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Preterm Birth Rates after Initiating the Third-Trimester Screening Protocol of Samrakshan in India: Initial Results

Rijo Mathew Choorakuttil[1] Bavaharan Rajalingam[2] Shilpa R. Satarkar[3] Lalit K. Sharma[4] Anjali Gupta[5] Akanksha Baghel[6] Praveen K. Nirmalan[7]

[1] Department of Clinical Radiology, AMMA Center for Diagnosis and Preventive Medicine, Kochi, Kerala, India
[2] Department of Clinical Radiology, Fetocare Magnum Imaging and Diagnostics, Trichy, Tamil Nadu, India
[3] Department of Clinical Radiology, Antarang Sonography and Colour Doppler Center, Satarkar Hospital, Tilaknagar, Aurangabad, Maharashtra, India
[4] Department of Clinical Radiology, Raj Sonography & X- Ray Clinic, Baiju Choraha, Nayapura, Guna, Madhya Pradesh, India
[5] Department of Clinical Radiology, Anjali Ultrasound and Colour Doppler Centre, Shanti Madhuban Plaza, Delhi Gate, Agra, Uttar Pradesh, India
[6] Department of Clinical Radiology, Baghel Sonography Center, Harda, Madhya Pradesh, India
[7] Department of Research, Chief Research Mentor, AMMA Education and Research Foundation, AMMA Healthcare Research Gurukul, Kochi, Kerala, India

Address for correspondence Rijo M. Choorakuttil, MD, AMMA Center for Diagnosis and Preventive Medicine Pvt. Ltd, Kochi 682036, Kerala, India (e-mail: rijomc@gmail.com).

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Abstract

Aim To determine the trends in preterm birth (PTB) rates in Samrakshan after initiating a third-trimester screening protocol.

Methods The Samrakshan program of IRIA focused on clinical stage-based management of fetal growth restriction (FGR) in the third trimester integrating fetal Doppler studies with routine trimester-specific antenatal scans. Mean uterine artery pulsatility index (PI), umbilical artery PI, middle cerebral artery PI, and cerebroplacental ratio were assessed for all third-trimester pregnant women in the program.

Results From 2019 to 2022, 249 (18.33%, 95% CI: 16.34, 20.54) women had PTB with 221 (16.67%, 95% CI: 14.73, 18.75) PTBs between 34 and 37 gestation weeks and 22 (1.66%, 95% CI: 1.10, 2.50) PTBs at gestation < 34 weeks. The overall preterm birth rates showed a significant (chi-square $p < 0.001$) declining trend each year from 23.18% ($n = 121$) in 2019–2020 to 16.81% ($n = 99$) in 2020–2021 and 10.75% ($n = 23$) in 2021–2022.

Conclusion The declining trend of PTB rates in the Samrakshan program shows that the reduction of PTB is an added benefit of the integration of fetal Doppler studies in the third trimester of pregnancy.

Keywords
- fetal doppler
- fetal ultrasound
- preterm birth
- Samrakshan India

Background

There are an estimated 15 million preterm births (PTB) each year with a global prevalence of 10.6%.[1] India contributes nearly 25% to the annual global prevalence of PTB although population-based estimates of PTB for India are not available.[1] Advances in health care and neonatal intensive care services have translated to the survival of millions of preterm children to adulthood but with a higher risk of adverse health events.[2–6] Preterm survivors have a 30 to 50% higher

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all-cause mortality as young adults compared with term survivors and strong associations with metabolic syndrome, hypertension, diabetes, and noncommunicable chronic diseases.[2–7] In this manuscript, we present the changes in the preterm birth rate compared with the baseline year after initiating a third-trimester screening protocol in the Samrakshan program.

Methodology

The Samrakshan program of IRIA focused on clinical stage-based management of fetal growth restriction (FGR) in the third trimester integrating fetal Doppler studies with routine trimester-specific antenatal scans.[8,9] Mean uterine artery pulsatility index (PI), umbilical artery PI, middle cerebral artery (MCA) PI, and cerebroplacental ratio (CPR) were assessed for all third-trimester pregnant women in the program and a mean uterine artery PI > 95th centile and/or umbilical artery PI > 95th centile, MCA PI < 5th centile, and CPR < 5th centile was considered an abnormal Doppler study.[8] The Barcelona protocol was used to categorize FGR with stage 1 FGR defined as an estimated fetal weight (EFW) < 3rd percentile with or without an abnormal Doppler study or an EFW < 10th percentile with an abnormal Doppler study.[8] Follow-up Doppler studies were performed based on the clinical staging of FGR as recommended by the Barcelona protocol.[8,9] The results of the Doppler studies were discussed with the managing obstetrician to plan childbirth. Radiologists participating in Samrakshan followed up with the managing obstetrician to collect data on childbirth outcomes from September 2019 to February 2022. A preterm birth was defined as childbirth > 24 and < 37 gestation weeks. The data were grouped year wise and the period from September 2019 to August 2020 (the first year of Samrakshan) was considered as the baseline to compare the trend of PTB rates in the program.

