Original Article

Preventive effect of one-day outpatient health management on adverse pregnancy outcomes in patients with gestational diabetes mellitus: a retrospective cohort study

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Background: One-day outpatient health management has been applied to treat gestational diabetes mellitus (GDM) and prevent further complications. However, the relationships between one-day outpatient health management and adverse pregnancy outcomes remain ambiguous, because of limited evidence. We analyzed the effects of one-day outpatient health management on premature birth, macrosomia and low-birth-weight infants in patients with GDM.

Methods: We retrospectively enrolled pregnant women with GDM who delivered at Guiyang Maternal and Child Health Hospital between 2019 and 2021. Patients could voluntarily choose to participate in either the general outpatient health education or a one-day outpatient health management. Data on demographic and clinical characteristics were collected and pregnancy outcomes ascertained. Logistic regression analysis was used to detect the potential relationship between one-day outpatient health management and adverse pregnancy outcomes including preterm birth, macrosomia, and low-birth-weight infants. GDM, preterm birth, low birth weight and macrosomia was diagnosed according to the criteria established by Obstetrics and Gynecology (9th edition).

Results: A total of 3,249 patients with GDM were included, and 798 (24.56%) patients participated in the one-day outpatient health management. Statistically significant differences were observed in the maternal age (P<0.05) and gravidity (P<0.001) between the study and control groups. The incidences of premature birth, low-birth-weight infant, and macrosomia in patients attending the one-day outpatient service were 9.6%, 8.1%, and 4.5%, while the incidences of those who did not attend the one-day outpatient service were 12.4%, 11.1%, and 7.5%. After adjusting for maternal age, ethnic groups, body mass index (BMI) before pregnancy, family history of diabetes, history of abnormal pregnancy, history of polycystic ovary syndrome, gravidity, hyperthyroidism and hypothyroidism, multivariate logistic regression analyses showed that this one-day outpatient health management was a protective factor for premature birth [odds ratio (OR) 0.751, 95% confidence interval (CI): 0.576–0.981], macrosomia (OR 0.567, 95% CI: 0.385–0.834) and low-birth-weight infants (OR 0.699, 95% CI: 0.522–0.937).

Conclusions: The degree of acceptance of patients with GDM to a one-day outpatient health management is still low. This one-day outpatient health management may reduce the incidence of adverse pregnancy outcomes in women with GDM to a certain extent.

Keywords: Gestational diabetes mellitus (GDM); one-day outpatient health management; pregnancy outcome; macrosomia

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Introduction

Gestational diabetes mellitus (GDM), which causes serious damage to maternal and infant physical health, refers to pregnancy with abnormal glucose fluctuations for the first time (1), except diabetes before childbirth. Patients with GDM suffer a higher risk of gestational hypertension, cesarean section (2), cardiovascular disease (3), and type II diabetes mellitus (T2DM) (4). Furthermore, GDM is associated with neonatal complications, such as macrosomia, premature delivery, hypoglycemia, neonatal respiratory distress, and jaundice (5,6). Therefore, GDM is an important public health issue. However, the adverse consequences of GDM can be actively prevented and reversed. Based on clinical experience, early diagnosis, and GDM treatment, opportunities can be provided for clinical intervention and the reduction of the incidence of adverse perinatal outcomes (7).

