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Frequency of Preterm Labour in Women Attending Delivery Suite of Civil Hospital, Karachi

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ABSTRACT

Background: Preterm birth remains a widespread issue worldwide, ranking as a leading cause of neonatal mortality and a significant contributor to long-term health complications. Its multifactorial nature, involving both individual and environmental influences, poses challenges for effective prediction and prevention during antenatal care. While the global incidence of preterm births continues to rise, there is a notable lack of comprehensive data from developing nations like Pakistan. **Methods:** This cross-sectional study was conducted at Dr. Ruth K.M. Pfau Civil Hospital, Karachi, over six months (from July 01, 2024 to December 31, 2024), to determine the frequency and associated factors of preterm labor. A total of 213 women aged 18–45 years undergoing delivery were included using non-probability consecutive sampling. Data on demographics, clinical details, and BMI, categorized using Asian criteria, were collected. Preterm labor was diagnosed based on uterine contractions and cervical assessment. Data were analyzed using SPSS version 21, with stratification and chi-square/Fisher's exact test applied to control effect modifiers. A p-value ≤ 0.05 was considered significant. Results provided insights into the prevalence and risk factors of preterm labor. **Results:** Among 213 participants, 26.29% experienced preterm labor with most preterm babies fell within the mild category (32–36 weeks, 60.7%) while moderate preterm (28–31 weeks, 26.8%) cases were second with extreme preterm (24–27 weeks, 12.5%) coming in as the least common. Chi-square tests revealed no significant relationships with residence, parity, or previous C-sections. Independent t-tests found no significant differences in continuous variables between groups. However, previous preterm delivery significantly predicted current preterm labor ($p = 0.04$). These findings suggest that preterm labor may be influenced by unmeasured or complex factors. **Conclusion:** This study found that previous preterm delivery was the only significant predictor of preterm labor, while factors such as age, BMI, residence, parity, and previous C-section showed no meaningful associations. These results emphasize the importance of focused interventions for women with a history of preterm birth to improve pregnancy outcomes.

INTRODUCTION

Term is defined as period from 37 to 41 completed weeks of gestation[1]. Delivery before 37 weeks is preterm[2]. The incidence of preterm labor is five to ten percent in developed countries[3]. In the United States of America, the incidence has risen about nine percent to twelve percent in the previous two decades[3]. Preterm delivery is divided into three groups on basis of gestational age: Mild preterm (32-36) weeks, Moderate preterm (28-31) week, Extremely preterm (24 to 27) weeks[2]

A recent study reported that Pakistan is 3rd highest country with high maternal and child mortality[3] and one of the major contributors of such neonatal incidents is preterm birth[4]. Currently, rising preterm birth is the leading burden on hospital economy and sources. One study reported that across 184 countries, the rate of PTB ranged from 5% to 18% of all newborns[5].

Preterm delivery itself is associated with increased risk of operative delivery, intrauterine infections, financial and psychological stress for parents[6] Fetal implications include prematurity, infections, metabolic disorders, hypoglycemia, hypocalcemia[6] intrauterine growth retardation (IUGR), necrotizing enterocolitis, septicemia, intracranial hemorrhage[7]

The strongest risks for birth prior to 37 weeks are a previous history of preterm birth[8]. Common causes of preterm labor are vaginal and urinary tract infection, cervical incompetence, recurrent bleeding episodes,

uterine anomaly, and progesterone deficiency, low socio economic status[9]. The other risk factors of preterm labor are maternal age, multiple pregnancy, smoking and poor nutritional status.[10] Iatrogenic causes include antepartum hemorrhage, uncontrolled blood pressure.

Study conducted in tertiary care hospital of Quetta reported the frequency of preterm labour in 16.6% women[11]. Another study conducted in Lahore reported the prevalence of preterm birth was 21.64%. Top 5 major risk factors identified were Placenta Previa (odds ratio: 51.97), maternal thyroid disease (odds ratio: 18.46), being a minority (odds ratio: 7.73), foetal distress (odds ratio: 7.19), and maternal asthma (odds ratio: 6.23)[12].

The aim of this study is to find out the burden of preterm labor in women attending delivery suite of tertiary care hospital. Various studies have been done at international level on this topic. However, local studies are very few which focusing on burden of preterm labour. It is utmost important to identify the burden which will help in allocating resources in public sector hospital and also provide insight for developing some strategies to reduce the risk. It will also help in decreasing the outcome of perinatal mortality and also provide an outlook on local figures since they are insufficient in Pakistan.

