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Original Research Article

Prevalence of high-risk pregnancy and its association with adverse maternal and perinatal outcomes: a longitudinal study in 25 villages under Sarjapur primary health centre near Bangalore, India

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ABSTRACT

Background: In India, about 20-30% pregnancies belong to the high-risk category. While an accurate estimate of maternal and neonatal mortality is available in India, there is a paucity of data on high-risk pregnancies in the rural population. Objectives were to estimate the prevalence of high-risk pregnancy among women residing in 25 villages of Sarjapur PHC area near Bangalore and to determine the association between high-risk pregnancy and adverse maternal and perinatal outcomes.
Methods: A longitudinal study was conducted among 180 pregnant women who completed 24 weeks of gestation. Subjects were visited once between 24-36 weeks of gestation and followed-up after 7 days of delivery. A pre-tested questionnaire was used to capture socio-demographic and obstetric details, risk factors and maternal outcomes. Regression analysis was performed to determine factors associated with adverse maternal outcomes.
Results: The mean age of study population was 24.7±4.2 years. The prevalence of high-risk pregnancy was 61.6%. High-risk factors found were previous LSCS (16.1%), hypothyroidism (11.6%), bad obstetric history (5.5%), Rh incompatibility (5.5%) and severe anaemia (5.5%). One-fifth of women had an adverse maternal outcome like postpartum haemorrhage (8.3%), puerperal sepsis (2.2%) and maternal death (0.6%). Factors significantly associated with adverse maternal outcome were presence of any one high risk condition in pregnancy [AOR=1.7 (95% CI:2.52-4.78), p=0.04], previous caesarean section [AOR=1.8 (95% CI:1.32-2.29), p=0.04] and bad obstetric history [AOR=17.3 (95% CI: 2.88-103.7), p=0.002].
Conclusions: Three out of every five pregnant women in the study area had high risk pregnancy and such pregnancies were associated with double the risk of adverse maternal outcomes. Routine ANC needs to be strengthened to screen for high-risk in pregnancy, with capacity building for management and referral.

Keywords: High risk pregnancy, Adverse maternal outcomes, Longitudinal study

INTRODUCTION

The global maternal mortality ratio (MMR) saw a 44% decline between 1990 and 2015, falling short of the targeted 75% reduction.[1] Sustainable development goal 3 aims to lower MMR to less than 70 per 100,000 live births, however, according to SRS 2017, MMR in Karnataka state has decreased from 108 (2014-16) to 83/100,000 live births (2017-19), while India's MMR is still high at 122/100,000 live births.[2]

Though pregnancy is a normal physiological condition, 15-37% pregnancies belong to high-risk category in India.[1,3] Common high-risk pregnancy conditions include severe anemia, hypothyroidism, HTN, diabetes, infections such as HIV/syphilis, multiple gestation, previous C-sections, and poor obstetric history.[4] These high-risk conditions can be identified during routine antenatal care.

With India's rural population experiencing a birth rate of 21.4%, many rural pregnant women face challenges

accessing quality obstetric services, leading to obstacles in screening, referral and management of high-risk pregnancies, specifically in these communities.

Existing literature predominantly stems from hospital-based or urban studies, highlighting a gap in rural community-based data on the prevalence of high-risk pregnancies and their outcomes for both mother and baby. Obtaining such data can inform targeted interventions to manage high-risk pregnancies and prevent adverse maternal outcomes.

This study was therefore conducted to estimate the prevalence of high-risk pregnancy among women residing in 25 villages of Sarjapur primary health centre (PHC) area near Bangalore and to determine the association between high-risk pregnancy and adverse maternal outcomes in this setting.

METHODS

Study setting

This was a longitudinal study in all the 25 villages under the four sub centres of Sarjapur PHC, Anekal Taluk, Bangalore Urban District.

Study population

Pregnant women in who have completed 24 weeks of gestation and residing in Sarjapur PHC area were selected.

