RESEARCH ARTICLE

Factors contributing to preterm birth in patients presenting at tertiary care hospitals in Punjab

Fariha Aslam Bajwa[1], Nayyer Sultana[2], Ameelia Sadaqat[3], Abida Riaz[4], Mirza Zeeshan Sikandar[5]

Abstract

Objective: To determine the various causes and factors leading to preterm birth in women presenting at tertiary care hospitals.

Method: The cross-sectional, prospective study was conducted from June 19, 2021, to January 19, 2022, at the Central Park Teaching Hospital, Lahore, Pakistan, in collaboration with other tertiary care teaching hospitals in Lahore, and comprised pregnant women aged 15-45 years with preterm birth. Demographic and obstetric data was collected. Depending on the factors contributing to preterm birth, the subjects were categorised as spontaneous labour group A, preterm prelabour rupture of membrane group B, and iatrogenic preterm birth group C. Data was analysed using SPSS 25.

Results: Of the 1,300 recorded births, 200(15.38%) were preterm. Group A had 86(43%) women with mean age 28.55±4.68 years, group B had 43(21,5%) women with mean age 27.14±3.25 years, and group C had 71(35.5%) women with mean age 28.28±3.74 years (p>0.05). There was significant difference among the groups with respect to body mass index (p=0.001) and parity (p=0.021). Vaginal and urinary tract infections were significantly higher in group A compared to the other groups (p<0.05). In group C, pre-eclampsia was the main reason for preterm birth 45(63.38%).

Conclusion: Medically indicated preterm birth rate was found to be high, and pre-eclampsia was noted as the main cause in iatrogenic preterm birth.

Keywords: Preterm, Labour, Reproductive age, PPROM, Pre-eclampsia, Obstetrical complications. (JPMA 74: 504; 2024)

DOI: https://doi.org/10.47391/JPMA.9474

Introduction

Preterm birth is a health issue seriously affecting neonates and their families, and has a global preterm birth rate of 11%. It is a leading cause of perinatal morbidity and mortality worldwide, being the second leading cause of neonatal death.[1,2] Those who survive suffer lifelong disability in terms of learning abilities due to hearing and visual impairments.[1] Preterm birth is not only associated with increased burden of perinatal morbidity, but it affects the whole family as it has been reported that mothers of preterm babies find difficulties in handling the newborn, and suffer from posttraumatic stress disorders (PTSD).[3,4] The major burden of preterm births is shared by countries in Asia and sub-Saharan Africa, accounting for up to 81%.[4] Pakistan ranks fourth in the prevalence of preterm births in the world, with prevalence ranging 11.4-22.8%.[5]

In spite of much efforts done to reduce the incidence, the rate of preterm birth has shown a raising trend in many countries, and a major contributory factor to this rise is increase in the incidence of multiple pregnancy and hypertensive disorders of pregnancy.[4,6] On the other hand, the rate of spontaneous preterm labour is seen to be reduced by improvements in some factors, including low parity, better antenatal care services and higher education level.[6] Other contributory factors to preterm birth are preterm prelabour rupture of membrane (PPROM), spontaneous preterm labour, previous preterm births, cervical incompetence, vaginal infections, urinary tract infections (UTIs), smoking, nutritional status of mother, and maternal conditions leading to iatrogenic preterm delivery, such as pre-eclampsia, eclampsia and antepartum haemorrhage.[7-9] Maternal anaemia and poor oro-dental hygiene are also contributory factors to preterm labour.[10,11] The role of vitamin D deficiency has been studied in the pathogenesis of many disease processes and its deficiency is also seen to be associated with preterm labour.[12]

It is important to implement effective research strategies to know the magnitude and determinants of the problem to prevent preterm birth and provide care to the born-too-soon babies to reduce the survival gap between high-income and low-income countries.[1]

Unfortunately, despite the magnitude of the problem, data from Pakistan is insufficient. The current study was planned to fill the gap by determining the various causes and

[1,2]Department of Obstetrics and Gynaecology, Central Park Medical College and Teaching Hospital, Lahore, Pakistan; [3]Department of Obstetrics and Gynaecology, Lahore Medical and Dental College, Lahore, Pakistan; [4]Department of Obstetrics and Gynaecology, Shiekh Zaiyed Medical College, Rahim Yar Khan, Pakistan; [5]Department of Medicine, Central Park Teaching Hospital, Lahore, Pakistan.

Correspondence: Nayyer Sultana. Email: sultana.nayyer@gmail.com

ORCID ID. 0009-0001-8200-9679

Submission complete: 15-03-2023 **Review began:** 18-04-2023

Acceptance: 04-11-2023 **Review end:** 04-11-2023

factors leading to preterm birth in women presenting at tertiary care hospitals in an urban setting.

