

Original Article

Clinical efficacy of nutritional diet therapy on gestational diabetes mellitus

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Abstract: Objective: To analyze the clinical effect of nutritional diet therapy on gestational diabetes mellitus (GDM). Methods: One hundred pregnant women with GDM who were admitted to Ji'nan Central Hospital were enrolled in this study. The patients were divided into an observation group (received individualized nutrition nursing, n=50) and a control group (received routine nursing, n=50). Results: The total incidence of postpartum complications in the control group was 28.00%, which was significantly higher than 8.00% in the observation group ($\chi^2=4.500$, $P=0.034$). After nursing, the amniotic fluid index in the observation group increased significantly as compared with the control group ($P<0.001$). The nursing satisfaction rate of the observation group was higher than that of the control group. The difference was statistically significant ($t=14.324$, $P<0.001$). The health condition of newborns in the observation group was better than that in the control group ($\chi^2=4.762$, $P=0.029$). After intervention, the level of blood glucose of women in the observation group was better than that of the control group ($P<0.05$). Conclusion: Nutritional diet therapy for pregnant women with GDM can help to reduce complications, control blood sugar, and improve the neonatal outcome. It is also conducive to the postpartum rehabilitation of pregnant women. It is worthy of clinical application and promotion.

Keywords: Nutritional diet therapy, gestational diabetes mellitus, clinical effect

Introduction

Gestational diabetes mellitus (GDM), as one of the common complications during pregnancy, mainly refers to the abnormal glucose tolerance or fasting blood glucose caused by a disorder in glucose metabolism, with an incidence of 1% to 5% [1]. Studies have shown that the onset of gestational diabetes could increase the incidence of adverse pregnancy outcomes, like stillbirth and macrosomia [2]. It was found that diet intervention is of great significance in controlling GDM [3]. Nutritional diet therapy is important in improving the quality of life for pregnant women with GDM.

Nutritional diet therapy has become an important part of nursing. Through related intervention measures, pregnant women can be in a pleasant state both psychologically and physiologically. A study found reduced complications in patients with GDM after personalized nutrition health education, and the scores of diets

and cognitive behavior were significantly improved [4].

With the improvement of living standards, people are paying more attention to diet. Statistics show more than 30% of pregnant women hire a nutritionist during pregnancy. Due to the different physical functions of each individual, a universal regimen is inappropriate and counterproductive. A reasonable nutritional diet is necessary to control the blood glucose level and maintain a healthy environment for the fetus. To provide better nursing for pregnant women, medical staff should carry out effective nutritional nursing interventions for pregnant women to control their blood glucose appropriate to the individual condition of each pregnant woman. Nurses should actively provide nutritional diet therapy to improve the quality of life of pregnant women [5, 6]. In this study, clinical data of 100 pregnant women with GDM who were admitted into our hospital from December 2019 to December 2020 were analyzed to

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explore the effect of nutritional diet therapy on blood glucose control in pregnant women with GDM.

Materials and methods

Baseline data

In this study, clinical data of 100 primiparas who came to our hospital for GDM treatment from December 2019 to December 2020 were analyzed. Using the nursing mode, the patients were divided into a control group (routine nursing) and an observation group (nutritional diet therapy). Nursing intervention was implemented as soon as the patients were admitted. Relevant data of the two groups were collected one month after nursing intervention. This study was approved by the ethics committee of Ji'nan Central Hospital (2019-26).

Inclusion and exclusion criteria

Inclusion criteria: (1) Pregnant women with an age of 22 to 40 years old, and a gestation of 37 to 42 weeks. (2) Singleton pregnant women with GDM. (3) Pregnant women who had vaginal delivery.

Exclusion criteria: (1) Pregnant women with gestational hypertension. (2) Pregnant women with major organ diseases in heart, liver, or kidney. (3) Pregnant women with functional disorders such as thyroid disease, immune disease, or blood disease. (4) Pregnant women with mental illnesses. (5) Pregnant women who were recently treated with hypoglycemic drugs.