MATERIAL AND METHODS

This cross-sectional study was conducted at Dr. Ruth K.M. Pfau Civil Hospital, Karachi, using the data collected from Gynae-Unit I of the department of Obstetrics and Gynecology. The study spanned six months (July 01, 2024 to December 31, 2024), following approval from the College of Physicians and Surgeons, Pakistan, A total of 213 women were enrolled using non-probability consecutive sampling. The sample size was determined using the WHO sample size calculator, with a 16.6% frequency of preterm labor, a 5% margin of error, and a 95% confidence level.

Participants included women aged 18–45 years undergoing delivery, regardless of gravida status. Women with iatrogenic preterm induction of labor due to maternal factors such as chemotherapy or cardiac diseases, congenitally abnormal fetuses, intrauterine fetal death, placenta previa, placental abruption, multiple pregnancies, or chorioamnionitis were excluded. Data collection involved obtaining informed verbal consent from eligible women admitted to the gynecology ward or labor room. Baseline demographic and clinical details, including age, residence, parity, BMI, gestational age, and prior caesarean sections, were recorded using a predesigned proforma. BMI was calculated as weight in kilograms divided by height in meters squared (kg/m^2) and categorized using Asian criteria: <18.5 for underweight, 18.5–22.9 for normal weight, 23.0–27.5 for overweight, and >27.5 for obese. Preterm labor was diagnosed based on regular uterine contractions (>4/10 minutes) before 37 weeks of gestation and cervical assessment showing effacement and dilation (<3 cm).

Data analysis was performed using SPSS version 21. Quantitative variables, including age, BMI, and gestational age, were summarized using mean (SD) or median (IQR) based on normality. Frequencies and percentages were calculated for qualitative variables such as residence, parity, prior caesarean sections, prior preterm deliveries, and preterm labor. Stratification was conducted to control effect modifiers, including age, residence, BMI, parity, and prior caesarean sections. Post-stratification, the chi-square or Fisher's exact test was applied, with a p-value ≤ 0.05 considered statistically significant.

RESULTS

The study analyzed data from 213 participants to identify factors linked to preterm labor. Research subjects with preterm labor received three group classifications according to their gestational week period that ranged from 32–36 weeks for mild preterm births, 28–31 weeks for moderate preterm birth and 24–27 weeks for extreme preterm birth. Most preterm birth developments belonged to the mild category (60.7%) with a combined total of moderate cases (26.8%) and extreme cases (12.5%). Most participants (64.79%) lived in urban areas (138 participants), while 35.21% resided in rural areas (75 participants). In terms of obstetric history, 39.91% were Primipara (85 participants) and 60.09% were Multipara (128 participants). These proportions remained consistent for Parity, with the same percentages classified as Primipara and Multipara. Additionally, 48.83% (104 participants) had a previous C-section, while 51.17% (109 participants) did not. Only 9.86% (21 participants) reported a previous preterm delivery, while 90.14% (192 participants) had no such history. Overall, 26.29% (56 participants) experienced preterm labor, while 73.71% (157 participants) did not.

Participants had an average age of 31.96 years (SD: 7.87), ranging from 18 to 45 years. The average height was 158.52 cm (SD: 11.67), and the average weight was 74.39 kg (SD: 16.10). The mean BMI was 26.69 (SD: 4.87), while the average gestational age was 32.52 weeks (SD: 5.62).

Logistic regression evaluated the relationship between preterm labor and key predictors. The final model included Age and BMI. The intercept was statistically significant (Coefficient: -8.33, p = 0.049), indicating baseline odds for preterm labor. However, none of the predictors showed significant associations. Age (p = 0.630), Weight (p = 0.499), and BMI (p = 0.883) had no meaningful effect. Although Height (p = 0.072) showed a weak association, it wasn't statistically significant.

Chi-square tests explored associations between preterm labor and four categorical variables: Residence, Parity, Previous C-section, and Previous Preterm Delivery. None of these variables showed significant associations, with p-values of 0.756 for Residence, 1.000 for Gravida, 0.508 for Parity, 0.249 for Previous C-section, and 0.146 for Previous Preterm Delivery.

