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A longitudinal study on high risk pregnancy and its outcome among antenatal women attending rural primary health centre in Puducherry, South India

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Abstract:

BACKGROUND: Almost 15% of all pregnant women can develop potentially life-threatening complications. As a result, identification of high-risk pregnancy at earliest stage will be useful in directing appropriate intervention. Hence, the current study was done to determine the prevalence and outcome of high-risk pregnancy among antenatal women in rural Puducherry.

MATERIALS AND METHODS: A record-based longitudinal study was done during March 2018 among 569 antenatal women who have attended rural health center of tertiary care institute. High-risk pregnancy was classified based on the guidelines from Pradhan Mantri Surakshit Matritva Abhiyan and outcome assessment based on the obstetric and neonatal outcomes.

RESULTS: Among 569 antenatal case record reviewed, 315 (55.3%) were in the age group of 20–25 years and majority (463, 81.4%) belonged to below poverty line families; 410 (74.3%) registered their current pregnancy within the first trimester. The prevalence of high-risk pregnancy among study participants was 18.3% (95% confidence interval: 15.3%–21.7%). Majority (81.9%) had term delivery. Regarding obstetric and neonatal outcomes, majority had spontaneous vaginal delivery (73.9%); about 10.4% gave birth to low-birth weight baby, and only 1.7% had stillbirth. Parity, socioeconomic status, and unfavorable outcomes such as low-birth weight, preterm, and postterm delivery were associated with high-risk pregnancy.

CONCLUSION: The current study found that almost one-fifth of the pregnant women in rural area have high-risk pregnancy. Unfavorable obstetric and neonatal outcomes were common among high-risk cases. Hence, early detection of high-risk pregnancy needs to be done at primary health-care level to improve the maternal, obstetric, and neonatal outcomes.

Keywords:

High-risk pregnancy, low birth weight, maternal–child health services

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Introduction

All pregnancies are at risk even though most of the pregnancies and childbirth worldwide are uneventful. Almost 15% of all the pregnant women can develop potentially life-threatening complications

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which might require skilled care with some requiring major intervention for survival.^[1] Complications can occur anytime during the course of the pregnancy and childbirth, which in turn can affect the health and the overall survival of mother and the fetus.^[2] The World Health Organization has reported that almost 830 women die daily

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as a result of complications during antenatal period and childbirth. There are five main reasons for death of pregnant women such as severe hemorrhage, maternal infections, unsafe abortion, hypertension-related disorders of pregnancy such as preeclampsia and eclampsia, and medical complications such as cardiac conditions, HIV/AIDS, or diabetes complicating or complicated by pregnancy.^[3] Hence, all the pregnancies need to be evaluated for high-risk pregnancy through routine antenatal care provided by the health-care professionals.

Identification of high-risk pregnancy, causes, and its complications through quality antenatal care helps in achieving favorable maternal, obstetric, and neonatal outcome.^[4,5] In addition, women identified to be at high risk need to be followed up at regular intervals through routine care by the health workers at health facility and home visits to prevent the development of any maternal or fetal complications. Apart from follow-up care, appropriate laboratory investigations and referral services also required to improve the outcome of pregnancy. Prognosis of the outcome also depends on the type of high-risk pregnancy among pregnant mothers.^[6] Hence, identification of type of high-risk pregnancy at earliest stage will be useful in directing the appropriate intervention measures for pregnant women.

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.^[7] Hence, the current study was done to determine the prevalence and outcome of high-risk pregnancy and factors associated with it among antenatal women attending rural primary health-care center in Puducherry, South India.

Materials and Methods

This is a record-based longitudinal study conducted by reviewing the maternal and child health (MCH) register maintained in the antenatal clinic of JIPMER Rural Health Centre (JIRHC) during March 2018. Records were reviewed for the details of pregnant women available over a period of 5 years from January 2013 to December 2017. JIRHC caters to a population of around 10,000 spread over four villages, namely, Ramanathapuram, Thondamanatham, Pillaiyarkuppam, and Thuthipet. All the four villages are located within 4 km of the health center which is located in Ramanathapuram village. Health services are provided by senior resident from the department of preventive and social medicine, who is the medical officer in charge of the health center, undergraduate intern trainees, postgraduates posted from the

Department of Community Medicine, JIPMER, as well as by nursing staff and public health nurses.

