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Original article

Clinico-epidemiological profile of women with high-risk pregnancy utilizing antenatal services in a rural primary health center in India

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Abstract

Objective: Early detection and effective management of high-risk pregnancies can substantially contribute to the reduction of adverse maternal and fetal outcomes. This study aimed to determine the prevalence and clinical profile of women with high-risk pregnancies in rural areas who utilize antenatal services in a primary health center (PHC).

Materials and Methods: A retrospective analysis was carried out over a six-month period by reviewing the mother and child protection cards maintained at the PHC's Maternal and Child Health Center. During the study period, 950 pregnant women were registered, of whom 793 were included in the study based on the completeness of the records. Data analysis was performed using the licensed Statistical Package for the Social Sciences (SPSS) software version 21.0.

Results: The prevalence of high-risk pregnancy among the antenatal women was 272 (34.3%) with 95% CI [31.1–37.7]. Of the 272 women, 240 (88.2%) had a single high-risk factor, while 32 (11.8%) had more than one high-risk factor. The major factor contributing to high-risk pregnancy was hypothyroidism (43.7% with 95% CI [37.9–49.6]), followed by a previous lower segment Caesarean section (LSCS) (19.1%).

Conclusion: The study found that the prevalence of high-risk pregnancies was 34.3% in this rural setting. The majority of high-risk pregnancies were due to hypothyroidism, followed by more than one previous LSCS or abortion. Further research is required to track high-risk pregnancy outcomes and investigate the newborn thyroid profile of women with hypothyroidism.

Key words: high-risk pregnancy, rural area, antenatal women, primary health center, hypothyroidism

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Introduction

A high-risk pregnancy is defined as one that is complicated by one or multiple factors that adversely affect the pregnancy outcome in maternal, perinatal, or both[1]. Pregnancy is the physiological process of developing a fetus within the maternal body. Women with high-risk pregnancies should receive care to ensure the best possible outcome. In high-risk pregnancies, the fetus is vulnerable to a significant risk of death before and after birth and may develop a disability later[2, 3].

Globally, almost 99% of maternal deaths occur in developing countries, and approximately 830 pregnant women die every day from preventable causes related to pregnancy and childbirth[4]. High-risk pregnancies are a major contributor to maternal and child health. In 2015, the risk of a woman dying from a maternal-related cause in a developing country was 33 times higher than that of a woman living in a developed country[4]. The global maternal mortality ratio decreased from 80% in 1990 to 43.9% in 2015, with an annual continuous rate of 2–3% reduction. However, the current high-risk proportion of pregnancies is always a threat in reducing the mortality indicators[5]. The current maternal mortality ratio in India is 130, with a lifetime risk of 0.3%[6]. Early detection and effective management of high-risk pregnancies can contribute substantially to the reduction of maternal and fetal adverse outcomes.

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Pradhan Mantri Surakshit Matriva Abhiyan (PMSMA) is an initiative of the Ministry of Health and Family Welfare of the Indian Government to identify high-risk pregnancies early and follow them at health care centers with proper facilities[7]. This initiative helps women with high-risk pregnancies to have healthy pregnancies and deliver without complications. There are lacunae in the data regarding high-risk pregnancies among antenatal women in the rural setting, which varies in different settings. Hence, this study aimed to determine the prevalence and clinical profile of women with high-risk pregnancies in the rural area who utilize the antenatal services at our primary health center.