Patients and Methods

The cross-sectional, prospective study was conducted from June 19, 2021, to January 19, 2022, at the Central Park Teaching Hospital, Lahore, Pakistan, in collaboration with other tertiary care teaching hospitals in Lahore. After approval from the institutional ethics review board, the sample size was calculated using the World Health Organisation (WHO) calculator with 95% confidence interval (CI) and 15% prevalence.[13] The sample was raised using non-random convenience sampling technique. Those included were pregnant women aged 15-45 years with preterm birth. Preterm birth was defined as a baby born alive with 25-37 weeks of gestation. Patients with complications like anomalous babies and intrauterine deaths were excluded.

After taking informed consent from the subjects, data was collected. Demographic characteristics included age and socioeconomic status (SES), while obstetric variables included parity, gestational age at delivery, and inter-pregnancy interval. Gestational age of the foetus was confirmed on the basis of last menstrual period combined with ultrasound scan done before 20 weeks of gestation.

The factors that contributed to spontaneous preterm labour and PPROM were also recorded. Data included the number of previous preterm births, if any, and the gestational ages in each case, vaginal infection (high vaginal swab for culture and sensitivity), UTI (symptomatology, pus cells in the urine and if present, culture and sensitivity), smoking and alcohol consumption, nutritional status of the mother assessed by body mass index (BMI), anaemia (intake of iron, haemoglobin [Hb] level) and hyperemesis gravidarum. Factors that contributed to uterine over-distension were assessed on ultrasound and included the number of foetuses, and the amount of liquor assessed by amniotic fluid index. In case a patient presented with PPROM, duration of membrane rupture till delivery as well as signs and symptoms of chorioamnionitis (pulse, temperature, total leukocyte count [TLC]) were recorded. Medical indications, such as pre-eclampsia (blood pressure [BP] >140/90mmHg after 20 weeks of pregnancy with proteinuria and/or signs and symptoms including headache, blurring of vision, right hypochondrial pain and vomiting), diabetes (fasting blood sugar [FBS] >100mg/dl in pregnancy), chronic hypertension (HTN) (BP >140/90mmHg diagnosed before 20 weeks of pregnancy), placental abruption and placenta previa, were noted.

Depending on the factors contributing to preterm birth, the subjects were categorised as spontaneous labour group A, PPROM group B, and iatrogenic preterm birth group C.

Data was analysed using SPSS 25. Data was presented as mean±standard deviation and frequencies and percentages, as appropriate. One-way analysis of variance (ANOVA) and post-Hoc Tukey's test were used to assess the mean intragroup and intergroup differences. For categorical variables, Pearson's chi-square and Fisher's exact test were used, as appropriate. P<0.05 was considered significant.

Results

Of the 1,300 recorded births, 200(15.38%) were preterm. Group A had 86(43%) women with mean age 28.55±4.68 years, group B had 43(21,5%) women with mean age 27.14±3.25 years, and group C had 71(35.5%) women with mean age 28.28±3.74 years (p>0.05). In group A, there were 38(44.2%) women with low SES, 47(54.6%) with middle SES and 1(1.2%) with high SES. In group B, there were 14(32.6%) with low SES and 29(67.4%) with middle SES, and the corresponding values in group C were 15(21.1%) and 56(78.9%). There was significant difference among the groups with respect to BMI (p=0.001) and parity (p=0.021), but there was no significant difference for gestational age (p>0.05) (Table 1).

Table-1: Demographic characteristics.

Parameter	Mean±SD			*p*-value
	Group A (n=86)	Group B (n=43)	Group C (n=71)	
Age (years)	28.55±4.68	27.14±3.25	28.28±3.74	0.175
BMI (kg/m^2)	25.56±0.674	25.64±2.74	28.05±3.88	0.001*
Parity	2.24±0.75	1.88±0.66	2.06±3.88	0.021*
Gestational Age (weeks)	33.19±2.84	33.47±2.48	33.80±2.65	0.365

SD: Standard deviation, BMI: Body mass index.

