RESEARCH

Preterm Delivery and Low Birth Weight in Relation with Term Pregnancy-Comparative Study

Mahaseth Binod Kumar[*1], **Malla Tark** [2]

[1]Department of Obstetrics and gynaecology, Nepalgunj Medical College Teaching Hospital, Kohalpur
[2]Department of Staistics, Nepalgunj Medical College,Teaching Hospital, Kohalpur

Date of Submission: Feb 05, 2019
Received in Revised Form: March 08, 2019
Date of Acceptance: March 20, 2019
Date of Publishing: July 30, 2019

ABSTRACT

Background:
Improvements in neonatal care has improved survival rate of preterm neonate but this consumes most of available resources. Most clinicians try to prevent preterm delivery, but with limited success. Present study was carried out with the intent to determine the risk factors for preterm delivery in a tertiary care level hospital set up.

Methods:
Preterm delivery followed by term pregnancy was used as control group from lists of all term babies delivered within the study period, using preterm: term ratios of 1:1.

Results:
A total of 834 (417 cases and 417 controls) child-mother pairs were included in the study. The mean age for preterm mothers was 22.6±4.2 years and for term delivery mothers, it was 23.2±4.1 years. 37.95% of the preterm group and 46.3% of the term delivered group mothers belonged to Bhrahaman/Chhetri ethnicity. Low birth weight was more common (64.7%) in preterm delivery group. Vaginal route was found to be the preferable route of delivery in both groups in the present study.

Conclusion:
The risk of preterm birth increased 2.5 fold with mal-presentation of baby and 1.6 times with Janjati ethnicity group. There was eight fold increased risk of babies born with low birth weight and 4.2 times increased risk of still birth in the preterm delivery group. The quality of antenatal care should be improved to decrease preterm delivery among Dalit and Janjati, young primi (age <20 yrs), and malpresentation of the foetus should be screened carefully and intervention to be done accordingly.

Key words: Preterm delivery, Risk factor, Term delivery

***Corresponding Author:**
Dr. Binod Kumar Mahaseth, Department of Obstetrics and gynaecology , Nepalgunj Medical College Teaching Hospital, Kohalpur, Nepal.
E-mail: Mahaseth.binod@yahoo.com

INTRODUCTION

Preterm delivery is defined as- any delivery occurring prior to 37 weeks of gestation (WOG) or before 259 days of gestation from 1st day of last menstrual period (LMP) after period of viability. Term pregnancy is defined as delivery occurring after 37 completed WOG but prior to 42 WOG from 1st day of LMP.

According to Liu et al, 15 million infants were born preterm worldwide. Among them, majority of preterm births (60%) occurred in Africa and Asia. Preterm delivery is a public health problem

worldwide. About 1 million neonates died from complications related with preterm delivery in 2015.[1-3] Worldwide incidence of preterm delivery rates have been stable or increasing due to improvements in subfertility treatment, early diagnosis of foetal or maternal risk factors leading to poor obstetrical outcome. Preterm babies consume more resources with poor outcome worldwide in aspect of management in neonatal intensive care unit (NICU) and long term neuropsychological development.

The key to minimize perinatal death rate is to prevent preterm delivery rate. Till date prevention of preterm deliveryis difficult due to lack of understanding of the biochemical mechanism of labour and the multiplicity of medical and socioeconomic factors associated with preterm delivery.[4] Bakketeig LS et al, Iams JD et al and Burguet A et al, reported that there is a proven clear association between preterm birth and previous preterm delivery, preterm premature rupture of the membranes and maternal smoking during pregnancy.[5-7] which was directly correlated by epidemiological studies.

In this study we have tried to carry out a limited comparison of preterm and term deliveries feasibility factors in a developing country.