Sample size calculation

A previous study done by Kumar et al in rural Dharwad showed a prevalence of high-risk pregnancy to be 37%.[5] With 95% confidence intervals and 20% relative precision (7.4%), the calculated sample size was 163 subjects. Assuming a drop-out rate of 10%, the final sample size was estimated to be 180.

Inclusion criteria

Pregnant mothers residing in the study area for the last 6 months, and who have completed 24 weeks of gestation were included.

Exclusion criteria

Pregnant women who could not be contacted even after two visits were excluded.

Sampling technique

Consecutive sampling was done. A list of pregnant women in the Sarjapur PHC area was obtained from PHC records. Thereafter the list was updated every month by contacting the Anganwadi workers and ASHA workers of each village. Women were consecutively enrolled into the study as soon as they crossed 24 weeks, until the sample size was achieved.

Ethical approval

The study was approved by the institutional ethics committee (IEC#267/2018). Before commencing data collection, subject information sheet explaining the purpose of study was provided and written informed consent was obtained from the participants.

Data collection

Subjects were visited at their home once between 24-36 weeks of gestation. They were followed-up after 7 days of delivery, either by a visit to their home or over the phone in case they had gone to their parents' home for delivery.

Study tool

A pre-tested questionnaire was used to capture socio-demographic and obstetric details. History of high risk pregnancy conditions were documented at both visits and adverse maternal/perinatal outcomes was documented at the follow-up visit. This study tool was face-validated by experts in the fields of obstetrics and community medicine, translated into the local language and piloted in a different area on a sample size of 30. Appropriate changes were made to the study tool based on the understanding and responses of the participants. Socio-economic class was determined using modified BG Prasad classification. Details of investigations done during pregnancy and post-partum were obtained from the mother and child protection card and other antenatal records and discharge summaries. Blood pressure and haemoglobin estimation was also done at both visits. Blood pressure was estimated using a digital sphygmomanometer (Omron HEM 7121, India) following standard procedure. Haemoglobin was estimated using a digital haemoglobinometer (Biosense Hb Check, India). Random blood sugar was performed at the first visit using digital glucometer (UBQDM0R3, Accu-Chek India).

Operational definitions

High-risk pregnancy: Pregnancy complicated by any one of the following were considered as high risk cases: severe anaemia (haemoglobin level <7 gm/dl), hypertensive disorder in pregnancy (blood pressure ≥140/90 mm Hg, pre-eclampsia, eclampsia), positive for HIV/syphilis, gestational diabetes mellitus (glucose challenge test ≥140 mg/dl or random blood sugar ≥200 mg/dl), hypothyroidism (thyroid-stimulating hormone values-first trimester: 0.1-2.5 mU/l, second trimester: 0.2-3 mU/l, and third trimester: 0.3-3 mU/l), Rh incompatibility, low-lying placenta or placenta previa by scan, adolescent pregnancy (≤19 years) or elderly primigravida (≥ 35 years), twin/multiple pregnancy, malpresentation of fetus in third trimester, bad obstetric history (previous history of congenital malformation, stillbirth, two or more abortions

or obstructed labour), previous history of lower segment caesarean section (LSCS).[1,4]

Adverse maternal outcome: Complications during and after delivery like post-partum anaemia (Hb <11gm/dl), postpartum haemorrhage, puerperal sepsis, post-partum hypertension (blood pressure ≥140/90 mm hg), intra/postpartum eclampsia, maternal death.[4]

Adverse perinatal outcome: low birth weight (birth weight <2500 g), small for gestational age (birthweight <10th percentile for gestational age), preterm birth (<37 completed weeks of gestation), hyperbilirubinemia (newborn requiring phototherapy), congenital anomalies, intrauterine death, stillbirth and neonatal mortality were the outcomes noted.