The antenatal clinic of JIRHC is a special clinic established exclusively for providing comprehensive health checkup and referral services of pregnant women under the supervision of the department of community medicine. It is functional once a week at health center which is located in Ramanathapuram village. On an average, 25 pregnant women will be attending every antenatal clinic and avail health-care services. The health-care services include essential antenatal care services such as registration of pregnancy, tetanus toxoid immunization, recording of body weight and blood pressure at each follow-up visit, basic laboratory investigations such as hemoglobin, blood grouping, glucose challenge test, venereal disease research laboratory, HIV, hepatitis B surface antigen testing, provision of iron and folic acid tablets, counseling for danger signs of pregnancy, birth preparedness, nutrition, and importance of spacing, contraception, immunization and breastfeeding, obstetrician consultation and routine health and antenatal checkup, follow-up, and referral services. Patients who had missed the scheduled visit are being followed by the health workers through mobile call or home visit.

All the above-mentioned services are provided free of cost. The obstetrician consultation is provided by senior resident of the department of obstetrics and gynecology. The counseling services are provided by staff nurse, interns posted at JIRHC, and medical social worker. The prescription for medication, laboratory investigations to screen for complications, and also referral forms for further follow-up in tertiary care center among high-risk cases are given. The patient is advised to make regular follow-up visits.

Each antenatal woman has a comprehensive case record which is updated during every visit by the health workers. The case records are issued by medical record department with a unique identity number. This identity number is entered in the attendees register maintained at antenatal clinic. Confidentiality of information for all pregnant women was maintained under this unique identity number. The health workers update the blood pressure during the visit, recent blood investigation reports, and also regarding specific advice given to pregnant women in that case record.

Line list of pregnant women who were registered in antenatal clinic maintained at JIRHC was obtained. In total, there were around 603 pregnant women registered with antenatal clinic. Out of which, 569 records of antenatal women were taken for the assessment of high-risk pregnancy and outcome of the pregnancy. Rest

of the records were excluded from the study as it had more incomplete details.

High-risk pregnancy was classified based on the guidelines provided by Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) for identification of high-risk pregnancy by health-care workers.^[3] The parameters considered for diagnosis of high-risk pregnancy were also defined as per the guidelines provided by PMSMA. Antenatal women with the following conditions were categorized under high-risk pregnancy:

- 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 \geq 140 mg/dl)
- f. Twin pregnancy or multiple pregnancy
- g. Previous history of lower segment cesarean section
- h. Younger primi (age <20 years) or elderly gravida (age >35 years)
- i. Malpresentation
- j. Bad obstetric history (history of congenital malformation, stillbirth, abortion, premature birth, and obstructed labor)
- k. Rh incompatibility
- l. Low-lying placenta or placenta previa.

Outcome of pregnancy was categorized based on the following domains:

- Obstetric outcome
 - i. Type of delivery – preterm (<37 weeks of pregnancy), term (37–42 weeks of pregnancy), and postterm delivery (>42 weeks of pregnancy)
 - ii. Mode of delivery – spontaneous vaginal delivery, assisted vaginal delivery, and lower segment cesarean section.
- Neonatal outcome:
 - i. Birth weight of child – low-birth weight baby (birth weight <2.5 kg), normal baby (birth weight \geq 2.5 kg)
 - ii. Status of birth – live birth, stillbirth, and abortion.

The pretesting was done with pro forma during February 2018 among five antenatal women case records, and few modifications were made and EpiCollect file was made for data extraction. No crosschecking was done by interviewing the patient.

