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Original Article

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Evaluation of Risk Factors in Preterm Labour as Compared to Term Labour

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ABSTRACT

Background: Preterm birth, the major risk factor for neonatal mortality and morbidity, is still a cause of concern worldwide. Detection of its multiple risk factors is important for the implementation of effective preventive measures. This study aims to evaluate the risk factors associated with preterm labour in comparison to term labour.

Methods: A two-year case-control study was conducted at a tertiary care centre among 125 mothers with preterm deliveries (cases) and 125 with term deliveries (controls). Socio-demographic, obstetric, and medical variables were recorded through a structured proforma and compared with Chi-square tests.

Results: The prevalence of preterm birth was 13.4%. Advanced maternal age (>35 years), lower educational status, being a labourer, higher gravidity (G>4), history of history of previous abortion or preterm labor, history of short inter-pregnancy interval (<24 months), hypertensive disorders, premature rupture of the membranes (PROM), and genitourinary infection were significant risk factors ($p<0.05$). Underutilization of antenatal care (<4 visits) was also significant. Preterm babies had significantly higher admission to the NICU and neonatal mortality.

Conclusion: Preterm birth is linked to a multifaceted interplay of socio-demographic, obstetric, and medical risk factors. A life-course approach with a strong focus on preconception counseling, selective antenatal care, and infection and hypertension management is needed for the prevention and enhancement of perinatal outcomes.

Key-words: Preterm birth, Risk factors, Case-control study, Maternal age, Premature rupture of membranes, Neonatal mortality

INTRODUCTION

The duration of gestation is a critical predictor of infant health and survival, and preterm delivery, as the birth before 37 completed weeks of gestation, is a major public health problem globally. Complications of preterm birth are the direct single largest killer among infants younger than one month and the second largest killer among children five years or younger, resulting in approximately one million deaths annually. In India, the incidence is 11-14%, wherein 3.5 million premature babies are born annually [1].

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These babies suffer severe short-term morbidities, such as respiratory distress syndrome, sepsis, and difficulties in feeding, as well as long-term morbidities in the form of cerebral palsy, mental disability, and chronic lung disease. The economic cost arising out of this is massive, in the form of intensive neonatal treatment and lifelong care for associated disabilities [2,3].

One of the principal challenges towards the prevention of this crisis is that no single, agreed-upon list of risk factors is clearly defined [4]. It is recognized to be multifactorial with engaged variables extending from maternal physiological history, including recurrent preterm delivery, multiple pregnancy, and infection, to socio-demographic variables such as extremes of age, low socioeconomic status, and education. Since the predictability of at-risk groups is not possible consistently, it is challenging to devise effective preventive strategies and interventions [5,6].

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To this end, the research attempts to compare and evaluate systematically the risk factors of preterm labor with term labor [7]. The research is two-pronged: one, to identify a systematic compilation of evidence-based risk factors from a literature review, and two, to develop predictive models based on the review of these variables within a tertiary care system [8]. In elucidating the significant maternal physiologic and socio-demographic predictors, this research hopes to provide the foundation for subsequent tools, such as a maternal-infant risk questionnaire, ultimately guiding targeted clinical interventions towards reducing the preterm birth rate and improving neonatal outcomes.

MATERIALS AND METHODS

Study Design and Setting- This case-control study was carried out for two years in the Obstetrics and Gynaecology department of a tertiary care centre. This design was adopted to allow comparison of risk factors between those mothers who had preterm labour and those who gave birth at term.

Study Participants and Sample Size- The participants of the study were two groups: cases, which are mothers who gave birth to a preterm baby (28-36 6/7 weeks of pregnancy), and controls, which are mothers who gave birth to a term baby (≥37 weeks of pregnancy). The mothers who gave birth at less than 28 weeks of pregnancy were excluded from the study. A sample size of a minimum of 250 cases was considered adequate for analysis, and a corresponding number of controls was recruited for comparison.