MATERIALS AND METHODS

This retrospective study is carried out at Nepalgunj Medical College Teaching Hospital Kohalpur between July to 2017 to June 2018. This is a tertiary referral centre with approximately 3600 deliveries a year; preterm deliveries (under 37 weeks' gestation) accounted for approximately 13% of all births during July 2016 to June 2017.[8] We obtained lists of all deliveries below 37 weeks gestation from the hospital database within the study period. We used subsequent term pregnancy followed by preterm delivery as control group from lists of all term babies delivered within the study period, using preterm: term ratios of 1:1.Gestational age was based on 1st day of LMP and who were not sure of their LMP were excluded from the study. Antenatal care case history was taken by health professional with the aims of this study was carried out to determine the incidence of low birth weight extreme low birth weight, the ethincity of mother, mode of delivery, maternal age and history of abortion between the two groups.

Sample size: all participants who meet inclusion criteria in study period enrolled in study Inclusion criteria- singleton preterm pregnancy with sure for date and subsequent term pregnancy who were sure for their date delivered in our hospital during study period were included in the study.

Exclusion criteria- maternal disorder, gestational hypertension, preeclampsia and eclampsia were excluded from the study.

Data analysis

Data was analysed using SPSS Version 21. Continuous variables were summarized using descriptive statistics such as mean with standard deviation (SD). Categorical variable were summarized using frequency and proportions. Binary logistic regression analysis was performed to determine the statistical association between various factors with preterm delivery. All variables with p-value less than 0.1 in bivariate analysis were considered for multivariate logistic regression. Odds ratio with 95% confidence interval (CI) for factors associated with preterm delivery was estimated in multivariate logistic regression. A p-value of <0.05 was considered statistically significant.

RESULTS

Characteristics of study population

A total of 834 (417 cases and 417 controls) child-mother pairs were included in the study. Socio-demographic and obstetric characteristics of case and control groups are summarized in Table 1. The mean age ± SD for preterm groupwas 22.6±4.2 years, and for term delivery group it was 23.2±4.1 years. 68% of mother in preterm group and 74% in the term group were aged 20-30 years.23.3% of mothers aged less than 20 years delivered at preterm as compared to 16.3% who had term delivery. Eight point four percent of the preterm and 9.6% of mothers of the term delivery group were aged 30 years and above.

Thirty seven point ninety five percent of the mothers in preterm and 46.3% of the mothers in term delivered group belonged to Brahaman/ Chhetri ethnicity group. Majority of the study population resided in Terai region. Most of the participants were primigravida in both groups but this was more common (59.7%) in preterm delivery group as compared to the term delivery group (52.3%). Multigravida mothers predominated in the control group (47.7%) as compared to case group (40.3%). Nulliparous

mothers accounted for 66.2% of preterm delivery group where as they accounted for 57.6% in term delivery group.

Individuals giving a birth after period of viable birth in previous pregnancy were more common in the control group (42.5%) compared to the case group (33.8%). Majority of mothers had no prior history of abortion (85.4% in the preterm group and 86.6% in the term delivery group). Most of the mothers (91.1 % in preterm group and 97.1% in Term group) had cephalic presentation of foetus, whereas breech presentation was more common (8.4%) in preterm group as compared to term group (2.9%). Female babies were more common in the term group (44.8%) as compared to the preterm group (40.8%). Male babies were more common in preterm group (59.2%) as compared to the term group (55.2%). Dead foetuses were more common in preterm group (11.3%) as compared to the term group (1.2%).
The mean birth weight of term babies was 2851±473 gram and it was 2112±616 gram for preterm babies. Low birth weight was more common in preterm group (64.7%). Thirty five point three percent babies were born with birth weight 2500 – 4000 gram in the preterm group. Twenty three point five of the babies of the preterm group had normal APGAR Score at 1 minute (Table 1).

