

## Original Article

**Outcomes of High-Risk Pregnancies in Northern Iran: Multivariate Logistic Regression Model**Mahmood Moosazadeh<sup>1</sup> \*Seyed Abdolhassan Naghibi<sup>2</sup> Soghra Khosravi<sup>3</sup> Mahdi Afshari<sup>4</sup> Roghaieh Afsargharehbagh<sup>5</sup>

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**Abstract**

**Background and purpose:** High-risk pregnancy is referred to a situation in which mother, fetus or neonate are in higher risk of morbidity or mortality. Because of adverse outcomes of high-risk pregnancies, this study aims to determine these outcomes in the North of Iran.

**Materials and Methods:** We recruited 803 urban and rural pregnant women in this cross-sectional study via consensus method. Data were collected by a questionnaire and analyzed using descriptive statistics [mean, standard deviation (SD)], chi-square test and multivariate logistic regression model. All data analyses were performed using SPSS software and  $P < 0.05$  was considered significant.

**Results:** Mean  $\pm$  SD, minimum and maximum age of participants were  $27.0 \pm 6.2$ , 14 and 44 years, respectively, 26.3% of which were urban residences. The frequency of adverse outcomes of pregnancy (stillbirth, abortion, and weight under 2500 g) was 10.8%. According to the multivariate logistic regression model, preeclampsia was significantly associated with adverse outcomes of high-risk pregnancy (Odds ratio = 2.7, 95% confidence interval: 1.03-7.10).

**Conclusion:** Our study showed that preeclampsia during pregnancy is a predictive factor of adverse outcomes of pregnancy such as abortion, stillbirth, and low birth weight.

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**Key words:** Pregnancy, High-Risk, Abortion, Stillbirth, Low Birth Weight

## 1. Introduction

Access to healthcare and prevention of maternal and neonatal mortality are of major components of social justice. Pregnancy is a unique and natural physiologic process among women, but can be deteriorated following background or unexpected disorders of mother or fetus (1,2). Pregnancy is considered high-risk when mother, fetus or neonate is more susceptible to death, disability or disorders. High-risk pregnant mothers are women with history of chronic diseases (diabetes mellitus, hypertension, cardiovascular disorders, ...), history of abortion or stillbirth during previous pregnancies, multiple pregnancy, those aged less than 18 or more than 35 years, gravidity more than four, and intervals less than 3 years between pregnancies (2,3).

In many developing countries, complications due to pregnancy and labor are main causes of maternal mortality. According to the WHO reports, every day, approximately 800 women die due to preventable pregnancy associated causes, 99% of these mortality occurs in developing countries (4). The prevalence of high-risk pregnancies is reported up to 20% worldwide. In addition, 50% of perinatal deaths are being observed during high-risk pregnancies. Prevalence of high-risk pregnancy varied in different countries. For example, it is reported as of 31.4% in the north India (5), 59.3% in Tunisia (6) and 40.1% in Nigeria (7).

In a study conducted in Sonqor, Iran, among 3157 pregnant women, 39.8% were high risk. Urinary tract infection (5.8%), history of abortion (4.02%), age over 35 years (3.8%) or under 18 years (2.7%), inappropriate weight gain (2.4%), anemia (2.4%), and hypertension (1.7%) were most causes of high risk pregnancies (8). In Bam and Yazd, Iran, maternal age more than 35 years, male gender of the neonate, prematurity, and low birth weight, interval lower than 1 year between pregnancies and pregnancy in lower ages, significantly increased the neonatal mortality

(9,10). Gestational age and the amount of weight difference are the most important independent predictive factors for perinatal mortality and morbidity (11).

The above-mentioned reports indicate that high-risk pregnancy can lead to undesirable complications. Since no similar study has been carried out in northern parts of Iran and related factors of pregnancy complications may be different among various geographical areas, this study aims to investigate the adverse outcomes of high-risk pregnancies among women living in Galikesh area, Golestan Province, Iran.

## 2. Materials and Methods

This cross-sectional study has been performed in the North of Iran (Galikesh district, Golestan province, Iran) in 2014 among 803 pregnant women. These participants were selected through consensus method from rural and urban areas. Data collection was done by a questionnaire. Content validity of the questionnaire was confirmed after being reviewed by experts and available scientific evidences.

These questionnaires consisted information such as residential area, number of children, intervals between pregnancies, body mass index (BMI), history of abortion, cardiovascular disease, hypertension, preeclampsia, and adverse outcomes of pregnancy. Moreover, abortion, stillbirth, and birth weight under 2500 g were considered as adverse outcomes of pregnancy, while live birth more than 2500 g weight was considered as the desirable outcome of pregnancy. Informed consent was provided prior to data collection. Completed questionnaires were reviewed by two researchers, and defects were resolved using original information.

