Prevalence of high-risk pregnancy among pregnant women enrolled under Pradhan Mantri Surakshit Matritva Abhiyan in government health facilities of district Etawah, Uttar Pradesh: A cross-sectional study

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ABSTRACT

Background: According to the Sample Registration System report, India has reduced the maternal mortality rate from 130 per 100,000 live births in 2014–2016 to 113 per 100,000 live births in 2016–2018. The main purpose of antenatal care is to identify “high-risk” cases as early as possible from a large group of antenatal mothers and provide them skilled and appropriate care. Objective: To determine the prevalence of high-risk pregnancy (HRP) in pregnant females availing services under pradhan mantri surakshit matritva abhiyan (PMSMA) and to assess awareness of pregnant mothers about services provided under PMSMA in district Etawah of Uttar Pradesh. Material and Methods: Community-based cross-sectional study was carried out among 400 female beneficiaries who were registered under the PMSMA scheme and delivered their baby at any government health facility during one year of study period. Results: It was observed that from all the antenatal women visiting the community health center for HRP day under the PMSMA scheme, 162 (40.5%) were categorized as HRPs and 238 (59.6%) of them were non-high-risk pregnancies. A statistically significant association was observed (P-value = 0.005 at 95% CI) between the difference in the proportion of HRPs and the educational status of the pregnant mothers. Out of 400 beneficiaries, 167 (41.75%) were aware of the PMSMA scheme. Conclusion: Regular antenatal care (ANC) check-ups, early identification of HRP, health education, and timely screening are needed to reduce maternal mortality.

Keywords: High-risk pregnancy, maternal mortality rate, PMSMA, prevalence

Introduction

The maternal mortality ratio (MMR) in India was very high in the year 1990 with 556 women dying during childbirth per hundred thousand live births as compared to the global MMR of 385/lakh live births.¹ As per the sample registration system (SRS) report by Registrar General of India for the last 3 years, the MMR of India has reduced from 130/lakh live births in SRS (2014–2016) to 122 in SRS (2015–2017) and 113/lakh live births in SRS (2016–2018) [Figure 1].² India has registered an overall decline in MMR of 70% between 1990 and 2015 in comparison to a global decline of 44%. Although India has made considerable progress in the reduction of maternal and infant mortality, every year approximately 44,000 women...
still die due to pregnancy-related causes and approximately 6.6 lakh infants die within the first 28 days of life. Many of these deaths are preventable and many lives can be saved if quality care is provided to pregnant women during their antenatal period and high-risk factors such as severe anemia, pregnancy-induced hypertension (PIH) etc., are detected on time and managed well.\(^{[9]}\)

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 program aims to provide assured, comprehensive, and quality antenatal care, free of cost, universally to all pregnant women on the 9th day [HRP (high-risk pregnancy) day] of every month. Under this campaign, a minimum package of antenatal care services is provided to the beneficiaries at PMSMA clinics to ensure that every pregnant woman receives at least one antenatal checkup in the 2nd/3rd trimester of pregnancy by the physician/specialist at designated government health facilities.

One of the critical components of this Abhiyan is the identification and follow-up of HRPs. The identification and line listing of HRPs are based on obstetric/medical history and existing clinical conditions which are done with special emphasis given on early diagnosis and adequate and appropriate management of women with malnutrition conditions like anemia as these pregnancies need extra and specialized care. A sticker indicating the condition and risk factor of the pregnant women is added onto the mother and child protection card for each visit, i.e., Green Sticker for women with no risk factor detected and Red Sticker for women with high-risk pregnancy.

HRP threatens the health or life of the mother or her fetus. It often requires specialized care from specially trained health care providers. Some pregnancies become high risk as they progress, while some women are at increased risk for complications even before they get pregnant for a variety of reasons. HRP may result because of various conditions, which are there either before getting pregnant such as diabetes or high blood pressure, and complications from a previous pregnancy, or conditions during pregnancy or delivery. Early and regular antenatal checkups help many women have healthy pregnancies and deliveries without any complications.\(^{[9]}\) In India, about 20%–30% of pregnancies belong to the high-risk category, which is responsible for 75% of perinatal morbidity and mortality.\(^{[9]}\) Early detection and effective management of HRPs can contribute substantially to the reduction of maternal and fetal adverse outcomes. Considering these clearly defined objectives of the PMSMA, we planned this study to determine the prevalence of HRP in pregnant females availing services under PMSMA and to assess awareness of pregnant mothers about services provided under PMSMA in district Etawah, Uttar Pradesh.