Data were entered into EpiCollect 5 (manufactured by Imperial College, London), and analysis was done using STATA version 12.0 (manufactured by StataCorp LP, College Station, Texas). Continuous variables, such as age, were summarized as mean (standard

deviation [SD]). Outcome variables such as high-risk pregnancy and outcome of pregnancy were 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. Log-binomial regression was done to quantify the association, and prevalence ratio (PR) with 95% CI was reported. Variables with $P < 0.05$ were considered to be statistically significant.

Results

In this record-based study, we reviewed MCH register for the prevalence and outcome of high-risk pregnancy among antenatal mothers registered between 2013 and 2017. There were a total of 603 registered pregnant women during the study period. Since 34 records had more missing data, they were removed, and 569 (94.4%) were included in the final analysis.

The mean (SD) age of the study participants was 25 (3.7) years. Table 1 describes the sociodemographic characteristics and obstetric index of the study participants.

Table 1: Sociodemographic characteristics and obstetric index of the study participants as recorded in the maternal and child health register in a primary health center of Puducherry during 2013-2017, n=569

Sociodemographic and obstetric index	Frequency, n (%)
Age category (years)	
<20	30 (5.3)
20-25	315 (55.3)
26-30	177 (31.1)
31-35	42 (7.4)
36-40	5 (0.9)
Socioeconomic status	
Below poverty line	463 (81.4)
Above poverty line	106 (18.6)
Gravida (n=567)	
Primi	236 (41.6)
Multi (2 or more pregnancy)	331 (58.4)
Parity (n=536)	
Nulliparous	230 (42.9)
Multiparous (parity - 1, 2 and 3)	306 (57.1)
Time of registration (n=552)	
Early (<12 weeks)	410 (74.3)
Late (12 weeks and more)	142 (25.7)
Number of living child (n=550)	
0	272 (49.4)
1	250 (45.5)
2	28 (5.1)
Abortion (n=551)	
0	457 (82.9)
1	82 (14.9)
2	9 (1.6)
3 or more	3 (0.5)

More than half of the pregnant women (315, 55.3%) were in the age group of 20–25 years and only about 5% was adolescent pregnancy; majority (463 [81.4%]) belonged to below poverty line families; more than half (331, 58.4%) were multigravida pregnancy; about 306 (57.1%) were multiparous woman. Almost three-fourth of the antenatal mothers (410, 74.3%) registered their current pregnancy within 12 weeks from last menstrual period. Only three antenatal women had three or more abortion (recurrent abortions).

The prevalence of high-risk pregnancy among the study participants was found to be 18.3% (95% CI: 15.3%–21.7%). Major cause for high-risk pregnancy was related to maternal age in which 35 (6.2%) belonged to either younger primi (age <20 years) or elderly gravida (age >35 years). Other causes were as follows: 18 (3.1%) had hypertension disorder in pregnancy ($\geq 140/90$ mmHg), 11 (1.9%) had gestational diabetes mellitus, 10 (1.7%) had severe anemia, 9 (1.6%) had previous history of lower segment cesarean section, 8 (1.4%) had twin or multiple pregnancy, 8 (1.4%) had hypothyroidism, 6 (1.0%) had Rh incompatibility, and 3 (0.5%) had bad obstetric history.

Table 2 shows the obstetric and neonatal outcome of pregnancy among the study participants. Obstetric outcomes were assessed based on the type and mode of delivery. Majority (452 [81.9%]) had term delivery. Most common mode of delivery was spontaneous vaginal delivery (73.9%) followed by lower segment cesarean section (25.2%). Neonatal outcomes were assessed based on the status of child and birth weight. About 56 (10.4%) gave birth to low-birth weight baby and only 10 (1.7%) had stillbirth.

