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Original Research Article

Obstetric and neonatal outcomes among high-risk pregnancy in Bengaluru

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ABSTRACT

Background: High-risk pregnancy (HRP) significantly contributes to adverse maternal and neonatal outcomes. Early identification and appropriate management through antenatal care (ANC) services, including initiatives such as Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA), are crucial in reducing morbidity and mortality. This study aimed to determine the obstetric and neonatal outcomes among high-risk pregnancies in a rural area of Bengaluru, South India.

Methods: A retrospective cohort study was conducted in the rural field practice area of a Tertiary care hospital and Medical College. High-risk pregnant women registered at a Primary Health Centre between January 2022 and July 2023 were included. Descriptive statistics were expressed as proportions with 95% confidence intervals. Chi-square test was used to assess associations between variables.

Results: A total of 94 high-risk pregnant women were included (mean age 26.7±4.1 years). Most participants (97.9%) had more than four ANC visits, while 89.4% did not utilize PMSMA services. Referral to higher centres was made in 36.2% cases. Common high-risk conditions included previous lower segment cesarean section (31.9%), previous bad obstetric history (19.1%), hypothyroidism (11.7%), gestational diabetes (5.3%) and pregnancy-induced hypertension (5.3%). Term deliveries accounted for 87.2% and the cesarean section rate was 73.4%. Postpartum hemorrhage occurred in 14.9% cases. Live births constituted 92.6%, with 3.2% stillbirths and 4.3% neonatal deaths. Low birth weight was observed in 19.1% newborns. A statistically significant association was found between number of ANC visits and newborn status ($\chi^2=45.97$, $p<0.01$).

Conclusions: High-risk pregnancies were associated with considerable obstetric and neonatal complications, including high cesarean section rates and low birth weight. Although ANC coverage was satisfactory, utilization of PMSMA services was low. Strengthening early risk identification, improving program awareness and ensuring timely referral and comprehensive management are essential to improve maternal and neonatal outcomes.

Keywords: Antenatal care, Community medicine, High-risk pregnancy, Neonatal outcomes, Obstetric outcomes, PMSMA, Rural health

INTRODUCTION

Optimal obstetric and neonatal care plays a crucial role in reducing maternal and neonatal mortality and morbidity. ANC utilization, medical interventions and delivery outcomes are key indicators of maternal and neonatal health. The Pradhan Mantri Surakshit Matritva Abhiyan

(PMSMA) was launched by the Ministry of Health and Family Welfare, Government of India on June 09, 2016. The main objective of this Abhiyan is to identify and follow up on High-risk Pregnancy.¹ A good maternal, obstetric and neonatal result can be attained by identifying high-risk pregnancy, its causes and its consequences through high-quality antenatal care.² The prevalence rate of high-risk pregnancies in India was found to be 30.7%,

detecting in the early stages will help in preventing maternal mortality.³ To lower neonatal and maternal mortality as well as morbidity, extra attention must be given to high-risk groups.⁴ An essential component of antenatal care is identifying the women who are at risk of these difficult pregnancies that have unfavorable outcomes.⁵

The PMSMA program's goal is to offer all expectant mothers guaranteed, thorough and high-quality prenatal treatment on the ninth of every month at no expense to them.⁶ This also extended to e-PMSMA to track high-risk pregnancies, especially in remote areas and rural places; thus helps every mother and child to have a safe delivery and healthy life by preventing high-risk pregnancy complications.⁷

The adverse outcomes of high-risk pregnancies can be prevented by early detection and treatment which are determined by the prevalence of past and present pregnancy high-risk characteristics.⁸ Regular risk assessment can assist identify patients who should get care in specialty centers and schedule safe deliveries in local communities, resulting in the best possible pregnancy outcomes.⁹ When a high-risk pregnancy is identified, it is more likely to receive the extra care and attention it needs, which lowers the odds of morbidity and mortality for both the mother and the newborn.¹⁰ Therefore, it is important to assess every pregnancy to determine any current or potential risk factors.¹¹ Through limited resources, primary healthcare facilities alone can refer patients and tertiary care facilities can create distinct protocols for addressing risk factors in order to guarantee better outcomes for both mothers and newborns.¹² This study aims to determine the Obstetric and neonatal outcomes among high-risk pregnancies in Bengaluru.

