

Original Article

Effects of individualized nutritional nursing in pregnant women with gestational diabetes mellitus complicated with hypertensive disorder

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Received August 5, 2020; Accepted September 10, 2020; Epub December 15, 2020; Published December 30, 2020

Abstract: Objective: To look into the effects of individualized nutritional nursing on pregnant women with gestational diabetes mellitus (GDM) complicated with hypertensive disorder complicating pregnancy (HDCP). Methods: We selected 100 pregnant women who suffered from GDM complicated with HDCP that received treatment in West China Second University Hospital, Sichuan University/West China Women's and Children's Hospital from April 2019 to April 2020 for the present retrospective study. The 100 selected patients were equally divided into the observation group (n = 50) and routine nursing group (n = 50). Patients in the observation group received individualized nutritional care, including combined health education, individualized nutrition and exercise prescription, psychological intervention, etc. based on different stages of gestational weeks. At the same time, patients in the routine nursing group received routine nursing care. Results: The complication rate of parturients after delivery was 28.00% in the control group, which was much higher than 8.00% in the observation group ($\chi^2 = 4.500$, $P = 0.034$). Besides, the amniotic fluid index of the observation group was markedly increased after nursing ($P = 0.000$). Total nursing satisfaction of the observation group was also substantially higher than that of control group ($t = 14.324$, $P = 0.000$). What is more, the health of the newborns was much better the observation group than that of control group ($\chi^2 = 4.762$, $P = 0.029$). After the intervention, blood glucose and blood pressure in the observation group were both memorably improved than those in the control group ($P < 0.05$). Conclusion: Individualized nutrition nursing for pregnant women with GDM and HDCP effectively reduced complications, blood sugar and blood pressure, and accelerated the recovery of pregnant women, which are all worthy of wide application and promotion.

Keywords: Individualized nutrition nursing, gestational diabetes mellitus, hypertensive disorder complicating pregnancy

Introduction

Gestational diabetes mellitus (GDM) refers to the first occurrence of diabetes mellitus during pregnancy, which has adverse effects on the outcomes of both the mother and their safety. Clinical pathological studies have shown that the islet cells of GDM patients could be damaged by hyperglycemia, thus promoting the generation of plasminogen activator inhibitor-1 (PAI-1) causing damage of endothelial cells, resulting in systemic vasospasms and eventually inducing hypertensive disorder complicating pregnancy (HDCP) [1]. GDM combined with

HDCP not only increases the risk of preeclampsia, premature delivery, fetal respiratory distress, pulmonary edema, but can also directly lead to the death of mother and infant [2, 3].

Individualized nutritional care is one of the new emerging nursing methods. It can effectively balance the diet and nutrition of pregnant women by evaluating the nutritional status of pregnant women to formulate individualized dietary nutrition programs and implementing supervision at the same time. Individualized nutritional care has gradually become an important part of nursing. Through a series of

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intervention measures, pregnant women can achieve pleasure in psychology, physiology, society and spirit, so as to significantly improve their physical condition and eliminate psychological adverse effects [4]. Therefore, individualized nutritional care has been valued and widely applied by medical staff [5]. This study aimed to explore the clinical effects of individualized nutritional care on reducing the incidence of complications of pregnant women with GDM and their fetuses through conducting intensive nursing intervention based on gestational stage. Thus, our present study selected 100 pregnant women who suffered from GDM complicated with HDCP in West China Second University Hospital, Sichuan University/West China Women's and Children's Hospital from April 2019 to April 2020 for investigation. Effects of individualized nutritional care on blood glucose and blood pressure control of pregnant women with GDM and HDCP were explored, in order to decrease the degree of discomfort of the pregnant women and improve their quality of life.

Materials and methods

General materials

One hundred pregnant women who suffered from GDM complicated with HDCP who received treatment in West China Second University Hospital, Sichuan University/West China Women's and Children's Hospital from April 2019 to April 2020 were selected for our investigation. These pregnant women were randomly divided into the observation group (intensive care group, $n = 50$) and the routine nursing group ($n = 50$) when they were diagnosed with GDM for the first time. Patients in both groups received different interventions as indicated and were observed until delivery. Inclusive criteria: According to the diagnostic methods and standards of IADPSG2010, fasting plasma glucose (FPG) ≥ 5.1 mmol/L when first examined at 24-28 weeks of pregnancy could be diagnosed as GDM [6]. Exclusion criteria: (1) Twin or multiple pregnancies; (2) combined with other metabolic diseases such as thyroid dysfunction, abnormal secretion of adrenaline or adrenocorticotrophic hormone or growth hormone; (3) combined with other diseases. This study was approved by the Ethics Committee of West China Second University Hospital,

Sichuan University/West China Women's and Children's Hospital and all patients provided written informed consent.