### Material and Methods

A community-based cross-sectional study was carried out in district Etawah, Uttar Pradesh for a period of 6 months. Women in the 2nd and 3rd trimesters, who have been registered during the last one year under PMSMA and delivered their baby at any government health care facility, were taken as the study participants. By considering estimated prevalence of HRP to be 37% on the basis of a study conducted in rural Haryana by Jaideep et al.\(^{[9]}\) 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: $N = \left[\frac{(Z_{1-\alpha/2})^2 \times P \times (1-P)}{d^2}\right]$, 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 37%, and $d =$ allowable absolute error, taken as 5%. The calculated sample size for the study was 358, which was rounded off to 400 to include an equal number of study participants from selected areas.

A convenience sampling technique was used to select the study participants as per the calculated sample size. Etawah district is comprised of 8 community development blocks with one community health center (CHC) functioning in each of these blocks. Out of these, 4 blocks, namely, Jaswant Nagar, Basrehar, Takha, and Barhpura, were selected purposively by lottery method. Subsequently, a list of all villages in these four selected blocks was obtained from the Community Development Office at Etawah district headquarters. Because our sample size was 400, we recruited 100 study subjects from each of the four randomly selected villages of different blocks to get equal representation from each study area of district Etawah. Hence, we interviewed 100 beneficiaries registered under PMSMA and delivered in the last one year. The accredited social health activist (ASHA) of the selected village was contacted to procure the list of registered beneficiaries. Subsequently, the beneficiaries of that selected village were visited door-to-door to recruit the study participants as per the inclusion criteria. Study participants were interviewed using a predesigned, pretested, semi-structured questionnaire. The working pro forma is comprised of questions related to sociodemographic profile, utilization of antenatal care services, factors affecting high-risk pregnancy, and specific questions related to awareness of PMSMA. Ethical clearance for the research was taken from the Ethical Committee before the start of the study. Informed written consent was taken from all the beneficiaries after explaining the purpose, nature, and procedure of the study.
Data thus collected were entered into the Microsoft Excel spreadsheet, scrutinized for completeness and was analyzed using IBM SPSS (Statistical Package for Social Sciences) Software, Version 25.0.

**Results**

Sociodemographic profiles of 400 beneficiaries revealed that the majority were between the age group of 20–30 years 375 (93.75%) with mean age ± SD of study participants 25 ± 3.3 years. The majority of them 215 (53.75%) were from joint families and 337 (84.25%) Hindu by religion. Most of them 285 (71.25%) got married between the age of 15–20 years and their first delivery 252 (63.0%) occurred between 21–25 years of age and the majority having more than three children 151 (37.75%). The educational status of 253 (63.25%) mothers was below high school and 147 (36.75%) were educated till high school and above. According to Modified B. G. Prasad’s classification AICPI-2020, the majority 175 (43.75%) belonged to the lower middle class and 1 (0.25%) belonged to the upper class [Table 1].

The distribution of HRP reveals that, out of all the antenatal women visiting the CHCs for HRP day under the PMSMA scheme, 162 (40.50%) were classified as HRPs and 238 (59.60%) were nonhigh-risk pregnancies [Figure 2].

On evaluating the various complications associated with HRP, it was observed that among obstetric complications of previous pregnancy, history of previous abortion 29 (7.25%) was the leading factor, followed by anemia 13 (3.25%) and previous lower segment cesarean section [LSCS, 12 (3%)]. Similarly, among previous medical history, hypertension 15 (3.75%) and diabetes 11 (2.75%) were responsible, while among complications during recent pregnancy, anemia 67 (16.75%) and high blood pressure 26 (6.50%) were prominent reasons [Figure 3]. Recent delivery complications that were responsible for HRP are prolonged labor 33 (8.25%), obstructed labor 31 (7.75%), excessive bleeding per vaginum 29 (7.25%), convulsion 8 (2%), and breech presentation [Figure 4] [Table 2].