Materials and Methods

This retrospective secondary analysis was carried out over a six-month period (June 2018 to December 2018) by reviewing the mother and child protection card maintained by the Maternal and Child Health (MCH) Center of the primary health center (PHC) at Fatehpur Beri, Delhi. The sample size was calculated using the formula Zά/2*pq/l2, where p=prevalence of high-risk pregnancy, q=100-p, and l=relative error/precision). By considering the prevalence of high-risk pregnancy (18.3%), with a 95% confidence interval, 80% power, and 3% absolute precision, the required sample size calculated was 665[8]. The PHC caters to a population of around 60,000 spread across 12 villages, namely Asola, Chandanhola, Fatehpur Beri, Karak, Dera, Farmhouse, Harooly, Hazrapooly, Shahurpur, Satbari, Badi, and Chota bas. All 12 villages are within a radius of 10 km from the health center, which is located in Southwest Delhi and integrated with the Department of Community Medicine, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi, India. The medical officer in charge of the health center provides antenatal services. The antenatal care (ANC) clinic of the PHC provides exclusive comprehensive health checkups and referral services for pregnant women. It includes immunization and contraceptive services with necessary investigations such as hemoglobin, blood grouping, glucose challenge test, and blood pressure monitoring. The provision of iron and folic acid tablets, counseling for danger signs of pregnancy, and importance of spacing were provided at the ANC clinic. On average, 50–60 pregnant women attend the antenatal clinic per day and avail healthcare services. The pregnant women were referred to Safdarjung Hospital for delivery and were followed-up regularly by health workers through home-based newborn care services. The weight, antenatal visit date, blood pressure, blood investigations, and clinical examination findings were regularly updated in the health records. Thyroid hormone levels were evaluated by referring antenatal women to nearby government settings or mohalla clinics. The high-risk pregnancies in this study were defined according to the guidelines provided by the PMSMA (Table 1)[9].

Data were entered into Microsoft Excel and cleaned for errors and missing values. The analysis was performed using the Statistical Package for the Social Sciences (SPSS) licensed version 21.0[10]. The continuous variables, such as age, hemoglobin, and random blood sugar levels, are expressed as mean with standard deviation. Categorical variables, such as high-risk pregnancy, severity of anemia, gravida, parity, and abortion, are expressed in proportion with a 95% confidence interval (CI). Chi-square statistics were used to study the association between qualitative variables. Statistical significance was set at $P<0.05$.

Results

During the study period, 950 pregnant women were registered, of whom 793 were included in the study based on the completeness of the records. The mean age of study participants was 23.98 ± 3.65 years ranging from 18 to 40 years. The majority of the study participants were in the age group of 21 to 25 years (55.1%) and 18.5% were pregnant adolescents (<20 years). Approximately 22.6% of the mothers were illiterate and the majority had completed secondary schooling. Approximately 12.5% of husbands were illiterate, 27.4% had completed secondary education, and 20.8%

Table 1. Antenatal women with any of the following conditions were categorized as "high-risk"

High–risk factors:
a. Severe anemia with hemoglobin level <7 g/dL
b. Hypertensive disorder in pregnancy (blood Pressure >140/90 mmHg)
c. Pregnant women positive for HIV/syphilis
d. Hypothyroidism (thyroid-stimulating hormone values–first trimester: 0.1–2.5 mIU/L, second trimester: 0.2–3 mIU/L, and third trimester: 0.3–3 mIU/L)
e. Gestational diabetes mellitus (glucose challenge test ≥140 mg/dL)
f. Twin pregnancy or multiple pregnancy
g. Previous history of lower segment cesarean section (LSCS) >1
h. Maternal factors: Younger primi (age <20 years) or elderly gravida (age >35 years), underweight, Multigravida (>5), short stature.

HIV: human immunodeficiency virus.

had passed the 12th grade (Figure 1).

Among the antenatal women, 299 (37.7%) were primigravida and 494 (62.3%) were multigravida. Considering parity, 59.6% were multiparous, 31% had one child and 23.1% had more than one child. Approximately, 12.2% of antenatal women had one abortion and 5.4% had more than one. For their previous delivery, 70.9% had delivered at an institution. Most patients had a normal vaginal mode of delivery (85.6%) during the previous childbirth (Table 2).

