



Risk Factors Responsible for the High-Risk Pregnancy and Its Association with the Outcome of the Pregnancy among the High-Risk Mothers of Bhavnagar District, Gujarat: A Follow-Up Descriptive Study

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ABSTRACT

Background: According to WHO, globally about 830 women die from pregnancy or childbirth-related complications every day. About 20-30% of all pregnancies belong to high-risk category, which is responsible for 70–80% of perinatal mortality and morbidity.

Objectives: This study was conducted to analyze the distribution of the risk factors responsible for the high-risk pregnancy and its association with the outcome of pregnancy among the high-risk mothers.

Methods: A descriptive study was conducted among the high-risk pregnant women of Bhavnagar district registered at the PHCs of Bhavnagar district by visiting them twice (i.e. once during the third trimester and again after delivery) for conducting the interview.

Results: Among the high-risk mothers, in the worst performing PHCs, anaemia was the most common risk factor (66.7%) followed by bad obstetric history and multiparity (31.1% each), while in the best performing PHCs also, anaemia was the most common risk factor (44.4%) followed by previous caesarean section (33.3%). In the worst performing PHCs, 60% of the high-risk mothers, while in the best performing PHCs, 44.4% of the mothers were having more than one risk factors.

Conclusions: The association between the anaemia, multipara, history of previous caesarean section and the mode of delivery was found statistically significant.

Keywords: high-risk, pregnancy, risk factors

INTRODUCTION

An estimated global total of 10.7 million women have died in the 25 years between 1990 and 2015 due to maternal causes.¹ Deaths among pregnant women, children and adolescents account for more than one-third of the global burden of premature mortality, despite the fact that the vast majority of these deaths are preventable.²

Despite substantial progress on maternal and child mortality, neither Millennium Development Goal

(MDG) 4 nor MDG 5 targets could be met. The global maternal mortality ratio declined by 44% between 1990 and 2015, short of the targeted 75% fall.²

Of all pregnancies, about 20-30% of pregnancies belong to high-risk category. Even with adequate antenatal and intranatal care, this small group is responsible for 70–80% of perinatal mortality and morbidity.³

Factors like anaemia, bad obstetric history, malpre-

sentation (Breech, Transverse lie), grand multipara (≥ 4 viable births), multiple pregnancy (twins/ triplets), elderly primigravida (>35 years), previous caesarean section, height ≤ 140 cm, weight ≤ 40 Kg, heart diseases, Mother with cephalopelvic disproportion (CPD)/ contracted pelvis), gestational diabetes mellitus (GDM), HIV status, teenage Pregnancy (13-19 years), convulsion and kidney diseases leads to increase risk for maternal as well as foetal health.

These conditions are largely preventable and once detected, they are treatable. Early detection of high risk pregnancy followed by special intensive care will show a significant change in the perinatal outcome. This study aims to analyse the distribution of risk factors responsible for high-risk pregnancy and its association with the outcome among the high-risk mothers of the worst and best performing PHCs of Bhavnagar district, Gujarat.

METHODOLOGY

It was a follow-up descriptive study conducted among high-risk mothers of 5 worst performing and 5 best performing PHCs of Bhavnagar district during the period from March 2017 to August 2018. High-risk mothers who were not willing to participate in the study and who were not in the third trimester were excluded.

Permission was obtained from Chief District Health Officer (CDHO) of Bhavnagar district to conduct this study. The study participants were selected by multi-stage sampling. In the first stage, 5 best performing PHCs and 5 worst performing PHCs (out of total 45 PHCs of the district) were selected by using total composite index, calculated from PHC score card. Total composite index includes different indices like pregnancy care group index, child birth group index, reproductive age group index, post natal mother and newborn care group index.

The lowest total composite index among the selected best performing PHCs was 0.82 and the highest total composite index among the selected worst performing PHCs was 0.24.

In second stage, from each selected PHC, 3 sub-centers were selected by simple random sampling using lottery method. In the final stage, from each selected sub-centre, 3 high-risk mothers were selected by simple random sampling using lottery method. If 3 high-risk mothers were not available in that sub-centre, another sub-centre was selected similarly by using lottery method.

A semi-structured questionnaire was designed, which was corrected by conducting a pilot study among 10 high risk mothers from the nearby PHC.

After the selection of high-risk mothers, they were called to fix their convenient time for their interview. All the women were interviewed twice i.e. once during third trimester and again after the delivery. The interviews were conducted in a local language and at a place and time convenient to the participant.