Table 2: Obstetric and neonatal outcome of pregnancy among antenatal women registered in a primary health center of Puducherry during 2013-2017, n=569

Outcome of pregnancy	Frequency, n (%)
Obstetric outcome	
Type of delivery (n=552)	
Preterm (<37 weeks)	69 (12.5)
Term (37-42 weeks)	452 (81.9)
Postterm (>42)	31 (5.6)
Mode of delivery (n=540)	
Spontaneous vaginal delivery	399 (73.9)
Lower segment cesarean section	136 (25.2)
Assisted vaginal delivery	5 (0.9)
Neonatal outcome	
Birth weight of the child (kg) (n=539)	
Low (<2.5)	56 (10.4)
Normal (≥ 2.5)	483 (89.6)
Status of birth (n=569)	
Live birth	540 (94.9)
Abortion	19 (3.4)
Stillbirth	10 (1.7)

Table 3 illustrates the factors associated with high-risk pregnancy. High-risk pregnancy was almost two times more common among woman belonging to below poverty line families (PR: 1.94, 95% CI: 1.07–3.49) when compared to woman of above poverty line. Nulliparous woman has 1.41 times (95% CI: 1.01–2.00) more risk of having high-risk pregnancy when compared to multiparous woman, and this was statistically significant. Gravidity and time of registration were not associated with high-risk pregnancy.

Table 4 represents the association of outcome of pregnancy with high-risk status. Among obstetric outcomes, type of delivery was found to be significantly associated with high-risk pregnancy with preterm (19.4% vs. 11.0%) and postterm (10.2% vs. 4.6%) delivery more prevalent among high-risk pregnancy when compared to normal pregnancy ($P = 0.004$). Mode of delivery was not associated with high-risk pregnancy. Among the neonatal outcomes, birth weight of baby was associated with high-risk pregnancy as giving birth to low-birth weight child was more common among high-risk pregnancy when compared to normal pregnancy (18.4% vs. 8.6%), and this was statistically significant ($P = 0.004$).

Discussion

This study was done to determine the factors associated with high-risk pregnancy and its outcome through longitudinal review of case records in rural primary health-care center. The prevalence of high-risk pregnancy was found to be 18.3%. Socioeconomic status and parity were found to be independently associated with high-risk pregnancy. Regarding the outcome of the pregnancy, most of the pregnant women had favorable obstetric and neonatal outcome. However, among obstetric outcome, unfavorable outcome such as preterm and postterm delivery was found to be more common among high-risk pregnancy when compared to normal pregnancy and found to be statistically significant. Similarly, in neonatal outcome, low-birth weight child was more prevalent among high-risk pregnant women and found to be statistically significant. Mode of delivery and status of child were not associated with high-risk pregnancy in the current study.

Studies around India have reported higher proportion of high-risk pregnancy in contrast to current study findings. Studies done in Nagpur, Haryana, and Karnataka have reported that almost one-third of antenatal women had high-risk pregnancy when compared to the current study finding of 18%.^[8-10] Majority of the high-risk pregnancy in the present study is contributed by maternal age (teenage and elderly pregnancy) followed by pregnancy-induced hypertension (PIH). Studies done in Haryana and Dharwad also reported that maternal age-related factor

Table 3: Sociodemographic and obstetric factors associated with high-risk pregnancy among antenatal women registered in a primary health center of Puducherry during 2013-2017, n=569

Sociodemographic characteristics and obstetric factors	High-risk pregnancy frequency, n (%)	Prevalence ratio	95% CI	P
Socioeconomic status				
Below poverty line	93 (20.1)	1.94	1.07-3.49	0.02
Above poverty line	11 (10.4)	Reference	Reference	-
Gravida (n=567)				
Primi	48 (20.3)	1.20	0.85-1.70	0.29
Multi	56 (16.9)	Reference	Reference	-
Parity (n=536)				
Nulliparous	52 (22.6)	1.41	1.01-2.00	0.05
Multiparous	49 (16.0)	Reference	Reference	-
Time of registration				
Early	77 (18.8)	1.03	0.69-1.53	0.90
Late	26 (18.3)	Reference	Reference	-

CI=Confidence interval

Table 4: Association of outcome of pregnancy with high-risk status among antenatal women registered in a primary health center of Puducherry during 2013-2017, n=569

