RESEARCH PAPER

A Study on Determinants and Prevalence of Preterm Birth in a Tertiary Care Hospital

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Abstract

Introduction: Preterm birth (PTB), defined as delivery before 37 completed weeks of gestation, remains a leading cause of neonatal morbidity and mortality worldwide. In India, PTB contributes significantly to neonatal complications and under-five mortality. Identifying determinants in high-burden settings such as tertiary hospitals is essential for guiding preventive strategies.

Methodology: A retrospective observational study was conducted over six months in the Department of Obstetrics and Gynaecology at a tertiary care hospital in South India. A total of 200 women who delivered during the study period were included based on eligibility criteria. Data were extracted from hospital records regarding maternal demographics, obstetric history, medical comorbidities, delivery characteristics, and neonatal outcomes. Descriptive statistics were applied, and associations were analysed using chi-square and logistic regression, with $p < 0.05$ considered significant.

Results: The prevalence of PTB was 29%. Key determinants significantly associated with PTB included previous preterm birth (20.7% vs. 5.6%, p=0.002), multiple pregnancy (17.2% vs. 4.2%, p=0.004), hypertensive disorders (24.1% vs. 8.5%, p=0.003), antepartum haemorrhage (10.3% vs. 2.8%, p=0.045), and maternal anaemia (34.5% vs. 21.1%, p=0.048). Preterm neonates had higher rates of low birth weight (35%), NICU admission (27%), and complications such as respiratory distress (9%), jaundice (11%), and sepsis (7%) compared with term neonates.

Conclusion: This study highlights a high burden of PTB in a tertiary hospital, with maternal and obstetric complications as key determinants. Strengthened antenatal surveillance, timely management of high-risk pregnancies, and larger multicentric studies are warranted to reduce PTB and improve neonatal outcomes.

Keywords Preterm birth, Complications, Maternal risk factors, Neonatal outcomes, Antenatal care

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Introduction

Preterm birth (PTB), defined as delivery before 37 completed weeks of gestation or fewer than 259 days since the first day of the last menstrual period, remains a major global public health challenge. It is the leading cause of neonatal morbidity and mortality, contributing significantly to long-term complications such as neurodevelopmental impairment, respiratory disorders, and metabolic diseases later in life .[1,2]

The global incidence of preterm birth is approximately 11%, translating to nearly 15 million babies born preterm each year.[3]

The burden of PTB is disproportionately higher in low- and middle-income countries.[4] In India, the prevalence of PTB is reported to be 7–9%, making it a significant contributor to neonatal

and under-five mortality.[5] Despite advances in neonatal care, the rates of preterm deliveries are rising, partly due to increasing use of assisted reproductive technologies, higher maternal age, and medically indicated preterm deliveries for maternal or fetal complications.[6]

Preterm births can be broadly classified into spontaneous (due to preterm labor or preterm premature rupture of membranes) and provider-initiated (induction or elective cesarean for maternal or fetal indications).[7] Risk factors are multifactorial and include maternal age, poor antenatal care, multiple pregnancies, infections, hypertensive disorders, and previous history of preterm birth.[8] Environmental and socio-demographic determinants such as low socioeconomic status, rural residence, and inadequate nutrition further aggravate the risk .[9] Prevention and management of PTB remain complex due to its multifactorial etiology. Evidence suggests that improved antenatal surveillance, timely identification of high-risk mothers, and accessible neonatal care can significantly reduce adverse outcomes.[10] However, in resource-limited settings, the challenge persists due to lack of awareness, inadequate health infrastructure, and socioeconomic disparities.

Given its high prevalence and devastating consequences, research on determinants of PTB is crucial for guiding preventive strategies and improving maternal and neonatal outcomes. This study, therefore, aims to estimate the prevalence of preterm birth in a tertiary care hospital and identify maternal, obstetric, medical, and socio-demographic determinants contributing to its occurrence.