Data analysis was conducted by SPSS software (version 20, SPSS, Inc., Chicago, IL, USA) using mean and standard deviation (SD) statistics, chi-square test, and

Multivariate logistic regression models (method = enter). Only variables associated with outcome with  $P < 0.20$  during univariate analysis were entered into the multivariate model.  $P < 0.05$  was considered statistically significant in final models.

### 3. Results

In this study, outcomes of pregnancy among 803 pregnant women were investigated. Mean  $\pm$  SD age of participants was  $27.0 \pm 6.2$  years. Minimum and maximum ages of pregnant women were 14 and 44 years respectively. Of them, 26.3% were living in urban areas. The frequency of undesirable outcomes (stillbirth, abortion, and low birth

weight) was 10.8%.

Frequency of undesirable outcomes was a higher among pregnant women aged more than 35 years (compared to that of 20-35 year-old women), rural habitants (compared to urban residences), those having four or more children (compared to those with 1-2 children), women with BMI less than 18 (compared to those with BMI more than 18), women with history of abortion (compared to those without) and women with more than 3 years interval between pregnancies (compared to those with less than 3 years interval). Univariate analyses showed that only interval, developing preeclampsia and history of abortion were associated with complications of pregnancy (Table 1).

**Table 1.** Distribution of clinical and demographic characteristics by pregnancy outcome

Variables	n	Pregnancy outcome n (%)		P
		Undesirable	desirable	
Total	803	87 (10.8)	716 (89.2)	-
Age group (mother)				
< 20	121	14 (11.6)	107 (88.4)	0.30
20-35	592	59 (10.0)	533 (90.0)	
> 35	90	14 (15.6)	76 (84.4)	
Residence area				
Urban	211	21 (10.0)	190 (90.0)	0.40
Rural	592	66 (11.1)	526 (88.9)	
Children number				
0	276	35 (12.7)	241 (87.3)	0.40
1	289	24 (8.3)	265 (91.7)	
2	153	17 (11.1)	136 (88.9)	
3	51	6 (11.8)	45 (88.2)	
$\geq 4$	34	5 (14.7)	29 (85.3)	
BMI				
< 18	54	7 (13.0)	47 (87.0)	0.60
18-24.9	363	42 (11.6)	321 (88.4)	
25-29.9	223	19 (8.5)	204 (91.5)	
$\geq 30$	163	19 (11.7)	144 (88.3)	
Time duration of Spacing between births				
First pregnancy	251	34 (13.5)	217 (86.5)	0.03
< 3 child	209	13 (6.2)	196 (93.8)	
$\geq 3$ child	343	40 (11.7)	303 (88.3)	
Abortion history				
Yes	176	26 (14.8)	150 (85.2)	0.04
No	627	61 (9.7)	566 (90.3)	
Preeclampsia				
Yes	24	6 (25.0)	18 (75.0)	0.03
No	779	81 (10.4)	698 (89.6)	
Heart disease				
Yes	7	1 (14.3)	6 (85.7)	0.50
No	796	86 (10.8)	710 (89.2)	
Blood pressure				
Yes	18	3 (16.7)	15 (83.3)	0.30
No	785	84 (10.7)	701 (89.3)	

BMI: Body mass index

**Table 2.** Multivariate logistic regression model of factors associated with pregnancy undesirable outcome

Variables	OR	CI	P
Abortion history			
No	-	-	-
Yes	1.6	0.9-2.6	0.07
Preeclampsia			
No	-	-	-
Yes	2.7	1.03-7.1	0.04
Time duration of spacing between births			
Without child	1.3	0.8-2.1	0.30
< 3 child	0.6	0.3-1.1	0.09
≥ 3 child	-	-	-

OR: Odds ratio, CI: Confidence interval

To determine the predictive factors for these complications variables with at least 0.2 significance level were entered into the multivariate models. Adjusted results showed that only preeclampsia during pregnancy [Odds ratio (OR) = 2.7, 95% confidence interval: 1.03-7.10] was a determinant factor of pregnancy complications Table 2].

#### 4. Discussion

Our study showed that more than one-tenth of pregnancies in the study area led to adverse outcomes. According to univariate analyses, preeclampsia, history of abortion, and intervals between pregnancies were significantly associated with these outcomes. In addition, adverse complications were a more common among women with hypertension, cardiac disease, rural inhabitants, aged over 35 years, and multiple pregnancies. However, the differences were not statistically significant.

