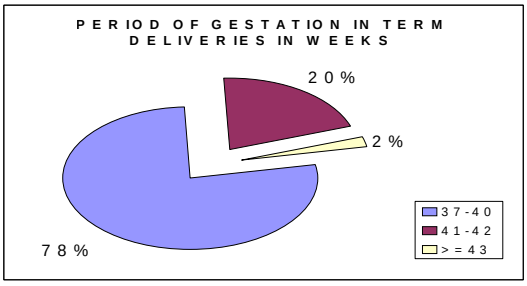

Fig. 2 The gestational age in weeks in term delivery.

Socio-demographic characteristics and preterm delivery:

The preterm delivery and term delivery groups differed in only a few socio-demographic characteristics. The proportion of farmers, small scale business women were significantly higher in preterm groups *(Table1).*

Table 1. The adjusted odds ratio and 95% confidence interval for socio-demographic variables in relation to preterm delivery.

Variable	Preterm delivery Adjusted OR	95% CI	p-value
Age (yrs):			
< 18	3.49	.84 – 14.50	.085
>=18	1		
Occupation:			
Farmer	**11.15**	**2.10 – 59.09**	**.005**
Teacher	.84	.16 - 4.5	.85
Business (s)	**5.8**	**1.6 – 21.3**	**.008**
Business(l)	3.2	.19 – 53.8	.419
Service	1.8	.67 – 4.72	.244
House- wife	1		
Mother's education:			
Illiterate	2.56	2.10 – 59.0	.465
Literate	2.43	.156 – 4.48	.604
Primary	.97	1.59 – 21.3	.984
Secondary	1.32	.19- 53.7	.820
Intermediate	1.75	.67- 4.7	.643
Bachelor	1.45		
Master	1		
Smoking:			
Yes	3.5	.84 – 14.4	.085
No	1		

Term delivery is the reference group for OR

s = small scale

l = large scale

Reproductive status factors and preterm delivery:

The previous preterm birth, UTI in index pregnancy were only significantly associated with preterm delivery among all the common reproductive status factors *(Table 2).*

Table 2. The adjusted odds ratio and 95% confidence interval for reproductive variables in relation to preterm delivery.

Variable	Preterm delivery Adjusted OR	95% CI	p-value
Gravidity:			
Primi	.53	1.7-1.67	.281
Multi	1		
Parity:			
Primi	2.2	.716-7.15	.164
Multi	1		
Abortion:			
Yes	1.6	.54-5.18	.365
No	1		
Previous preterm birth			
Yes	**10.063**	**1.78-65.8**	**.009**
No	1		
ANC visit:			
Yes	3.6E-08	3.5E-07 – 3.75E-09.000	
No	1		
Medical illness:			
Yes	3510…	35100000…-355 …	
…			
No	1		
Surgical illness:			
Yes	3.38	.651-17.62	.147
No	1		
UTI:			
Yes	**8.39**	**1.49 - 46.9**	**.015**
No	1		
Anaemia:			
Yes	2.33	.922-5.9	1.64
No	1		

Term delivery is the reference group for OR

Reproductive status and socio-demographic factors adjusted for each other:

Risk of preterm delivery was increased with history of previous preterm delivery, urinary tract infection and heavy manual working like farming long time standing in shops *(Table 3).*

Table 3. The adjusted odds ratio and 95% confidence interval for reproductive status variables and socio-demographic factors in relation to preterm delivery.

Variable	Preterm delivery Adjusted OR	95% CI	P value
Previous preterm birth			
Yes	**13.13**	**2.48-69.8**	**.003**
No	1		
ANC visit:			
Yes	.10	9.9E-07 – 1.1	.060
No	1		
UTI:			
Yes	**7.6**	**1.24 - 47.3**	**.028**
No	1		
Anaemia:			
Yes	2.4	.906-6.4	.078
No	1		
Age (yrs):			
< 18	2.4	.47 – 12.51	.289
>=18	1		
Occupation:			
Farmer	**14.8**	**2.8 – 78.2**	**.001**
Teacher	.95	.17 - 5.3	.96
Business(s)	**8.0**	**2.18– 29.4**	**.002**
Business(l)	5.1	.30 – 86.27	.254
Service	2.3	.82 – 6.25	.289
House- wife	1		

Term delivery is the reference group for OR

S = Small scale, L = Large scale

Discussion

Generally, preterm delivery has been associated with many factors like previous preterm births, urinary tract infection, genital infection, utero-placental insufficiency, stressful conditions, maternal smoking, alcohol intake, extremes of age, multiparity, medical and surgical illnesses.

