

Study Risk Factor of preterm labor and Association of risk factor with preterm labor in tertiary care center. A prospective cross sectional study

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Abstract

Background: Preterm is defined as babies born alive before 37 weeks of pregnancy are completed. There are sub-categories of preterm birth, based on gestational age. extremely preterm (less than 28 weeks), very preterm (28 to 32 weeks), moderate to late preterm (32 to 37 weeks). There are several risk factors for preterm labor and premature birth, including ones that researchers have not yet identified. Some of these risk factors are "modifiable," meaning they can be changed to help reduce the risk. Other factors cannot be changed. **Aim & Objective:** 1.To Study risk factor of preterm labor.2.To study association of risk factor with pre term labor.3.Incidence of pre term labor.4.Outcome of pre term labor. **Methods:** Study design: A prospective cross sectional study. Study settings: Department of Obstetrics and Gynaecology, National institute of medical science and research,Jaipur,Rajasthan. Study duration: From October 2022 to October 2023. Study population: All the labor cases admitted in OBGY department of National institute of medical science and research,Jaipur,Rajasthan were included in the study. **Sample size:** 400. **Results:** Majority of cases belonged in ≤ 20 age group e.g 110 (27.5%) followed by 30-34 years age group 94 (23.5%), above 35 age group 80 (20%),68(17%) and 48 (12%) cases was found in 25-29 and 21-24 age group respectively. most common risk factor was PPROM e.g 10 cases, followed by DM 9, Twins 7, age above 35 years 5, age below 20 years 8, HTN 5 and placenta previa 4. Incidence of preterm labor was 12%. Majority of cases suffered from Respiratory Distress syndrome 8 (2%) followed by infection 8 (2%), neonatal jaundice 4 (1%), Hypoglycemia 2 (0.5%), intraventricular hemorrhage 1(0.25%) and Early neonatal death 1(0.25%). When statistical analysis using Chi- square test was done, proportion of preterm with age group was statistically not significant at $p < 0.05$. **Conclusions:** ≤ 20 age group, age above 35 years, PPROM, HTN, DM, placenta previa, Twins pregnancy were reported as risk factors for preterm labor. Male sex infant were had double risk more likely to be born preterm as compared to female counterparts. Proper control of HTN and DM, early diagnosis and treatment of modifiable risk factors recommended during prenatal and antenatal care.

Keywords: PPROM, placenta previa, preterm labor, risk factors, preterm outcome.

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Introduction

Preterm is defined as babies born alive before 37 weeks of pregnancy are completed. There are sub-categories of preterm birth, based on gestational age.¹ extremely preterm (less than 28 weeks), very preterm (28 to 32 weeks), moderate to late preterm (32 to 37 weeks).¹ There are several risk factors for preterm labor and premature birth, including ones that researchers have not yet identified. Some of these risk factors are "modifiable," meaning they can be changed to help reduce the risk. Other factors cannot be changed.

Women who have delivered preterm before, or who have experienced preterm labor before, are considered to be at high risk for preterm labor and birth.² Being pregnant with twins, triplets, or more (called "multiple gestations") or the use of assisted reproductive technology is associated with a higher risk of preterm labor and birth. One study showed that more than 50% of twin births occurred preterm, compared with only 10% of births of single infants.³

Women with certain abnormalities of the reproductive organs are at greater risk for preterm labor and birth than are women who do not have these abnormalities. For instance, women who have a short cervix (the lower part of the uterus) or whose cervix shortens in the second trimester (fourth through sixth months) of pregnancy instead of the third trimester are at high risk for preterm delivery.

Certain medical conditions, including some that occur only during pregnancy, also place a woman at higher risk for preterm labor and delivery. Some of these conditions include.⁴ Urinary tract infections, STD Certain vaginal infections, such as Bacterial vaginosis , HTN, Certain developmental abnormalities in the fetus, Pregnancy resulting from *in vitro* fertilization, Placenta previa, a condition in which the placenta grows in the lowest part of the uterus and covers all or part of the opening to the cervix, DM

Other factors that may increase risk for preterm labor and premature birth include: Ethnicity. Preterm labor and birth occur more often among certain racial and ethnic groups. For example, infants of African American mothers are more likely to be born preterm than infants of white mothers. American Indian/Alaska Native mothers are also more likely to give birth preterm than are white mother.⁵

Age of the mother. 1. Women younger than age 18 are more likely to have a preterm delivery. Women older than age 35 are also at risk of having preterm infants because they are more likely to have other conditions (such as high blood pressure and diabetes) that can cause complications requiring preterm delivery⁵

