Section: Paediatrics

Original Research Article

TO IDENTIFY MODIFIABLE RISK FACTORS ASSOCIATED WITH PRETERM BIRTH IN A TERTIARY NEONATAL CARE CENTRE

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ABSTRACT

Background: Introduction: An estimated 13.4 million babies were born premature in 2020 worldwide. Prematurity is the leading cause of death among children under 5 years of age, causing lifetime disabilities and drain of resources. **Aim:** To find the independent association of various risk factors with preterm birth. **Materials and Methods:** The Study was conducted in the Neonatal unit of Government Chengalpattu Medical College and Hospital by Analytical cross-sectional study. A total of 338 mothers were included in the study and were divided into two groups based on whether they delivered term or preterm babies and data was collected from interviews and hospital records. **Result:** Our study showed out of eighteen modifiable variables analysed, thirteen had positive association with preterm birth. Five variables were found to have an independent association with preterm birth. They were multiple gestation, intrauterine growth restriction, Pregnancy induced Hypertension, low maternal pre-pregnancy BMI and low gestational weight gain. Other parameters found to have significant but not independent association were Gestational diabetes mellitus, small for gestational age, Prior poor birth outcome, Maternal Sepsis, Failure to take Antenatal Supplements. **Conclusion:** In our study we found an independent association between Prematurity and Intrauterine growth restriction, multiple gestation, low maternal weight gain, low maternal pre-pregnancy BMI, Pregnancy induced Hypertension.

INTRODUCTION

An estimated 13.4 million babies were born too soon in 2020 worldwide [1] which is around one for every ten babies. Prematurity is the leading cause of death among children under 5 years of age, which contributed to approximately 900000 deaths in 2019 world-wide,[2] Preterm babies also face lifetime disabilities. In the Indian subcontinent, the highest preterm birth rate was in southern Asia (13·2%), and is almost twice the rate of the lowest preterm birth rate reported in the Sustainable Developmental Goals regions of eastern Asia, south-east Asia, and Oceania (excluding Australia and New Zealand (6·8%). At Government Chengalpattu hospital the incidence of preterm birth is 18% .In India, the leading cause of neonatal deaths is prematurity (43.8%) followed by birth asphyxia and sepsis (13.6%).[11] Developed nations like the US spend around 26 billion dollars for the hospital care of preterm babies.

Aim of the study: To identify the risk factors associated with preterm births at our hospital, define the maternal population which are at high risk of preterm delivery and to find the independent association of various risk factors associated with preterm birth. This can aid in effective use of resources for the prevention of preterm birth in a public health setting.

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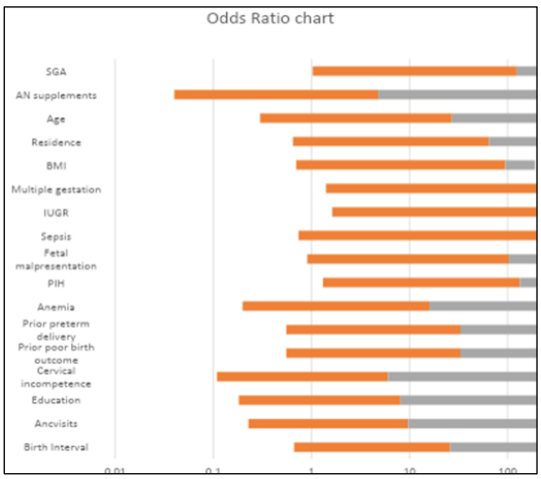
MATERIALS AND METHODS

The study was conducted in the Neonatal unit of Government Chengalpattu Hospital as an Analytical cross-sectional study. All mothers who were registered and delivered at Chengalpattu Medical College and Hospital over a period of six months were enrolled in the study. Informed consent was obtained from the mothers. A total 338 mothers enrolled were divided into two groups - mothers who delivered preterm babies and mothers who had delivered term babies during the same period. Data was collected from the study population through questionnaire and hospital records. The statistical methods employed were Interval and ratio data represented as Odds ratio for each risk factor and multiple logistic regression.

RESULTS

Approximately eighteen variable modifiable risk variables were used in our study. Among eighteen variables, odds ratio of teenage pregnancy and preterm birth is 0.9, Odds ratio of Underweight (BMI) and preterm birth is 1.36, odds ratio of locality and preterm birth is 1, odds ratio of low maternal education and preterm birth is 0.7, odds ratio of Antenatal visits and preterm birth is 0.65, small for gestation babies are at 1.2 times risk of preterm birth. Odds ratio of low interpregnancy interval causing preterm birth is 1.05, odds ratio of anaemic mothers delivering preterm babies is same as non-anaemic mothers (odds ratio=1), the mothers who are having prior poor pregnancy outcomes are at 1.14 times higher risk of delivering preterm babies. In our study those mothers who delivered a preterm baby previously are at half the risk of delivering a preterm baby at present pregnancy (0.55).Odds ratio of cervical incompetence causing preterm birth is 0.66, odds ratio maternal sepsis causing preterm birth is 3.6, odds ratio of fetal malpresentation leading to preterm birth is 2.01, Gestational diabetic mothers are at 1.6 times risk of delivering preterm babies. Of these, after multiple logistic regression, there is a positive correlation between pregnancy-induced hypertension and preterm birth (odds ratio: 2.3), between intrauterine growth restriction and preterm birth (odds ratio: 4.9), and between multiple gestations and preterm birth (odds ratio: 4.9), between low maternal pre pregnancy BMI and preterm birth (1.36).