Data Collection- Information was gathered using a systematically prepared case proforma that aimed to provide in-depth information on maternal and neonatal outcomes. The proforma was organized into various sections to achieve systematic recording. The demographic section captured maternal age, occupation, educational level, and socioeconomic status. A thorough medical history was taken, including family history, previous medical and surgical history, and any medical disorders complicating the pregnancy.

The obstetric history section collected detailed data on past conceptions and the progress of the present pregnancy. Gestational age was determined mainly by the last menstrual period date and supplemented by first-trimester ultrasound reports where they existed. Certain clinical conditions were identified using standard diagnostic criteria: gestational diabetes mellitus (fasting plasma glucose ≥92 mg/dl to 126 mg/dl), pregnancy-induced hypertension (systolic BP ≥140 mmHg and/or diastolic BP ≥100 mmHg), anaemia (haemoglobin<11.0g/dl), and oligohydramnios (amniotic fluid index <5).

Obstetric outcomes were noted, such as gestational age at the time of delivery and mode of delivery (vaginal, assisted vaginal, or caesarean). Perinatal outcomes in the newborn were examined through Apgar scores, whether or not the infant cried at the time of delivery, necessity for and length of NICU stay, and cases of neonatal mortality.

Statistical Analysis- All data collected were keyed into a computer database and underwent careful cleaning and processing. Statistical analysis was conducted using the right software. Frequency tables and graphic plots were produced to describe the data. The relationship between several of the risk factors and preterm birth was evaluated using the Chi-square (χ^2) test. A p-value <0.05 was taken to be statistically significant for all analyses.

Ethical Approval- Informed written consent was obtained from each of the participants following an explanation of the study procedures. Ethical approval for the research protocol was obtained from the Institutional Review Committee.

RESULTS

During the two-year study period, there were 3,542 live births, of which 475 were preterm, yielding a prevalence rate of 13.4%. The final analysis included 250 patients, comprising 125 cases (preterm delivery) and 125 controls (term delivery). The distribution of gestational age among the cases is detailed in Table 1.

Table 1: Distribution of Preterm Cases by Gestational Age

Gestational Age Group (weeks)	Number of Cases (n=125)	Percentage (%)
28.1 - 32	14	11.2
32.1 - 34	27	21.6
34.1 - 36.6	84	67.2

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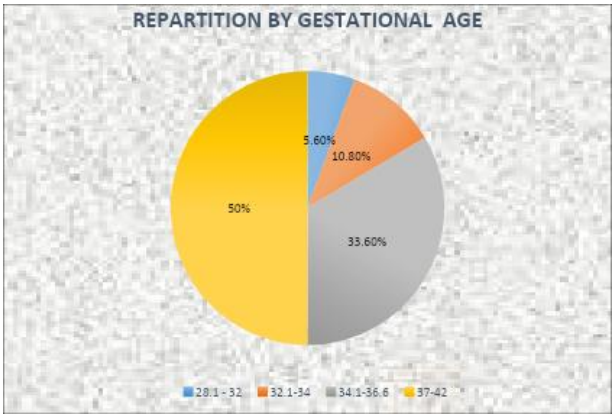

Fig. 1: Distribution of Subjects According to Gestational Age

A very strong correlation was noted between maternal age and preterm delivery (p<0.001), with a U-shaped risk curve. Preterm delivery was higher in adolescents (≤20 years) and women of older maternal age (≥35 years). Likewise, lower educational level and profession as a labourer were strongly related to a higher risk of preterm delivery (p<0.001 and p=0.028, respectively). Obstetric history was also a major determinant; increased gravidity (Gravida >4) and two or more prior abortions were strongly linked with preterm delivery (p<0.001 for both). A brief inter-pregnancy interval of <24 months was also a significant risk (p<0.001), as was prior preterm delivery history (p=0.028). In addition, reduced antenatal care visits were significantly associated with increased rates of preterm birth (p=0.009). These historical and demographic risk factors are presented in Table 2.