The first visit was conducted to collect the information regarding socio-demographic profile, risk factors for high-risk pregnancy, relevant obstetrics and medical history, etc. The second visit was conducted to collect the information regarding outcome of the pregnancy.

Simple proportions were calculated and chi-square test for statistical significance was used for association. The association was said to be statistically significant, if the P-value for the association was less than 0.05.

Informed written consent was obtained from the pregnant women after explaining the nature and purpose of the study in the local language. The process of data collection did not involve any invasive process and does not pose any potential risk or harm to the participants.

All the participants identified as high risk were counselled for referral services and alarming symptoms. Privacy was ensured while taking the interview.

Ethical approval was obtained from the IRB, Government Medical College, Bhavnagar for conducting this study. All information collected during the study was kept confidential.

The study procedures from recruitment till data entry were piloted for feasibility and for making any changes in the procedures. Data entry was done in Epi Info software version 7.0 with appropriate data checks in order to avoid errors in data entry.

As the study sample was selected from the high risk mothers, registered in the PHCs of Bhavnagar district, the findings can be generalized to the high-risk mothers registered in the PHCs of the Bhavnagar district of Gujarat.

RESULTS

There were 90 high-risk mothers selected from 10 PHCs (5 worst performing PHCs + 5 best performing PHCs) of Bhavnagar district.

In the worst performing PHCs, 80% of high-risk mothers were between the age group of 25-35 years, while in the best performing PHCs, 68.9% of the high-risk mothers were between the age group of 25-35 years.

Almost all the selected mothers were Hindu in both types of PHCs. In the worst performing PHCs, 37.7% of the high-risk mothers were illiterate, while in the best performing PHCs, 28.8% of the high-risk mothers were illiterate. 71.1% of the selected mothers from the worst performing PHCs and 88.9% of the high-risk mothers from the best performing PHCs were housewives.

According to the Modified Prasad classification, among the high-risk mothers, in the worst performing PHCs, 46.7% of the mothers were from the lower middle class and 26.7% of the mothers were from the middle class, while in the best performing PHCs, 53.3% of the mothers were from the lower middle class and 24.5% mothers were from the lower class.

Table 1 presents the distribution of the high-risk mothers according to the risk factors, which was responsible for their high-risk pregnancy. As observed from the study, among the high-risk mothers of the worst performing PHCs, anaemia was the most common risk factor (66.7%) followed by bad obstetric history and multiparity (31.1% each), while among the mothers of the best performing

PHCs, anaemia was the most common risk factor (44.4%) followed by previous caesarean section (33.3%).

Table 1: Distribution of the High-risk Mothers by Risk Factors

Risk Factors	High-risk mothers (%)	
	Worst performing PHCs (n=45)	Best performing PHCs (n=45)
Anaemia	30 (66.7)	20 (44.4)
Abortion (≥ 2 abortions)	14 (31.1)	14 (31.1)
Multiparity (≥ 4 births)	14 (31.1)	9 (20.0)
Previous CS*	8 (17.8)	15 (33.3)
Short stature (<140 cm)	3 (6.6)	1 (2.2)
Twin	2 (4.4)	2 (4.4)
Low weight (<40 kg)	2 (4.4)	2 (4.4)
Elderly primigravida	2 (4.4)	1 (2.2)
PIH@	1 (2.2)	2 (4.4)
CPD#	1 (2.2)	0
Heart disease	1 (2.2)	0
Malpresentation	1 (2.2)	4 (8.9)
HIV	0	1 (2.2)

*caesarean section; @Pregnancy induced Hypertension; #Cephalopelvic disproportion

Table 2: Association of Risk Factors with the Mode of Delivery among the High-risk Mothers

Risk factors	Worst performing PHCs (n=45)				Best performing PHCs (n=45)			
	Caesarean delivery	Normal delivery	Total (%)	P value	Caesarean delivery	Normal delivery	Total (%)	P value
Anaemia								
Present	2 (6.7)	28 (93.3)	30	0.000	2 (10.0)	18 (90.0)	20 (100)	0.000
Absent	11 (73.3)	4 (26.7)	15		16 (64.0)	9 (36.0)	25 (100)	
H/o abortion (≥2)								
Present	4 (28.6)	10 (71.4)	14 (100)	0.975	4 (28.6)	10 (71.4)	14 (100)	0.293
Absent	9 (29.0)	22 (71.0)	31 (100)		14 (45.2)	17 (54.8)	31 (100)	
Multipara (≥ 4 births)								
Present	0	14 (100)	14 (100)	0.004	0	9 (100)	9 (100)	0.006
Absent	13 (41.9)	18 (58.1)	31 (100)		18 (50.0)	18 (50.0)	36 (100)	
Previous LSCS								
Present	8 (100)	0	8 (100)	0.000	14 (93.3)	1 (6.7)	15 (100)	0.000
Absent	5 (13.5)	32 (86.5)	37 (100)		4 (13.3)	26 (86.7)	30 (100)	
Total	13 (28.9)	32 (71.1)	45 (100)		18 (40.0)	27 (60.0)	45 (100)	

