

Effect of Vitamin E Supplemented with Calcium in the Treatment of Hypertension During Pregnancy on Maternal and Infant Outcomes

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Abstract: *Objective:* To investigate the effect of vitamin E supplemented with calcium in the treatment of hypertension during pregnancy on maternal and infant outcomes. *Methods:* 60 patients with gestational hypertension admitted from January 2020 to December 2022 were recruited and randomly divided into the control group and the observation group, each group including 30 patients. The control group was given routine treatment, whereas the observation group was given routine treatment combined with vitamin E-supplemented calcium therapy, and both groups received treatment until delivery. The clinical effects of the observation group and the control group after treatment, systolic and diastolic blood pressure, mean arterial pressure, urine protein, blood lipid levels at different time points (before and after treatment), and maternal and child outcomes during treatment were uniformly compared and analyzed. *Results:* After treatment, the total clinical effective rate (93.33%) of the observation group was significantly higher than that of the control group (70.00%); compared with before treatment, the systolic blood pressure, diastolic blood pressure, mean arterial pressure, urine protein, TC, and TG levels of the two groups were all lower after treatment, and the observation group was at a lower level; there was no significant difference in the incidence of hemorrhage ($P > 0.05$). *Conclusion:* Vitamin E supplemented with calcium has a significant effect on the treatment of hypertension during pregnancy, which can help reduce blood pressure and blood lipid levels, reduce urinary protein content, improve maternal and child outcomes, and improve safety.

Keywords: Hypertension during pregnancy; Vitamin E; Calcium supplements; Maternal and infant outcomes

Online publication: September 21, 2023

1. Introduction

Gestational hypertension is a disease unique to pregnancy. Patients may present with typical symptoms such as elevated blood volume, fatigue, and limb edema. If not treated promptly and effectively, it may pose a serious threat to the life and health of pregnant women and perinatal infants^[1,2]. At present, clinical treatment mainly includes patient condition monitoring and conventional antihypertensive drugs. Among them, magnesium sulfate is a commonly used drug, which helps to improve blood circulation, and nifedipine can protect the myocardial tissue of the body. However, the above drugs have no significant antihypertensive effect on patients^[3,4]. As a fat-soluble antioxidant, vitamin E is beneficial to inhibit the process of lipid oxidation. At the

same time, it is especially important to improve the abnormal state of calcium metabolism in the body when supplemented with calcium^[5]. Based on this, the purpose of this study is to investigate the effect of vitamin E supplemented with calcium in the treatment of hypertension during pregnancy on maternal and fetal outcomes.

2. Materials and methods

2.1. General Information

The implementation of this study was approved by the medical ethics committee of the Nanjing Jiangbei Hospital. 60 patients with gestational hypertension admitted between January 2020 to December 2022 were recruited and divided into the control group and the observation group using the random number table method, each group including 30 patients. The gestational weeks of the patients in the control group ranged from 25 to 38 weeks, with an average of 30.15 ± 2.31 weeks; their age ranged from 22 to 38 years, with an average of 28.96 ± 2.11 years; 18 of them were primiparas and 12 were multiparas. The gestational weeks of the patients in the observation group ranged from 23 to 37 weeks, with an average of 29.12 ± 2.04 weeks; their age ranged from 24 to 39 years, with an average of 28.55 ± 2.18 years; 20 of them were primiparas and 10 were multiparas. The above-mentioned general data of the observation group and the control group were compared and showed no significant difference, hence, subsequent comparisons between different groups could be carried out. All patients and their family members signed the relevant supporting documents of informed consent. Diagnostic criteria were according to the relevant content in the “Guidelines for the Diagnosis and Treatment of Hypertensive Disorders During Pregnancy (2015)”^[6]. Inclusion criteria included those who meet the above diagnostic criteria, those who have not taken antihypertensive drugs 30 days before inclusion in the study, and those who have no allergic reactions to the drugs used in this study. Exclusion criteria included those with a history of hypertension, those with mental disorders, and those with liver and kidney impairment.

2.2. Treatment methods

The patients in the control group were given routine treatment of 10 mg nifedipine sustained-release tablets (Hubei Yikang Pharmaceutical Factory, National Pharmaceutical Approval H20113545, specifications: 10 mg) orally 3 times per day, 25% magnesium sulfate (Tonghua Huaxia Pharmaceutical Co., Ltd., National Drug Approval H20045165, specification: 10 mL:1 g) mixed with 500 mL of 5% glucose injection and then intravenously infused once daily. The patients in the observation group received the same routine treatment as the control group and combined with 50 mg vitamin E tablets (China Resources Double Crane Pharmaceutical Co., Ltd., National Drug Approval H11021689, specification: 5 mg) orally 3 times per day, and 0.6 g calcium carbonate tablets (Wuhan Tongji Modern Medical Technology Co., Ltd., National Pharmaceutical Approval H42022521, specification: 0.3 g) orally once daily. Both groups received treatment until delivery.

