

Risk Factors of Hypertension Disease during Pregnancy and their Influence on Pregnancy Outcome and Newborns

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The high-risk factors of hypertension disease during pregnancy were retrospectively analyzed for their influence on pregnancy outcome and newborns. 72 patients with pregnancy hypertension admitted to the Department of Obstetrics and Gynecology in our hospital from December 2019 to December 2020 were retrospectively analyzed and set as the study group. At the same time, the 72 cases of healthy pregnancy subjects who received birth checkups during the same period were included as the control group. Self-made questionnaire was used to survey the basic information of the subjects, including age, income, emotions, living habits, education level and other related factors. Pregnancy outcome and neonatal complications were statistically measured and then univariate and multivariate logistic analysis methods were adopted to investigate their main risk factors. Univariate analysis found that 7 factors including age, body mass index, monthly income, education level, family history of hypertension, pregnancy complications and negative emotions are related to the onset of hypertension disease in pregnancy, and further multivariate unconditional logistic regression analysis showed that body mass index, education level, family history of hypertension and negative emotions are risk factors for the onset of hypertension disease in pregnancy; the incidence of fetal distress, low birth weight infants, perinatal death and neonatal asphyxia in the study group were significantly higher than that in the control group, the difference was statistically significant ($p < 0.05$). In the study group, there were 17 cases of serious complications and 11 cases of more than two complications and in the control group, there were 8 cases of serious complications and 4 cases of more than two complications. The difference was statistically significant after testing ($p < 0.05$). Obesity during pregnancy, low education level, family history of hypertension and negative emotions are risk factors for hypertension disease during pregnancy. In addition, hypertension disease during pregnancy can adversely affect pregnancy outcome and newborns, and clinical prevention and health care should be strengthened.

Key words: Pregnancy hypertension, pregnancy outcome, high-risk factors, univariate and multivariate logistic analysis, neonatal complications

Pregnancy hypertension is a common disease during pregnancy and directly threatens the health of mothers and babies, which is the focus of research, prevention and control of clinical specialists, scholars and experts at home and abroad^[1,2]. According to statistics, the incidence of pregnancy hypertension in China is 9.5 %-10.5 %, which is a unique complication during pregnancy and its pathogenesis is not clear. It is one of the important cause of adverse maternal and infant outcomes such as neonatal asphyxia, fetal distress, postpartum hemorrhage, etc.^[3,4]. Therefore, understanding the factors of pregnancy hypertension

diseases, adopting targeted intervention measures and choosing appropriate delivery methods are of great significance for improving the prognosis of mothers and infants. At present, there are many clinical researches on the risk factors of pregnancy hypertension and the delivery outcomes of pregnant women with pregnancy hypertension, but there are relatively few or even no researches on the relationship between the onset factors of pregnancy hypertension and maternal and infant outcomes. This study mainly explored the influence of pregnancy hypertension on pregnancy outcome and newborns.

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MATERIALS AND METHODS

General data:

The 72 patients with pregnancy hypertension admitted to the Department of Obstetrics and Gynecology in our hospital from December 2019 to December 2020 were retrospectively analyzed and set as the study group. All patients met the diagnostic criteria for pregnancy hypertension^[5] and patients with mental disorders and communication difficulties were excluded. Among the 72 patients, 2 cases were diagnosed as pregnancy hypertension, 57 cases as preeclampsia, 1 case as eclampsia, 5 cases as pregnancy complicated with hypertension and 7 cases as chronic hypertension complicated with preeclampsia. In addition, the 72 cases of healthy pregnancy subjects who received birth checkups during the same period were included as the control group.

