

Changes and Clinical Value of Serum Cortisol Levels in Patients with Hypertensive Disorder in Pregnancy

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Abstract: Objective: To investigate the changes and the corresponding clinical value of serum cortisol levels in patients with hypertensive disorders during pregnancy.

Methods: In this study, 90 patients with different degrees of hypertensive disorders during pregnancy who were admitted from August 2018 to August 2019 in our hospital were set as the research objects. 90 cases were grouped according to the diagnostic criteria in Obstetrics and Gynecology, including 30 cases in each of the hypertension group, the preeclampsia group, and the eclampsia group. Another 30 healthy pregnant women were selected as the control group.

The serum cortisol levels of pregnant women in the above four groups were measured. **Results:** Compared with the control group, the serum cortisol levels in the other three groups were significantly increased. In perinatal outcome, compared with the control group, the three groups of patients had an increase in Apgar score, preterm birth, stillbirth rate, growth restriction rate and neonatal asphyxia rate. There were significant differences between groups ($P < 0.05$), and showed as gestational hypertension < preeclampsia < eclampsia.

Conclusion: With the exacerbation of hypertensive disorders during pregnancy, the serum cortisol level continues to increase, which has a serious adverse effect on the prognosis of the perinatal infants.

Keywords: Hypertensive disorders in pregnancy; Serum cortisol levels; Clinical value

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Hypertensive disorders in pregnancy is a common disease in pregnant women. According to the severity

of the patient's condition, it can be divided into gestational hypertension, preeclampsia and eclampsia. Hypertension, proteinuria, and lower extremity edema are common in the early stages of the disease. If the condition is severe, convulsions, coma, and even heart and kidney failure may occur, which seriously affects the outcome of delivery. Serum cortisol, which is a steroid hormone secreted by the fascicular and reticular bands of the adrenal cortex during the pregnancy, can be increased on the basis of the gestational weeks, which can not only promote fetal organ maturity, but also inhibit cell proliferation and severely affect the normal growth of the fetus. At present, clinical knowledge of hypertensive disorders in pregnancy has been deepened, and it has been found that serum cortisol has played a certain role in the occurrence and development of hypertensive disorders in pregnancy. In this study, our hospital used chemiluminescence to detect serum cortisol in patients with hypertensive disorder at different degrees during pregnancy, and compared their delivery outcomes. The report is as follows.

1 Information and methods

1.1 General information

90 patients with different degrees of hypertensive disorders during pregnancy who were admitted from August 2018 to August 2019 in our hospital were set as the research objects and divided into 3 groups. Gestational hypertension group: A total of 30 patients. The ages are about (30.1 ± 4.1) years old with the maximum age of 36 and minimum age of 23. The gestational weeks are about (38.53 ± 0.96) weeks with the longest gestational week of 39 and shortest gestational week of 37; Preeclampsia group: A total of

30 patients. The ages are about (31.0±3.2) years old with the maximum age of 35 and minimum age of 22. The gestational weeks are about (39.44±0.87) weeks with the longest gestational week of 41 and shortest gestational week of 38; Eclampsia group: A total of 30 patients. The ages are about (30.4±3.9) years old with the maximum age of 36 and minimum age of 22. The gestational weeks are about (39.27±1.23) weeks with the longest gestational week of 40 and shortest gestational week of 38; Control group: A total of 30 patients. The ages are about (31.4±2.9) years old with the maximum age of 34 and minimum age of 23. The gestational weeks are about (38.27±2.01) weeks with the longest gestational week of 41 and shortest gestational week of 39.

1.2 Research method

After all the patients were admitted to the hospital, their blood pressure was measured once every 4 hours. 4ml venous blood was extracted from the patients with a fasting state in the morning, and placed in the sodium citrate anticoagulation tube produced by Shandong Chengwu Huabo Medical Co., Ltd., and was centrifuged at a temperature of 2500 r / min for 10 minutes at room temperature. The upper serum was removed and stored at -20°C.

The chemiluminescence method was used to detect the serum cortisol levels of all the patients. The detection instrument was the German Roche E170 automatic chemiluminescence analyzer, and

the reagent was a Roche chemiluminescence cortisol detection kit.

1.3 Observation index

In this study, serum cortisol levels in pregnant women and perinatal outcomes were compared as observational index.

1.4 Statistical method

SPSS 20.0 was used to analyze and process the data in the study.

2 Result

2.1 Comparison of serum cortisol levels in study subjects

The serum cortisol level in gestational hypertension group was (319.57 ± 13.29) nmol / L, the preeclampsia group was (479.66 ± 11.78) nmol / L, the eclampsia group was (608.88 ± 20.24) nmol / L, and the control group was (259.35 ± 10.99) nmol / L. Compared with the control group, the serum cortisol levels in the other three groups were significantly increased. Among the three groups, the serum cortisol levels were significantly increased in the preeclampsia and eclampsia groups. In the comparison between the preeclampsia group and the eclampsia group, the serum cortisol level in the eclampsia group increased significantly, and the comparison between the groups was significantly different ($P < 0.05$). See table 1.