Full antenatal care (ANC): ≥4ANC visits+100 days of iron and folic acid (IFA)+two doses or one booster tetanus toxoid (TT).[5]

Statistical analysis

The data collected was entered in Microsoft excel and analysed using IBM statistical package for social sciences (SPSS) for Windows version 20 (IBM Corp., Armonk, N.Y., USA). The study variables were described using frequencies, proportions, mean, standard deviation, median and interquartile range. The presence of any one adverse maternal or neonatal outcome was associated with various high risk conditions in pregnancy as well as other socio-demographic and obstetric variables using Chi-square test and Fischer's exact test as applicable.

Variables with a p≤0.2 were entered into a multiple logistic regression model and adjusted odds ratios were calculated with 95% confidence intervals. P<0.05 was considered significant for all statistical analysis.

RESULTS

Socio-demographic details

The mean age of the 180 subjects in this study was 24.7±4.2 years. Majority (45%) belonged to the age group 20-24 years (Range=17-38 years). Most of study population (75%) had completed high school education or beyond. Most women (90%) were homemakers, 60% had a below-poverty line (BPL) card and 43.9% belonged to lower middle class or lower socio-economic class (Table 1). Consanguineous marriage was documented among 14 (7.8%) of the subjects, all of which were third degree consanguinity.

Obstetric details

More than three fourth of the study subjects (77.9%) were primigravidae. Mean age of first childbirth was 22±4.6 years. The mean gestational age at registration was 12±1.3 weeks. Most subjects (91.1%) completed full ANC prior to delivery, 70% delivered in a government hospital and 40% of the deliveries were either Caesarean section or assisted deliveries (Table 2).

High risk pregnancy

Majority of the pregnant women (61.6%) had at least one high risk condition in pregnancy. Common high risk conditions seen were previous caesarean section (21.7%), Rh incompatibility (20%), hypothyroidism (11.7%) (Figure 1). There were 1.6% cases of hypertension in pregnancy and a single case of syphilis in pregnancy. Single case of multiple gestation. There were no cases low-lying placenta, malpresentation.

Adverse maternal outcomes

Nearly two-thirds of the pregnancies had some adverse maternal outcome (61.6%), the commonest being post-partum anaemia (49.4%), followed by postpartum haemorrhage (8.3%), puerperal sepsis (2.2%), postpartum hypertension (1.6%) and intra-partum eclampsia (0.6%) (Figure 2). There was one case of maternal death among the subjects which had been reported due to postpartum hemorrhage.

Association between high risk pregnancy and adverse maternal outcomes

Bivariate analysis showed significant association of adverse maternal outcome with hypothyroidism, previous LSCS, Rh incompatibility and the presence of any one high risk condition in pregnancy (Table 3). Some of these high risk conditions retained significance after multiple logistic regression analysis: any one high risk condition in pregnancy [AOR=1.7 (95% CI: 2.52-4.78), p=0.04], previous caesarean section [AOR=1.8 (95% CI:1.32-2.29), p=0.04] and bad obstetric history [AOR=17.3 (95% CI: 2.88-103.7), p=0.002] (Table 4).

Association between high risk pregnancy and adverse neonatal outcomes

Those with caesarean/assisted mode of delivery has 1.9 times higher chances of adverse perinatal outcome than with the vaginal mode of delivery with a p=0.04 [AOR=1.9 (95% CI:1.89-4.46), p=0.04]. Those who not done full ANC has 1.5 times higher chances of developing adverse perinatal outcomes than those who done full ANC with a p=0.03 [AOR=1.5 (95% CI:1.25-2.14), p=0.03].

Those who had previous LSCS has 1.6 times higher chances of developing adverse perinatal outcomes than those without [AOR=1.6 (95% CI:1.51-3.77), p=0.04]. Those subjects who had any one high risk present has 2.2 times higher chance of developing adverse perinatal outcome than those without having any high risk. [AOR=2.2 (95% CI:1.03-4.77), p=0.04] (Table 5).

Table 1: Socio demographic factors of the study subjects (n=180).