Table 2: Association of Selected Socio-Demographic and Obstetric Factors with Preterm Birth

Risk Factor	Category	Preterm Group (n=125)	Term Group (n=125)	p-value
Maternal Age	≥35 years	12 (9.6%)	1 (0.8%)	<0.001
Education	Illiterate	26 (20.8%)	9 (7.2%)	<0.001
Occupation	Labourer	17 (13.6%)	5 (4.0%)	0.028
Obstetric History	Gravida >4	18 (14.4%)	0 (0%)	<0.001
	History of ≥2 abortions	16 (12.8%)	0 (0%)	<0.001
	Previous Preterm Delivery	47 (37.6%)	14 (11.2%)	0.028
Inter-pregnancy interval	<24 months	41 (32.8%)	16 (12.8%)	<0.001

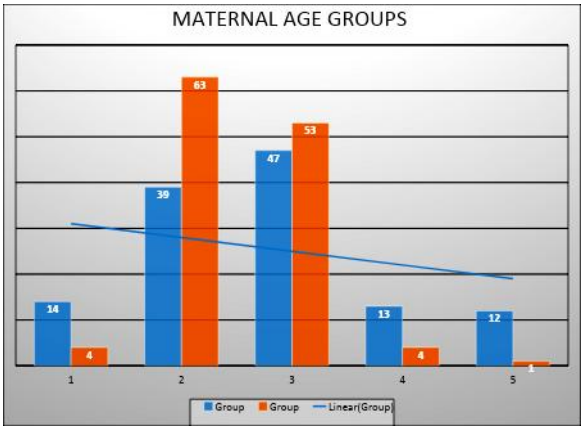

Fig. 2: Maternal Age Groups

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The presenting symptom of preterm rupture of membranes (PROM) was strongly correlated with preterm labour (p<0.001). Pregnancy medical complications in the form of hypertensive disorders were also much more common in the preterm group (p=0.045). The occurrence of infections such as urinary tract infections (UTIs) and vaginal infections such as bacterial vaginosis was also a strong predictor of preterm delivery (p<0.001 and p=0.011, respectively). These clinical observations are shown in Table 3.

Table 3: Association of Clinical and Medical Factors with Preterm Birth

Risk Factor	Preterm Group (n=125)	Term Group (n=125)	p-value
Presenting with PROM	52 (41.6%)	17 (13.6%)	<0.001
Hypertensive Disorders	21 (16.8%)	10 (8.0%)	0.045
Urinary Tract Infection	27 (21.6%)	7 (5.6%)	<0.001
Bacterial Vaginosis (HVS)	19 (15.2%)	8 (6.4%)	0.011

Neonatal results were substantially poorer among the preterm group. Preterm babies were much more likely to be admitted to neonatal intensive care units (NICU) and experienced a significantly higher incidence of neonatal mortality than term babies (p<0.001 and p=0.009, respectively). The data is further illustrated in the following Fig.