Table 3: Association of Risk Factors with the Birth Weight of the Infant among the High-risk Mothers

Risk factors	Worst performing PHCs (n=45)				Best performing PHCs (n=45)			
	<2.5 kg	>2.5 kg	Total (%)	P value	<2.5 kg	>2.5 kg	Total (%)	P value
Anaemia								
Present	15 (50.0)	15 (50.0)	30 (100)	0.526	5 (25.0)	15 (75.0)	20 (100)	0.688
Absent	6 (40.0)	9 (60.0)	15 (100)		5 (20.0)	20 (80.0)	25 (100)	
H/o abortion (≥2)								
Present	5 (35.7)	9 (64.3)	14 (100)	0.322	4 (28.6)	10 (71.4)	14 (100)	0.491
Absent	16 (51.6)	15 (48.4)	31 (100)		6 (19.4)	25 (80.6)	31 (100)	
Multipara (≥ 4 births)								
Present	4 (28.6)	10 (71.4)	14 (100)	0.102	2 (22.2)	7 (77.8)	9 (100)	1.000
Absent	17 (54.8)	14 (45.2)	31 (100)		8 (22.2)	28 (77.8)	36 (100)	
Previous LSCS								
Present	1 (12.5)	7 (87.5)	8 (100)	0.033	5 (33.3)	10 (66.7)	15 (100)	0.205
Absent	20 (54.1)	17 (45.9)	37 (100)		5 (16.7)	25 (83.3)	30 (100)	
Total	21 (46.7)	24 (53.3)	45 (100)		10 (22.2)	35 (77.8)	45 (100)	

Table 4: Association of Socio-demographic Variables with Number of the Risk Factors Present among the High-risk Mothers

Socio demographic variables	Number of the high-risk mothers (%)									
	Worst performing PHCs (n=45)				Best performing PHCs (n=45)					
	No. of the risk factors			Total	P value	No. of the risk factors			Total	P value
1	2	3	1			2	3			
Age										
<25 years	6 (75.0)	2 (25.0)	0	8	0.033	7 (58.4)	4 (33.3)	1 (8.3)	12	0.710
25-35 years	12 (33.3)	18 (50.0)	6 (16.7)	36		16 (51.6)	10 (32.3)	5 (16.1)	31	
>35 years	0	0	1 (100)	1		2 (100)	0	0	2	
Education										
≥High school	1 (33.3)	2 (66.7)	0	3	0.723	2 (66.7)	1 (33.3)	0	3	0.951
Middle school	2 (50.0)	2 (50.0)	0	4		5 (65.5)	2 (25.0)	1 (12.2)	8	
Primary school	9 (42.9)	7 (33.3)	5 (23.8)	21		10 (47.6)	8 (38.1)	3 (14.3)	21	
Illiterate	6 (35.3)	9 (52.9)	2 (11.8)	17		8 (61.5)	3 (23.1)	2 (15.4)	13	
SE Class*										
Class II	1 (16.7)	4 (66.6)	1 (16.7)	6	0.287	1 (50.0)	1 (50.0)	0	2	0.986
Class III	4 (33.3)	7 (58.4)	1 (8.3)	12		5 (62.5)	2 (25.0)	1 (12.5)	8	
Class IV	12 (57.1)	6 (28.6)	3 (14.3)	21		13 (54.2)	8 (33.3)	3 (12.5)	24	
Class V	1 (16.7)	3 (50.0)	2 (33.3)	6		6 (54.5)	3 (27.3)	2 (18.2)	11	
Total	18 (40.0)	20 (44.4)	7 (15.6)	45		25 (55.6)	14 (31.1)	6 (13.3)	45	

*According to modified Prasad Classification

Table 5: Association of Pregnancy Outcome with Number of the Risk Factors Present among the High-risk Mothers