Variables	Category	N	Percentage (%)
Age (in years)	<20	16	8.8
	20-24	81	45.0
	25-30	60	33.3
	>30	23	12.7
Education	No formal education	1	0.6
	Primary school	7	3.9
	Middle school	37	20.6
	High school	82	45.6
	PUC	28	15.6
	Diploma	9	5.0
	Graduation	12	6.7
	Post-graduation	4	2.2
Occupation	Gainfully employed	17	9.4
	Homemaker	163	90.6
Religion	Hindu	144	80.0
	Muslim	36	20.0
Caste	General	138	76.7
	Scheduled caste	27	15.0
	Scheduled tribe	3	1.7
	Other backward caste	12	6.7
Socio-economic status	Upper class	5	2.8
	Upper middle	6	3.3
	Middle class	90	50
	Lower middle	77	42.8
	Lower class	2	1.1
Possession of BPL card	Yes	109	60.5
	No	71	39.6

Table 2: Essential antenatal care factors among the study subjects (n=180).

Variables	Category	N	Percentages (%)
Registration of pregnancy	≤12 weeks	149	82.7
	>12 weeks	31	17.2
Place of ANC	Government hospital	140	77.7
	Private hospital/clinic	40	22.2
Number of ANC visits	<4	1	0.6
	4-7 times	142	78.9
	≥ 8 times	37	20.5
Duration of IFA supplementation in pregnancy (days)	<100	9	5.0
	100-179	121	67.2
	>180	50	27.8
Duration of calcium supplementation in pregnancy (days)	<100	36	20.0
	100-179	136	75.6
	≥180	8	4.4
Tetanus toxoid injection	No dose taken	1	0.5
	2 doses	128	71.7
	Booster dose	51	28.3
Number of ultrasound scans in pregnancy	1	5	2.7
	2-3	148	82.2
	>3	27	15.1
Full ANC	Yes	164	91.1
	No	16	8.9
Place of delivery	Government hospital	126	70.0
	Private hospital/clinic	51	28.3
	Home	3	1.7

Continued.

Variables	Category	N	Percentages (%)
Mode of delivery	Normal	107	59.4
	Caesarean section	61	33.8
	Assisted delivery	12	6.7

Table 3: Association of high-risk factors with adverse maternal outcomes (n=180).

Variables	Category	N (%)	Any one adverse maternal outcome, N (%)		P value
			Present 111 (61.6)	**Absent 69 (38.4)**	
Severe anaemia	Yes	11 (6.1)	3 (27.3)	8 (72.7)	0.383
	No	169 (93.9)	33 (19.5)	136 (80.5)	
Adolescent pregnancy	Yes	16 (8.8)	13 (81.3)	3 (18.7)	0.091
	No	164 (91.2)	98 (59.8)	66 (40.2)	
Hypothyroidism	Yes	21 (11.7)	6 (28.5)	15 (71.5)	0.004
	No	159 (88.3)	30 (18.9)	129 (81.1)	
Bad obstetric history	Yes	8 (4.4)	3 (37.5)	5 (62.5)	0.200
	No	172 (95.6)	33 (19.2)	139 (80.8)	
Previous caesarean section	Yes	39 (21.7)	7 (17.9)	32 (82.05)	0.012
	No	141 (78.3)	29 (20.5)	112 (79.5)	
Rh incompatibility	Yes	36 (20.0)	5 (13.9)	31 (86.1)	0.006
	No	144 (80.0)	14 (9.7)	130 (90.3)	
Any one high risk condition in pregnancy	Yes	111 (61.7)	86 (77.5)	25 (22.5)	0.005
	No	69 (38.3)	11 (15.9)	58 (84.1)	

Table 4: Multivariate analysis: logistic regression of the factors associated with the adverse maternal outcomes (n=180).