Survey methods:

Self-made questionnaires were used to collect the patients age, monthly income, education level, parity, history of miscarriage, family history of hypertension, poor lifestyle, twin or multiple pregnancy, pregnancy complications, Body Mass Index (BMI), negative emotions, etc. Poor lifestyles mainly include drinking, active or passive smoking, staying up late, etc. Negative emotions mainly include anxiety and depression, which were assessed using the anxiety self-rating scale and depression self-rating scale respectively. The pregnancy outcomes of the two groups were followed up and investigated, including: Fetal distress, low birth weight infants, perinatal death, fetal malformations and neonatal asphyxia. The complications of the two groups of newborns after birth were followed up and investigated, including Neonatal Respiratory Distress Syndrome (NRDS) referred to the short natural breathing for a few minutes to a few hours after birth, followed by acute respiratory distress symptoms such as progressive dyspnea, cyanosis, etc., and respiratory failure. Neonatal jaundice: Jaundice appeared at 24 h after birth, did not disappear after 2 to 3 w and even continued to deepen and worsen or subsided and repeated or did not appear until a week to a few weeks after birth. Neonatal asphyxia: Appearance, Pulse, Grimace, Activity and Respiration (APGAR) score ≤ 7 points in 1 min of newborn. Fetal Growth Restriction

(FGR): Full-term fetus weight <2500 g or fetal weight less than two standard deviations (or the 10th percentile) of the average weight of the same gestational age.

Statistical analysis:

Statistical Package for the Social Sciences (SPSS) 20.0 software was used for statistical analysis. The comparison of measurement data between two groups was performed by t test, the comparison of count data between two groups was performed by χ^2 test and the risk factor selection was performed by univariate and multivariate unconditional logistic regression analysis; $p < 0.05$ was considered as statistically significant.

RESULTS AND DISCUSSION

Univariate screening of influencing factors was done. The χ^2 test and t test were used to analyze the influencing factors of pregnancy hypertension disease. The results showed that the differences in age, BMI, monthly income, education level, family history of hypertension, pregnancy complications, negative emotions, etc., between the two groups were statistically significant ($p < 0.05$); while there was no statistically significant difference in the parity, history of miscarriage, poor lifestyle, twin or multiple pregnancy, etc. ($p > 0.05$), as shown in Table 1.

Multivariate unconditional logistic regression analysis showed that BMI, education level, family history of hypertension and negative emotions were risk factors for the onset of pregnancy hypertension disease. The Odds Ratio (OR) values were 4.478, 1.184, 2.804 and 2.479 as shown in Table 2.

Pregnancy outcomes between the two groups were compared. The incidence of fetal distress, low birth weight infants, fetal malformations, perinatal death and neonatal asphyxia in the study group were significantly higher than those in the control group and the difference was statistically significant ($p < 0.05$), as shown in Table 3.

Neonatal complications between the two groups were compared. A total of 74 newborns were born in patients with pregnancy hypertension, of which 17 had serious complications and 11 had more than two complications; in the control group, 8 had severe complications and 4 had more than two complications. The difference was statistically significant ($p < 0.05$), as shown in Table 4.

TABLE 1: UNIVARIATE ANALYSIS OF RELATED FACTORS IN TWO GROUPS

Item		Control group	Study group	χ^2/t	p
Age		26.55±8.77	30.81±8.54	3.456	<0.001
Parity	Primipara	53	49	1.043	0.378
	Multipara	19	23		
History of miscarriage	Yes	9	11	0.887	0.479
	No	63	61		
BMI (kg/m ²)		24.56±7.73	28.40±6.05	3.218	<0.001
Monthly income (Yuan)		6556.4±257.8	3748.9±309.2	6.678	<0.001
Education level	Elementary school and below	12	25	10.771	<0.001
	Secondary school	36	34		
	University and above	24	13		
Family history of hypertension	Yes	3	17	14.167	<0.001
	No	69	55		
Pregnancy complications	Yes	9	23	8.226	<0.001
	No	63	49		
Negative emotions	Yes	11	33	12.384	<0.001
	No	61	39		
Poor lifestyle	Yes	16	56	1.443	0.194
	No	19	53		
Twin or multiple pregnancy	Yes	3	2	0.091	0.856
	No	69	70		