Table 1. Comparison of serum cortisol levels in study subjects ($\bar{x} \pm s$, nmol/L)

groups	serum cortisol level
gestational hypertension group (n=30)	319.57±13.29
preeclampsia group(n=30)	479.66±11.78
eclampsia group(n=30)	608.88±20.24
control group(n=30)	259.35±10.99

2.2 Comparison of perinatal outcomes of study subjects

In perinatal outcomes, compared with the control group, the three groups had increased Apgar scores, preterm births, stillbirth rates, fetal growth restriction rates, and neonatal asphyxia rates. Among the three groups of patients, compared with the gestational hypertension group, the preeclampsia

group and the eclampsia group showed an increase in Apgar score, preterm birth, stillbirth rate, fetal growth restriction rate and neonatal asphyxia rate. Compared with the preeclampsia group, the eclampsia group had an increase in Apgar score, preterm birth, stillbirth rate, fetal growth restriction rate, and neonatal asphyxia rate, and there were significant differences between groups ($P < 0.05$). See table 2.

Table 2. Comparison of perinatal outcomes of study subjects

groups	Apgar score ($\bar{x} \pm s$, unit)	preterm birth n(%)	stillbirth n(%)	fetal growth restriction n(%)	neonatal asphyxia n(%)
gestational hypertension group (n=30)	7.82±0.43	3(10.00)	2(6.66)	4(13.33)	4(13.33)
preeclampsia group(n=30)	6.91±0.35	6(20.00)	2(6.66)	10(33.33)	7(23.33)
eclampsia group(n=30)	4.12±0.22	25(83.33)	4(13.33)	13(43.33)	19(63.33)
control group(n=30)	9.32±0.20	1(3.33)	0	1(3.33)	1(3.33)

3 Discussion

According to related research, one of the common causes of essential hypertension is patients' elevated serum cortisol level, which can stimulate the central nervous system of patients, leading to excitement of the adrenal cortex axis system, and increase cortisol secretion. In general, patients with hypertension and coronary heart disease have significantly higher serum cortisol levels than healthy people. The main reason is that the increase in serum cortisol concentration can lead to an enhancement in the ability of the body's cardiovascular system to respond to other substances, resulting in an enhancement in the body's cardiac output and myocardial contractility, which can lead to hypertension. In addition, the increase of serum cortisol levels in the body can not only accelerate the production of angiotensinogen in the liver, and produce angiotensin faster, but also cause the patient to receive water retention, increase the blood volume, and lead to increased blood pressure. Traditionally, the correlation between elevated serum cortisol levels and the severity of hypertensive disorders in pregnancy has not been given enough attention. However, according to the results of this study, patients with elevated serum cortisol levels can increase their severity of hypertension.

In normal pregnancy, maternal and fetal adrenal-derived serum cortisol can usually increase with prolonged gestational age, but when this type of cortisol enters the blood circulation system, most of it binds to globulin, a few binds to albumin, and only about 10% of free cortisol can promote blood pressure. Once the pregnant woman has hypertensive disorders in pregnancy, her health can be damaged to varying degrees. This is mainly manifested in the fact that both the pregnant woman and the fetus are under a strong stress state, and may cause fetal retardation, premature birth, stillbirth, fetal asphyxia and other adverse conditions, which seriously affect the health of maternal and infant.

In this study, serum cortisol levels were (319.57±13.29) nmol/L in the gestational hypertension group, (479.66±11.78) nmol/L in the preeclampsia group, (608.88±20.24) nmol/L in the eclampsia group, and (259.35±10.99) nmol/L in the control group. Serum cortisol levels in the other three groups were significantly higher than in the control group. In perinatal outcome, compared with the control group, the patients in the three groups had an increase in Apgar score, preterm birth, stillbirth rate, fetal growth restriction rate, and neonatal asphyxia rate. The comparisons had significant differences ($P < 0.05$), and showed as gestational hypertension group < preeclampsia < eclampsia.

The results of this study are basically consistent with the results of previous studies, and it is concluded that the main component of serum cortisol is corticosterone, which can severely limit the growth of the fetus. It shows that cortisol can bind to protein and regulate the protein in the early pregnancy of the pregnant woman and plays an important role in the growth of the perinatal infants.

In summary, with the aggravation of the condition of patients with hypertension in pregnancy, the serum cortisol level will continue to increase, which will have a serious adverse effect on the prognosis of the perinatal infants. Patients with hypertension during pregnancy should test serum cortisol levels as early as possible, which is conducive to early treatment and can improve the prognosis of perinatal infants.

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