Methods

Control group: The control group: routine nursing was implemented for the pregnant women in the control group and the main nursing measures are listed as follows: construct a favorable rehabilitation environment for pregnant women; nursing staff closely observed the indicators of pregnant women, such as blood glucose, blood pressure detection and infection, etc., and conducted psychological counseling for pregnant women regularly, so as to reduce the psychological barriers and negative emotions of pregnant women, and to achieve a more comfortable state [7, 8].

Observation group: On the basis of the control group, additional individualized nutritional care measures were conducted in the observation group.

(1) Prenatal care: evaluate the dietary preference of pregnant women and implement individualized nutritional intervention. Then, experts from the Nutrition Department and Endocrinology Department explained the diet plan to pregnant women and their families, and informed them of scientific methods of food collocation based on the results of the consultation, so as to maintain balanced nutrition. The daily caloric requirement in the first trimester of pregnancy was 105 kJ/Kg, and was 126 kJ/kg in the second and third trimester, in which protein accounted for 25%, carbohydrates accounted for 55% and fat accounted for 20% of the diet, which was consumed in 5-6 meals a day. In addition, pregnant women adhered to low salt and low sugar diets, and were supplemented with folic acid appropriately during pregnancy [7, 8].

(2) Intrapartum care: Continuous observation of the labor process changes and evaluation of vaginal delivery status. After the uterine mouth opened to 2 cm, the pregnant woman was sent to the delivery room for one-on-one midwifery, and the pregnant woman was instructed to relax. Before delivery, B-ultrasound examination was carried out. Besides, appropriate position should be selected according to fetal position, and a venous channel was created,

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Table 1. Comparison of general information of pregnant women ($\bar{x} \pm sd$)

General information	Control group	Observation group	t/ χ^2	P
Age (year)	28.5 \pm 3.1	29.6 \pm 3.2	1.746	0.084
BMI (kg/m ²)	27.52 \pm 2.81	28.30 \pm 3.11	1.354	0.179
Gestational age (week)	39.6 \pm 1.9	39.8 \pm 1.0	0.125	0.581
Height (cm)	159.5 \pm 20.5	159.48 \pm 20.4	0.015	0.988

electrocardiogram (ECG) monitoring of mother and fetus was done, and first-aid kit were prepared. Shortening of the second stage of labor was done as much as possible [9, 10]. During this period, it was immediately converted to cesarean section if the risk of vaginal delivery increased, and emergency preparations for cesarean section were made in advance.

(3) Postpartum care: After birth, the umbilical cord blood was collected appropriately to measure the blood glucose, bilirubin and other indicators. The infants were nursed as high-risk infants and were placed in an incubator. At the same time, oxygen inhalation and warmth were given. Thirty minutes later, breast-feeding was started and glucose solution was dripped. At the same time, the physical signs and complexion were observed [11]. Then, 24 h after giving birth, insulin treatment at 50% of original dose on the parturient woman was conducted. Then, the dose of insulin was adjusted and evaluation of physical signs and the symptoms of the parturient woman were made. Any abnormalities were checked in time. At the same time, the parturient woman was urged to rest [12]. In addition, keeping the perineum clean was a priority. After delivery, the diet was formulated by a nutritionist to guide the parturient to have a high protein and high vitamin diet during the month. At the same time, an appropriate exercise plan was made according to the recovery of the parturient to enhance their health. It was also suggested to get out of bed as soon as possible to promote lochia excretion and train the uterine involution function [13, 14].

Outcome measures

Main outcome measures: (1) GDM related indicators: Blood glucose (fasting and 2 h after meal), amniotic fluid, weight gain, etc. (2) Pregnancy outcome related indicators: complications after delivery (puerperal infection and

postpartum hemorrhage), changes of amniotic fluid index, etc. (3) Perinatal health related indicators: neonatal hypoglycemia, hyperbilirubinemia, neonatal asphyxia, neonatal pneumonia, neonatal hypoxic-ischemic encephalopathy, etc. [15].