In a descriptive-analytic study conducted by Jokar et al. among high-risk pregnant women in Shiraz, an association was observed between type of labor and maternal cardiovascular complication. Moreover, 29.8% of neonates were admitted to neonatal care unit due to prematurity, respiratory distress and blood sugar problems. These admissions were significantly related to the maternal labor complications (12). In the current study, complications were more common among

women with cardiac disorders, but these differences were not statistically significant.

Fadaei et al. investigated the effect of maternal age on pregnancy outcomes among 500 pregnant women in Isfahan, Iran, and showed that mothers under 20 and over 35 years compared to those aged between 20 and 35 had 7.9 folds increased odds of stillbirth. The odds of developing preeclampsia for mothers under 20 were 3.9 folds more than that of older mothers. Moreover, the frequency of preterm labor was higher among pregnant women with BMI lower than 20 compared to that of heavier women (13). Similarly, our study showed that the complications of pregnancy were more common among women with BMI lower than 18.

In a case-control study carried out by Rezavand et al. entitled “A comparative study of pregnancy results in adolescents and young mothers referred to the Motazedi hospital in Kermanshah, Iran” 11.5% of adolescent mothers and 3.7% of young mothers had low birth weight neonates lower than 2500 g which is in keeping with the current study (14).

In a nested case-control study conducted by Chaman et al. in a rural area of Iran, 33% of pregnant women in control group, as well as 67% of case group had history of high-risk pregnancy. That study reported a significant correlation between high-risk pregnancy and neonatal mortality (15).

According to the results of a cohort study performed by Jourabchi et al. among 450 pregnant women referring to Qazvin and Alborz health centers, Iran, frequencies of pregnancy complications such as hypertension, preterm labor and premature neonate were lower among mothers under supervision of "Integrated Management of Maternal Health Care program." These mothers had higher referrals compared to those with routine pregnancy cares. Although the above-mentioned program had only 60% coverage in Alborz, it seems that it had an effective role in maternal health promotion (16).

Another cross-sectional study carried out by Faraji et al. in Rasht Hospital, Iran, incidences of preterm and post-term labor in twin pregnancies were 60.4% and 0.6% respectively. In addition, incidences of fetal abnormality, gestational diabetes, and preeclampsia during twin pregnancies were 1.6%, 2.3%, and 8.8% respectively. Moreover, 65.8% of such mothers underwent cesarean section and 66.8% of them labored neonates under 2500 g (11).

About 118 deaths before 1 year age were compared with 236 controls during a case-control study. Factors such as intervals between births (OR: 28.8) and previous history of abortion (OR: 4.5) were significantly associated with infant death (17). Shorted intervals, higher risk of complications in pregnancies. This fact should be taken into consideration in women care systems during fertility age and pregnancy (18). Since low birth weight is associated with low socio-economic status and maternal situations such as anemia, malnutrition, inadequate pregnancy cares and complications of pregnancy, preventive activities should be carried out to reduce the risk of low birth weight (17).

Results of an American survey showed that eclampsia and chronic hypertension is attributed with adverse outcomes in mothers and neonates (19). A systematic review

including the results of 22 primary studies reported that obesity among pregnant women leads to complications for them and their neonates. These mothers in compared with normal pregnant women had higher rates of gestational diabetes, preeclampsia, depression, cesarean surgery, and wound infection leading adverse outcomes such as prematurity, stillbirth, and low birth weight (20). Afshari et al. showed that 63% out of 62 neonatal deaths in Toiserkan district, Iran, occurred in the absence of any risk factors during pregnancy. They also reported that age over 35 years (16.1%) and gravity more than four (16.1%) were the main risk factors for death (21). Miletic et al. in Croatia investigated the outcomes of pregnancies among 2099 more than 40 year-old women. They observed that 19.8% of these pregnancies led to miscarriage. They also found that perinatal deaths were more common among these women compared to those aged 20-39 years (22). In Latin America, the rate of fetal death among 837,233 singleton births registered in the Perinatal Information System database was 17.6/1000 live births. Lack of pregnancy cares [risk ratio (RR): 4.26] and small for gestational age (RR: 3.26) were reported as the main risk factors of fetal death (23). Outcomes of pregnancies were compared between women with and without risk of abortion in Tehran. This study showed that spontaneous preterm delivery (RR: 1.4) and placental abruption (RR: 1.1) were more common among high-risk women (24).

As one of the limitations of the current study, adverse outcomes of pregnancies such as abortion, stillbirth, and low birth weight were investigated ignoring their specific weight and degree of importance. That was due to the low frequencies of each of these complications.

In conclusion, our study showed that preeclampsia during pregnancy is a predictive factor for undesirable complications such as abortion, stillbirth, and low birth weight.

**Conflict of Interests**

The Authors have no conflict of interest.

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