The prevalence of high-risk pregnancies among the an-

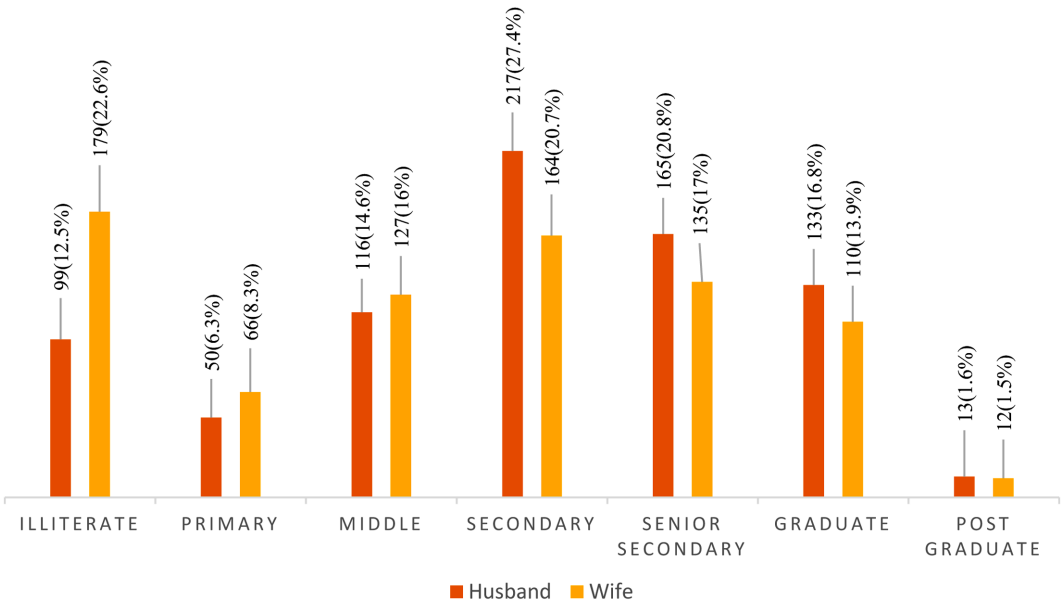

Figure 1 Distribution of educational status of high-risk pregnant women & their husbands.

Table 2. Distribution of study participants according to obstetric profile (n=793)

Characteristics	Frequency	Percentage (95% Confidence Interval)
Gravida (n=793)		
One	299	37.7 (34.3–41.1)
Two	237	29.9 (26.8–33.1)
Three	159	20.1 (17.4–22.9)
More than 3	98	12.4 (10.2–14.8)
Number of living children (n=793)		
None	364	45.9 (42.4–49.3)
One	246	31.0 (27.9–34.3)
Two	136	17.2 (14.3–19.9)
Three	30	3.8 (2.6–5.3)
More than three	17	2.1 (1.3–3.4)
Number of abortion (n=793)		
Nil	653	82.3 (79.5–84.8)
One	97	12.2 (10.1–14.6)
Two	31	3.9 (2.7–5.5)
More than two	12	1.5 (0.8–2.6)
Place of Previous Delivery (n=494)		
Home	144	29.1 (25.3–33.3)
Institutional	350	70.9 (66.6–74.6)
Previous mode of child birth (n=494)		
Vaginal	423	85.6 (82.2–88.4)
LSCS	71	14.4 (11.5–17.7)

LSCS: lower segment cesarean section.

tenatal women was 272 (34.3%). Among these high-risk pregnant women, 240 (88.2%) had a single high-risk factor, and the remaining 32 (11.8%) had more than one high-risk factor (Figure 2). Among the high-risk pregnant women, 23.9% were illiterate, 8.8% had completed primary school, 14.7% had completed middle school, 20.3% had completed secondary education, 17.4% had completed a diploma or senior secondary education, and 14.9% were graduates. Of the high-risk pregnant women, 25.4% were primigravida and 74.6% were multigravida.

Table 3 shows the contribution of individual risk factors. The major risk factor was hypothyroidism (43.7%; 95% CI [37.9–49.6]), followed by previous lower segment Caesarean section (LSCS) (19.1%). The mean hemoglobin among the study participants was 10.29 ± 1.07 ranging from 5.4 to 14.1 g/dL. Of the antenatal women 598 (75.4%) had a hemoglobin level <11gm, that is, they were anemic. Among the anemic women, 470 (70.2%) of them were mildly anemic, 174 (29.1%) were moderately anemic and 4 (0.6%) were found to be severely anemic. Among the antenatal women diagnosed with hypothyroidism, 97 (81.6%) were initiated on treatment from the first trimester and 22 (18.4%) from the second trimester.