Table 1: Characteristics of study participants in preterm (case) and Term (control) delivery group (n=834)

Characteristics		Preterm (Case) (n=417) n (%)	Term (Control) (n=417) n (%)
Age (Years)	<20 Yrs	97 (23.3)	68 (16.3)
	20-30 Yrs	285 (68.3)	309 (74.1)
	>=30 Yrs	35 (8.4)	40 (9.6)
	Mean (±SD)	22.6(4.2)	23.2(4.1)
Ethnicity	Dalit	72 (17.3)	58 (13.9)
	Janjati	152 (36.5)	123 (29.5)
	Madheshi	7 (1.7)	7 (1.7)
	Muslim	6 (1.4)	2 (.5)
	Brahaman/Chhetri	158 (37.9)	193 (46.3)
	Others	22 (5.3)	34 (8.2)
Residence	Hilly region	20 (4.8)	9 (2.2)
	Tarai region	397 (95.2)	408 (97.8)
Gravida	Primigravida	249 (59.7)	218 (52.3)
	Multi gravida	168 (40.3)	199 (47.7)
Parity	Nuliypara	276 (66.2)	240 (57.6)
	1 - 2 para	125 (30.0)	163 (39.1)
	> 2 Para	16 (3.8)	14 (3.4)
History of abortion	No history of abortion	356 (85.4)	361 (86.6)
	1	38 (9.1)	39 (9.4)
	≥ 2	23 (5.5)	17 (4.1)
Presentation	Breech	35 (8.4)	12 (2.9)
	Cephalic	380 (91.1)	405 (97.1)
	Transverse	2 (0.5)	0 (0.0)
Mode of delivery	Vaginal	384 (92.1)	362 (86.8)
	C-section	33 (7.9)	55 (13.2)
Sex of new born	Female	170 (40.8)	187 (44.8)
	male	247 (59.2)	230 (55.2)
Baby status at birth	Alive	370 (88.7)	412 (98.8)
	Dead	47 (11.3)	5 (1.2)
Birth weight baby (in gram)	ELBW (<1000 grm)	15 (3.6)	0 (.0)
	VLBW (1000-1500 grm)	44 (10.6)	2 (.5)
	LBW (1500 -2500 grm)	211 (50.6)	63 (15.1)
	Normal (>=2500 grm)	147 (35.3)	352 (84.4)
	Mean (±SD)	2112.5(616.1)	2851.0(473.7)
APGAR score at 1min	0	47 (11.3)	5 (1.2)
	1-7	272 (65.2)	232 (55.6)
	>=7	98 (23.5)	180 (43.2)
	Mean (±SD)	6.9 (1.2)	6.2(0.9)
APGAR score at 5min	0	47 (11.3)	5 (1.2)
	1-7	75 (18.0)	34 (8.2)
	>=7	295 (70.7)	378 (90.6)
	Mean (±SD)	6.9(1.2)	7.4(0.8)

Factors associated with preterm delivery
The results from binary univariate logistic regression analysis are presented in Table 2. The women whose age was< 20 years at pregnancy were 1.5 times more at risk of preterm delivery as compared to those who were 20-30 years of age (OR 1.5, 95% CI: 1.09-2.19).

Women belonging to the Dalit and Janjati ethnic groups, were 1.5 times more at risk of preterm delivery as compared to those who belonged to the Brahaman and Chhteri ethnic group (Dalit=OR 1.566, 95% CI: 1.05–2.3, Janjati= OR 1.558, 95% CI:1.15–2.12). Women residing in hilly region were 2.2 times moreat risk of preterm delivery as compared to those residing in Terai region (OR 2.284, 95% CI: 1.03–5.08).

Nine percent of case had malpresentation of the foetus compared to nearly 3% of control and women having malpresentation of the foetus were 3.3 times moreat risk of preterm delivery (OR 3.3, 95% CI: 1.69-6.39). However women who were multigravida (OR 0.74, 95% CI: 0.56-0.97), 1-2 Parity (OR 0.67, 95% CI: 0.49-0.89) and or had a Cesarean Section (OR 0.57, 95% CI: 0.36-0.89) were less likely at risk of preterm delivery.

Preterm delivery group was 10 times more likely at risk of low birth weight baby as compared to the term delivery group (OR 9.9, 95% CI: 7.13-13.87). There was 10 times increased risk of still birth in the preterm delivery group (OR 10.467, 95% CI: 4.12-26.60).