Variables	Category	Adjusted odds ratio	95% CI		P value
			Lower	**Upper**	
Socio-demographic factors					
Gainfully employed	Yes	1	-	-	0.687
	No	1.34	0.17	3.20	
SES	Upper/upper middle/ middle class	1	-	-	0.03*
	Lower middle or the lower class	2.65	1.12	2.64	
Obstetric care					
No. of ANC visits	<8	8.11	2.56	116.54	0.012*
	≥8	1	-	-	
Full ANC	Yes	1	-	-	0.002*
	No	9.48	2.36	38.13	
Place of delivery	Government hospital	1.91	1.23	5.48	0.022*
	Private hospital	1	-	-	
High risk pregnancy					
Previous caesarean section	Yes	1.8	1.33	2.28	0.04*
	No	1	-	-	
Thyroid disease	Yes	1.6	0.17	2.25	0.47
	No	1	-	-	
Bad obstetric history	Yes	17.3	2.88	103.70	0.002*
	No	1	-	-	
Rh incompatibility	Yes	0.9	0.25	2.91	0.80
	No	1	-	-	
Any one high risk condition in pregnancy	Yes	1.7	2.52	4.78	0.04*
	No	1	-	-	

*Hosmer-Lemeshow goodness of fit test: p=0.916.

Table 5: Distribution of various perinatal outcomes (n=180).

Variables	Category	N	Percentage (%)
Outcomes of delivery	Live birth, infant alive	172	95.6
	Neonatal death	4	2.3
	Stillbirth	1	0.5
	IUD	3	1.6
Birth weight (gm)	<2500	57	31.6
	≥2500-3999	123	67.7
	≥4000	1	0.57
APGAR score* (n=176)	5 at 1 min	173	96.1
	<7 at 5 min	7	3.8
Gestational age at birth	<37 weeks	47	26.2
	≥37 weeks	133	73.8
NICU admission	Yes	47	26.2
	No	133	73.8

*N=176, as APGAR scores were recorded for only live births.

Table 6: Association of high risk factors with adverse perinatal outcomes (n=180).

Variables	Category	Any one adverse perinatal outcome, N (%)		Chi square value	P value
		Present 111 (61.6)	**Absent 69 (38.4)**		
Severe anaemia	Yes	8 (72.7)	3 (27.3)	3.48	0.060
	No	74 (43.7)	95 (56.3)		
Hypothyroidism	Yes	14 (66.4)	7 (33.3)	17.9	0.001*
	No	68 (42.7)	91 (57.2)		
Bad obstetric history	Yes	14 (38.9)	22 (61.1)	0.07	0.593
	No	65 (45.2)	79 (54.8)		
Previous LSCS	Yes	17 (43.6)	22 (56.4)	13.3	0.005*
	No	65 (46.1)	76 (53.9)		
Rh incompatibility	Yes	10 (52.6)	9 (47.4)	14.3	0.008#
	No	72 (42.1)	99 (57.8)		
Any one high risk present	Yes	54 (48.7)	57 (51.3)	14.06	0.002*
	No	28 (40.6)	41 (59.4)		

*Statistically significant at <0.05, #Fischer's exact test.

Table 7: Association of adverse perinatal outcomes with independent covariates (n=180).

Variables	Category	Adjusted odds ratio	95% CI		Variables
			Lower	**Upper**	
Education	Middle school	1.2	0.57	2.52	0.640
	Others	1	-	-	
Occupation-gainfully employed	Yes	1	-	-	0.650
	No	1.8	0.26	2.30	
Consanguinity	No consanguinity	1	-	-	0.110
	2nd /3rd degree	2.10	0.84	5.21	
Type of family	Nuclear	1	-	-	0.330
	Joint/extended/ 3 generation	1.4	0.71	2.72	
Mode of delivery	Vaginal	1	-	-	0.040
	Caesarean/assisted	1.9	1.89	4.46	
Place of delivery	Government/home	1.7	0.41	2.09	0.870
	private	1	-	-	
IFA supplementation	<180 tablets	1.5	0.28	1.09	0.090
	≥180 tablets	1	-	-	
Full ANC	Yes	1	-	-	0.030
	No	1.5	1.25	2.14	

Continued.