Secondary outcome measures: (1) Nursing satisfaction was assessed

according to a self-made questionnaire at discharge and was divided into three standards: very satisfied, basically satisfied and dissatisfied, mainly focusing on nursing attitude, professional level, care degree, diagnosis and treatment environment, diagnosis and treatment skills. Nursing satisfaction = cases of (satisfaction + basic satisfaction)/total cases * 100% [16].

Statistical analysis

All data were analyzed using SPSS 22.0. The test of normality was conducted for the measurement data, and enumeration data was expressed as number of cases/percentage (n/%). $P < 0.05$ meant the difference was statistically significant.

Results

Comparison of general information of pregnant women

There was no difference in the general information of the pregnant women between groups ($P > 0.05$). See **Table 1**.

Comparison of complications after delivery

There were 7 cases of puerperal infection and 7 cases of postpartum hemorrhage in the control group, and each classification had 2 cases in the observation group. Thus, the total complication rate of the control group was 28.00% (14/50), which was significantly higher than 8.00% (4/50) of the observation group ($\chi^2 = 4.500$, $P = 0.034$). See **Table 2**.

Comparison of changes of amniotic fluid index

The amniotic fluid index of both groups was measured before and after intervention. Intra group comparison showed that the amniotic

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Table 2. Comparison of complications after delivery (n, %)

Groups	Cases	Puerperal infection	Postpartum hemorrhage	Total incidence
Control group	50	7 (14.00)	7 (14.00)	14 (28.00)
Observation group	50	2 (4.00)	2 (4.00)	4 (8.00)
χ^2 value				4.500
P value				0.034

Table 3. Comparison about changes of amniotic fluid index (cm, $x \pm sd$)

Groups	Cases	Before intervention	After intervention	t	P value
Control group	50	16.22 \pm 1.42	15.97 \pm 2.33	0.657	0.513
Observation group	50	16.23 \pm 1.40	18.94 \pm 2.44	-6.814	0.000
t		0.027	6.239		
P value		0.979	0.000		

Table 4. Comparison of nursing satisfaction (n, %)

Groups	Cases	Very satisfied	Basically satisfied	Dissatisfied	Total satisfaction
Control group	50	25 (50.00)	14 (28.00)	13 (26.00)	39 (78.00)
Observation group	50	32 (64.00)	16 (32.00)	2 (4.00)	48 (96.00)
t					14.324
P					0.000

fluid index of the observation group was markedly increased after treatment compared with before treatment ($P = 0.000$). However, there was no significant difference in the control group before and after treatment ($P > 0.05$). Group comparison showed that there was no significant difference in amniotic fluid index between the two groups before intervention ($P > 0.05$). However, the amniotic fluid index of the observation group was markedly increased after the intervention and the difference between the two groups was statistically significant ($P = 0.000$). See **Table 3**.

Comparison of nursing satisfaction

The observation group had much higher total nursing satisfaction than the control group ($t = 14.324$, $P = 0.000$). See **Table 4**.

Comparison of perinatal health

Compared with the control group, the incidence of neonatal hypoglycemia, hyperbilirubinemia, neonatal asphyxia, neonatal pneumonia and neonatal ischemia in the observation group

were all much lower ($\chi^2 = 4.762$, $P = 0.029$). See **Table 5**.

Comparison of blood glucose and blood pressure in two groups of pregnant women

After nursing, the blood glucose level and blood pressure level of the two groups were both largely decreased through the nursing ($P < 0.05$). After intervention, the level of Fasting blood glucose (FBG), two-hour postprandial blood glucose (2 hPG), systolic blood pressure (SBP) and diastolic blood pressure (DBP) in the observation group was all lower than those in the control group ($P < 0.05$). See **Figures 1-4**.

