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A longitudinal study on high risk pregnancy and its outcome among antenatal women attending a tertiary health centre

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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 Hyderabad.
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: More than half of the pregnant women 288, 51% were in the age group of 20–25 years and about 9% was adolescent pregnancy; more than half 350, 64% were multigravida pregnancy; about 344, 60% were multiparous woman. Majority 448 [79%] had term delivery. Most common mode of delivery was spontaneous vaginal delivery 69% followed by lower segment cesarean section 29%. Neonatal outcomes were assessed based on the status of child and birth weight. Among obstetric outcomes, type of delivery was found to be significantly associated with high-risk pregnancy with preterm 35% vs. 11.0% more prevalent among high-risk pregnancy when compared to normal pregnancy $P = 0.004$ and post term delivery was equally associated.
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: multiparous, cesarean, neonatal outcomes, high-risk pregnancy

Introduction
Women form the centre of the family and their health is of prime importance to the wellbeing of the whole family. Women's health is of cardinal importance to the health of the society. In the last decade, considerable attention has been paid to the health of women in their reproductive age by the health care providers and public health experts. The slogans like "Pregnancy is Special, Let's keep it safe" have widely been perpetuated throughout the world. Though more than 50% of reduction has registered in the approximate number of maternal deaths in the last two decades, the present status shows that even now, 120, women die of causes associated with pregnancy, in a day, in India. The life time risk, defined as the probability that one woman of reproductive age 15- 49 will die due to child birth or puerperium 6 weeks after delivery assuming that chance of death is uniformly distributed across the entire reproductive span is 0.4% in India.
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 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 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. A study revealed that India and other developing countries, has a very high perinatal mortality, with a high illiteracy, teeming population and lack of facilities and resources. 70-80% of perinatal mortality in developing countries including India is accounted for by the mothers falling in the high risk category. This needs for early identification of high risk mothers so that they receive timely and appropriate care.

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 Dr VRK Womens Medical College during March 2018-March 2019. Records were reviewed for the details of pregnant women available over a period of 5 years from January 2013 to December 2017.

The health-care services in the hospital 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 check-up, 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.

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.

In total, there were around 603 pregnant women registered with antenatal clinic OPD. Out of which, 567 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 ≥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 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**
  a) Type of delivery – preterm <37 weeks of pregnancy, term 37–42 weeks of pregnancy, and post term delivery >42 weeks of pregnancy
  b) Mode of delivery – spontaneous vaginal delivery, assisted vaginal delivery, and lower segment cesarean section.
- **Neonatal outcome**
  a) Birth weight of child – low-birth weight baby birth weight <2.5 kg, normal baby birth weight ≥2.5 kg
  b) Status of birth – live birth, stillbirth, and abortion.

Statistical analysis is done by SPSS statistical software. Continuous variables, such as age, were summarized as mean standard deviation [SD]. 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 567 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.

More than half of the pregnant women 288, 51% were in the age group of 20–25 years and about 9% was adolescent pregnancy; more than half 350, 64% were multigravida pregnancy; about 344, 60% were multiparous woman.

The prevalence of high-risk pregnancy among the study participants was found to be 19% Major cause for high-risk pregnancy was related to maternal age in which 509% belonged to either younger primi age <20 years or elderly gravida age >35 years. Other causes were as follows: 22 had hypertension disorder in pregnancy ≥140/90 mmHg, 16 had gestational diabetes mellitus, 22 had severe anemia, 11 had previous history of lower segment cesarean section, 4 had twin or multiple pregnancy, 12 had hypothyroidism, 8 had Rh incompatibility, and 3 had bad obstetric history.

Table 1: Sociodemographic and obstetric index Sociodemographic characteristics and obstetric index of the study participants as recorded in the maternal and child health register during 2013-2017, *n*=567.