The present study showed only a few factors as significant independent risk to preterm delivery, such as patients having previous preterm delivery, urinary tract infection in index pregnancy and heavy physical work during pregnancy (farmers, small scales business). Though anemia, medical illness and lack of antenatal care also showed significant risk to preterm delivery, they no longer remained significant after adjusting for all other variables.

Among the socio-demographic variables only the occupation of the patient showed strong independent association with preterm delivery. The farmers and small-scale businesswomen were found to be at elevated risk (14.8 and 8 times) for preterm delivery than housewives. The small-scale businesswomen in the present study mean the women, who stands for long hours in the shops. The explanation behind this could be the association of heavy physical activity with increased incidence of preterm birth. Long working hours with long periods of standing is also reported risk for preterm births[6]. The result of our study is consistent with the result of a cohort study done in Honoi, Vietnam during 2002, which found that working in farm during pregnancy raised the risk of preterm delivery [7].

Other factors like smoking, low education and younger age of the patients was associated with an increased risk but was not significant statistically.

Regarding the reproductive status factors, previous preterm delivery and urinary tract infection in the index pregnancy showed significant influence on risk for preterm delivery in the present study.

It is well accepted that previous preterm delivery is a strong risk factor for the subsequent preterm delivery. This study detected a strong association (adj. OR = 13.13, P = 0.003) between previous preterm delivery and the present preterm delivery. A multi center case control study conducted in nine different collaborating institutions, Northern Italy, detected significant relation between previous preterm delivery and preterm delivery OR = 5.7, 95% CI 2.5-12.9[8]. Another similar case control study done by De Hassa I and college also reported a very significant risk of previous preterm delivery for preterm delivery, odds ratio 3.5 and 95% CI 1.6-7.8[9].

The present study found significant independent positive link between urinary tract infection in index pregnancy and preterm delivery (OR=7.6, CI 1.24- 47.3) as in the study done by Monaghan SC, Little RE, Hulchiy O, Strassner H, Gladen BC. at urban areas of Ukraine[10].

This study did find the protective effect of prenatal care in preterm delivery but was not significant.

In relation to anemia, association of anemia to preterm

delivery was not found to be significant in this study. The subjects were of both mild and severe anemia. As there was only one subject of severe anemia, both severe and mild anemia was grouped into one for analysis. However, again a case control study conducted in Patan Hospital, Nepal during 1994 to 1996, evaluated the relation of anemia to preterm delivery and results showed that only severe anemia (Hematocrit = < 24%) was associated with preterm delivery (OR 3.6, 95% CI = 1.5-8.7) [11]. Whereas, a study done in Venezuelan pregnant women during the same time period (1996) indicated even mild anemia during third trimester and at labor is a significant risk for preterm birth (OR: 1.7; 95%CI=1.18-2.57)[12].

This study did not detect significant associations between ethnicity, religion, parity, gravidity and previous abortions to preterm delivery.

Conclusion

This case control study, carried out to explore various risk factors for preterm delivery in women delivering at Tribhuvan University Teaching Hospital, demonstrated that previous preterm delivery and urinary tract infection in index pregnancy were strong risk factors among the all other reproductive status factors. Both contributed to significant independent risk factors for preterm delivery.

On the other hand, heavy physical activity like working in farm and long standing in shops also contributed to independent risk factors for preterm delivery in this hospital based study.

Recommendations

The present study detected previous preterm delivery, urinary tract infection and heavy physical activity to be at risk for preterm delivery in our setting.

All women with history of previous preterm delivery should be counseled about the risk of repeat preterm delivery. They should be advised to take adequate rest and not to indulge in heavy stressful work.

Regular urinary examination should be advised in antenatal clinic, so that timely intervention may protect against preterm delivery.

All pregnant women should avoid heavy physical work.

Finally, a study in a larger scale may be necessary for formulation of the necessary planning in future to reduce preterm birth.

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