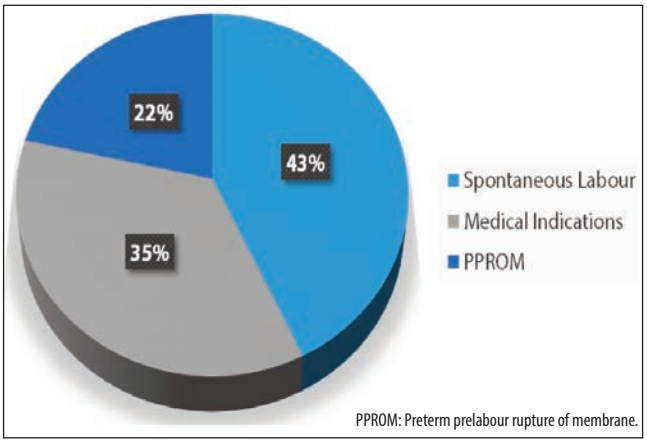

Figure-1: Distribution of the sample in relation to the cause of preterm birth.

Table-2: Demographic characteristics.

Parameter	n (%)			*p*-value
	Group A (n=86)	Group B (n=43)	Group C (n=71)	
Anaemia	28 (32.6)	9 (20.9)	21 (29.6)	0.387
Hyperemesis gravidarum	28 (32.6)	11 (25.6)	14 (19.7)	0.191
Bleeding in 1st trimester	8 (9.3)	2 (4.7)	13 (18.3)	0.064
Previous preterm birth	21 (24.4)	7 (16.3)	9 (12.7)	0.154
UTI	17 (19.8)	6 (14)	2 (2.8)	0.006*
Vaginal Infections	22 (25.6)	15 (34.9)	10 (14.1)	0.033*

UTI: Urinary tract infection.

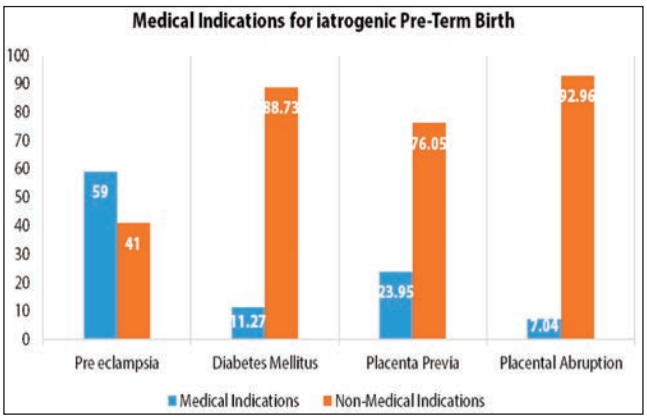

Figure-2: Causes of iatrogenic preterm birth (n=71).

With respect to BMI, the mean difference between groups A and C was -2.492 (p=0.0001), and between groups B and C it was -2.411 (p=0.002). With respect to parity, the mean difference between groups A and B was 0.360 (p=0.019) suggesting that higher parity was associated with spontaneous labour.

With respect to gestational age10(11.6%) women in group A had gestational age <28 weeks, 37(43%) had gestational age 28-34 weeks, and 39(45.4%) had gestational age >34 weeks. In group B, the corresponding values were 4(9.3%), 19(44.2%) and 20(46.5%), and in group C the values were 6(8.4%), 21(29.6%) and 44(62%), respectively.

Vaginal infections and UTIs were significantly higher in group A compared to the other groups (p<0.05) (Table 2). In group C, pre-eclampsia was the main reason for preterm birth 42(59.0%) (Figure 2).

Discussion

In the current study, the prevalence of preterm birth was 15.38%. About 90% of world's burden of preterm birth rates is shared by low-income countries. The reported rate is >18% in low-income countries and as low as 4% in high-income countries.[2] A 2011 study in Karachi showed a prevalence of 11.4%.[13] Another study in Karachi done in 2015 showed a prevalence of 17.9%.[14] In Kenya, the prevalence of preterm birth was 18.3%[15] in Ethiopia 15.5%[16] and in China 7.3%.[17] The prevalence noted in the current study was similar to earlier reports from Pakistan.

In the current study, 86(43%) of the cases had spontaneous labour, 71(35%) had medical indications, while PPROM was observed in 43(22%) cases. Metquin et al. described reported 25% medically indicated preterm births, 25% PPROM and 50% spontaneous preterm labour.[18] The raising trend of preterm births in cases of iatrogenic medically-indicated births noted in the current study was similar to Chen et al. who reported it to be 42.7%.[17] The persistent or increasing rates of preterm birth may be attributed to increase in the number of medically-indicated preterm births.[19] The frequently seen conditions leading to medically-indicated preterm births are severe pre-eclampsia, antepartum haemorrhage, intrauterine growth restriction and foetal distress. In the current study, the most common indication for preterm birth on medical grounds was pre-eclampsia, followed by placenta previa, placental abruption and multiple pregnancy. Pre-eclampsia as a significant factor contributing to preterm birth has also been reported by other studies.[16,19-21]