Results

Data on childbirth outcomes were available from five states, namely, Kerala, Maharashtra, Madhya Pradesh, Tamil Nadu, and Uttar Pradesh, for 522 women in 2019–2020, 589 women from September 2020 to August 2021 and 214 women from September 2021 to February 2022. From 2019–2022, 249 (18.33%, 95% CI: 16.34, 20.54) women had PTB with 221 (16.67%, 95% CI: 14.73, 18.75) PTBs between 34 and 37 gestation weeks and 22 (1.66%, 95% CI: 1.10, 2.50) PTBs at gestation < 34 weeks. The overall preterm birth rates showed a significant (chi-square $p < 0.001$) declining trend each year from 23.18% ($n = 121$) in 2019–2020 to 16.81% ($n = 99$) in 2020–2021 and 10.75% ($n = 23$) in 2021–2022. Preterm births < 34 gestation weeks showed a declining trend from 1.92% in 2019–2020 to 1.70% in 2020–2021 and 0.93% in 2021–2022. An abnormal Doppler study (OR: 2.62, 95% CI: 1.95, 3.53), FGR (OR: 2.47, 95% CI: 1.74, 3.49) and maternal pre-eclampsia (PE) (OR: 3.49, 95% CI: 2.02, 6.02) were significantly associated with PTB.

We observed a significant reduction ($p < 0.001$) in proportion of women with stage 1 FGR and PE in this population compared with the baseline (►**Table 1**). Additionally, we observed a significant reduction of PTB ($p < 0.001$) in the normal population of pregnant women without FGR or PE (►**Table 1**). The reduction in PTB in women with small for gestational age (SGA) babies was not statistically significant (Fisher exact $p = 0.80$). The declining trend in PTB resulted in a significant gain in mean birthweight (one-way analysis of variance [ANOVA] $F = 3.80$, $p = 0.02$) from 2715.86 (518.74) g in 2019–2020 to 2803.56 (470.33) g in 2021–2022.

Conclusion

The declining trend of PTB rates in the Samrakshan program shows that reduction of PTB is an added benefit of the integration of fetal Doppler studies in the third trimester of pregnancy. The reduction of PTB can be attributed to the surveillance and planning of childbirth based on clinical stage-based classification of FGR and was also observed in normal pregnancies without FGR and PE in Samrakshan. The significant reduction in PTB rates for stage 1 FGR and women with PE is important, considering the high incidence of PE and FGR in India[8] and can lead to a significant reduction in the absolute numbers of PTB in India. The integration of fetal Doppler studies may impact fetal causes of PTB more than maternal causes for PTB. However, we are unable to comment further on this as we had not collected data on the differential causes of PTB in Samrakshan. If we extrapolate the results from Samrakshan to India, PTB would have reduced from 6.2 million in 2019–2020 to 2.9 million in

Table 1 Proportion of preterm birth by subgroups of pregnant women

Preterm births in subgroups of pregnant women	2019–2020 (September to August) $n = 522$	2020–2021 (September to August) $n = 589$	2021–2022 (September to February) $n = 214$
No fetal growth restriction (FGR)	19.63%	15.71%	9.76%
Stage 1 FGR	34.15%	24.14%	4.17%
Small for gestational age	17.78%	12.50%	13.04%
Normal Doppler study	19.09%	12.71%	9.83%
No pe-eclampsia	21.13%	16.25%	10.90%
Pre-eclampsia	64.00%	27.59%	0.00%

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2021–2022 in India. However, these absolute numbers must be interpreted with caution as our data may not be representative of the entire population of pregnant women in India.

Note

This work was attributed to the Indian Radiological & Imaging Association, IRIA House, New Delhi, India.

Conflict of Interest

None declared.

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