DISCUSSION

Out of eighteen variables analysed in the study, thirteen variables were found to be significant and independent association was found for five variables. The foremost important modifiable risk factor associated with preterm birth is multiple gestation (odds ratio - 4.99). This statistics is in concordance with a study conducted by Samita Seetho in a tertiary care institute in Thailand , a retrospective cohort study with a relative risk of 2.04.[24] Other factors associated with preterm birth are intrauterine growth restriction which has an odds ratio of 4.91.This evidence is supported by a study conducted by J.Zeitlin , who conducted a case control study on the relationship between intrauterine growth restriction and Preterm delivery and there was significant association between intrauterine growth restriction and preterm delivery (odds ratio = 6.41).[25] Pregnancy induced hypertension is significantly associated with prematurity (Odds Ratio = 2.33). A large systematic review and meta-analysis was conducted in Ethiopia on the effect of pregnancy induced hypertension on preterm birth with a study population of 27,119 from 9 studies. The results were that mothers with pregnancy induced hypertension were 4.69 times at higher risk of preterm delivery.[26] Mothers with low pre-pregnancy BMI are at 1.36 times at risk of preterm birth. In a retrospective cohort study conducted by Al Girsen on low maternal pre-pregnancy BMI and preterm birth the adjusted relative risk was 1.61 and there is linear association between severity underweight and prematurity (lower the pre-pregnancy BMI, lower the gestational age).[27]

In our study, there is also a significant association between low gestational weight gain and preterm birth. This is in concordance with study conducted by Zhen Han, a systematic review and meta-analyses on low pregnancy weight and preterm birth and low birth weight births in Hamilton which comprises fifty-five studies, with data extracted from MEDLINE, EMBASE databases. This study concludes that there is a relative risk of 1.39 between low gestational weight gain and preterm birth.[28]

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Other parameters found to have a significant association were gestational diabetes mellitus, Small for gestational age, Prior poor birth outcome, Maternal Sepsis, Failure to take antenatal supplements. However they failed to prove an independent association after multiple logistic regression. According to a cohort study conducted by Berkowitz,[29] in Mount Sinai on Modifiable risk factors associated with preterm birth , he found a significant association between Gestational diabetes mellitus (RR- 4.1) , Antepartum Haemorrhage (RR -3.6), Low/No antenatal visits (RR- 1.3), Previous preterm delivery (RR -4.5), Maternal Sepsis (RR-3.3).

However our study failed to find an independent association of GDM with preterm birth because of frequent co-occurence of gestational diabetes mellitus and Pregnancy induced hypertension among our population. And also probably because of well controlled sugars amongst the study group in our unit. The difference in distribution of small for gestational age babies in term and preterm pregnancies is negligible resulting in lack of independent association.

In our study there is no significant association of preterm birth with risk factors like less antenatal visits, locality in which the mother is residing, educational qualification of the mother, prior preterm delivery, or cervical incompetence. Our study failed to find the association between preterm birth and these risk factors because about 92% of the population are from rural areas and the majority of the mothers completed only the primary level of education and around 79% of the mothers were Primigravida. Early identification of cervical incompetence and cerclage for the same is done early in our institute. Of these, after multiple logistic regression, risk factors like pregnancy-induced hypertension intrauterine growth restriction, multiple gestations and prepregnancy BMI, Poor maternal weight gain were found to have independent association. In our study we also found a regression equation which is

Gestational age = -0.08*BMI+0.712*PIH+1.573*Multiple gestation+1.402*IUGR+0.073* weight gain-7.48.

CONCLUSION

Our study showed independent association between Prematurity and Intrauterine growth restriction, multiple gestation, low maternal weight gain, low maternal pre-pregnancy BMI and Pregnancy induced Hypertension. The study implies the need for further studies as registration of the majority of the antenatal mothers were done in a primary health care centre and a prospective cohort study would be better in assessing the strength of the association of risk factors with preterm birth.