Methods

The control group: The pregnant women in this group were provided with routine nursing care. The nurses created a good rehabilitation environment which included close observation of blood glucose and infection related indicators and providing regular psychological counseling to reduce psychological burdens and negative emotions [7, 8].

The observation group: Based on the control group, patients in the observation group received an additional nutritional diet therapy.

Establishment of a research team: An integrated diet therapy group for nutritional assessment and treatment was established. The re-

search team was composed of specialist physicians, nurses, and dietitians. The group members were trained for relevant knowledge and precautions [9, 10].

Identification of the problems: The nurses observed the conditions of the patients and recorded feedback from the patients about the treatment and recovery [11, 12].

The form, content, and time of the nursing nutrition therapy: The first two nursing nutrition therapies were face-to-face communication, and targeted therapy was provided based on the individual conditions of patients. Telephone communication was conducted for 4 times on average, with an interval of 2 weeks to 1 month between each phone call [13]. Wechat was also used to communicate with patients. The individual diet was designed pertaining to the treatment and patients' personal conditions. A strict diet intervention and at least seven hours of sleep was suggested for patients. During treatment, many patients had negative emotions because of their conditions or family situation. Support was provided from nurses to reduce their negative emotions. During communication, nurses tried to understand the patients' feeling to formulate a better, more relevant treatment plan. The successful-Rehabilitation therapy was carried out by professionals to help control blood glucose and reduce the occurrence of complications.

Outcome measures

All data were collected before the pregnant women were discharged. There were 3 primary outcome measures. (1) GDM was evaluated by related indicators such as blood sugar (fasting, 2 h after meal), amniotic fluid, and weight gain. (2) Pregnancy outcome was analyzed based on postpartum complications (puerperal infection and postpartum hemorrhage) and changes of amniotic fluid index. (3) Perinatal health was observed if they had neonatal hypoglycemia, hyperbilirubinemia, neonatal asphyxia, neonatal pneumonia, or neonatal ischemic encephalopathy [14].

There were 2 secondary outcome measures. (1) Satisfaction rate of nursing work was evaluated by a self-made questionnaire, which included work attitude, professional level, attentiveness, treatment environment, and skills

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Table 1. Comparison of baseline data between the two groups ($\bar{x}\pm sd$)

Baseline data	Control group	Observation group	t	P
Age (years)	28.5±3.1	29.6±3.2	1.746	0.084
BMI (kg/m ²)	27.52±2.81	28.30±3.11	1.354	0.179
Gestational weeks (W)	39.6±1.9	39.8±1.0	0.125	0.581
Height (cm)	159.50±20.50	159.48±20.40	0.015	0.988
High blood pressure			0.278	0.598
Yes	17	19		
No	33	31		

Note: BMI: body mass index; t: result from t test; P: P value.

Three satisfaction levels were established: very satisfied, basically satisfied and dissatisfied. Nursing satisfaction rate = (cases of very satisfied + cases of basically satisfied)/total number of cases *100% [15]. (2) Blood glucose and body weight were measured and regularly recorded every week. The contact information of each patient and their family members were filed for regular follow-up.

Statistical analysis

Statistical software SPSS 17.0 was used for statistical analysis. The measured data that conformed to normal distribution were expressed as mean \pm standard deviation ($\bar{x}\pm sd$). Independent sample t test was used for comparison between the two groups. The paired t test was used for the comparison before and after treatment within the group. The enumeration data were expressed by the number of cases and percentage (n, %), and compared by the chi-square test (χ^2). $P<0.05$ indicated that the difference was statistically significant.

Results

Comparison of the basic conditions between the two groups

There was no difference in the baseline data between the pregnant women in the two groups (all $P>0.05$). See **Table 1** for details.