According to the study, only 167 (41.75%) of the 400 beneficiaries were aware of the existence of the PMSMA scheme, while 233 (58.25%) were unaware [Figure 5]. Out of 167 (41.75%) study participants, the majority 66 (39.52%) received information from ASHA, followed by 46 (27.54%) from relatives, 23 (13.77%) from friends, 13 (7.78%) from radio, 12 (7.18%) from newspaper, and the least 7 (4.19%) from television [Table 3].
Table 1: Distribution of beneficiaries according to sociodemographic profile

| Sociodemographic profile | Variables | Subgroups                  | Frequency (n=400) | Percentage (%) |
|--------------------------|-----------|----------------------------|-------------------|----------------|
| Age Group (in years)     | <20 years | 8                          | 02.00             |
|                          | 20‑30 years | 375                       | 93.75             |
|                          | >30 years  | 17                        | 04.25             |
|                          | Mean±SD    | 25±3.3                    |                   |
| Religion                 | Hindu      | 337                       | 84.25             |
|                          | Muslim     | 63                        | 15.75             |
| Caste                    | General    | 118                       | 29.50             |
|                          | OBC        | 173                       | 43.25             |
|                          | ST/SC      | 109                       | 27.25             |
| Age at Marriage (in years) | 15‑20 years | 285                       | 71.25             |
|                          | 21‑25 years | 111                       | 27.75             |
|                          | 26‑30 years | 3                         | 00.75             |
|                          | >30 years  | 1                         | 00.25             |
|                          | Mean±SD    | 19±2.0                    |                   |
| Age at first delivery (in years) | 15‑20 years | 138                       | 34.50             |
|                          | 21‑25 years | 252                       | 63.00             |
|                          | 26‑30 years | 6                         | 01.50             |
|                          | >30 years  | 4                         | 01.00             |
|                          | Mean±SD    | 21±2.1                    |                   |
| Total number of children | 1          | 114                       | 28.50             |
|                          | 2          | 135                       | 33.75             |
|                          | ≥3         | 151                       | 37.75             |
| Type of Family | Nuclear    | 111                       | 27.75             |
|                          | Joint      | 215                       | 53.75             |
|                          | Three generation | 74          | 18.50             |
| Education of Mother | Illiterate | 102                       | 25.50             |
|                          | Primary    | 73                        | 18.25             |
|                          | Junior high school | 78          | 19.5              |
|                          | High school | 60                        | 15.00             |
|                          | Intermediate | 49                        | 12.25             |
|                          | Graduate and Above | 38          | 09.50             |
| Education of Father | Illiterate | 17                        | 04.25             |
|                          | Primary    | 23                        | 05.75             |
|                          | Junior high school | 73          | 18.25             |
|                          | High school | 96                        | 24.00             |
|                          | Intermediate | 102                      | 25.50             |
|                          | Graduate and Above | 89          | 22.25             |
| Occupation of Women | Unskilled worker | 356                  | 89.00             |
|                          | Semi-skilled worker | 38          | 09.50             |
|                          | Skilled worker | 6                        | 01.50             |
| Occupation of Husband | Unskilled worker | 100                  | 25.00             |
|                          | Semi-skilled worker | 264          | 66.00             |
|                          | Skilled worker | 36                        | 09.00             |
| Socioeconomic status (Modified BG Prasad’s classification as per AICPI 2020) | Upper class (≥7533)* | 1                   | 00.25             |
|                          | Upper middle class (3766-7532) | 29          | 07.25             |
|                          | Middle class (2260-3765) | 82                        | 20.50             |
|                          | Lower middle class (1130-2259) | 175         | 43.75             |
|                          | Lower class (≤1129 and below) | 113        | 28.25             |

*Per capita monthly income of the family

Table 4 illustrates that the difference in the proportion of HRP among women had a statistically significant association with the educational status \( (P\)-value = 0.025). Among all studied subjects, 313 (78.25%) were educated up to high school, while 87 (21.75%) had received the education of senior secondary schooling and above.

Discussion

A pregnancy is considered high risk when there are potential complications that could affect the mother and the baby, or both. To ensure the best outcome for both the mother and the baby, HRPs must be managed by a specialist. In the present study, it
Table 2: Distribution of beneficiaries according to complications in high-risk pregnancy

| Complications in previous pregnancy | Number (n) | Percentage (%) |
|------------------------------------|------------|----------------|
| Obstetric complications            |            |                |
| 1) APH (Antepartum hemorrhage)     | 1          | 0.25           |
| 2) PPH (Postpartum hemorrhage)     | 5          | 1.25           |
| 3) PIH (Pregnancy-induced HTN)     | 3          | 0.75           |
| 4) Anemia                          | 13         | 3.25           |
| 5) Eclampsia                       | 0          | 0.00           |
| 6) Previous LSCS                   | 12         | 3.00           |
| 7) Congenital Anomaly              | 0          | 0.00           |
| 8) Abortion                        | 29         | 7.25           |
| 9) None of these                   | 337        | 84.25          |