Methodology

This study was a retrospective observational study carried out over a period of six months and was conducted in the Department of Obstetrics and Gynaecology at a tertiary care hospital in South India. The study population included all women who delivered in the hospital during the defined study period. The sample size was calculated using a prevalence of preterm birth reported in earlier Indian studies, which ranges between 7 to 9 percent. Considering a 95 percent confidence interval and an allowable error of 5 %, the minimum required sample size was estimated as 200. Eligible cases were recruited consecutively until the sample size was achieved, ensuring that the sample adequately represented the target population.

Women were included if they had a confirmed gestational age established either by a reliable last menstrual period (LMP) or by first-trimester ultrasound. Both singleton and multiple pregnancies were included if the delivery resulted in a live birth or stillbirth after the age of viability, which in this study was taken as 28 weeks of gestation. Only those cases with complete antenatal, intrapartum, and neonatal records were considered for inclusion, so as to ensure data accuracy and reliability.

Women were excluded from the study if their hospital records were incomplete or if key information such as gestational age, pregnancy outcome, or maternal risk factors was missing. Deliveries that occurred outside the hospital and were later referred post-delivery were also excluded. Pregnancies that ended before the age of viability due to medical termination or congenital anomalies incompatible with life were not included in the study. In addition, cases with uncertain gestational age, due to the absence of early ultrasound or unreliable LMP, were excluded.

Data were collected retrospectively from hospital records, including delivery registers, patient case sheets, and neonatal intensive care unit (NICU) admission logs. A structured data extraction sheet was used to ensure uniformity in recording information. The variables collected included maternal demographic details such as age, residence, education, occupation, and socioeconomic status. Obstetric history variables included gravida, parity, history of previous preterm birth, inter-pregnancy interval, and multiple gestation. Antenatal details included booking status, number of antenatal visits, timing of the first antenatal visit, medical comorbidities such as hypertension, diabetes, thyroid disorders,

anaemia, or infections, and obstetric complications like antepartum haemorrhage, preeclampsia, intrauterine growth restriction, and preterm premature rupture of membranes (PPROM). Delivery-related information such as gestational age at delivery, mode of delivery, type of labour, and neonatal outcomes were also documented. Neonatal outcomes included birth weight, NICU admission, complications such as respiratory distress syndrome, jaundice, or sepsis, and final outcome at discharge.

Data were entered into Microsoft Excel and analysed using SPSS version 20. Descriptive statistics were used to estimate the prevalence of preterm birth. Categorical variables were analysed using chi-square test or Fisher's exact test, while continuous variables were summarised as mean and standard deviation and compared using Student's t-test. Logistic regression analysis was performed to identify independent determinants of preterm birth after adjusting for potential confounding factors. A p-value of less than 0.05 was considered statistically significant.

Results

The study found that the prevalence of preterm birth was 29%, while 71% of deliveries were term. (Figure 1)

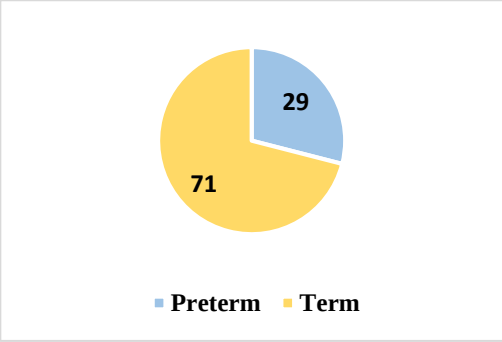

Figure 1: Prevalence of Preterm Birth in the Study Population

Preterm neonates had a higher frequency of complications such as respiratory distress syndrome, jaundice, and sepsis, as well as an increased requirement for NICU admission. In contrast, term neonates were more likely to have an uncomplicated course. (Figure 2)