There was 2.5 more risk of low APGAR score at 1 minute (OR 2.472,95% CI:1.83-3-33) and four times more risk of low APGAR score at 5 minutes (OR 4.00,95% CI: 2.71-5.93) of birth in the preterm delivery group. The history of abortion and sex of baby were not significantly associated with preterm delivery (Table 2).

Table 2: Socio-demographic and obstetric factors associated with preterm delivery (N=834)

Variables	Preterm (Case) (n=417)		Term (Control) (n=417)		COR (95% CI)	P-Value
	n	%	n	%		
Age (Years)						0.042*
<20 Yrs	97	23.3	68	16.3	1.547 (1.09-2.19)	0.014*
20-30 Yrs	285	68.3	309	74.1	Ref.	
≥30 Yrs	35	8.4	40	9.6	0.949 (0.59-1.54)	0.83
Ethnicity						0.014*
Dalit	72	17.3	58	13.9	1.566 (1.05-2.33)	0.027*
Janjati	152	36.4	123	29.5	1.558(1.15–2.12)	0.005*
Madhesi and Muslim	13	3.1	9	2.2	1.822 (0.76-4.357)	0.178
B/C & Others	180	43.2	227	54.4	Ref.	
Residence						
Hilly region	20	4.8	9	2.2	2.284 (1.03-5.08)	0.043*
Tarai region	397	95.2	408	97.8	Ref.	
Gravida						
Primigravida	249	59.7	218	52.3	Ref.	

Multi gravida	168	40.3	199	47.7	0.739 (0.56 – 0.97)	0.031*
Parity						
Nully para	276	66.2	240	57.6	Ref.	0.022*
1 - 2 para	125	30	163	39.1	0.667 (0.49 – 0.89)	0.006*
> 2 Para	16	3.8	14	3.4	0.994 (0.47 – 2.07)	0.987
Abortion history						
No	356	85.4	361	86.6	Ref.	
Yes	61	14.6	56	13.4	1.105 (0.75 – 1.63)	0.859
Presentation of baby						
Cephalic	380	91.1	405	97.1	Ref.	
Other than cephalic	37	8.9	12	2.9	3.286 (1.69 – 6.39)	<0.001*
Mode of delivery						
Vaginal	384	92.1	362	86.8		
C-section	33	7.9	55	13.2	0.566 (0.36 – 0.89)	0.014*
Sex of baby						
Female	170	40.8	187	44.8	Ref.	
Male	247	59.2	230	55.2	1.181 (0.89 – 1.55)	0.234
Baby born status						
Alive birth	370	88.7	412	98.8	Ref.	
Still birth	47	11.3	5	1.2	10.467 (4.12 – 26.60)	<0.001
Birth Weight (in gram)						
NBW (≥2500 gram)	147	35.3	352	84.4	Ref.	
LBW (<2500 gram)	270	64.7	65	15.6	9.947 (7.13 – 13.87)	<0.001*
APGAR at 1 minute						

B/C= Brahaman and Chhetri. NBW= Normal birth weight; LBW= Low Birth Weight. COR= Crude Odds Ratio; CI = Confidence Interval. * Significant at ($p < 0.05$).

According to univariate logistic regression, maternal age, ethnicity, residence, presentation of baby, birth status of baby, birth weight and APGAR score were found to be significantly associated with preterm birth. However, after controlling the possible confounders on multivariate logistic regression only Janjati ethnicity, malpresentation of baby, low birth weight and still births remained significantly associated factors with increased risk of preterm delivery (Table 3).

Table 3: Multivariate logistic regression of significant factors

Variables	Adjusted OR* (95% Confidence Interval)	P-Value
Ethnicity (Janjati)	1.698(1.17 – 2.45)	0.005*
Malpresentation of baby	2.571(1.15 – 5.75)	0.021*
Low birth weight (<2500 gram)	8.459(5.91 – 12.12)	<0.001*
Still birth	4.298(1.43 – 12.88)	0.009*

The risk of baby born with low birth weight was eight fold and there was 4.2 times increased risk of still birth among preterm delivery group (Table 3).