Even though many studies have been done to determine the prevalence of high-risk pregnancy in India, fewer studies were done to determine the outcome of high-risk pregnancy in rural settings, especially in South India. Early detection and effective management of HRP can contribute substantially to the reduction of maternal and fetal adverse outcomes.

Objectives

Among antenatal women attending a rural primary health centre in Bengaluru, South India. To estimate the proportion and outcome of high-risk pregnancy. To assess the factors associated with high risk pregnancy. To assess the current health status of child born to a high risk mother.

METHODS

This was a retrospective cohort study done in Rural field practice area of Department of Community Medicine, ESIC Medical College and PGIMSR, Bengaluru. The study included high risk pregnant women who was registered in the PHC between January 2022- July 2023.

Sample size

By considering estimated prevalence of High risk pregnancy to be 40% on the basis of a study conducted in rural Haryana by Jaideep et al⁶ and considering an allowable margin of error 5% at 95% confidence interval, the sample size for the present study has been calculated using the formula:

$$N = ((Z_{1-\alpha/2})^2 \times P(1-P))/d^2,$$

where N=minimum required sample size, $Z_{1-\alpha/2}$ =constant value at 95% confidence level (1.96), P=estimated prevalence of HRP, taken as 40% and d=allowable absolute error, taken as 5%. The calculated sample size for the study was 90.

The registered antenatal mother was screened for high risk pregnancy by using the PMSMA guidelines criteria for HRP. A pre-tested semi structured questionnaire was administered for data collection. The questionnaire has four parts in which Part A collects personal data, Part-B captures the brief obstetric history, Part-C collects data pertaining to Intranatal and natal history of the mother and Part-D collects data about the newborn status immediately.

Study tools

Informed consent form. Pre tested, pre designed questionnaire

Data analysis

Frequency averages—mean, median and standard deviation, standard error, quartiles. Outcome variables such as high-risk pregnancy and outcome of pregnancy was expressed as proportion with 95% confidence interval (CI). Bivariate analysis using Chi-square test was done to assess the association of sociodemographic characteristics and outcome of pregnancy with high-risk pregnancy.

RESULTS

The socio-demographic characteristics of the study participants (N=94), the mean age of participants was 26.7 years with a standard deviation of 4.1. The majority of the study participants (38.3%) studied till high school and 30.9% with graduate education, while very few had no formal education (3.2%) and postgraduate qualifications (1.1%). A study done at Belagavi, Karnataka revealed factors such as the education status of pregnant women, age at pregnancy and parity of pregnant women have significant associations, however, the current study reveals they are independently associated with high-risk pregnancies.³

A significant portion of the participants were homemakers (89.4%), with only 10.6% employed, reflecting traditional gender roles in this population. The socio-economic status (SES) distribution showed that most participants belonged

to the upper middle (41.5%) and middle (33.0%) classes, with a small fraction in the lower SES (1.1%). Religion was predominantly Hindu (94.7%) and most households hold a Below Poverty Line (BPL) card (68.1%), indicating economic vulnerability. Insurance coverage was notably low, with 98.9% lacking any insurance, which could impact access to healthcare services. Most participants had one to two children under five years old (89.4%) and had

resided in their current residence for over two years (92.5%). Overall, this highlights critical socio-economic and educational disparities that could influence health and well-being outcomes among the participants. There was a statistically significant association between number of antenatal visits and newborn status ($\chi^2=45.97$, degree of freedom=2, $p<0.01$).

Table 1: Socio-demographic characteristics of the study participants (n=94).

	Frequency (N)	(%)
Age (Mean±SD)	26.7 (4.1)	
Educational status		
No formal education	3	3.2
Primary school	0	
Middle school	11	11.7
High school	36	38.3
Diploma	14	14.9
Graduate	29	30.9
Post graduate	1	1.1
Occupation		
Employed	10	10.6
Home maker	84	89.4
SES class		
Upper	11	11.7
Upper middle	39	41.5
Middle	31	33.0
Lower middle	12	12.8
Lower	1	1.1
Religion		
Hindu	89	94.7
Muslim	5	5.3
Card holders		
BPL	64	68.1
APL	4	4.3
No card	26	27.7
Insurance		
Yes	1	1.1
No	93	98.9
Total number of living under five children		
0	4	4.3
1-2	84	89.4
>2	6	6.3
Number of years residing in current residence		
<2	7	7.5
>2	87	92.5

Table 2: Obstetric and neonatal outcomes among the study participants (N=94).