Pregnancy Outcome	Worst performing PHCs (n=45)				P value	Best performing PHCs (n=45)				
	No. of the risk factors			P value		No. of the risk factors			P value	
	1 (n=18)	2 (n=20)	3 (n=7)			1 (n=25)	2 (n=14)	3 (n=6)		
Term of delivery										
Preterm	1 (5.6)	2 (10.1)	0	0.640	0	0	3 (50.0)	0.000		
Term	17 (94.4)	18 (90.0)	7 (100)		25 (100)	14 (100)	3 (50.0)			
Mode of delivery										
Caesarean	6 (33.3)	4 (20.0)	3 (42.9)	0.448	9 (36.0)	8 (57.1)	1 (16.7)	0.198		
Normal	12 (66.7)	16 (80.0)	4 (57.1)		16 (64.0)	6 (42.9)	5 (83.3)			
Birth weight										
<2.5 kg	11 (61.1)	9 (45.0)	1 (14.2)	0.106	3 (12.0)	3 (21.4)	4 (66.7)	0.015		
>2.5 kg	7 (38.9)	11 (55.0)	6 (85.8)		22 (88.0)	11 (78.6)	2 (33.3)			
Overall	18 (40)	20 (44.4)	7 (15.6)		25 (55.6)	14 (31.1)	6 (13.3)			

Table 2 presents the association of risk factors with the mode of delivery among the high-risk mothers.

As observed from the study, 6.7% of the anaemic mothers from the worst performing PHCs were delivered by caesarean section as compare to 73.3% of the non-anaemic mothers. Similarly, 10% of the anaemic mothers from the best performing PHCs and 64.0% of the non-anaemic mothers were delivered by caesarean section. In the worst performing PHCs, there was not much difference in the proportion of caesarean section found between the mothers who had history of ≥2 abortion and the mothers who had not (28.6% and 29.0% respectively), while in the best performing PHCs, 28.6% of the mothers who had history of abortion and 45.2% of the mothers who had no history of abortion delivered by caesarean section. None of the multiparous (≥4 births) high-risk mothers from any of the group of PHCs was delivered by caesarean section. All the mothers from the worst performing

PHCs and almost all the mothers from the best performing PHCs who had history of previous LSCS delivered by caesarean section in recent pregnancy.

Table 3 presents the association of risk factors with the birth weight of the infant among the high-risk mothers.

As observed from the study, 50.0% of the anaemic mothers from the worst performing PHCs were delivered low birth weight babies as compare to 40.0% of the non-anaemic mothers. 25.0% of the anaemic mothers from the best performing PHCs and 20.0% of the non-anaemic mothers were delivered low birth weight babies. In the worst performing PHCs, 35.7% of the mothers who had ≥2 history of abortion and 51.6% of the mothers who had no history of abortion delivered low birth weight babies, while in the best performing PHCs, 28.6% of the mothers who had history of abortion and 19.4% of the mothers who had no history of abortion delivered low birth weight babies. From the

worst performing PHCs, 28.6% and from the best performing PHCs 22.2% of the multiparous high-risk mothers delivered low birth babies. 12.5% of the mothers with history of previous caesarean section from the worst performing PHCs were delivered low birth weight babies as compare to 54.1% of the the mothers with no history of previous caesarean section. 33.3% of the mothers with history of previous caesarean section from the best performing PHCs and 16.7% of the mothers with no history of previous caesarean section were delivered low birth weight babies.

Figure 1 presents the distribution of the high-risk mothers according to the number of risk factors present in a mother.

It was found that 60.0% of the high-risk mothers of the worst performing PHCs and 44.4% of the mothers from the best performing PHCs were having more than one risk factors.

Table 4 presents the relationship between various socio-demographic variables and presence of the number of risk factors in the high-risk mothers.

As observed from the study, among the high-risk mothers of aged 25 to 35 years, 66.7% of the mothers from the worst performing and 48.4% of the mothers from the best performing PHCs had more than one risk factor. In the worst performing PHCs, the association between the age group and the number of the risk factors present was found statistically significant ($P=0.033$), while the association was not found statistically significant in the best performing PHCs. ($P=0.710$) The association of the other socio-demographic variables i.e. education and socio-economic class with the number of risk factors present were also not found statistically significant among the mothers of any of the groups of the PHCs.

Table 5 presents the association of pregnancy outcome with number of the risk factors present among the high-risk mothers

As observed from the study, 50% of the mothers of the best performing PHCs with 3 risk factors had preterm delivery as against none of the mothers with 1 or 2 risk factors. The difference found was statistically significant. ($P=0.000$). The association of the mode of delivery with the number of risk factors present was not found significant among the mothers of any of the groups of the PHCs.