PTB results from multiple etiologies and can occur either spontaneously, due to PTL or preterm premature rupture of membranes (PPROM), or iatrogenic due to fetal and maternal conditions.⁶ PPRM is the spontaneous rupture of fetal membranes before 37 gestational weeks and before the labor onset and lead to PTB. In Egypt, a prevalence of 4.1% has been estimated for PPRM, with a global prevalence between 5% and 15%.⁷

PPROM impact is greatest in low- and middle-income countries, where the majority of childhood deaths associated with prematurity occur.⁸ Infection is the most common maternal complications of PPRM, which in some cases can lead to maternal death. Fetal complications include infections and fetal distress, due to umbilical cord compression, respiratory distress, necrotizing enterocolitis, and interventricular hemorrhage; in addition to long-term complications such as chronic lung diseases, developmental retardation, visual and hearing difficulties, and intellectual disabilities. In few cases, fetal deaths may occur, with greater risk at earlier gestational age.^{9,10}

An estimated 15 million babies are born too early every year. That is more than 1 in 10 babies. Approximately 1 million children die each year due to complications of preterm birth.¹¹ Many survivors face a lifetime of disability, including learning disabilities and visual and hearing problems.

Globally, prematurity is the leading cause of death in children under the age of 5 years. And in almost all countries with reliable data, preterm birth rates are increasing.

Inequalities in survival rates around the world are stark. In low-income settings, half of the babies born at or below 32 weeks (2 months early) die due to a lack of feasible, cost-effective care, such as warmth, breastfeeding support, and basic care for infections and breathing difficulties. In high-income countries, almost all of these babies survive. Suboptimal use of technology in middle-income settings is causing an increased burden of disability among preterm babies who survive the neonatal period.

Where and when does preterm birth happen?

More than 60% of preterm births occur in Africa and South Asia, but preterm birth is truly a global problem. In the lower-income countries, on average, 12% of babies are born too early compared with 9% in higher-income countries. Within countries, poorer families are at higher risk.

The 10 countries with the greatest number of preterm births.¹²

- India: 3 519 100
- China: 1 172 300
- Nigeria: 773 600
- Pakistan: 748 100
- Indonesia: 675 700
- United States of America: 517 400
- Bangladesh: 424 100
- Philippines: 348 900
- Democratic Republic of the Congo: 341 400
- Brazil: 279 300

WHO has developed new guidelines with recommendations for improving outcomes of preterm births. This set of key interventions can improve the chances of survival and health outcomes for preterm infants.

The guidelines include interventions provided to the mother – for example steroid injections before birth, antibiotics when her water breaks before the onset of labour, and magnesium sulfate to prevent future neurological impairment of the child – as well as interventions for the newborn baby – for example thermal care, feeding support, kangaroo mother care, safe oxygen use, and other treatments to help babies breathe more easily.¹

This study was conducted to find out the incidence of preterm labor, to study the risk factor and association of risk factor with preterm labor and outcome of preterm labor.

Methodology

Study design: A prospective cross sectional study.

Study settings: Department of Obstetrics and Gynaecology, National institute of medical science and research, Jaipur, Rajasthan.

Study population: All the labor cases admitted in Department of Obstetrics and Gynaecology, National institute of medical science and research, Jaipur, Rajasthan

Study period: 1 years

Sample size: With reference to study by Liu L et al (2016)¹¹

The incidence of preterm labour was 10%

Formula for sample size = $4 * P * Q / L^2$

Where P= 10%

$$Q = 100 - 10 = 90$$

L = Allowable error = 30% (Absolute error)

$$\text{Sample size} = 4 * 10 * 90 / 9 = 400$$

Sample size Rounded to = 400

Inclusion criteria

1. All the labor cases admitted in Department of Obstetrics and Gynaecology, National institute of medical science and research, Jaipur, Rajasthan

Exclusion criteria

1. Patients in who follow up not feasible.
2. Not willing to participate in the study

Approval for the study

Written approval from Institutional Ethics committee was obtained beforehand. Written approval of OBGY department was obtained. After obtaining informed verbal consent from all patients with the Labor admitted to Department of Obstetrics and Gynaecology, National institute of medical science and research, Jaipur, Rajasthan such cases were included in the study.

Sampling technique

Convenient sampling technique used for data collection. All patients admitted in Department of Obstetrics and Gynaecology, National institute of medical science and research, Jaipur, Rajasthan From October 2022 to October 2023. Explained the purpose of study and who gave consent and detailed history such cases included in this study.