Discussion

At present, GDM combined with HDCP has become a common disease in the clinic. A large number of clinical trials and survey data show that most pregnant women have poor understanding and mastery of the rehabilitation knowledge of GDM, thus leading to negative psychological emotions of many pregnant women and poor prognosis [17]. During the past nursing process, untimely nursing commonly occurs due to inaccurate information provided by the patients, which further leads to the unclear health of patients. In previous studies, blood glucose and blood pressure levels of pregnant women can be controlled, and hypotension and hypoglycemia can also be avoided through strengthening of dietary intervention [18]. Some studies have shown that individualized nutritional care can reduce the psychological pain of patients and shorten the healing time, thus fully meeting the needs of patients [19]. The premise of the implementation of humanized and targeted nursing is to effectively integrate clinical nursing experience, comprehensively evaluate the personal situation of the pregnant women, fully understand their nursing needs and actively listen to their main complaints. This nursing mea-

Table 5. Comparison of perinatal health (n, %)

Groups	Cases	Neonatal Hypoglycemia	Hyperbilirubinemia	Neonatal Pneumonia	Neonatal Asphyxia	Neonatal Ischemia	Incidence
Control group	50	1 (2.00)	3 (6.00)	2 (4.00)	2 (4.00)	4 (8.00)	12 (24.00)
Observation group	50	0 (0.00)	1 (2.00)	1 (2.00)	1 (2.00)	1 (2.00)	4 (8.00)
χ^2 value							4.762
P value							0.029

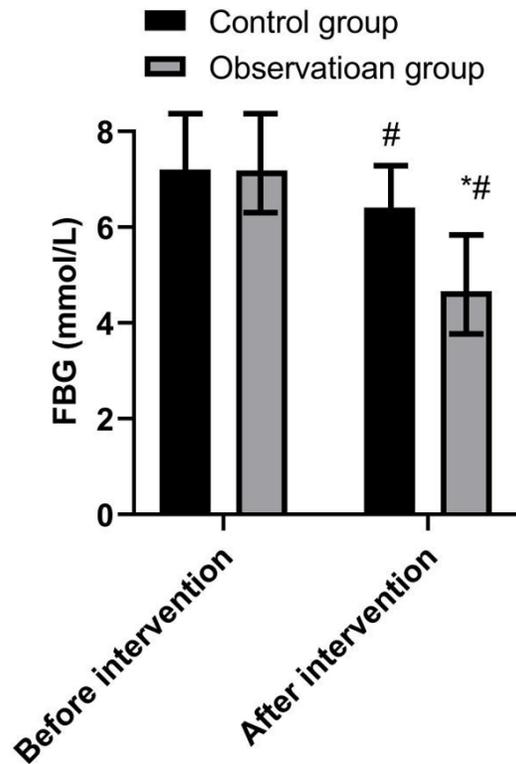


Figure 1. Comparison of FBG between two groups of pregnant women. Note: Compared with the before nursing in the same group, $^{\#}P < 0.05$; compared with the control group after nursing, $^{*}P < 0.05$. FBG: Fasting blood glucose.

sures aims to control the disease, ensure the safety of the pregnancy and puerperium, and reduce maternal and infant complications.

In recent years, clinical studies have found that high-quality clinical nursing can effectively control the blood glucose level of patients with gestational diabetes mellitus and greatly improve the pregnancy outcome [20]. In our present study, the blood glucose and blood pressure indexes of pregnant women in the observation group were both much better than those in the control group. Our results indicate that reasonable nursing has positive signifi-

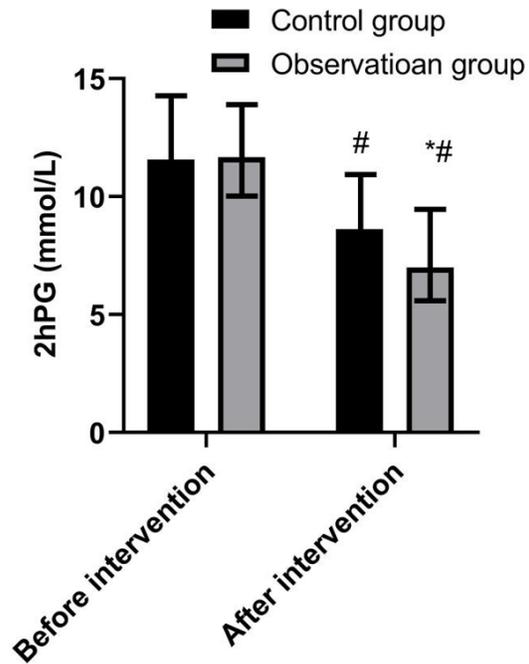


Figure 2. Comparison of 2 hPG between two groups of pregnant women. Note: Compared with the before nursing in the same group, $^{\#}P < 0.05$; compared with the control group after nursing, $^{*}P < 0.05$. 2 hPG: two-hour postprandial blood glucose.