| Previous medical complications     |            |                |
|------------------------------------|------------|----------------|
| 1) Diabetes                        | 11         | 2.75           |
| 2) Hypertension                    | 15         | 3.75           |
| 3) Tuberculosis                    | 1          | 0.25           |
| 4) Asthma                          | 3          | 0.75           |
| 5) Heart Disease                   | 0          | 0.00           |
| 6) None of these                   | 370        | 92.50          |

| Complications during recent pregnancy | Number (n) | Percentage (%) |
|--------------------------------------|------------|----------------|
| 1) Anemia                            | 67         | 16.75          |
| 2) Weak or no movement of fetus      | 2          | 0.50           |
| 3) High blood pressure               | 26         | 6.50           |
| 4) Excessive bleeding                | 8          | 2.00           |
| 5) Cord around the neck of fetus     | 10         | 2.50           |
| 6) HBsAg positive                    | 9          | 2.25           |
| 7) None of these                     | 278        | 69.50          |

| Complications during recent delivery | Number (n) | Percentage (%) |
|--------------------------------------|------------|----------------|
| 1) Convulsion                        | 8          | 2.00           |
| 2) Excessive bleeding                 | 29         | 7.25           |
| 3) Prolonged labor                   | 33         | 8.25           |
| 4) Breech presentation               | 7          | 1.75           |
| 5) Obstructed labor                  | 31         | 7.75           |
| 6) None of these                      | 292        | 73.00          |

Table 3: Distribution of beneficiaries according to awareness about PMSMA scheme

| Awareness about PMSMA | Number (n) | Percentage (%) |
|-----------------------|------------|----------------|
| Awareness             |            |                |
| 1) Aware              | 167        | 41.75          |
| 2) Unaware            | 233        | 58.25          |
| Sources (n=167)       |            |                |
| 1) Friends            | 23         | 13.77          |
| 2) Relatives          | 46         | 27.54          |
| 3) Television         | 7          | 4.19           |
| 4) Radio              | 13         | 7.78           |
| 5) Newspaper          | 12         | 7.18           |
| 6) ASHA               | 66         | 39.52          |

was observed that among all the antenatal women visiting the CHCs for HRP day under the PMSMA clinic, 162 (40.50%) were HRP. A similar study conducted by Antara et al. observed that 90.70% of antenatal women attending HRP days had HRP. Anemia was the most common (81.4%) cause of HRP. There was a significant association between the number of pregnancies and abortions with the marriage age of women. In our study, there was a significant association between HRP and education status ($P < 0.005$). Another study conducted by Jaideep et al. found that the prevalence of HRP was 30.7%, with 59.8% having a bad obstetric history, 4% having pregnancy-induced hypertension, 5.5% being elderly gravida, 3.2% being Rh-negative, and 22.3% having other risk factors. Factors such as the education status of pregnant women, age at pregnancy, and parity of pregnant women were found to be significantly associated with the prevalence of high risk.

Another study, conducted in Rohtak, Haryana, by Bharti et al., discovered that the prevalence of HRP was 31.4% (292/931) with the lower education group (36.7%) significantly higher than the higher education group (24.9%). John et al. in their study reported that PIH is a common medical disorder associated with pregnancy. The prevalence of PIH was 10.75% (43/400). The most important risk factors for PIH discovered in his study were a previous history of PIH (adjusted OR = 1.276, 95% CI: 0.125–11.836), a family history of hypertension (adjusted OR = 1.930, 95% CI: 1.130–3.296), and thyroid problems (adjusted OR = 1.904, CI: 0.786–4.611). Similar findings have been reported in the studies conducted in Brazil and South Africa, where the prevalence of PIH were 13.9 and 12%, respectively. In the present study, the prevalence of PIH among antenatal women was 3 (0.75%). According to Kumari et al., the leading cause of death in their study was hypertensive disorders of pregnancy (47.6%), followed by postpartum hemorrhage (PPH, 28.4%). In the present
study, the most common obstetric complications in previous pregnancy were abortion, followed by severe anemia, LSCS, PPH, PIH, and APH Antepartum hemorrhage. Another study, conducted by Verma et al.,[10] discovered that the prevalence of anemia was 87.3% of the study participants. The prevalence of anemia in our study was 67 (16.75%). According to Rahmati et al.,[11] the relative risk for maternal anemia in the first, second, and third trimester of pregnancy were 1.26 (95% CI: 1.03–1.55), 0.97 (95% CI: 0.57–1.65), and 1.21 (95% CI: 0.84–1.76), respectively. The relationship between maternal anemia and infant low birth weight in the first trimester of pregnancy was significant (P < 0.001). In a similar study, Chauhan et al.[12] discovered that anemia was the most common risk factor (66.7%) among high-risk mothers.