Variables	Category	Adjusted odds ratio	95% CI		Variables
			Lower	Upper	
Hypothyroidism	Yes		0.17	1.42	0.190
	No	1	-	-	
Previous LSCS	Yes	1.6	1.51	3.77	0.040
	No	1	-	-	
Rh incompatibility	Yes	1.4	0.15	1.36	0.170
	No	1	-	-	
Any one high risk present	Yes	2.2	1.03	4.77	0.040
	No	1	-	-	

*Statistically significant at <0.05. Hosmer-Lemeshow goodness of fit test-chi square value: 13.601 with df 4; p=0.416, Cox and Snell R square value 0.118.

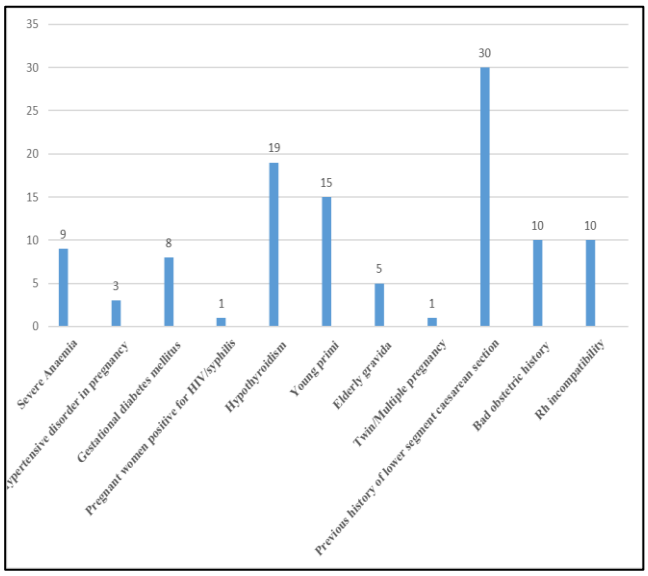

Figure 1: High risk pregnancy conditions among the study subjects (n=180).

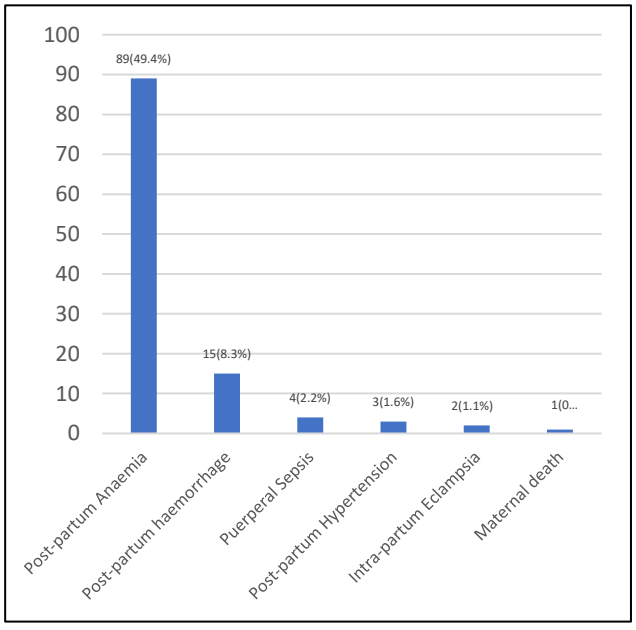

Figure 2: Adverse maternal outcomes among the study subjects (n=180).

DISCUSSION

As per NFHS-4 (2015-16), approximately 26.8% of Indian women are married before reaching adulthood (18 years of age), and 7.8% of women aged 15 to 19 are either pregnant or mothers.[7] Research indicates a 60% heightened likelihood of experiencing preeclampsia among mothers aged 15-19 years. In our study 3 of 180 (1.66%) were had pre eclamptic conditions 163 (90.6%) of study subjects were home makers by occupation.