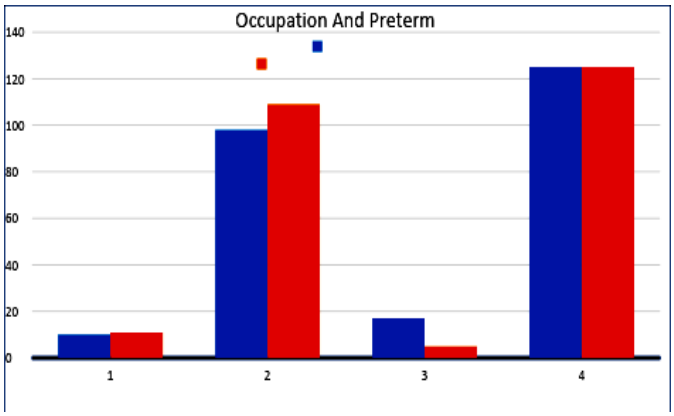

Fig. 3: Occupation

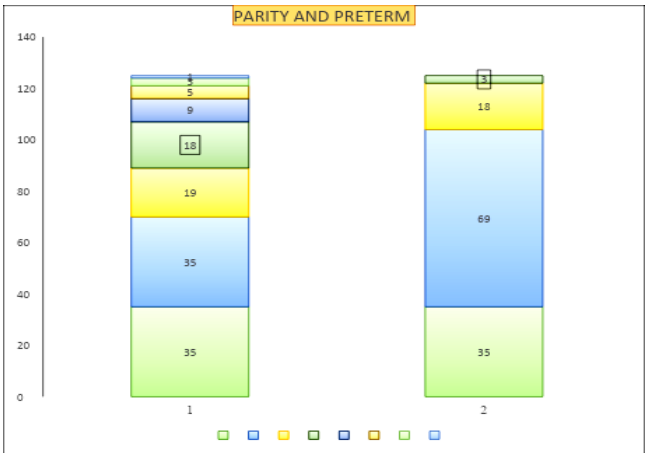

Fig. 4: Gravid Status

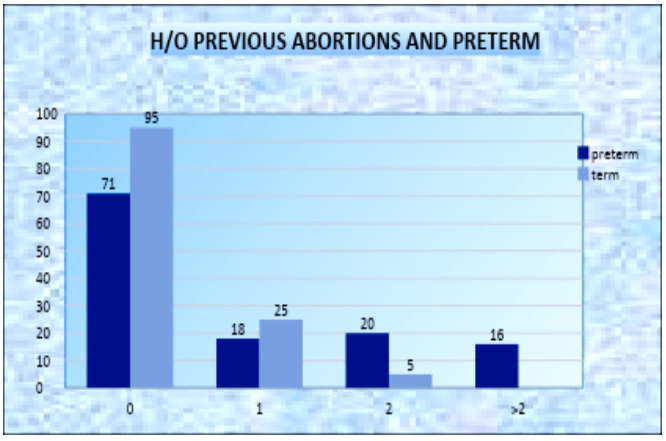

Fig. 5: History of Previous Abortions

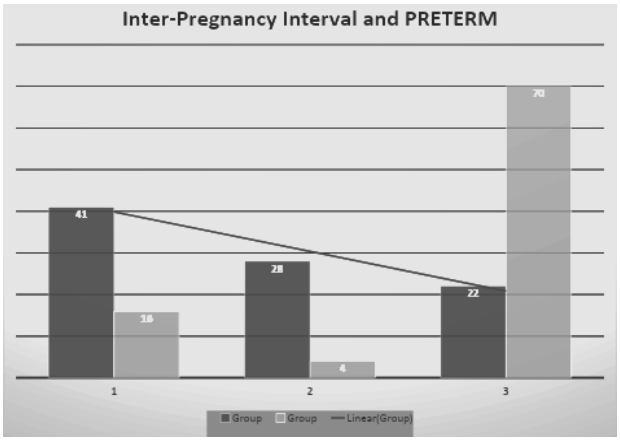

Fig. 6: Inter-pregnancy Interval

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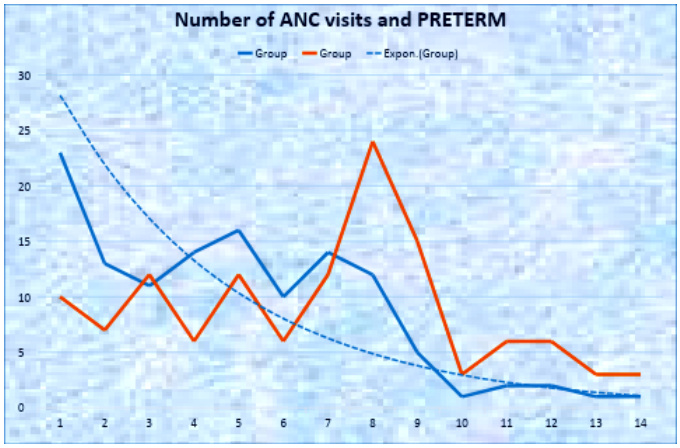

Fig. 7: Number of Antenatal Visits

DISCUSSION

This case-control analysis revealed a multifactorial list of risk factors strongly linked to preterm delivery, supporting the complex etiology of this significant public health problem. Preterm birth occurred in 13.4% of our tertiary-level care, consistent with national rates and emphasizing its significant contribution to perinatal morbidity and mortality.