Outcome of pregnancy	Normal pregnancy frequency, n (%)	High-risk pregnancy frequency, n (%)	χ^2	P
Obstetric outcome				
Type of delivery (n=552)				
Preterm (<37 weeks)	50 (11.0)	19 (19.4)	10.90	0.004
Term (37-42 weeks)	383 (84.4)	69 (70.4)		
Postterm (>42)	21 (4.6)	10 (10.2)		
Mode of delivery (n=540)				
Spontaneous vaginal delivery	334 (75.4)	65 (67.0)	3.95	0.14
Lower segment cesarean section	106 (23.9)	30 (30.9)		
Assisted vaginal delivery	3 (0.7)	2 (2.1)		
Neonatal outcome				
Birth weight of the child (kg) (n=539)				
Low (<2.5)	38 (8.6)	18 (18.4)	8.19	0.004
Normal (≥ 2.5)	403 (91.4)	80 (81.6)		
Status of birth (n=569)				
Live birth	443 (95.3)	97 (93.3)	0.70	0.40
Stillbirth/abortion	22 (4.7)	7 (6.7)		

and PIH are major contributing factors for high-risk pregnancy.^[9,11]

Parity and socioeconomic status were found to be independently associated with high-risk pregnancy. Similar findings were found in study done in Karnataka.^[10] However, we could not assess the other factors influencing the high-risk pregnancy such as education, age at marriage, and age at first pregnancy which were reported by other studies. Outcome of the pregnancy was also found to be unfavorable among the high-risk cases in the current study, which is comparable to the studies done in other parts of India.

Limited evidence available on birth outcomes reported significant association between low-birth weight and high-risk pregnancy which is comparable to the current study finding. A study done in Nagpur also reported that high-risk pregnancy had significant association with

lower segment cesarean section which is contrast to the current study.^[8] However, the current study found that preterm and postterm delivery is more common among high-risk pregnant women.

Major strength of the study is the use of standard guidelines for the diagnosis of high-risk pregnancy which will help to compare the current study findings across various studies from India. All the records were included in the study which represents the reality of the status of pregnant women in rural setting. The current study adds to the limited literature available regarding outcome of high-risk pregnancy in a primary care setting.

However, the study has its own limitations. Since the study is record based and we relied on the data recorded in the case record, there could be errors in entering the data of the pregnant women by the stakeholders. We could not gather data on various possible factors

influencing high-risk pregnancy such as education, employment status, spousal support, age at marriage, and age at first pregnancy. Causal outcome for factors related to high-risk pregnancy and outcomes cannot be inferred as the data on time of exposure cannot be retrieved from the case records. Further cohort studies can be done to focus on factors influencing the high-risk pregnancy and outcome of pregnancy.

High-risk pregnancy can have serious maternal, obstetric, and neonatal complications if left undetected. The Government of India has introduced several schemes for early detection of high-risk pregnancy with recent one being “PMSMA” which aims to provide quality antenatal care for pregnant women throughout the country. Even though several measures are taken to tackle the problems, frequent monitoring by the relevant stakeholders for success and quality of the schemes needs to be done. This can be done by surveying the reduction in the trend of high-risk pregnancy and increase in the trend of favorable maternal and neonatal outcomes. This can help in improving the quality of service delivery and strengthen the interventions already in place.

Conclusion

The current study found that almost one-fifth of the pregnant women in rural area have high-risk pregnancy with majority of them contributed by maternal age and PIH. Parity and socioeconomic status were independently associated with high-risk pregnancy. Even though most of the study participants had favorable obstetric and neonatal outcomes, unfavorable outcomes such as low-birth weight, preterm, and postterm delivery were more common among high-risk antenatal women. Hence, early detection of high-risk pregnancy needs to be done at primary health-care level to improve the maternal, obstetric, and neonatal outcome through quality and accessible antenatal care and appropriate referral services.

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Conflicts of interest

There are no conflicts of interest.

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