Independent t-tests compared continuous variables between participants with and without preterm labor. Again, no significant differences emerged. Age (p = 0.805), Height (p = 0.125), Weight (p = 0.427), BMI (p = 0.986), and Gestational Age (p = 0.615) all showed no meaningful distinction between the two groups.

Age, BMI, Gestational Age, Residence, Parity, Previous C-section, did not significantly predicted preterm labor. Previous preterm delivery significantly impacted current preterm labour (p value = 0.04). Although Height hinted at a possible relationship, it didn't reach statistical significance. These results suggest that other unmeasured or more complex factors might influence preterm labor outcomes.

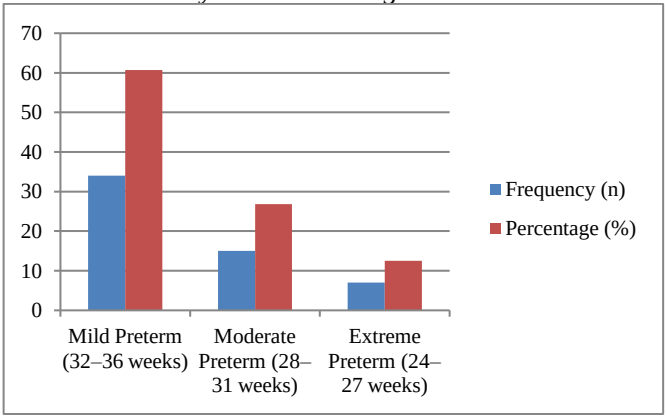
Table 1

Frequency of Preterm Labor by Gestational Age Category

Gestational Age Category	Frequency (n)	Percentage (%)
Mild Preterm (32–36 weeks)	34	60.7%
Moderate Preterm (28–31 weeks)	15	26.8%
Extreme Preterm (24–27 weeks)	7	12.5%

Figure 1

Preterm Labor by Gestational Age



DISCUSSION

This study investigated factors associated with preterm labor among women attending the delivery suite of Civil Hospital, Karachi. The findings revealed a preterm labor frequency of 26.29%, lower than figures reported in previous local studies, such as 51.05% in a study by Fatima et al. [13]This variation could be attributed to differences in sample size, study design, and population characteristics. Globally, preterm birth rates range between 5% and 18%, emphasizing the persistent burden of this condition.[14]

In this study, previous preterm delivery was the only significant predictor of preterm labor (p = 0.04), consistent with findings from both local and international research.[15] Previous studies have highlighted short inter-pregnancy intervals (IPI) as a key contributing factor to preterm labor.[13] A shorter IPI is believed to limit maternal recovery, leading to nutrient depletion, hormonal imbalances, and impaired uterine recovery, all of which contribute to adverse pregnancy outcomes. This aligns with international research suggesting that inadequate maternal recovery increases vulnerability to complications like preterm pre-labor rupture of membranes (PPROM).[15]

In contrast, variables such as age, BMI, gestational age, residence, parity, and previous cesarean section did not show significant associations with preterm labor. This is consistent with findings from studies conducted by Dekker et al.[15] and Najafi et al.[16], where maternal BMI and height were weak predictors. Although height in our analysis showed a borderline association (p = 0.072), it was not statistically significant. Research by Dekker et al. also found that shorter maternal height increased the risk of preterm birth in certain populations.[15]

Parity and gravidity, often considered critical factors in obstetric outcomes, showed no significant associations with preterm labor in this study (p = 1.000 and p = 0.508, respectively). While primiparous women are traditionally considered at higher risk due to cervical insufficiency and uterine inexperience, these associations were not evident in our analysis. This discrepancy may reflect population-specific factors or the influence of other unmeasured variables, such as socioeconomic status, maternal stress, and antenatal care adherence.[15-16]

Chi-Square tests also found no significant associations between preterm labor and residence (urban/rural) or previous cesarean section (p = 0.756 and p = 0.249, respectively). Previous research has shown mixed results regarding these variables, with some studies identifying urban residency as a protective factor due to better access to healthcare, while others found no significant impact.[13,15] Similarly, previous C-sections can increase the risk of preterm labor due to uterine scarring and impaired placentation, but this relationship was not observed in our analysis.

From a global perspective, studies have identified multiple risk factors for preterm labor, including maternal infections, stress, cervical length, and hormonal imbalances.[17] For instance, Dekker et al.[15] emphasized that shorter cervical length and uterine artery abnormalities are strong predictors of preterm birth.