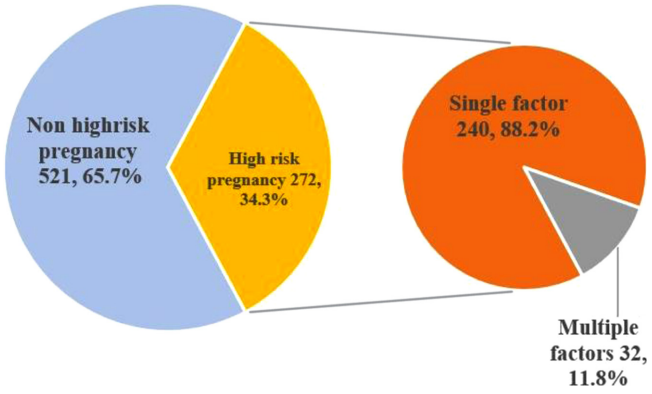

Figure 2 High-risk pregnancy profile of antenatal women (n=793).

There was a statistically significant association between maternal literacy and anemia status (χ^2=18.86, degree of freedom=1, P<0.01). Anemic mothers were 4.42 (Odds ratio) times more likely to be illiterate than non-anemic mothers were. There was no significant association between maternal education level and high-risk pregnancies (P>0.05). Anemic women were 1.83 times more likely to be multigravida than non-anemic women were, and there was a significant association (P<0.05).

Discussion

This study was conducted to determine the prevalence of high-risk pregnancy and its associated factors, and to study the clinical profile of pregnant women attending the antenatal clinic of a primary health center through a review of

Table 3. Contribution of individual risk factors among the high-risk pregnancies (n=272)

Risk factor	Frequency*	Percentage (95% Confidence Interval)
Hypothyroidism	119	43.7 (37.9–49.6)
>1 Previous LSCS	52	19.1 (14.8–24.2)
> 1 abortion	43	15.8 (11.9–20.6)
Multigravida (>5)	21	7.7 (5.1–11.5)
Underweight	20	7.3 (4.8–11.1)
Previous stillbirth	10	3.6 (2.0–6.6)
Poly/Oligo hydramnias	10	3.6 (2.0–6.6)
Rh incompatibility	9	3.3 (1.7–6.1)
Multiple pregnancy	7	2.5 (1.2–5.2)
Severe anemia	4	1.4 (0.5–3.7)
Placental abnormalities	3	1.1 (0.3–3.2)
Elderly primi age >35 years	3	1.1 (0.3–3.2)
Gestational DM	2	0.7 (0.2–2.6)
HbsAg positive	2	0.7 (0.2–2.6)
Gestational HTN	1	0.3 (0.07–2.1)
Known DM	1	0.3 (0.07–2.1)
Ectopic pregnancy	1	0.3 (0.07–2.1)
Height <145 cm	1	0.3 (0.07–2.1)
Previous congenital anomaly	1	0.3 (0.07–2.1)
Hepatitis	1	0.3 (0.07–2.1)
HIV	1	0.3 (0.07–2.1)

*Results are not mutually exclusive. LSCS: lower segment cesarean section; DM: diabetes mellitus; HTN: hypertension; HIV: human immunodeficiency virus.

records. The prevalence of high risk was 34.3%. This finding was similar to the studies conducted globally, that is, Sylvie *et al.* in Congo (33.1%), Muhammed *et al.* in Egypt (51.3%), and Kashani *et al.* in Iran (63.1%), where a majority of studies reported more than one-third of pregnancies were high-risk[11, 12]. However, studies conducted in India by Kalaivani *et al.*, Kumar *et al.*, Majella *et al.*, Bharti *et al.*, and Jaideep *et al.* showed a high-risk prevalence of 55%, 37%, 18.3%, 31.4%, and 30.7%, respectively[8, 13–15]. A higher prevalence of high-risk pregnancies was prominent from the study results conducted in the northern part of India. Previous studies have reported that education level plays a role in the reduction of high-risk pregnancies. In the present study, among the high-risk pregnant women, 23.3% were illiterate, while a study in southern India reported that 14.4% were illiterate. However, the present study found no association between maternal education level and high-risk pregnancies. The current study found that a higher proportion of high-risk pregnant women were multigravida (74.6%), which is comparable to the findings of Jaideep *et al*[15].