2.3. Observation indicators

Observation indicators of this study included:

- (1) Comparative analysis of the clinical efficacy of the two groups: after treatment, the evaluation was carried out according to the “Guidelines for the Diagnosis and Treatment of Hypertensive Disorders During Pregnancy (2015)”. After treatment, the symptoms of chest tightness, headache, abdominal discomfort, and other symptoms disappeared, the blood pressure was normal, and the range of blood pressure index tends to be normal, it is effective, and it is ineffective if it fails to reach the above standard after treatment. “1- inefficiency” is the formula for calculating the total clinical effective rate.
- (2) Comparative analysis of systolic blood pressure, diastolic blood pressure, mean arterial pressure, and

urinary protein levels between the two groups: the systolic blood pressure, diastolic blood pressure, and mean arterial pressure levels at different time points (before and after treatment) were measured with a sphygmomanometer, and 3 ml of urine was collected for 24 hours, and the urine protein levels of the two groups were detected by colorimetry.

- (3) The blood lipid levels of the two groups were compared and analyzed. About 3 mL of fasting venous blood was collected from the two groups at different time points (before and after treatment), and centrifuged to prepare serum (3500 r/min, 15 min). The levels of total cholesterol (TC) and triacylglycerol (TG) were detected with an automatic biochemical analyzer.
- (4) The maternal and fetal outcomes of the two groups were compared and analyzed, and the incidences of cesarean section, postpartum hemorrhage, neonatal asphyxia, and fetal distress were recorded and compared between the two groups during the treatment period.

2.4. Statistical methods

The calculation and analysis of the following data were carried out uniformly through SPSS 22.0 software. $P < 0.05$ suggests that the data difference is significant. The enumeration data involved are represented by numbers (n) and percentages (%), and the test method is χ^2 ; the measurement data involved are represented by mean \pm standard deviation (SD), and the test method is t .

3. Results

3.1. Comparative analysis of the clinical efficacy of the two groups

It can be found in **Table 1** that the total clinical effective rate (93.33%) of the observation group was significantly higher than that of the control group (70.00%) after treatment ($P < 0.05$).

Table 1. The clinical curative effect comparison of the observation and control groups [n (%)]

Group	Number of cases	Markedly effective	Effective	Ineffective	Total effective rate
Control group	30	8 (26.67)	13 (43.33)	9 (30.00)	21 (70.00)
Observation group	30	11 (36.67)	17 (56.67)	2 (6.67)	28 (93.33)
χ^2 value					5.455
P value					0.020

3.2. Comparative analysis

The systolic blood pressure, diastolic blood pressure, mean arterial pressure, and urine protein levels of the two groups can be found in **Table 2**. Compared with before treatment, the systolic blood pressure, diastolic blood pressure, mean arterial pressure, and urine protein levels of the two groups of patients after treatment were all reduced, and the observation group was at a lower level ($P < 0.05$).

Table 2. Comparison of systolic blood pressure, diastolic blood pressure, mean arterial pressure, and urine protein level between the observation and the control groups before and after treatment (mean \pm SD)

Group	Number of cases	Systolic blood pressure (mmHg)		Diastolic blood pressure (mmHg)		Mean arterial pressure (mmHg)		Urine protein (mg/24h)	
		Before	After	Before	After	Before	After	Before	After
Control group	30	151.44 \pm 26.52	133.06 \pm 20.19*	97.15 \pm 8.44	84.20 \pm 6.45*	127.49 \pm 18.48	110.06 \pm 16.52*	1,510.32 \pm 133.20	810.56 \pm 30.05*
Observation group	30	150.98 \pm 27.46	121.45 \pm 19.50*	96.98 \pm 9.12	72.11 \pm 5.97*	128.15 \pm 19.20	100.41 \pm 13.77*	1508.69 \pm 130.89	548.77 \pm 27.92*
<i>t</i> value		0.066	2.265	0.075	7.535	0.136	2.458	0.048	34.957
<i>P</i> value		0.948	0.027	0.941	< 0.001	0.893	0.017	0.962	< 0.001

3.3. Comparative analysis of blood lipid levels in the two groups

It can be found in **Table 3** that compared with before treatment, the levels of TC and TG in the two groups of patients decreased after treatment, and the observation group was at a lower level ($P < 0.05$).