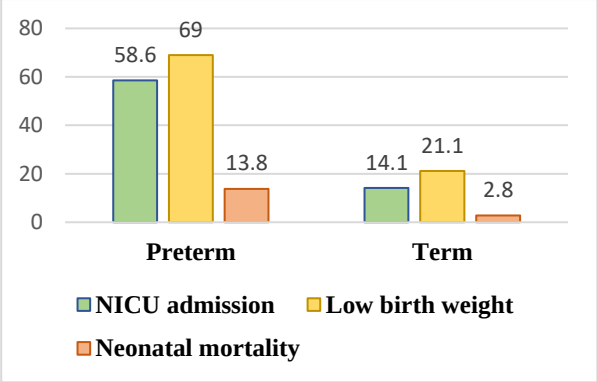

Figure 2: Neonatal Outcomes among Preterm vs. Term Births

Maternal demographic characteristics revealed that the majority of mothers were between 20 and 29 years of age, accounting for 59% of the study population, followed by 29% who were 30 years or older, and 12% who were younger than 20 years.

Table 1. Maternal Demographic Characteristics (n=200)

Variable		Frequency (%)
Age (years)	<20	24 (12.0)
	20–29	118 (59.0)
	≥30	58 (29.0)
Residence	Urban	96 (48.0)
	Rural	104 (52.0)
Education level	Illiterate	38 (19.0)
	Primary	46 (23.0)
	Secondary	74 (37.0)
	Graduate and above	42 (21.0)
Occupation	Homemaker	126 (63.0)
	Employed	58 (29.0)
	Other	16 (8.0)
Socioeconomic status	Low	84 (42.0)
	Middle/High	116 (58.0)

More women resided in rural areas (52%) compared to urban areas (48%). Regarding education, 37% of the mothers had secondary education, 23% had primary education, 21%

were graduates or above, and 19% were illiterate. Most of the women were homemakers (63%), while 29% were employed and 8% belonged to other occupations.

In terms of socioeconomic background, 58% belonged to the middle or high socioeconomic groups, whereas 42% were from the low socioeconomic group. (Table 1)

Delivery-related findings showed that 29% of the deliveries were preterm and 71% were term. Vaginal delivery was the mode of birth in 44% of cases, while cesarean section accounted for 47%, and instrumental deliveries for 9%. Low birth weight (<2500 g) was observed in 35% of neonates, while 65% weighed 2500 g or more at birth. NICU admissions were required in 27% of cases.

Table 2: Delivery Characteristics and Neonatal Outcomes

Variable		Frequency (%)
Gestational age at delivery	Preterm (<37 weeks)	58 (29.0)
	Term (≥37 weeks)	142 (71.0)
Mode of delivery	Vaginal	88 (44.0)
	Cesarean	94 (47.0)
	Instrumental	18 (9.0)
Birth weight	<2500 g	70 (35.0)
	≥2500 g	130 (65.0)
NICU admission	Yes	54 (27.0)
Neonatal complications	Respiratory distress syndrome	18 (9.0)
	Jaundice	22 (11.0)
	Sepsis	14 (7.0)
	None	146 (73.0)

Among neonatal complications, 9% developed respiratory distress syndrome, 11% had jaundice, and 7% developed sepsis, while 73% of babies had no complications. These results indicate that preterm birth was closely associated with low birth weight, higher NICU admissions, and neonatal morbidity. (Table 2)

Obstetric and medical risk factors showed significant associations with preterm birth. A history of previous preterm delivery was present in 20.7% of women with preterm birth compared to 5.6% of those with term deliveries, which was statistically significant. Multiple pregnancies were more common in the preterm group (17.2% vs. 4.2%). Hypertensive disorders occurred in 24.1% of preterm mothers compared to 8.5% of term mothers, showing a strong association.

Antepartum haemorrhage was reported in 10.3% of preterm cases and 2.8% of term cases. Anaemia was also significantly higher in the preterm group (34.5% vs. 21.1%).