	Frequency (N)	(%)
Total ANC visits		
<4	2	2.1
>4	92	97.9
PMSMA Visits		
No visits	84	89.4
1-2 visits	8	8.5

Continued.

	Frequency (N)	(%)
>2 visits	2	2.1
Referral made		
Yes	34	36.2
No	60	63.8
IFA taken		
Yes	93	98.9
No	1	1.1
Calcium taken		
Yes	94	100
No	0	0
High risk (HR) conditions		
1	67	71.3
2-3	27	28.7
Previous LSCS	30	
Gestational Diabetes	5	
Pregnancy induced hypertension	5	
Hypothyroidism	11	
Previous bad obstetric history	18	
Place of delivery		
Government	52	55.3
Private	42	44.7
Gestational age during delivery		
Term	82	87.2
Pre-term	12	12.8
Mode of delivery		
Normal vaginal delivery	25	26.6
Elective LSCS	43	45.7
Emergency LSCS	266	27.7
Breastfeeding within 1 hour after delivery	42	44.7
Post-partum haemorrhage	14	14.9
Perinatal complications	2	2.1
Newborn status		
Live	87	92.6
Still birth	3	3.2
Died	4	4.3
Gender of the newborn		
Male	38	40.4
Female	49	52.1
Birth weight		
Normal	76	80.9
Low birth weight	18	19.1
Current family planning usage	29	30.9

DISCUSSION

The present study highlights key findings related to obstetric and neonatal outcomes among high-risk pregnancies. A high proportion of participants (97.9%) had more than four antenatal visits, which is higher compared to studies conducted in Ethiopia where only 32.3% had adequate visits.¹³ This indicates better utilization of antenatal services in the present setting. However, utilization of PMSMA services was low (89.4% non-utilization), which is inconsistent with findings from

other Indian studies showing improved uptake due to government initiatives.¹⁴ This suggests the need for better awareness and accessibility. The prevalence of cesarean section (73.4%) in this study is significantly higher than the WHO recommended rate of 10–15%, similar to findings from studies in Maharashtra. High cesarean rates may be attributed to increased detection of high-risk conditions and clinical decision-making.¹⁵ Neonatal outcomes showed that 19.1% had low birth weight, which is higher than the global average of 15.5%. Similar findings have been reported in studies from developing

countries, indicating ongoing nutritional and healthcare challenges.¹⁶ The neonatal mortality rate observed was also higher compared to global averages, consistent with findings from studies in Saudi Arabia. This emphasizes the need for strengthening neonatal care services.¹⁷ Overall, the study findings are consistent with previous research and highlight the importance of early identification and management of high-risk pregnancies to improve maternal and neonatal outcomes.

Neonatal outcomes

The neonatal mortality rate (4.3%) is higher than the global average of 2.8% per 1,000 live births but aligns with rates in some LMICs. This underscores ongoing challenges in neonatal care. The low birth weight rate of 19.1% is slightly higher than the global average of 15.5%, indicating nutritional and health challenges during pregnancy. A study conducted in Saudi Arabia revealed neonatal mortality and morbidity are more among high-risk pregnancies.¹⁸

Family planning

Current family planning usage (30.9%) is comparable to other studies in similar settings, where postpartum contraceptive use remains suboptimal due to various barriers including cultural factors, lack of access and inadequate counselling.

CONCLUSION

This study highlights the multifaceted nature of obstetric and neonatal outcomes among study participants, emphasizing the importance of comprehensive prenatal and perinatal care. Addressing gaps in specialized care access, optimizing delivery practices and implementing strategies to mitigate maternal and neonatal complications are crucial steps toward improving maternal and neonatal health outcomes. Collaborative efforts among policymakers, healthcare providers and communities are essential to ensure equitable access to quality obstetric and neonatal care services and achieve better health outcomes for mothers and newborns.

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