According to Saxena et al pregnant women aged 15-24 residing in rural areas of Gujarat, with five or more years of education, demonstrated a higher propensity to attend at least three ANC visits. Education and antenatal care visit have a positive relationship. Women with higher education go for more health check-ups than the illiterate or less educated women. Our current study did not determine any difference in antenatal care among the various educational and economic backgrounds. This was probably due to geographically accessible and affordable antenatal services. A population-based, case-control study done in Iran found an association between consanguineous marriage (first-cousin marriage) and stillbirth risk among women with preeclampsia.[11] Our study could not found any relation between consanguinity and birth defects outcomes of pregnancy. The mode of delivery in the subjects, 59.4% are by normal delivery. The 23.8% underwent LSCS and 6.7% had assisted delivery due to obstructed labour or complications. A Nordic obstetric surveillance study found that first caesarean delivery is associated with a generally increased risk of severe complications compared with a first vaginal delivery. A first cesarean was associated with up to 97% of severe complications in the second pregnancy.[12] Education and antenatal care visit have a positive relationship.[5] Women with higher educated partner visit the health centre more than the women having lower educated partners and there is a strong rural urban differential in antenatal care visit in favour of urban women.[10] The prevalence of high-risk factors among study subjects who had one or more risk factors in pregnancy is 61.6%. The major complications that account for nearly two-thirds of all maternal deaths are severe bleeding (mostly bleeding after childbirth), infections, high blood pressure during pregnancy (pre-eclampsia and eclampsia), complications from delivery and unsafe abortions.[1] In our study previous pregnancy

factors contributing to high-risk pregnancy were caesarean section 21.6%; low birth weight 15%; pre term 11.6%; ante partum haemorrhage 8.3%. Anaemia 77.7% was the most common high-risk factor in the present pregnancy. Hemoglobin levels in the study mention those during registration or the first contact with the patient According to DLHS-4, 2012-2013 Karnataka 5.4% of pregnant women had severe anaemia in pregnancy due to under detection of anaemia after 28 weeks of gestation.[20]

A study done in Kolar district in 446 pregnant women, anaemia was one of the main pregnancy related complications among 124 (62.3%) study subjects in the age group 21-30 years.[24] A longitudinal study in Puducherry found severe anaemia in 9 (1.6%) pregnant women.[6] Another study done in Belgavi Karnataka found 10.7% had anaemia.[16] An analysis of a 312 281 pregnancies in 29 countries from the WHO multicounty survey, the odds of maternal death were twice as high in those with severe anaemia compared with those without severe anaemia OR 2.36 (95% CI 1.60-3.48).[25] While comparing with the above findings 5.5% of pregnant women had severe anaemia which may be due to the role of health system and grass root level workers acting efficiently High-risk conditions detected during pregnancy, such as hypertensive disorders and gestational diabetes mellitus (GDM) increase the risk of cardiometabolic disease in the years following birth.[14] Risk factors detected were history of repeated abortions (40.5%) short stature (29.7%), PIH (10.8%), chronic medical disorders (10.8%), parity more than 2 (5.4%).[15] In a study done in Belgavi, Karnataka among 600 pregnant women, the prevalence of high risk was 30.7% where the major factors considered were age of the mother, bad obstetric history, previous still birth.[16] Causes of high risk pregnancy were maternal age >30 years of whom 3.1% had hypertension disorder in pregnancy, 1.9% gestational diabetes mellitus, 1.7% severe anaemia, 1.6% previous LSCS,1.4% multiple pregnancy.[17] Another study done in Rohtak, Haryana showed that prevalence of high risk pregnancy was 13.7% in multigravida (four and above) in which high risk factors found were among 292 high risk pregnancies.[18] A cross-sectional study, conducted at a maternity hospital for high-risk pregnant women at Brazil found the prevalence of high risk factors to be 50.2%.[19] Studies done in Haryana and Dharwad also reported that maternal age and PIH are major contributing factors for high-risk pregnancy.[18] Our study gives a value of 16.1% of previous LSCS as high-risk factor. A cross-sectional study 4552 pregnant women in Iran found the most risk factor related to previous pregnancy was previous caesarean section 17.1%.[23] A prospective longitudinal study done in Rajasthan shows similar findings to our study of 5.5%.[26]

A significant association has been found with education and occupation of spouse and high-risk pregnancy. (Chi square with $p<0.01$). Those in lower middle/lower class have a 2.65 higher risk of developing adverse maternal outcomes ($p=0.03$). Delivery at a government hospital has 1.918 higher risk ($p=0.022$) of adverse maternal outcome. Those who had previous LSCS has 1.8 higher-risk ($p=0.040$) of an adverse maternal outcome. Pregnant women who had previous any one high risk present has 1.7 times higher risk of developing adverse maternal outcomes ($p=0.040$) (Table 6).