Methods of Data Collection and Questionnaire

Pre-designed and pre-tested questionnaire was used to record the necessary information. Questionnaires included general information, such as age, sex, religion, occupation of parents, residential address, and date of admission. Medical history- chief complain, past history, general examination, systemic examination.

Data on demographic profile endoscopic findings, treatment modalities, and clinical outcome collected from endoscopy unit and from patient files at the Medical Records department.

The data were entered in Microsoft Excel and data analysis was done by using SPSS demo version no 21 for windows. The analysis was performed by using percentages in frequency tables and association of pre term risk factor with age, religion, socioeconomic class, etc $p < 0.05$ was considered as level of significance using the Chi-square test

Observations And Result

Table no 1: Distribution of cases according to Age

Age Group	Frequency	Percentage
≤20	110	27.5%
21-24	48	12%
25-29	68	17%
30-34	94	23.5%
Above 35	80	20%
Total	400	100%

The above table shows majority of cases belonged in ≤ 20 age group e.g 110 (27.5%) followed by 30-34 years age group 94 (23.5%), above 35 age group 80 (20%),68(17%) and 48 (12%) cases was found in 25-29 and 21-24 age group respectively.

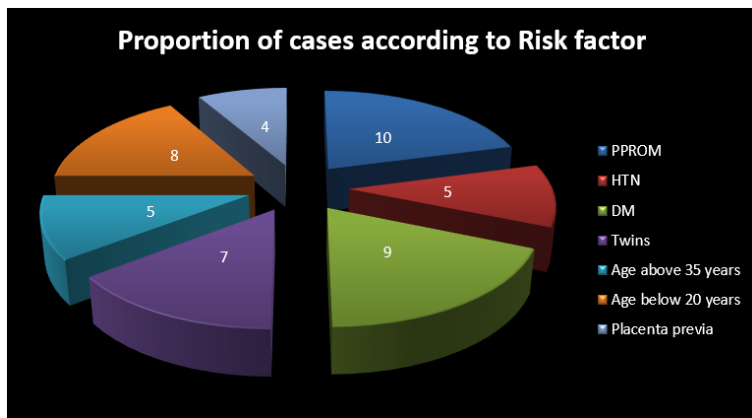


Figure no 1: Proportion of cases according to Risk factor

The above picture 1 shows most common risk factor was PPROM e.g 10 cases, followed by DM 9, Twins 7, age above 35 years 5, age below 20 years 8, HTN 5 and placenta previa 4

Table no 2: Incidence of cases according to Age

Sr.No	Age Group	Frequency	Percentage
1	≤ 20	14	3.5%
2	21-24	8	2%
3	25-29	9	2.25%
4	30-34	12	3%
5	Above 35	5	1.25%
	Total	48	12%

The above table shows incidence of preterm labor was 12%

Majority of cases belonged in ≤ 20 age group 14 (3.5%) followed by 30-34 years age group 12 (3%), 25-29 age group 9 (2.25%), 21-24 years age group 8 (2%) and above 35 years age group 5 (1.25%).

Table no 3: Distribution of cases according to Outcome

Outcome in newborn	Frequency	Percentage
Respiratory Distress syndrome	8	2%
Intraventricular hemorrhage	1	0.25%
Neonatal jaundice	4	1%
Hypoglycemia	2	0.5%
Early neonatal death	1	0.25%
Infection	8	2%
Total	24	6%

The above table shows majority of cases suffered from Respiratory Distress syndrome 8 (2%) followed by infection 8 (2%), neonatal jaundice 4 (1%), Hypoglycemia 2 (0.5%), intraventricular hemorrhage 1(0.25%) and Early neonatal death 1(0.25%).

Table no 4: Association of age with preterm labor

	Preterm labor	Total (%)
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Age in years	Present	Percentage	Absent	Percentage	
≤20	14	3.5%	96	24%	27.5%
21-24	8	2%	40	10%	18%
25-29	9	2.25%	59	14.75%	17%
30-34	12	3%	82	20.5%	23.5%
Above 35	5	1.25%	75	18.75%	20%
Total	48	12%	352	88%	100%

Chi-square value-2.8157, p-value-0.93347

When statistical analysis using Chi- square test was done, proportion of preterm with age group was statistically not significant at $p < 0.05$.