Table 3: Obstetric and Medical Risk Factors Associated with Preterm Birth

Risk Factor	Preterm (n=58)	Term (n=142)	p-value
Previous preterm delivery	12 (20.7%)	8 (5.6%)	0.002*
Multiple pregnancy	10 (17.2%)	6 (4.2%)	0.004*
Hypertensive disorders	14 (24.1%)	12 (8.5%)	0.003*
Gestational diabetes	8 (13.8%)	12 (8.5%)	0.280
Antepartum haemorrhage	6 (10.3%)	4 (2.8%)	0.045*
Anaemia (Hb < 10 g/dl)	20 (34.5%)	30 (21.1%)	0.048*

Gestational diabetes was more frequent in preterm deliveries (13.8% vs. 8.5%), but the difference was not statistically significant. These findings establish that obstetric complications, hypertensive disorders, anaemia, and previous preterm deliveries are important determinants of preterm birth. (Table 3)

Discussion

The present study reported a high preterm birth (PTB) prevalence of 29% and found that previous preterm delivery, multiple pregnancy, hypertensive disorders, antepartum haemorrhage (APH) and maternal anaemia were significantly associated with PTB. These findings align with the Indian and international literature in terms of risk factors but differ in prevalence magnitude.

Hospital-based studies in India generally report lower PTB prevalence than our figure. For example, a retrospective study in Odisha reported a prevalence of 17.4% ,[11] while a tertiary-centre study in Karnataka observed 16.8% .[12] Similarly, a North Indian study documented PTB prevalence at 14.3%.[13] Our higher prevalence is likely attributable to referral bias, as tertiary hospitals cater to a larger share of high-risk pregnancies.

Risk factor associations in our study are consistent with published reports. A case-control study in Tamil Nadu highlighted previous preterm birth, preeclampsia, and multiple gestations as strong determinants .[14] Likewise, an analysis from Nepal found maternal anaemia and hypertensive disorders to be independent predictors of PTB.[15] The association of multiple pregnancy with PTB observed in our study reflects findings from a large South Indian cohort, which showed significantly higher PTB rates among twin gestations .[16]

Our study also confirmed adverse neonatal outcomes associated with PTB, including low birth weight, higher NICU admissions, and complications such as respiratory distress syndrome and sepsis. Similar observations have been made in an Uttar Pradesh study, which reported a strong correlation between PTB and NICU admission, with respiratory distress as the leading morbidity .[17] Another study by Nair LM et al reinforced that preterm neonates disproportionately contribute to neonatal mortality due to preventable morbidities .[18]

While our study was retrospective and single-centre with consecutive recruitment, other studies employed larger, multicentric, or prospective designs. Additionally, many studies stratified spontaneous and provider-initiated PTB, a distinction not made in our analysis. This heterogeneity highlights the need for cautious interpretation of institutional PTB prevalence .[12,15]

The implications of our findings are significant. The concordance of risk factors across studies underscores the need to strengthen antenatal surveillance for hypertensive disorders, anaemia, infections and monitoring of women with prior PTB and multiple gestation. At the same time, the higher prevalence at our centre points to the importance of conducting multicentric or population-based surveillance to obtain representative prevalence estimates. Differentiating spontaneous from provider-initiated PTB and auditing referral patterns are also essential for identifying potentially preventable preterm deliveries.

This study had certain limitations, including its retrospective single-centre design and relatively small sample size, which may limit generalizability. Referral bias in a tertiary hospital setting likely contributed to the high preterm birth prevalence. Additionally, not distinguishing between spontaneous and provider-initiated preterm births and potential unmeasured confounders may have influenced outcomes.

Conclusion

The present study revealed a high prevalence of preterm birth (29%) in a tertiary care setting, underscoring the significant burden of this condition. Key determinants identified included previous preterm birth, multiple gestation, hypertensive disorders, antepartum haemorrhage, and maternal anaemia, all of which were strongly associated with adverse neonatal outcomes such as low birth weight, respiratory distress, sepsis, and increased NICU admissions. These findings highlight the multifactorial nature of preterm birth and the need for targeted interventions focusing on maternal risk factors. Strengthening antenatal care services, early identification and management of high-risk pregnancies, and

timely treatment of maternal complications are essential strategies to reduce preterm deliveries and improve neonatal survival. Furthermore, the high prevalence observed suggests the necessity for larger multicentric and community-based studies to provide more representative data and guide preventive programs. Focused policy interventions and improved perinatal care can substantially reduce the adverse impact of preterm birth.

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