The factors significantly associated with spontaneous preterm labour are personal obstetrical history (previous preterm labour, over-distended uterus), lifestyle (strenuous physical conditions, stress, smoking), UTI, vaginal infection and social factors (low SES, anaemia, low BMI).[18] In the current study, among patients who had spontaneous preterm labour, anaemia was present in 29.9% of women. Anaemia was seen as a significant risk factor for spontaneous preterm labour in other studies as well.[10,22] Some studies did not find it significant.[15]

The current study showed previous preterm birth in 28.8% of the subjects. Previous preterm birth was also a significant factor and seen in 13%, 35% and 65% of cases in earlier studies.[15,22,23]

Hyperemesis gravidarum was demonstrated as a factor contributing to preterm delivery.[24] In the current study, it was seen in 28.8% of the patients. Low maternal BMI is significantly associated with preterm labour.[18,19,22] However, in the current study, the result was contradictory, and patients who had spontaneous preterm labour had normal BMI, while patients who had preterm birth due to medical indications had mean BMI 28.05 kg/m^2 with the highest incidence of pre-eclampsia suggestive of possible correlation of higher BMI and pre-eclampsia. The finding was in line with those of Motedayen at el.[25]

The current study showed non-significant association of smoking with preterm delivery, and had frequency of only 1%. UTI and vaginal discharge were significantly associated

with preterm birth. Wagura et.al demonstrated UTI as a notable factor causing preterm birth.[15] Multiparity increases the risk of preterm birth[13,15] but in the current study, multiparity was not significantly associated with preterm birth.

The current study has its limitations, including its descriptive, cross-sectional design with a small sample size, and lack of comparison with term births. Besides, the impact of preterm birth on neonatal morbidity and mortality was also not recorded. The results, as such, cannot be generalised.

However, in the light of the findings, better antenatal management and early diagnosis of pre-eclampsia are recommended. Prenatal and antenatal reduction in BMI may be beneficial in reducing the incidence of medical disorders during pregnancy. The prevalence of placenta previa is increasing due to increase in the number of caesarean births. Attention needs to be given on the indication of first-time caesarean birth.

Conclusion

The most common factor for preterm birth used to be spontaneous preterm labour in the past, but medically indicated preterm birth rate is now increasing. The most common reason for iatrogenic preterm birth was pre-eclampsia.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