Discussion

Preterm delivery refers to childbirth occurring at less than 37 completed weeks of gestational age. It contributes to about 11% of annual birth worldwide.¹³ It is the leading cause of neonatal morbidity and mortality; and the second most leading cause of under-five death in the world^{14,15}. A previous hospital based study in North-Eastern Tanzania reported prevalence of preterm birth of 14.3% which was higher compared with that reported in developing countries.¹⁶ In this study majority of cases belonged in ≤20 age group e.g 110 (27.5%) followed by 30-34 years age group 94 (23.5%), above 35 age group 80 (20%), 68 (17%) and 48 (12%) cases was found in 25-29 and 21-24 age group respectively.[Table no 1]

In this study the male sex infant were had double risk more likely to be born preterm as compared to female counterparts. Similar finding in the study of Khalil MM et al (2013)²⁰ He found that the male sex infant were two times more likely to be born preterm as compared to female counterparts.

In this study most common risk factor was PPRM e.g 10 cases, followed by DM 9, Twins 7, age above 35 years 5, age below 20 years 8, HTN 5 and placenta previa 4.[picture no 1] similar observations found in the study of Choudhary R et al (2018)¹⁷ He observed that the Preterm Premature Rupture of Membranes is 24.00% and iatrogenic preterm birth is 12.67%. Similar finding observed in the study of Theresia B et al (2016)¹⁹

In this study most common risk factor for preterm labor was PPRM contrast result found in the study of Choudhary R et al (2018)¹⁷ It is found that the most common risk factors associated with preterm births is maternal genitourinary infections (incidence 29%). Camilla N et al (2014)¹⁸ He revealed that the association between alcohol use during pregnancy and increasing risk of preterm delivery.

In this study incidence of preterm labor was 12%. Majority of cases belonged in ≤20 age group 14 (3.5%) followed by 30-34 years age group 12 (3%), 25-29 age group 9 (2.25%), 21-24 years age group 8 (2%) and above 35 years age group 5 (1.25%).[Table no 2] similar finding in the study of Choudhary R et al (2018)⁸ He found that the incidence of preterm birth is found to be 8.28%. similar result observed in the study of Theresia B et al (2016)¹⁵ The prevalence of preterm birth was 14.2%.

In current study majority of cases suffered from Respiratory Distress syndrome 8 (2%) followed by infection 8 (2%), neonatal jaundice 4 (1%), Hypoglycemia 2 (0.5%), intraventricular hemorrhage 1(0.25%) and Early neonatal death 1(0.25%).[Table no 3] as compared with other study, Zhang Y et al (2012)²³ It is the leading cause of neonatal morbidity and mortality; and the second most leading cause of under-five death in the world

When statistical analysis using Chi- square test was done, proportion of preterm with age group was statistically not significant at $p < 0.05$. [Table no 4] contrast result found in the study of Mumghamba E et al (2007)²¹ He revealed that the maternal age below 19 years and advanced maternal age was associated with increasing risk of preterm delivery. L´opez PO et al (2012)²²

He found that the maternal age below 19 years and advanced maternal age were associated with increasing risk of preterm delivery.

Conclusions

In current study shows ≤ 20 age group, age above 35 years, PPRM, HTN, DM, placenta previa, Twins pregnancy were reported as risk factors for preterm labor. Male sex infant were had double risk more likely to be born preterm as compared to female counterparts. Proper control of HTN and DM, early diagnosis and treatment of modifiable risk factors recommended during prenatal and antenata