In the best performing PHCs, 66.70% of the mothers having 3 risk factors had delivered low birth weight babies as against only 12.0% of the mothers having only 1 risk factor. The association of the number of the risk factors with the delivery of LBW babies was found statistically significant. ($P=0.015$) However, the association was not found

statistically significant in the worst performing PHCs.

DISCUSSION

In the present study anaemia was found to be a most common cause for high-risk pregnancy among the high-risk mothers of the both group of PHCs. H. Akhtar et al (2009) in their study among the high-risk mothers in Bangladesh found that among the high-risk pregnancies, preeclampsia and PIH were the most common risk factors (30.97% each) followed by primigravid (17.69%).⁴ J. Chaubey et al (2017) in their cross-sectional study in Karnataka found that bad obstetric history (59.8%) was the common risk factor among the high-risk mothers.⁵ M. Kumar et al (2015) in their study in Dharwad found that short stature (40.5%) was the most common risk factor among the high-risk mothers.⁶ A. Jadhoo et al (2017) in their study among pregnant mothers of rural area of Nagpur district found that previous caesarean section was the most common risk factor (14.49%) followed by malpresentation (7.94%).⁷

The probability of the delivery by caesarean section among the anaemic high risk mothers was less as compared to non-anaemic mothers (OR=0.0260, CI 0.0041-0.1627 and OR=0.625, CI 0.0117-0.3332 for worst and best performing PHCs, respectively). This may be because delivery by caesarean section could be riskier for the anaemic women as compare to non-anaemic women, which might have led doctors to avoid the same as far as possible. The difference in the proportion of caesarean section delivery between anaemic and non-anaemic high risk mothers was found statistically significant in both i.e. worst and best performing PHCs. ($P=0.000$ for both types of PHCs)

In the worst performing PHCs, there was not much difference in the proportion of caesarean section found between the mothers who had history of ≥ 2 abortion and the mothers who had not (28.6% & 29.0% respectively) while in the best performing PHCs the difference observed was higher (i.e. 28.6% of the mothers who had history of abortion and 45.2% of the mothers who had no history of abortion). However, the association of the history of abortion and delivery by caesarean section was not found statistically significant among the high risk mothers of any of the groups of the PHCs. G. Singh et al (2010) in their prospective study from 2003 to 2007 carried out among 79 pregnant women with history of stillbirth, neonatal death, three or more consecutive abortions found that there was significantly higher incidence of caesarean section in the test group ($P<0.05$) compared with control group of 300 deliveries.⁸

None of the multiparous (≥ 4 births) high-risk mothers from any of the group of PHCs was delivered by caesarean section. The association between the multiparity and the mode of delivery was found statistically significant. ($P=0.004$ and $P=0.006$, respectively) R. Roy et al. (2017) in their study in Kolkata found that 70% of the grand multipara mothers delivered normally.⁹ S. Singh et al (2015) in their descriptive observational study of 100 grand multipara in Haryana found that 28% mothers delivered by caesarean section.¹⁰ M. Alsammani et al (2015) in their study in Sudan found a statistically significant association between grand multiparity and adverse pregnancy outcomes caesarean delivery (OR=2.699, CI=2.072-3.515, $P<0.001$).¹¹

All the mothers from the worst performing PHCs and almost all (93.3%) the mothers from the best performing PHCs who had history of previous LSCS delivered by caesarean section in recent pregnancy. The association between the previous LSCS and the mode of delivery was found statistically significant. ($P=0.000$ each for both group of PHCs) G. Desai et al. (2017) in their study in Jaghadiya found that the mother who had delivered by caesarean section among them the history of previous caesarean was accounted 23.9% in tribal population and 33.2% in non-tribal population.¹²

The association of the various risk factors such as anaemia, history of abortion and multiparity with low birth weight of babies were not found statistically significant among the high risk mothers of any of the groups of the PHCs. In the worst performing PHCs, 12.5% of the mothers, who had history of previous LSCS delivered low birth babies as against 54.1% of the mothers, who had no history of previous LSCS. The association between the previous LSCS and low birth weight of babies was found statistically significant ($P=0.033$). The findings of this study were not consistent with various studies. S. Rahmati et al. 2016 in their meta-analysis study in Iran found that maternal anaemia in the first trimester showed a significant relationship with low birth weight (RR:1.28, 95% CI 1.10-1.50, $P<0.01$).¹³ R. Roy et al. 2017 in their study in

Kolkata found that 8.7% of the multipara had delivered low birth babies.⁹ S. Singh et al. 2015 in their descriptive observational study of 100 grand multipara in Haryana found that 15% of the them had delivered low birth babies.¹⁰

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