Awareness of any health program encourages beneficiaries to utilize existing healthcare services, resulting in lower maternal morbidity and mortality. In the present study, 167 (41.75%) of 400 beneficiaries were aware of the PMSMA scheme. A similar study conducted by Sharma et al.[13] discovered that only 128 (29.5%) of 433 women were aware of the existence of the PMSMA scheme. Television and radio were the most common sources of information about the ANC, accounting for 189 (63%), followed by neighbors with 68 (22.5%), and newspapers with 37 (12.2%). In our study, 66 (39.52%) received information about PMSMA from ASHA, followed by 46 (27.54%) relatives, 23 (13.77%) friends, 13 (7.8%) radio, 12 (7.18%) newspapers, and least 7 (4.19%) television. Another study conducted by Sinha et al.[14] discovered that only 5% of mothers were aware of PMSMA services. A study conducted in Mangaluru by Vishnu et al.[15] on the utilization of antenatal services and supplementary nutrition during pregnancy reported that only 5% of the participants were aware of PMSMA compared to 167 (41.75%) in our study.

**Conclusion**

Findings of the present study help to conclude that a high proportion of HRP Day beneficiaries of district Etawah were anemic, having high blood pressure and bleeding complication, etc., It is well known that if these complications were detected early, they can be reduced to a marked level. Initiatives like PMSMA can help to detect these avoidable risk factors in time and help in reducing the MMR in our country. It is suggested that short and focused education intervention can provide awareness, change their attitude, and help the mothers to utilize the existing healthcare facilities. Educating the girls can be one of the effective interventions to reduce the prevalence of HRPs.

**Summary**

Major findings of the study:

1. Sociodemographic profiles of 400 beneficiaries revealed that the majority were between the age group of 20–30 years 375 (93.75%) with mean age ± SD of study participants was 25 ± 3.3 years. Most of them 215 (53.75) are from joint families and 337 (84.25%) Hindu by religion.

2. The majority of them 285 (71.25%) got married between the age of 15–20 years and their first delivery 252 (63.0%) occurred between 21–25 years of age.

3. In the present study, the prevalence of HRP was observed, i.e., 162 (40.5%).

4. The most common complication during current pregnancy is anemia, i.e., 67 (16.75%), followed by 26 (6.50%) high blood pressure, 10 (2.50%) cord around the neck of the fetus, 9 (2.25%) HBsAg + ve, 8 (2.00%) excessive bleeding, and 2 (0.50%) weak or no movement of the fetus.

5. Many beneficiaries had completed their 4 ANC visits, i.e., 35 (8.75%) which was very less, and also 302 (75.5%) beneficiaries had done their ultrasound (USG), while 98 (24.5%) had not.

6. Place of delivery: out of 400 beneficiaries, 383 (95.75%) delivered at the CHCs, 12 (3.00%) delivered at a private hospital due to their previous history of LSCS, and the rest 5 (1.25%) delivered at home due to nonavailability of transportation.

7. Mode of delivery: out of 400 beneficiaries, 388 (97.0%) were normal-vaginal delivery including 5 (1.25%), who delivered their baby normally at home, and the rest 12 (3.00%) delivered their baby by LSCS.

8. Outcome of delivery: out of 388 (97.0%) beneficiaries who delivered their baby normally, 346 (89.17%) were live birth, 25 (6.44%) stillbirths, and 17 (4.38%) were died.

9. According to the study, only 167 (41.75%) of the 400 beneficiaries were aware of the existence of the PMSMA scheme.

**Recommendation**

1. There is an urgent need for medical staff at these CHCs to fulfill requirements such as specialist doctor, i.e., Obstetrician and Gynecologist, and more trained staff nurse who were skilled in delivery are required.

2. Diagnostic services like blood-grouping, screening for gestational diabetes mellitus, oral glucose tolerance test (OGTT), and USG facility were not available at these CHCs.

3. Many essential drugs were not available in these CHCs such as tab: metronidazole, paracetamol, chloroquine, iron-folic acid, cal+vit D3, albendazole, erythromycin, cap amoxicillin and inj: dexamethasone, tetanus toxoid, gentamicin, paracetamol, labetalol, nifedipine. Concerned authority should look into this.

4. A systematic approach is required to reduce the prevalence of HRPs from policymakers.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent...
for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**
There are no conflicts of interest.

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