Comparison of postpartum complications between the two groups

There were 7 cases of puerperal infection and 7 cases of postpartum hemorrhage in the control group, with an incidence of 28.00% (14/50). There were 2 cases of postpartum hemorrhage and 2 cases of puerperal infection

in the observation group, with an incidence of 8.00% (4/50). This was significantly lower than that in the control group ($P<0.05$, **Table 2**).

Comparison of the changes in amniotic fluid index between the two groups

As compared with before treatment, the amniotic fluid index in the observation group increased significantly after treatment ($P<0.001$). There was no significant difference in the amniotic fluid index in the control group before or after treatment ($P>0.05$). The comparison between the two groups showed that there was no significant difference in the amniotic fluid index between the two groups before the intervention ($P>0.05$). After nursing, the amniotic fluid index in the observation group increased significantly as compared with the control group ($P<0.001$). See **Table 3**.

Comparison of nursing satisfaction rate between the two groups

The total nursing satisfaction rate of the observation group was higher than that of the control group. The difference was statistically significant ($t=4.567$, $P<0.001$). See **Table 4**.

Comparison of perinatal health between the two groups

The incidences of neonatal hypoglycemia, hyperbilirubinemia, neonatal asphyxia, neonatal pneumonia, and neonatal ischemia in the observation group were lower than those in the control group. The difference was statistically significant ($t=3.154$, $P=0.029$), as shown in **Table 5**.

Comparison of blood glucose levels between the two groups

After nursing, the blood glucose level was lower than that before nursing in both groups. The differences were statistically significant ($P<0.05$). After intervention, the fasting blood glucose (FBG) and 2-hours postprandial blood glucose (2hPG) in the observation group were lower than those in the control group. The dif-

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Table 2. Comparison of pregnancy complications between the two groups (n, %)

Groups	n	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				1.257
P				0.034

Note: χ^2 : result from chi-square test; P: P value.

Table 3. Comparison of the changes in amniotic fluid index between the two groups (cm, $\bar{x} \pm sd$)

Groups	n	Before intervention	After intervention	t	P
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	<0.001
t	/	0.027	3.124	/	/
P	/	0.979	<0.001	/	/

Note: t: result from t test; P: P value.

Table 4. Comparison of nursing satisfaction rate between the two groups (n, %)

Groups	n	Very satisfied	Basically satisfied	Dissatisfied	Overall satisfaction rate
Control group	50	25 (50.00)	14 (28.00)	11 (22.00)	39 (78.00)
Observation group	50	32 (64.00)	16 (32.00)	2 (4.00)	48 (96.00)
χ^2	/	/	/	/	4.567
P	/	/	/	/	<0.001

Note: χ^2 : result from chi-square test; P: P value.

Table 5. Comparison of perinatal health between the two groups (n, %)

Groups	Control group	Observation group	χ^2	P
n	50	50	/	/
Neonatal hypoglycemia	1 (2.00)	0 (0.00)	/	/
Hyperbilirubinemia	3 (6.00)	1 (2.00)	/	/
Neonatal pneumonia	2 (4.00)	1 (2.00)	/	/
Neonatal asphyxia	2 (4.00)	1 (2.00)	/	/
Neonatal ischemia	4 (8.00)	1 (2.00)	/	/
Incidence	12 (24.00)	4 (8.00)	3.154	0.029

Note: χ^2 : result from chi-square test; P: P value.

ferences were statistically significant ($P < 0.05$), as shown in **Figure 1, 2**.

Discussion

Gestational diabetes mellitus is a serious disease during pregnancy with a high incidence. It can cause many complications, such as gestational hypertension, premature delivery, and excessive amniotic fluid. It can also cause pathological changes of the fetus, such as premature death and malformation of the fetus. This can seriously endanger the safety of pregnant women and fetuses. The occurrence of GDM is

closely related to abnormal glucose metabolism during pregnancy, mainly because of the increasing needs of maternal nutrition with the continuous growth of the fetus [16]. With the progress of the gestation, the secretion of insulin antagonist continues to increase, and the body becomes less sensitive to insulin, resulting in

abnormal blood glucose metabolism and leading to GDM [17]. Since the 21st century, the incidence of GDM has been increasing, reaching as high as 13% [18]. Most of the clinical routine therapies are simple in form, narrow in scope, and have a lack of scientific support [19]. It is particularly important to find reasonable and scientific nutritional therapy to avoid abnormal blood glucose levels in pregnant women and newborns.