Sociodemographic and obstetric index		
Age category years	**Frequency, *n***	**%**
<20 Yrs	50	9%
20-25 Yrs	288	51%
26-30 Yrs	182	32%
31-35 Yrs	40	7%
36-40 Yrs	7	1%
TOTAL	**567**	100%
Obstetrics status		
Gravida *n*=548	**Frequency, *n***	**%**
Primi	198	36%
Multi 2 or more pregnancy	350	64%
Parity *n*=574	**Frequency, *n***	**%**
Nulliparous	230	40%
Multiparous parity - 1,2 and 3	344	60%
Time of registration *n*=548	**Frequency, *n***	**%**
Early <12 weeks	410	75%
Late 12 weeks and more	138	25%
Abortion *n*=31	**Frequency, *n***	**%**
1	26	84%
2	4	13%
3 or more	1	3%

Table 2: Outcome of Pregnancy Obstetric and neonatal outcome of pregnancy among antenatal women registered in a primary health center during 2013-2017, *n*=567

Outcome of pregnancy	**Frequency, *n***	**%**
Obstetric outcome		
Type of delivery *n*=567		
Preterm <37 weeks	91	16%
Term 37-42 weeks	448	79%
Post term >42	28	5%
Mode of delivery *n*=567		
Spontaneous vaginal delivery	389	69%
Lower segment cesarean section	166	29%
Assisted vaginal delivery	12	2%
Neonatal outcome		
Birth weight of the child kg *n*=567		
Low <2.5	28	5%
Normal ≥2.5	539	95%
Status of birth *n*=567		
Live birth	524	92%
Abortion	31	5%
Stillbirth	12	2%

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 448 [79%] had term delivery. Most common mode of delivery was spontaneous vaginal delivery 69% followed by lower segment cesarean section 29%. Neonatal outcomes were assessed based on the status of child and birth weight. About 28 mothers, 5% gave birth to low-birth weight baby and around 5% abortions were reported and only 2% had stillbirth.

Table 3 illustrates the factors associated with high-risk pregnancy. Nulliparous woman has 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 3: Obstetric factors associated with high-risk pregnancy among antenatal women registered during 2013-2017, *n*=569

obstetric factors	**High-risk pregnancy frequency, *n***	**%**	***P value***
	Gravida *n*=567		
Primi	48	20.3	0.29
Multi	56	16.9	-
	Parity *n*=536		
Nulliparous	52	22.6	0.05
Multiparous	49	16.0	-
	Time of registration		
Early	77	18.8	0.90
Late	26	18.3	-

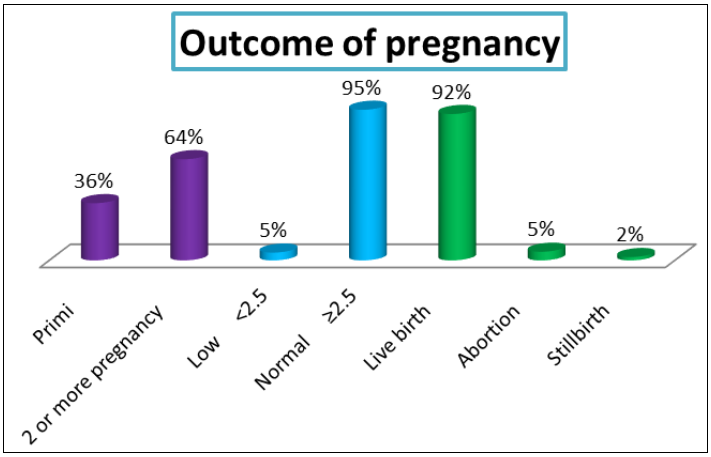

Fig 1: Outcome of Pregnancy

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 35% vs. 11.0% more prevalent among high-risk pregnancy when compared to normal pregnancy P = 0.004 and post term delivery was equally associated. 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 33% vs. 2%, and this was statistically significant P = 0.004.

Table 4: Association of outcome of pregnancy with high-risk status among antenatal women during 2013-2017, *n*=567

Outcome of pregnancy	Normal pregnancy frequency, *n*	%	High-risk pregnancy frequency, *n*	%	*P*
Obstetric outcome					
Type of delivery *N*=567					
	Frequency, *n*	**%**	**Frequency, *n***	**%**	P
Preterm <37 weeks	49	11%	42	35%	
Term 37-42 weeks	376	84%	72	60%	0.005
Post term >42	22	5%	6	5%	
Total	447		120		
Mode of delivery *N*=567					
	Frequency, *n*	**%**	**Frequency, *n***	**%**	P
Spontaneous vaginal delivery	341	72%	48	52%	
Lower segment cesarean section	125	26%	41	45%	0.12
Assisted vaginal delivery	9	2%	3	3%	
Total	475		92		
Neonatal outcome					
Birth weight of the child kg *N*=567					
	Frequency, *n*	**%**	**Frequency, *n***	**%**	P
Low <2.5	8	2%	20	33%	0.004
Normal ≥2.5	498	98%	41	67%	
	506		61		
Status of birth *N*=567					
	Frequency, *n*	**%**	**Frequency, *n***	**%**	P
Live birth	447	98%	77	71%	0.008
Abortion	8	2%	23	21%	
Stillbirth	3	1%	9	8%	
TOTAL	458		109		