DISCUSSION

Three point three % of mothers aged less than 20 years delivered at preterm compared to 16.3% who had term delivery, relation with number of antenatal care not related with abortion was comparable with study conducted by Ip M. et. al, [9] Omole-Ohonsi A,[10] Meis et. al ,[11] Passini R Jr, et. al ,[12] and Berkowitz et al [13],but it was not comparable when the age was > 30 yrs.

Fifty nine point seven percent of the women in the preterm delivery group were nullipara where as 57.6% women in term delivery group were nullipara which is comparable with the study of Ip M.et.al,[9] Shrim et al ,[14] Tehranian et al. [15]

Huang et al,[16] in their study reported an average weight. of 2 022.3 ± 338.9 gram in preterm group,. Rao C. Ret al.[17] reported average weight of 2452.7± 436.01 gram in preterm and 2977.8± 401.97 gram in the term group. In this study, weight in the preterm group was 2112.5± 616.1gram and2851.0± 473.7 grams in the term group which was comparable with the previously mentioned studies.

Rao et al,[17] reported vaginal route as route of delivery in 47.3% of case and 61.4% in controls, where as in present study it is 91.2% for case and 86.8% for control. Reasons behind this in our setup poor survival of the preterm baby discourage us to choose ceserean section. Sharma S. R et al, [18] did not report any association with history of previous abortion with preterm delivery, but they did report association of younger age with increased risk of pre term delivery which is comparable with present study. Razeq et al.[19]also reported that young mother were more prone to go in preterm labour. It's may be associated with immaturity of hypothalamo-pituitory-ovarian and uterine axis and reproductive organ maturity.

In the same study presentation of foetus in utero was reported as being cephalic in 95.4 % in term and 86.9% in preterm group which is comparable to the finding in the present study of being cephalic 97.1% in term and 91.1%in preterm group. The APGAR score wasalso comparable with study conducted by Razeq et.al[21]There was 2.5 times more risk of less APGAR score among preterm deliveries at 1 minute (OR 2.472,95% CI:1.83-3-33) and 4 times more risk at 5 minutes (OR 4.00,95% CI: 2.71-5.93) of birth. Poor APGAR score may be due to poor development of lungs in premature delivery and insufficient maturity.

Who has history of previous birth after period viability was more common in term delivery (42.5%) compared to preterm group (33.8%).Whereas, still births were more common in the preterm delivery group (11.3%) compared to the term group (1.2%). Women who had malpresentation of the foetus were 3.3 times more likely at risk of preterm delivery (*OR* 3.3, 95% *CI:* 1.69-6.39).

The history of previous abortion and sex of baby were not significantly associated with preterm delivery. The women who were< 20 years at the time of pregnancy were 1.5 times more likely at risk of having a preterm delivery compared to those who were aged between 20-30 years (*OR* 1.5, 95% *CI:* 1.09-2.19).

CONCLUSION:

intrauterine fetal demise is one of the major causes of preterm delivery followed by the age at the time of first pregnancy (young primi). Dalit and janjati groups are more at risk of having a preterm delivery, so the quality of antenatal care should be improved in areas where these groups predominate. Also people especially females belonging to these ethnic groups should be educated about the importance of good and timely antenatal care. Furthermore, women should be encouraged to opt for hospital delivery. As malpresentation of the foetus is a major contributing factor for preterm delivery, appropriate management should be done by the consulting gynaecologist. Heavy physical work also contributes to the increased incidence of preterm delivery, so the mothers should be educated to avoid it as much as possible.

Limitation of study: Most of the persons were illiterate; therefore the quality of history was poor. Most of the pregnancy was unplanned in our study.

Conflict of interest: There is no conflict of interest in present study.