The change of blood glucose in patients with GDM is positively correlated with fetal development and birth weight. The higher the glucose

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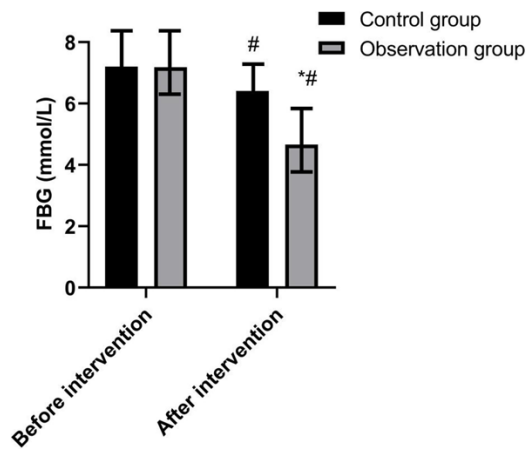


Figure 1. Comparison of FBG between the two groups. Compared with the same group before nursing, [#] $P < 0.05$; compared with the control group after nursing, ^{*} $P < 0.05$. FBG: fasting blood glucose.

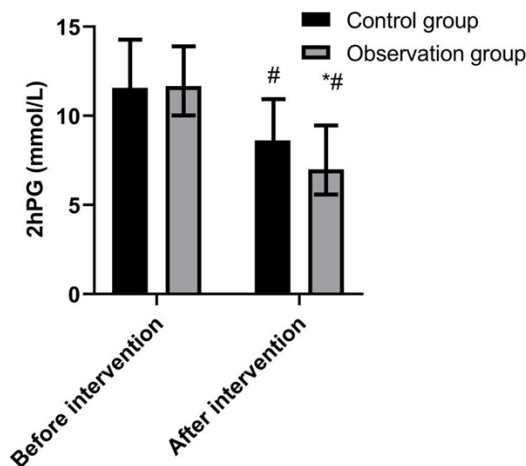


Figure 2. Comparison of 2hPG between the two groups. Compared with the same group before nursing, [#] $P < 0.05$; compared with the control group after nursing, ^{*} $P < 0.05$. 2hPG: 2-hours postprandial blood glucose.

sugar level, the higher the risk of the fetus to develop macrosomia. It was confirmed that during pregnancy, pregnant women are likely to be irritable [20]. During pregnancy, the hormones in the body remain in an excited state, which can easily change the blood glucose level and promote the stimulation of blood glucose on pancreatic cells, inducing the production of insulin. A previous study showed that nutritional diet therapy had benefits for gestational diabetes and could improve pregnancy and fetal outcome [21]. To meet the needs of pregnant women and fetuses, nutrition therapy also

aims to decrease abnormal blood glucose and related complications through diet control and nutrition knowledge education. Reasonable exercise, medication prescribed by doctors, and self-monitoring of blood glucose level can help pregnant women to avoid the attack of hypotension. In this study, our results also showed that after nursing, the general condition of pregnant women in the observation group was better than that in the control group. This indicated that nutritional diet therapy had a positive effect on pregnant women with GDM, which is consistent with the existing research results.

There are still some limitations in this study. We only explored the influence of diet and blood glucose indicators in patients with GDM, but did not conduct an in-depth research on indicators such as diabetes family history and nutritional intake structure. The number of cases in this study is small, which may have affected the results of the study.

This study found that the nutritional diet therapy can reduce complications, control glucose sugar, and improve the quality of life of pregnant women with GDM. It is beneficial to the rehabilitation of pregnant women and worthy of clinical application and promotion.

Disclosure of conflict of interest

None.

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