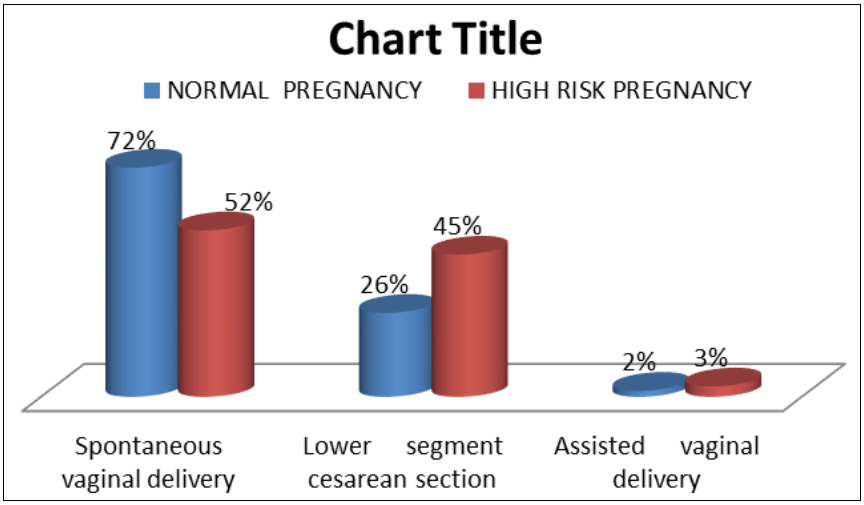

Fig 2: Mode of Delivery

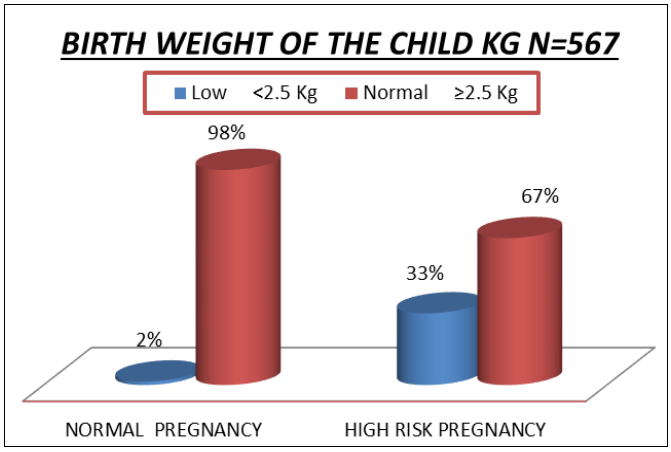

Fig 3: Birth Weight of the child

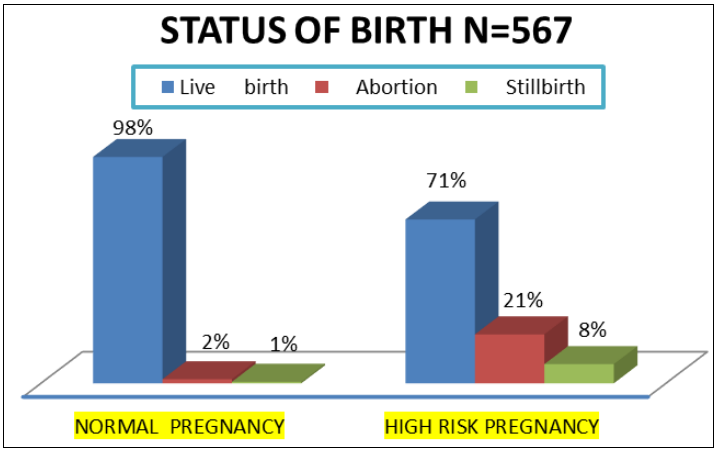

Fig 4: Status of Birth

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 19%. 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 post term 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, 9, 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 by Mehta B *et al*. and in Dharwad by Kumar MP also reported that maternal age-related factor 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 by Jaideep KC *et al*. [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 by Jadhao *et al*., 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 post term 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. The current study adds to the limited literature available regarding outcome of high-risk pregnancy in a tertiary 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 post term 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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Conflict of Interest

None

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Nil

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