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REFERENCES

1. Ohuma E, Moller A-B, Bradley E, et al. National, regional, and worldwide estimates of preterm birth in 2020, with trends from 2010: a systematic analysis. Lancet. 2023;402(10409):1261-1271. doi:10.1016/S0140-6736(23)00878-4.
2. Perin J, Mulick A, Yeung D, et al. Global, regional, and national causes of under-5 mortality in 2000-19: an updated systematic analysis with implications for the Sustainable Development Goals. Lancet Child Adolesc Health 2022; 6(2): 106-15.
3. WHO-MCEE estimates for child causes of death, 2000-2015. (http://www.who.int/healthinfo/global_burden_disease/estimates_child_cod_2015/).
4. Kuehn BM (2006) Groups take aim at the US preterm birth rate. JAMA 296 (24), 2907–8. [PubMed: 17190882]
5. McCormick, MC. The contribution of low birth weight to infant mortality and childhood morbidity. N Engl J Med 1985; 312: 82–90.
6. Liggins GC, Fairclough RJ, Grieves SA, Forster CS, Knox BS. Parturition in the sheep. Ciba Found Symp 1977; 47: 5–30.
7. Sfakianaki AK, Norwitz ER. Mechanisms of progesterone action in inhibiting prematurity. J Matern Fetal Neonatal Med 2006; 19: 763–72.
8. Garfield RE, Gasc JM, Baulieu EE. Effects of the antiprogesterone RU 486 on preterm birth in the rat. Am J Obstet Gynecol 1987; 157: 1281–85.
9. Romero R,Espinoza J,Kusanovic J, et al.The preterm parturition syndrome. BJOG 2006;113: 17–42.
10. Villar J, Abalos E, Carroli G, et al. Heterogeneity of perinatal outcomes in the preterm delivery syndrome. Obstet Gynecol 2004;104: 78-87.
11. Romero R, Mazor M, Munoz H, et al. The preterm labor syndrome. Ann N Y Acad Sci 1994;734:414-29.
12. Romero R, Espinoza J, Kusanovic JP, et al. The preterm parturition syndrome. BJOG 2006113(suppl 3):17-42.
13. Behrman R, Stith Butler A. Preterm birth: causes, consequences and prevention. National Institute of Medicine. Washington, DC: National Academy of Sciences; 2007
14. Delobel-Ayoub M, Kaminski M, Marret S, Burguet A, Marchand L, N'Guyen S, et al. Behavioral outcome at 3 years of age in very preterm infants: the EPIPAGE study. Pediatrics. 2006;117(6):1996-2005.
15. van Baar AL, van Wassenaer AG, Briet JM, Dekker FW, Kok JH. Very preterm birth is associated with disabilities in multiple developmental domains. Journal of pediatric psychology. 2005;30(3):247-55.
16. Tamura T,Goldenberg RL,Freeberg LE,Cliver SP,Cutter GR,Hoffman HJ.Maternal serum folate and zinc concentrations and their relationship to pregnancy outcome. Am J Clin Nutr 1992; 56: 365–70.
17. Scholl TO. Iron status during pregnancy: setting the stage for mother and infant. Am J Clin Nutr 2005; 81: 1218S–22S.
18. Mercer BM, Goldenberg RL, Moawad AH, et al. The preterm prediction study: effect of gestational age and cause of preterm birth on subsequent obstetric outcome. National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. Am J Obstet Gynecol 1999; 181: 1216–21.
19. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2006;29(Suppl 1):S43–S48. - PubMed
20. WHO. World Health Organization, March of Dimes: The Partnership for Maternal Newborn & Child Health, Save the Children. In Born Too Soon: The Global Action Report on Preterm Birth. Geneva: World Health Organization; 2012.
21. Blencowe H, Cousens S, Chou D, et al. Born too soon: the global epidemiology of 15 million preterm births. Reprod Health. 2013; 10(SUPPL. 1): 1-14.

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22. Institute of Medicine (US) Committee on Understanding Premature Birth and Assuring Healthy Outcomes.Preterm birth:causes,consequences,and prevention.Washington(DC): National Academies Press (US); 2007.
23. Siddiqui F, McEwan A. Twins Obstet Gynaecol Reprod Med. 2007;17:289–295. doi: 10.1016/j.ogrm.2007.07.011.
24. Martin JA, Hamilton BE, Osterman MJK. Three decades of twin births in the United States, 1980–2009. NCHS Data Brief. 2012;80:1–8
25. Koops BL, Morgan LJ, Battaglia PC. Neonatal mortality risk in relation to birth weight and gestational age: An update. J Pediatr 1977; 101: 969–977.
26. Beck S, Wojdyla D, Say L, Betran AP, Merialdi M, Requejo JH, et al. The worldwide incidence of preterm birth: a systematic review of maternal mortality and morbidity. Bull World Health Organ. 2010;88:31–8.
27. Hendler I, Goldenberg RL, Mercer BM, Iams JD, Meis PJ, Moawad AH, et al. The preterm prediction study: association between maternal body mass index and spontaneous and indicated preterm birth. Am J Obstet Gynecol 2005; 192: 882–6.
28. NICE (National Institute for Health and Clinical Excellence). Dietary interventions and physical activity interventions for weight management before, during and after pregnancy. London , UK : Public Health Guidance, 2010; PH27: 1–44.
29. Shaw GM, Wise PH, Mayo J, Carmichael S, Ley C, Lyell DJ, et al. Maternal prepregnancy body mass index and risk of spontaneous preterm birth. Paediatr Perinat Epidemiol 2014; 28: 302–11.

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