The maternal death found in our study was in a young primi who is short stature and was not sure about her conception and detected to be pregnant at 5 months of gestation and was not under medical supervision. She died due to haemorrhage following use of medicinal plants to terminate pregnancy. Of the 180 deliveries, there were 4 neonatal deaths (2.3 %) one stillbirth (0.5%) and three intrauterine deaths (1.6%).

As per the pragmatic criteria for neonatal near miss,36.1% of newborns had a neonatal near miss. Near miss was predominantly due to birth weight <1750 gm, gestational age <33 weeks, APGAR score at 5th minute <7. The four neonatal deaths in our study pertaining to high risk groups is also similar to the findings in rural south India study.[27] It was noted that the perinatal death rate at low risk intended to deliver in primary care was higher than that of women at high risk delivering in secondary care.[28] Apgar score had better scores in low risk group which is similar to study done in rural South India on perinatal risk factors and outcomes.[29] Many population based evidences shows the heightened risk of women with potentially disabling health conditions for poor maternal and infant outcomes of pregnancy.[30]

Our study found mother's education and occupation significantly associated with adverse perinatal outcomes. Higher education of women translates into higher awareness and subsequent utilisation of obstetric care. Mothers who are educated are more likely to recall and identify danger signs and seek timely care. Other variables notably associated were place of delivery, mode of delivery, full ANC. Delivery in a government facility was found to be significantly associated with adverse perinatal outcomes. This could be because most of the deliveries were at the primary health centre which has newborn care corner but not newborn stabilisation unit and no paediatrician. The high prevalence of 31.6% of low birth weight can be due to various nutritional factors or because of multiple pregnancies. similar observations were reported by Dutta and Das and Samiya respectively regarding low birth weight which simply signifies that the baby is born malnourished, and is a formidable challenge for India which, according to the WHO, tops the world with an incidence of 30%.[31] In our study no one reported severe anemia conditions in newborns. A study was carried out among 55 patients who were attending antenatal clinic in Bhopal. The incidence of anaemia was 25% in newborn, of which 2 had severe anaemia and 12 had mild to moderate anaemia and 13% suffered from hyperbilirubinemia.[32]

The limitations of the study were: it was conducted in one PHC area of Bangalore Urban District. Also, certain

neonatal outcomes couldn't be assessed properly as the woman and the baby were at mother's house. These findings may not be generalised to other rural areas with different sociocultural, economic, and environmental contexts. Utilization of PMSMA services were not enquired about in this study as the program had not been rolled out in the study area at the time of data collection.

CONCLUSION

The study was done among 180 women from four sub centres including 26 villages of Sarjapur PHC. The prevalence of high-risk pregnancy among study subjects (one or more high risk conditions) was 61.6%. We recommend the need for preparing adolescent girls about marriage and pregnancy with the motivation and efforts of the health professionals. This is essential for a safe motherhood and childbirth. Also, early diagnosis and treatment through regular antenatal check-up are the single key factor to prevent high risk pregnancy complications and to avoid adverse outcomes. Health education to improve awareness and utilisation is required among pregnant women and their families. Spouse and family members need to be counselled for high-risk conditions and early interventions to avoid the first delay in maternal health.

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. Adequate monitoring and supervision can be done by surveying the reduction in the trend of high-risk pregnancy and increase in focus of screening for high risk and management of high risk conditions, role of grass root level workers and capacity building, referral linkages favouring maternal and neonatal outcomes by relevant stake holders. This can help in improving the quality-of-service delivery and strengthen the interventions which were already in place.

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