Our results confirm that both younger and older maternal age raise the risk of preterm birth substantially, a finding established by many international studies. This U-shaped risk curve implies that biological inexperience and age-dependent obstetric complications, including hypertensive disorders, could explain this relationship [9]. In addition, reduced socio-demographic status, represented by maternal occupation as a labourer and reduced educational level, was a strong risk factor. This is probably due to reduced access to health resources, worse nutrition, and greater exposure to physical stressors, producing a socio-economic gradient in preterm risk [10].

Prior history of preterm delivery was one of the strongest predictors, raising the risk in a subsequent pregnancy by more than threefold. This observation is extremely congruent with a large volume of international literature, which suggests previous preterm birth as the strongest individual prognostic factor [11]. High gravidity and history of repeated abortions were also major obstetric risk factors, possibly representing covert uterine or cervical pathology. An inter-pregnancy gap of less than 24 months further added to this risk, possibly because of a lack of adequate recovery time for maternal nutritional and physiological stores.

The essential role of antenatal care was substantiated, as women who had fewer than four visits were at very high risk. This emphasizes the need for continual prenatal surveillance for early detection and control of complications [12,13]. The clinical presentation of PROM was strongly related to preterm labour, where it tended to be the terminal event leading to delivery. Underlying infections, particularly urinary tract infections and bacterial vaginosis, made significant contributions, supporting the pathophysiological role of inflammation and subclinical infection in the initiation of early labour [14].

Anaemia was prevalent in both groups, but was not statistically correlated with preterm birth in our sample. However, hypertensive disorders of pregnancy were significantly more common in the preterm group, often requiring iatrogenic premature delivery for maternal or fetal reasons. The neonatal outcomes forcefully demonstrated the sequelae of prematurity, as preterm infants had greatly increased NICU admission and neonatal mortality rates, which highlight the extreme and long-term significance of early delivery [15].

Finally, the heterogeneity of risk factors identified—across socio-demographic, obstetric, and medical categories—attests to the multifactorial etiology of preterm birth [16]. This demonstrates the need for a multifaceted prevention strategy. Successful interventions must combine enhanced access to education and prenatal care, targeted screening for and treatment of infections and medical complications, and individualized obstetric management for high-risk women, especially those with a preterm delivery history [17]. Future public health initiatives should be designed to

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address this complex web of determinants to mitigate the significant burden of preterm birth.

CONCLUSIONS

In conclusion, preterm birth is a multifactorial, complex obstetric challenge characterized by the convergence of maternal socio-demographic traits, obstetric history, and medical conditions, as indicated by the risk factors prevailing in this study. Its etiology is not confined to pregnancy and highlights the imperative for a life-course prevention strategy that is initiated through preconception care, targeting modifiable lifestyle factors, and guaranteeing access to quality reproductive health services. Although advances in neonatal intensive care have enhanced survival, preterm survivors' long-term health consequences make it necessary to avoid elective deliveries before 39 weeks without a medical reason. In the end, reducing preterm birth's tremendous burden calls for collective public health action aimed at community-based interventions, directed education, and universal prenatal care to stem its causes and enhance perinatal outcomes effectively.

CONTRIBUTION OF AUTHORS

Research concept- Poonam Patil, Rujuta Puranik
Research design- Poonam Patil, Madhuri Kompally
Supervision- Poonam Patil, Madhuri Kompally
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Data collection- Poonam Patil, Madhuri Kompally
Data analysis and interpretation- Poonam Patil, Rujuta Puranik, Madhuri Kompally
Literature search- Poonam Patil, Rujuta Puranik
Writing article- Poonam Patil, Rujuta Puranik
Critical review- Poonam Patil, Madhuri Kompally
Article editing- Poonam Patil, Madhuri Kompally
Final approval-Poonam Patil, Rujuta Puranik

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