References

1. <https://www.who.int/news-room/fact-sheets/detail/preterm-birth>. Assessed on 25th August 2020
2. Ekwo, E. E., Gosselink, C. A., & Moawad, A. (1992). Unfavorable outcome in penultimate pregnancy and premature rupture of membranes in successive pregnancy. *Obstetrics and Gynecology*, 80, 166–172.
3. The American College of Obstetricians and Gynecologists. (2015). Multiple Pregnancy. Retrieved May 16, 2018, from <https://www.acog.org/Patients/FAQs/Multiple-Pregnancy#most>. Assessed on 27th August 2020
4. March of Dimes. (2008, 2010). *Preterm labor and birth: A serious pregnancy complication*. Retrieved April 23, 2012, from http://www.marchofdimes.com/pregnancy/preterm_indepth.html. Assessed on 27th August 2020
5. Centers for Disease Control and Prevention. (2018). *Births: Final Data for 2016*. Retrieved May 16, 2018, from https://www.cdc.gov/nchs/data/nvsr/nvsr67/nvsr67_01.pdf. Assessed on 25th November 2020
6. Oskovi Kaplan ZA, Ozgu-Erdinc AS. Prediction of preterm birth: maternal characteristics, ultrasound markers, and biomarkers: an updated overview. *J Pregnancy* 2018;**2018**:8367571.
7. Abouseif HA, Mansour AF, Hassan SF, Sabbour SM. Prevalence and outcome of Preterm Premature Rupture of Membranes (PPROM) among pregnant women attending Ain Shams maternity hospital. *Egyptian J Commun Med* 2018;**36**:99–107.
8. Lannon SM, Vanderhoeven JP, Eschenbach DA, Gravett MG, Adams Waldorf KM. Synergy and interactions among biological pathways leading to preterm premature rupture of membranes. *Reprod Sci* 2014;**21**:1215–27.
9. Assefa NE, Berhe H, Girma F, Berhe K, Berhe YZ, Gebreheat G, et al. Risk factors of premature rupture of membranes in public hospitals at Mekele city, Tigray, a case control study. *BMC Pregnancy Childbirth* 2018;**18**:386.
10. Boskabadi H, Zakerihamidi M. Evaluation of maternal risk factors, delivery, and neonatal outcomes of premature rupture of membrane: a systematic review study. *J Pediatr Rev* 2019;**7**:77–88.
11. 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. *Lancet*. 2016;**388**(10063):3027-35.
12. Blencowe H, Cousens S, Oestergaard M, Chou D, Moller AB, Narwal R, Adler A, Garcia CV, Rohde S, Say L, Lawn JE. National, regional and worldwide estimates of preterm birth. *The Lancet*, June 2012. **9**;379(9832):2162-72. Estimates from 2010.
13. Lasiuk GC, Comeau T, Newburn-Cook C. Unexpected: an interpretive description of parental traumas' associated with preterm birth. *BMC Pregnancy Childbirth* 2013; **13**(Suppl 1): S13; [http:// dx.doi.org/10.1186/1471-2393-13-S1-S13](http://dx.doi.org/10.1186/1471-2393-13-S1-S13).

14. Zhang Y, Liu X, Gao S, Wang J, Gu Y, Zhang J, et al. Risk factors for preterm birth in five maternal and Child Health hospitals in Beijing. *PLoS One* 2012; 7(12): e52780.
15. Chang HH, Larson J, Blencowe H, Spong CY, Howson CP, Cairns-Smith S, et al. Preventing preterm births: trends and potential reductions with current interventions in 39 very high human development index countries. *Lancet* 2013; 381(9862): 223-234; [http://dx.doi.org/10.1016/S0140-6736\(12\)61856-X](http://dx.doi.org/10.1016/S0140-6736(12)61856-X).
16. Mahande MJ, Daltveit AK, Obure J, Mmbaga BT, Masenga G, Manongi R, et al. Recurrence of preterm birth and perinatal mortality in northern Tanzania: registry-based cohort study. *Trop Med Int Health* 2013; 18(8): 962-967.
17. Choudhary R, Jakhar R. A Study of Risk Factors Associated with Preterm Labour at a Tertiary Care Centre in Jodhpur, Western Rajasthan. *IJSR*. Paper ID: ART20203043 10.21275/ART20203043 1728.
18. Camilla N, Alwan NA, Greenwood DC, Simpson NA, Hay AW, White KL, et al. Maternal alcohol intake prior to and during pregnancy and risk of adverse birth outcomes: evidence from a British cohort. *J Epidemiol Community Health* 2014; 68(6): 542-549.
19. Theresia B. Temu, Gilead Masenga, Joseph Obure, Dominic Mosha, Michael J. Mahande. Maternal and obstetric risk factors associated with preterm delivery at a referral hospital in northern-eastern Tanzania. *Asian Pacific Journal of Reproduction* 2016; 5(5): 365-370
20. Khalil MM, Alzahra E. Fetal gender and pregnancy outcomes in Libya: a retrospective study. *Libyan J Med* 2013; 8; <http://dx.doi.org/10.3402/ljm.v8i0.20008>
21. Mumghamba E, Manji KP. Maternal oral health status and preterm low birth weight at Muhimbili National Hospital, Tanzania: a casecontrol study. *BMC Oral Health* 2007; 12: 1-12.
22. L'opez PO, Paulina O, Br'ear G. Sociodemographic characteristics of mother's population and risk of preterm birth in Chile. *Reprod Health* 2012; 10: 26.
23. Zhang Y, Liu X, Gao S, Wang J, Gu Y, Zhang J, et al. Risk factors for preterm birth in five maternal and Child Health hospitals in Beijing. *PLoS One* 2012; 7(12): e52780.