References

1. Leung C. Born too soon. Neuro Endocrinol Lett 2004;25(Suppl 1):133-6.
2. Walani SR. Global burden of preterm birth. Int J Gynaecol Obstet 2020;150:31-3. doi: 10.1002/ijgo.13195.
3. Brunson E, Thierry A, Ligier F, Vulliez-Coady L, Novo A, Rolland AC, et al. Prevalences and predictive factors of maternal trauma through 18 months after premature birth: A longitudinal, observational and descriptive study. PLoS One 2021;16:e0246758. doi: 10.1371/journal.pone.0246758.
4. Chawanpaiboon S, Vogel JP, Moller AB, Lumbiganon P, Petzold M, Hogan D, et al. Global, regional, and national estimates of levels of preterm birth in 2014: a systematic review and modelling analysis. Lancet Glob Health 2019;7:e37-46. doi: 10.1016/S2214-109X(18)30451-0.
5. Hanif A, Ashraf T, Waheed K, Sajid MR, Guler N, Pervaiz MK. Prevalence of preterm birth in Pakistan: a systematic review and meta-analysis. Ann King Edw Med Univ 2017;23:229-35.
6. Ma R, Luo Y, Wang J, Zhou Y, Sun H, Ren X, et al. Ten-year time trends in preterm birth during a sociodemographic transition period: a retrospective cohort study in Shenzhen, China. BMJ Open 2020;10:e037266. doi: 10.1136/bmjopen-2020-037266.
7. Rahman A, Rahman M, Pervin J, Razzaque A, Aktar S, Ahmed JU, et al. Time trends and sociodemographic determinants of preterm births in pregnancy cohorts in Matlab, Bangladesh, 1990-2014. BMJ Glob Health 2019;4:e001462. doi: 10.1136/bmjgh-2019-001462.
8. Baig SA, Khan N, Baqai T, Fatima A, Karim SA, Aziz S. Preterm birth and its associated risk factors. A study at tertiary care hospitals of Karachi, Pakistan. J Pak Med Assoc 2013;63:414-8.
9. Liu YX, Xu FL, Duan WL, Dong HF, Wang YJ, Zhang Y, et al. A multicenter study of the birth condition of preterm infants and the causes of preterm birth in Henan Province, China. Zhongguo Dang Dai Er Ke Za Zhi 2021;23:121-6. doi: 10.7499/j.issn.1008-8830.2010063.
10. Lone FW, Qureshi RN, Emmanuel F. Maternal anaemia and its impact on perinatal outcome in a tertiary care hospital in Pakistan. East Mediterr Health J 2004;10:801-7.
11. Uwambaye P, Munyanshongore C, Rulisa S, Shiau H, Nuhu A, Kerr MS. Assessing the association between periodontitis and premature birth: a case-control study. BMC Pregnancy Childbirth 2021;21:204. doi: 10.1186/s12884-021-03700-0.
12. McDonnell SL, Baggerly KA, Baggerly CA, Aliano JL, French CB, Baggerly LL, et al. Maternal 25(OH)D concentrations ≥40 ng/mL associated with 60% lower preterm birth risk among general obstetrical patients at an urban medical center. PLoS One 2017;12:e0180483. doi: 10.1371/journal.pone.0180483.
13. Lwanga SK, Lemeshow S. Sample size determination in health studies: a practical manual. Geneva, Switzerland: World Health Organization; ⊠1991⊠. [Online] 1991 [Cited 2023 November 29]. Available from URL: https://apps.who.int/iris/handle/10665/40062.
14. Imran A, Arif A, Jamal S, Karim SA. Oral Hygiene and Gestational Age at Delivery; A Cross-Sectional Survey Conducted at a Tertiary Care Hospital. Annals ASH & KMDC 2015;20:40–4.
15. Wagura P, Wasunna A, Laving A, Wamalwa D, Ng'ang'a P. Prevalence and factors associated with preterm birth at kenyatta national hospital. BMC Pregnancy Childbirth 2018;18:107. doi: 10.1186/s12884-018-1740-2.
16. Abdo RA, Halil HM, Muhammed MA, Karebo MS. Magnitude of Preterm Birth and Its Associated Factors: A Cross-Sectional Study at Butajira Hospital, Southern Nations, Nationalities, and People's Region, Ethiopia. Int J Pediatr 2020;2020:e6303062. doi: 10.1155/2020/6303062.
17. Chen C, Zhang JW, Xia HW, Zhang HX, Betran AP, Zhang L, et al. Preterm Birth in China Between 2015 and 2016. Am J Public Health 2019;109:1597-604. doi: 10.2105/AJPH.2019.305287.
18. Moutquin JM. Classification and heterogeneity of preterm birth. BJOG 2003;110(Suppl 20):30-3. doi: 10.1016/s1470-0328(03)00021-1.
19. Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. Lancet 2008;371:75-84. doi: 10.1016/S0140-6736(08)60074-4.
20. Aregawi G, Assefa N, Mesfin F, Tekulu F, Adhena T, Mulugeta M, et al. Preterm births and associated factors among mothers who gave birth in Axum and Adwa Town public hospitals, Northern Ethiopia, 2018. BMC Res Notes 2019;12:640. doi: 10.1186/s13104-019-4650-0.
21. Rao CR, de Ruiter LE, Bhat P, Kamath V, Kamath A, Bhat V. A case-control study on risk factors for preterm deliveries in a secondary care hospital, southern India. ISRN Obstet Gynecol 2014;2014:e935982. doi: 10.1155/2014/935982.
22. Baig SA, Khan N, Baqai T, Fatima A, Karim SA, Aziz S. Preterm birth and its associated risk factors. A study at tertiary care hospitals of Karachi, Pakistan. J Pak Med Assoc 2013;63:414-8.

23. Khan MW, Arbab M, Murad M, Khan MB, Abdullah S. Study of factors affecting and causing low birth weight. J Sci Res 2014;6:387-94.

24. McCarthy FP, Lutomski JE, Greene RA. Hyperemesis gravidarum: current perspectives. Int J Womens Health 2014;6:719-25. doi: 10.2147/IJWH.S37685.

25. Motedayen M, Rafiei M, Rezaei Tavirani M, Sayehmiri K, Dousti M. The relationship between body mass index and preeclampsia: A systematic review and meta-analysis. Int J Reprod Biomed 2019;17:463-72. doi: 10.18502/ijrm.v17i7.4857.

Author Contribution:

FAB: Conceptualization of project, data collection, literature search, writing manuscript, final approval.
NS: Conceptualization of project, statistical analysis, drafting, revision, writing manuscript, final approval.
AS: Conceptualization of project, data collection, literature search, final approval.
AR: Data collection, literature search, final approval.
MZS: Statistical analysis, drafting, revision, writing manuscript, final approval.