REFERENCES

1. Beck S, Wojdyala D, Say L, Betran AP, Merialdi M, Requejo JH, et al. The worldwide incidence of preterm birth: a systematic review of maternal mortality and morbidity. Bull World Health Organ. 2010; 88:1-80.
2. Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. The Lancet. 2008; 371:75-84.
3. Liu L, Oza S, Hogan D, Chu Y, Perin J, Zhu J, et al. Global, regional, and national causes of under-5 mortality in 2000-15: an updated systematic analysis with implications for the Sustainable Development Goals.The Lancet. 2016; 388(10063):3027-35.
4. Lopez B A. Mechanisms of labour--biochemical aspects. BJOG 2003; 110(Suppl 20):39-45.
5. Bakketeig LS, Hoffman HJ, Harley EE. The tendency to repeat gestational age and birth weight in successive births. Am J Obstet Gynecol. 1979; 135:1086-1103.
6. Iams JD, Stilson R, Johnson FF, Williams RA, Rice R. Symptoms that precede preterm labor and preterm premature rupture of the membranes. Am J Obstet Gynecol. 1990; 162:486-490.
7. Burguet A, Kaminski M, Abraham-Lerat L, Schaal JP, Cambonie G , Fresson J et al. The complex relationship between smoking in pregnancy and very preterm delivery. Results of the Epipage study. BJOG. 2004; 111:258-265.
8. Mahaseth BK , Srivastav M , Das CR. Preterm Labour, Pprom, Prom And Neonatal Outcomes Associated With Vaginal Infection: A Prospective Study. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS). 2017;16 (12)VI: 79-83
9. M. Ip, Peyman E., V. Lohsoonthorn, Michelle A. W. A case–control study of preterm delivery risk factors according to clinical subtypes and severity. J Obstet Gynaecol. 2010; Res. 36(1): 34–44.
10. Omole-Ohonsi A, Attah R. A.Risk Factors of Preterm Deliveries at Aminu Kano Teaching Hospital, Kano, Nigeria. SAJMS. 2012;Vol. 1 (1):3-10.
11. Passini R Jr, Cecatti JG, Lajos GJ, Tedesco RP, Nomura ML, et al. (2014) Brazilian Multicentre Study on Preterm Birth (EMIP): Prevalence and Factors Associated with Spontaneous Preterm Birth. PLoS ONE 9(10): e109069.
12. Meis PJ, Michielutte R, Peters TJ. Factors associated with preterm birth in

Cardiff,Wales. II. Indicated and spontaneous preterm birth. Am J Obstet Gynecol. 1995; 173: 597–602.

13. Berkowitz GS, Blackmore-Prince C, Lapinski RH, Savitz DA.Risk factors for preterm birth subtypes. Epidemiology. 1998; 9:279–285.
14. Shrim A, Ates S, Mallozzi A, Brown R, Ponette V, Levin I, et al. Is young maternal age really a risk factor for adverse pregnancy outcome in a Canadian tertiary referral hospital? JPediatr Adolec Gynecol. 2011; 24(4):218-222.
15. Tehranian N, Ranjbar M, Shobeiri F. The Prevalence Rate and Risk Factors for Preterm Delivery in Tehran, Iran. Journal of Midwifery and Reproductive Health. 2016; 4(2): 600-60.
16. Huang A.Q, Jin X , Liu X. H. and Gao S.H. A matched case–control study of preterm birth in one hospital in Beijing, China. Reproductive Health. 2015; 12(1): 1-6
17. Rao C. R, Ruiter L. E. E. de, Bhat P, KamathV., Kamath A, Bhat V. A Case-Control Study on Risk Factors for Preterm Deliveries in a Secondary Care Hospital, Southern India. ISRN Obstetrics Gynecol. 2014; 1-5.
18. Sharma S. R, Giri S, Timalsina U, Bhandari S. S, Basyal B, Wagle K, et al. Low Birth Weight at Term and Its Determinants in a Tertiary Hospital of Nepal: A Case-Control Study. PLoS ONE10(4): e0123962.
19. Razeq N. M. A, Khader Y. S, Batieha A.M.The incidence, risk factors, and mortality of preterm neonates: A prospective study from Jordan (2012-2013)Turk. J Obstet Gynecol. 2017; 14(1):28-36.