However, these variables were not included in the current study, highlighting a potential limitation.

Independent t-tests comparing continuous variables such as age, BMI, weight, height, and gestational age between women with and without preterm labor revealed no statistically significant differences. This supports the growing consensus that preterm labor is a multifactorial condition with no single dominant predictor.[15-16]

Findings from Makhijani et al.[18] suggest that factors such as failed induction of labor and poor Bishop scores are linked to adverse outcomes, including preterm birth. However, these variables were not assessed in our study. Additionally, the psychological state of the mother, stress levels, and nutritional deficiencies are known contributors to preterm labor but were beyond the scope of this analysis.[20-21]

These results underscore the complexity of preterm labor and the need for a multifaceted approach to prevention. Improved antenatal care, counseling on inter-pregnancy intervals, and infection screening should be prioritized. Educational campaigns focusing on maternal health awareness and early identification of high-risk pregnancies are essential for reducing the burden of preterm labor.

CONCLUSION

This study found that previous preterm delivery was the only significant predictor of preterm labor, while factors such as age, BMI, height, weight, residence, parity, and previous C-section showed no meaningful associations. These results emphasize the importance of focused interventions for women with a history of preterm birth to improve pregnancy outcomes.

LIMITATIONS

This study has several limitations that should be considered when interpreting the findings. It did not include key predictors of preterm labor, such as cervical length, uterine artery Doppler studies, maternal infections, and psychosocial stressors, all of which are well-documented contributors to preterm birth. Similarly, inter-pregnancy interval (IPI), an important risk factor, was not explicitly analyzed, limiting insights into its impact. The study also did not address maternal stress levels and emotional well-being, which are known to influence pregnancy outcomes. Additionally, the absence of socioeconomic factors—such as income level, education status, and access to healthcare—restricts the analysis, as these elements often play a critical role in maternal and neonatal health.

Being conducted at a single tertiary care center (Civil Hospital, Karachi), the findings may not be fully generalizable to other regions with different healthcare systems, demographic profiles, and resource availability. The reliance on self-reported data for variables like previous preterm delivery and previous cesarean section introduces the possibility of recall bias or reporting inaccuracies.

The study's cross-sectional design also limits its ability to establish causal relationships between predictors and preterm labor. A longitudinal approach would better capture these dynamics and clarify cause-and-effect links. Moreover, the absence of advanced diagnostic tools, such as fetal fibronectin testing or biomarker analysis, reduced the predictive precision for identifying preterm labor risk.

Future research should address these limitations by incorporating a wider range of clinical, social, and psychological factors, conducting multicenter studies for broader applicability, adopting longitudinal designs to establish causality, and utilizing advanced diagnostic tools for more accurate predictions. Addressing these gaps will provide a clearer understanding of preterm labor's multifactorial nature and guide more effective prevention and management strategies.

Table 1

Distribution of characteristics of the study population.

Variables	Mean±SD	Frequency (%)
Age (years)	31.96±7.87	
BMI	26.68±4.86	
Gestational Age (weeks)	32.52±5.62	
Residence		
Rural		75 (35.21)
Urban		138 (64.79)
Parity		
Multipara		128 (60.09)
Primipara		85 (39.91)
Previous Preterm Delivery		
No		192 (90.14)
Yes		21 (9.86)
Previous caesarean section		
No		109 (51.17)
Yes		104 (48.83)

Table 2

Distribution of characteristics among those who had a preterm labour versus those who did not have preterm labour.

Variables	Preterm Labour No Mean ± Standard Error Frequency (%)	Preterm Labour Yes Mean ± Standard Error Frequency (%)
Age (Years)	31.90± 0.57	32.32±1.54
BMI	26.68±0.34	26.67±1.12
Height (cm)	158.04±0.84	162.08±2.40
Weight (kg)	74.72±1.16	71.88±3.33
Gestational age (Weeks)	32.44±0.41	33.04±1.09
Residence Rural Urban	 65(34.57) 123(65.43)	 10(40.0) 15(60.0)
Parity Multipara Primipara	 115(61.17) 73(38.83)	 13(52.0) 12(48.0)
Previous C-section		

No Yes	93(49.47) 95(50.53)	16(64.0) 9(36.0)
Previous Preterm Delivery	172(91.49)	20(80.0)
No Yes	16(8.51)	5(20.0)

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