The majority of high-risk pregnancies in the present study was caused by hypothyroidism (43.7%) followed by more than one previous LSCS (19.1%). In their study conducted in Pondicherry, Majella *et al.* reported that maternal age is a major contributor to high-risk pregnancy followed by pregnancy-induced hypertension[8]. Bharti *et al.* in their study on the prevalence of high-risk pregnancy in rural Haryana reported that abortion (>1) is a major risk factor (27.4%) followed by height <145 cm (24.7%) and hypertension in pregnancy (22%). Sex determination is an important risk factor for abortions among young women. The study results from a rural area of Dharwad showed that a history of more than one abortion and a height <140 cm were the primary contributors to high-risk pregnancy[13].

Severe anemia, diabetes, and thyroid disorders contributed to 14.7% of high-risk pregnancies and 13.7% of high-risk pregnancies were multigravidas (four or more) in a study by Bharti *et al.*, while the contribution was 5.5% in this study. In this study, adolescent pregnancy contributed to 18.5%, while in the studies by Kumar *et al.*, Majella *et al.*, Jaideep *et al.*, and Bharti *et al.* it contributed to 22%, 5.3%, 7%, and 10.5% pregnancies[13–15].

The prevalence of hypothyroidism among antenatal women was 15%, that is, 43.7% among high-risk pregnancies. Studies conducted in various states in India found that the female sex was more predisposed to hypothyroidism[16]. another study conducted in North India found the prevalence of hypothyroidism to be 14.3%[17]. There are few published studies on this pertinent topic that demonstrates a similar prevalence of hypothyroidism[18, 19]. Thyroid dysfunction during pregnancy has been an important research area in public health because thyroid dysfunction has an immense impact on maternal and fetal outcomes that influence maternal indicators. Predominantly, children born to hypothyroid mothers have poor intellectual function during the latter part of their life, which affects mental health[17].

The study's major strength was the use of the PMSMA guidelines for high-risk pregnancy diagnosis, which helps in the comparison of findings nationally[9]. The current study obtained antenatal data from large rural populations and adds value to the limited literature on the high-risk patterns and clinical profiles of antenatal women in the PHC. The limitations of the study are that it is record-based, and the outcomes of high-risk pregnancies were not studied. Data on significant factors affecting high-risk pregnancy explored in previous literature were not gathered, and causality could not be determined. Furthermore, a trimester-wise high-risk pattern was observed in this study. In addition, due to incomplete data, the age at marriage of the pregnant women and the number of antenatal visits were not analyzed in the study. The unexpected finding of hypothyroidism contribution in the present study on high-risk pregnancy signals the need for additional detailed studies. Approximately three-fourths of the study participants had an institutional delivery in their previous delivery, and the reasons that the remaining women did not have institutional deliveries need to be explored. Further, in-depth research in this area would help shed more light on high-risk pregnancies in the context of hypothyroidism.

Conclusion

The study found that the prevalence of high-risk pregnancies was 34.3% in this rural setting. The majority of high-risk pregnancies were due to hypothyroidism, followed by more than one previous LSCS or abortion. Three-quarters of the women registered were anemic and found to be significantly associated with literacy. Further research should be conducted to track high-risk pregnancy outcomes and investigate the newborn thyroid profile of women with hypothyroidism.

Ethical statement: Ethical clearance was obtained from the Institute Ethics Committee of VMMC & Safdarjung Hospital, New Delhi. The privacy of subjects and confidentiality of information was maintained.

Conflict of interest: None.

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