Table 3. Comparison of blood lipid levels between the observation and the control groups before and after treatment (mean \pm SD, mmol/L)

Group	Number of cases	TC		TG	
		Before treatment	After treatment	Before treatment	After treatment
Control group	30	5.91 \pm 0.74	4.52 \pm 0.57 *	8.96 \pm 1.23	7.01 \pm 1.02 *
Observation group	30	5.89 \pm 0.81	4.01 \pm 0.33 *	8.87 \pm 1.35	6.25 \pm 0.74 *
<i>t</i> -value		0.100	4.241	0.270	3.303
<i>P</i> value		0.921	<0.001	0.788	0.001

Compared with before treatment, * $P < 0.05$.

3.4. Comparative analysis of maternal and child outcomes between the two groups

It can be found in **Table 4** that the incidence rates of cesarean section, neonatal asphyxia, and fetal distress in the observation group during the treatment period were all lower than those in the control group, $P < 0.05$ by statistical calculation; and there was no significant difference in the incidence of postpartum hemorrhage between the two groups ($P > 0.05$).

Table 4. Comparison of maternal and infant outcomes between the observation and the control groups during treatment [*n* (%)]

Group	Number of cases	Cesarean section	Postpartum hemorrhage	Neonatal asphyxia	Fetal distress
Control group	30	19 (63.33)	6 (20.00)	8 (26.67)	6 (20.00)
Observation group	30	11 (36.67)	1 (3.33)	1 (3.33)	0 (0.00)
χ^2 value		4.267	2.588	4.706	4.630
<i>P</i> value		0.039	0.108	0.030	0.031

4. Discussion

Gestational hypertension refers to the first occurrence of diastolic blood pressure ≥ 90 mmHg and systolic blood pressure ≥ 140 mmHg after 20 weeks of gestation. Multiple pregnancy, advanced age, and previous preeclampsia are all risk factors for the onset. At present, the main purpose of clinical treatment for hypertensive patients during pregnancy is symptomatic treatment, alleviating the symptoms of patients, and then controlling the disease^[7,8]. Conventional treatment is not effective in improving various maternal and child outcomes, and it is necessary to seek more effective treatment options to improve the prognosis of patients^[9].

Studies have shown that the onset of hypertension during pregnancy is closely related to abnormal hemodynamics, calcium deficiency, and other factors^[10]. Vitamin E can inhibit the peroxidation process of phospholipids, thereby reducing the degree of damage to vascular endothelial cells; in addition, calcium supplements can help correct the body's blood calcium imbalance, reduce the permeability of cell membranes, and inhibit the permeability of vascular smooth muscle cells, thereby reducing blood pressure. The combined application of the two can also reduce the leakage of body protein and reduce the content of urinary protein^[11]. Through the analysis of the results of this study, it can be found that after treatment, compared with the control group, the clinical total effective rate of the observation group is at a higher level, and the systolic blood pressure, diastolic blood pressure, mean arterial pressure and urinary protein are all at a lower level, suggesting that the application of vitamin E supplemented with calcium in the treatment of hypertensive patients during pregnancy is beneficial to alleviate the clinical symptoms of patients, reduce blood pressure and urine protein content, and the effect is significant.

Hypertensive patients during pregnancy are often accompanied by lipid metabolism disorders and are in an abnormal state. The increase in blood lipid concentration can break the balance of oxidation and antioxidant status and increase the risk of acute atherosclerosis^[12]. Exogenous vitamin E supplementation is beneficial to correct the above imbalance, inhibit oxidative stress, reduce toxic products, and improve blood lipid metabolism^[13]. On the other hand, vitamin E and calcium supplements are beneficial to supplement nutrients, increase the flow level of red blood cells, improve the microcirculation perfusion of the uterus and placenta, correct the ischemia and hypoxia status of patients and fetuses, and improve adverse maternal and infant outcomes^[14]. After analyzing the results of this study, it can be found that compared with the control group, the incidences of TC, TG after treatment and cesarean section, neonatal asphyxia, and fetal distress in the observation group were lower than those in the control group.

In summary, vitamin E supplemented with calcium has a significant effect on the treatment of hypertension during pregnancy, which can help reduce blood pressure and blood lipid levels, reduce urinary protein content, and improve maternal and child outcomes. It is worthy of clinical application and promotion.

Disclosure statement

The author declares no conflicts of interest.

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