cance for pregnant women with GDM and HDCP, which is consistent with the existing research results [21]. At the same time, the incidence of complications in the observation group has been markedly reduced. Besides, no statistically significant difference existed in the complications and amniotic fluid index after delivery between these two nursing methods. In addition, the investigation of pregnant women showed that the observation group had much higher satisfaction than the control group. Therefore, individualized nutritional nursing intervention guaranteed the nursing service of pregnant women with GDM and HDCP. However, this study is a single center study with small sample size, the application value of individualized nutritional care has not

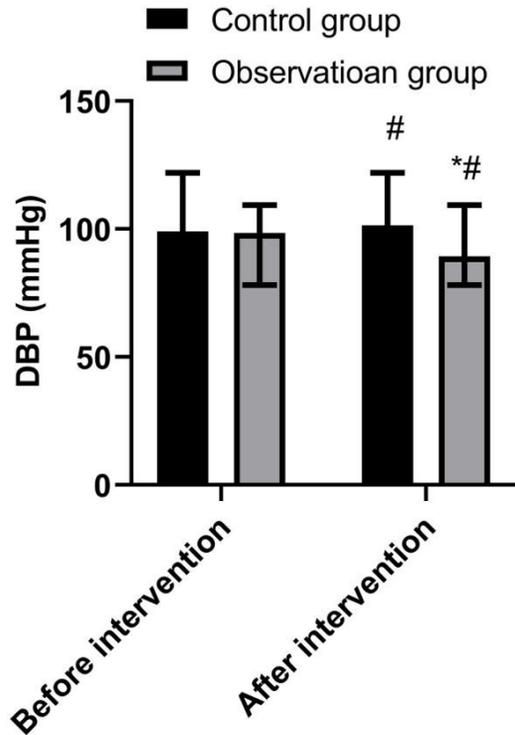


Figure 3. Comparison of DBP between two groups of pregnant women. Note: Compared with the before nursing in the same group, [#]P < 0.05; compared with the control group after nursing, ^{*}P < 0.05. DBP: diastolic blood pressure.

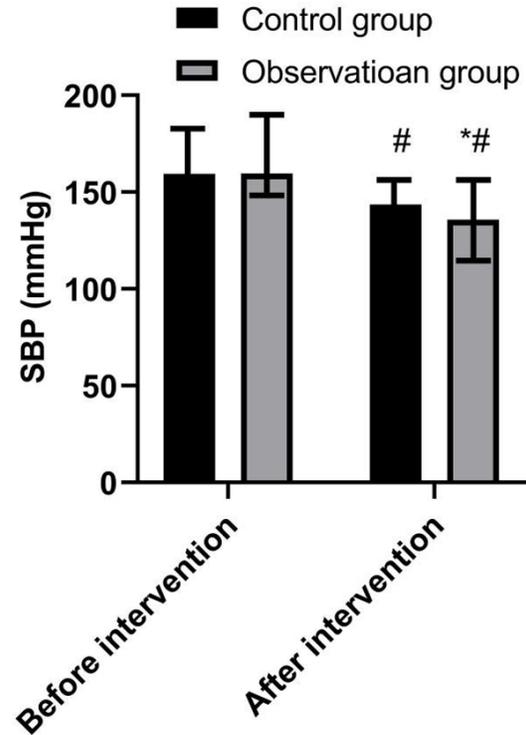


Figure 4. Comparison of SBP between two groups of pregnant women. Note: Compared with the before nursing in the same group, [#]P < 0.05; compared with the control group after nursing, ^{*}P < 0.05. SBP: systolic blood pressure.

been deeply explored. In the future research, we will carry out multi center research and further expand the sample size to make further research about its application value.

To sum up, the results of this study fully prove that individualized nutrition nursing intervention on pregnant women with GDM and HDCP can effectively reduce complications, control blood glucose and blood pressure, improve the quality of life, and promote the recovery of pregnant women, which is worthy of wide application and promotion.

Disclosure of conflict of interest

None.

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