TABLE 2: MULTIVARIATE UNCONDITIONAL LOGISTIC REGRESSION ANALYSIS OF RELATED FACTORS IN TWO GROUPS

Related factors	Beta (B)	Standard error	OR value (95 %)	p
BMI	1.825	0.911	4.478 (2.600-7.882)	<0.001
Education level	0.611	0.396	1.184 (0.678-1.763)	<0.004
Family history of hypertension	1.114	0.672	2.804 (1.783-4.065)	<0.001
Negative emotions	0.884	0.522	2.479 (1.559-3.831)	<0.001

TABLE 3: PREGNANCY OUTCOMES IN THE TWO GROUPS

Groups	Fetal distress	Low birth weight infants	Fetal malformations	Perinatal death	Neonatal asphyxia
Study group	22 (30.55 %)	15 (20.83 %)	2 (2.78 %)	5 (5.67 %)	13 (18.06 %)
Control group	6 (4.17 %)	4 (2.78 %)	1 (1.89 %)	0 (0.00 %)	2 (2.78 %)

TABLE 4: NEONATAL COMPLICATIONS IN THE TWO GROUPS

Groups	N	Neonatal jaundice	NRDS	FGR	Complication rate
Study group	72	10 (13.89)	9 (12.50)	9 (12.50)	28 (38.89)
Control group	72	3 (4.17)	3 (4.17)	3 (4.17)	9 (12.50)

Note: NRDS: Neonatal Respiratory Distress Syndrome; FGR: Fetal Growth Restriction

Pregnancy hypertension is a peculiar disease during pregnancy, which is caused by a combination of many factors. With the development of economy and the change of lifestyle, the proportion of obese patients during pregnancy has increased significantly^[6]. This study demonstrated that obese pregnant women with high BMI during pregnancy are a risk factor for the onset of pregnancy hypertension and the risk of pregnancy hypertension of obese pregnant women with high BMI is 4.478 times higher than that of normal pregnant women (OR=4.478). Obesity is an important basis for metabolic syndrome and it is closely related to hypertension, dyslipidemia, high leptin levels, insulin resistance, impaired glucose tolerance, etc. Dyslipidemia causes increased blood consistency and increased peripheral resistance of blood vessels, which is more likely to cause atherosclerosis of small arteries, leading to the occurrence of pregnancy hypertension^[7,8]. Therefore, for obese patients during pregnancy, they should be given dietary guidance, reasonable diet and appropriate activities, regular weight measurement and dietary adjustments according to weight changes and regular birth checkups to control their weight within a reasonable range. Pregnancy hypertension diseases have an obvious family genetic tendency, which is mainly manifested in maternal inheritance and the incidence of first-degree relatives is higher than that of second-degree relatives. Many gene polymorphisms are closely related to the genetic susceptibility of pregnancy hypertension diseases^[7,9,10]. A study has revealed that pregnant women with a family history of hypertension are at 2.743 times the risk of pregnancy hypertension compared with those without a family history^[11]. This study showed that the family history of hypertension is a risk factor for the onset of pregnancy hypertension diseases and the risk of onset is 2.804 times higher than that of other pregnant women (OR=2.804). It is needed to carry out major monitoring of such pregnant and lying-in women clinically.

Pregnancy itself is a major life event. The expectations of family members and the public opinion of the society will have an important impact on the psychology and neuroendocrine of pregnant women. Stimulated by external factors, pregnant and lying-in women have physical and psychological changes, which can easily cause negative emotions such as tension, anxiety, depression, etc., thereby leading to abnormal neuroendocrine function and increasing the risk of onset of pregnancy hypertension diseases^[12,13]. This study demonstrated that the existence of negative emotions is a risk factor for the onset of pregnancy hypertension

disease and the risk of pregnancy hypertension of pregnant women with negative emotions is 2.479 times higher than that of pregnant women with positive emotions (OR=2.479). For such pregnant and lying-in women, early detection and early prevention should be done, psychological support and health care during pregnancy should be strengthened, the adverse effects of external stimuli on pregnant women should be reduced and a good pregnancy and production environment should be created, as well as the lying-in women should maintain a positive and optimistic attitude^[14].

This study also showed that low education level is a risk factor for the onset of pregnancy hypertension disease and the risk of pregnancy hypertension of pregnant women with a low education level is 2.479 times higher than that of pregnant women with high education level. The economic conditions of pregnant and lying-in women with low education level are relatively poor. They do not pay enough attention to perinatal health care, are lack of understanding of health care knowledge and do not have the awareness of prenatal care, early expectation, etc. On the contrary, the economic conditions of pregnant and lying-in women with high education level are relatively good. The perinatal health care is emphasized and the surrounding medical care conditions can be used autonomously to reduce and overcome the unfavorable factors for pregnancy, decreasing the occurrence of pregnancy complications^[15]. For such pregnant and lying-in women, it is necessary to do a good job in community publicity work, enhance their awareness of perinatal health care and improve basic maternity check-up services.

Neonatal complications and prognosis in patients with pregnancy hypertension is discussed below. The basic pathophysiological feature of pregnancy hypertension diseases is systemic spasm of small blood vessels, which leads to decrease in placental vascular perfusion, easily inducing premature delivery of the fetus. Trophoblasts and villi vascular endothelium are damaged, which causes decrease in the exchange area of placental microvilli and decline in the ability to transport amino acids, thereby reducing the fetus intake of oxygen and nutrients, and leading to the occurrence of FGR^[16,17]. Uterine spiral atherosclerosis leads to stenosis and atresia of the lumen, resulting in insufficient blood perfusion in the placental villi space, hypoxia and acidosis in the fetus in the uterus, causing fetal distress of which 2/3 can further evolve into neonatal asphyxia. It often causes NRDS and can lead

to death in severe cases. In addition, neonatal hypoxia and asphyxia will inhibit the activity of liver enzymes, resulting in decrease in the ability of liver cells to take up and bind bilirubin, causing increased blood bilirubin and pathological jaundice. This study showed that the complication rate of neonates in the control group was significantly lower than that of neonates of pregnant women with pregnancy hypertension, which is consistent with the results of existing reports^[18,19].

This study also explored the influence of pregnancy hypertension disease on pregnancy outcome. The results revealed that the incidence of fetal distress, low birth weight infants, perinatal death and neonatal asphyxia in the study group were significantly higher than those in the control group and the difference was statistically significant ($p < 0.05$), suggesting that pregnancy hypertension disease had an adverse effect on pregnancy outcome. Pregnant women with pregnancy hypertension disease showed spasm of small arteries, decrease in placental and uterine blood flow, impaired placental function and growth restriction, causing adverse pregnancy outcomes such as fetal distress, neonatal asphyxia, etc.,^[1,20]. Therefore, under the premise of understanding the high-risk factors of pregnancy hypertension disease, choosing appropriate delivery methods, strengthening perinatal health care for pregnant women and timely termination of pregnancy, are of great significance for early prevention and diagnosis of pregnancy hypertension disease, improvement of patient prognosis, reduction of the incidence of complications and mortality, which is also the direction of our continued research in the future.

Acknowledgements:

This work was supported by the Guangzhou Biostime Institute of Nutrition and Nursing "Special Fund for Maternal and Infant Clinical Research" (No. 2021BINCLC001), the Natural Science Foundation of Gansu Province (No. 20JR10RA428). Wei Kai Wang and Ru Lin contributed equally to this work. Jing Yu and Bin Yi are considered co-corresponding authors.

Conflict of interests:

The authors report no conflicts of interest.

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This article was originally published in a special issue, "Novel Therapeutic Approaches in Biomedicine and Pharmaceutical Sciences" Indian J Pharm Sci 2021;83(6) Spl Issue "158-163"