Treatment options for GDM include pharmacological therapy and non-pharmacological interventions. Alternative drugs include oral hypoglycemic agents and insulin therapy. Although insulin therapy has traditionally been the preferred treatment for GDM, contrary opinions also exist. For example, Nicholson *et al.* (8) recommend non-pharmacological interventions as the first-line treatment with self-care measures, including lifestyle changes (usually diet and exercise) and self-monitoring of blood glucose levels. A meta-analysis of lifestyle interventions for the treatment of GDM also showed that this is the main treatment strategy for such patients (9). As most patients control their blood glucose at normal levels through appropriate dietary regulation and exercise, researchers have evaluated the effectiveness of dietary control, physical exercise, and health education in improving the pregnancy outcomes of patients with GDM (10). First, several pilot studies have assessed the effectiveness of various dietary strategies, such as low-sodium diets, low-to-moderate carbohydrate diets, low-glycemic index diets, and high-fiber diets (11,12). For example, Perichart-Perera *et al.* (13) found that the risk of low-birth-weight infants (<2,500 g) in pregnant women with GDM who received nutritional intervention was significantly lower than that in the control group (P=0.041). Second, for physical exercise, a double-blind randomized clinical trial assessed the effectiveness of routine exercise in reducing the risk of GDM-related complications (14). The study indicated that moderate intensity aerobic exercise (25–30 min, 3 times a week) significantly reduced the incidence of macrosomia and cesarean sections. Although exercise intervention lowered blood glucose levels and provided exercise guidance for pregnant women, it is rarely used as an independent intervention and is often implemented with other types of interventions (15). Third, effective health education strategies for pregnant women, providing key information on GDM, could increase the treatment adherence of pregnant women and relieve the psychological burden, such as anxiety and depression (16). Health education can indirectly elevate the practical implementation as a better adjuvant measure to understand dietary control, physical exercise, and the effective rate of other measures. Recently, to improve the effects of GDM-related health education, many teams have implemented various educational modes, such as increasing emotional support for pregnant women based on traditional nursing and suggesting that family members also receive relative education (17). Furthermore, smartphone applications have been used to manage blood glucose levels and deliver information on a healthy diet and physical exercise (18-20).

For the scientific management of GDM, one-day outpatient health management has been applied in many hospitals and has achieved reliable results in China (21-24). One-day outpatient health management for patients with GDM and their families refers to a series of systemic measures, such as diet control, proper exercise, and blood glucose monitoring, supervised by medical staff with an interval of one day. It is aimed at strengthening patients' self-management concepts and executive ability, and at regularly following pregnant women. This clinical service is jointly implemented by the deputy chief physician or attending physician in the departments of obstetrics, endocrinology, and nutrition, as well as specialist nurses in diabetes who have sufficient time. This service offsets restrictions of limited time and physicians' qualifications in the traditional methods. Different from the monotonous and unpractical management mode in previous clinical processes, one-day outpatient health management

programs, using face-to-face demonstrations and hands-on experience, translates abstract concepts to the concrete feelings of pregnant women to establish effective interaction between medical staff and pregnant women and their families, thereby enhancing the effectiveness of health education (25).

However, the precise relationships between one-day outpatient health management and adverse pregnancy outcomes among GDM patients remain ambiguous. It is unclear whether one-day outpatient health management could reduce the incidence of adverse pregnancy outcomes in GDM participants (26-29).

The Guiyang Maternal and Child Health Care Hospital opened a one-day outpatient health management program in 2015. This study reviewed the data of hospital outpatient services in 2019–2021 targeting pregnant women and analyzed the effects of outpatient services in preventing preterm birth, macrosomia, and low-birth-weight infants in patients with GDM, to provide better medical services for such patients in the future. Previous studies (30-32) simply gave the concept of one-day outpatient management and briefly described it, making many hospitals unclear how to scientifically implement one-day outpatient interventions. Different from previous studies, this study included more GDM patients and gave a very detailed one-day outpatient intervention process, aiming to help patients regulate blood glucose through diet and exercise, enable pregnant women to master the methods of self-monitoring and self-controlling of blood glucose, and improve patients' understanding of the GDM. We present the following article in accordance with the STROBE reporting checklist (available at https://tp.amegroups.com/article/view/10.21037/tp-22-324/rc).

Methods

Study design and population

We carried out a retrospective comparative cohort study. The data of patients, including those with GDM, who gave birth at Guiyang Maternal and Child Health Hospital from 1 January 2019 to 30 December 2021 were retrospectively collected. GDM was diagnosed according to the criteria established by Obstetrics and Gynecology (9th edition). First, the blood glucose levels of women in the early stage of the third trimester were measured after fasting for one night, then the oral glucose tolerance test (OGTT) was conducted (75 g glucose was dissolved in 250 mL warm water, and consumed within 5 min). The cutoff values for blood glucose levels 1 and 2 h after drinking the solution were measured. If the women's values met or exceeded the blood glucose value standards, namely 5.1 (empty stomach), 10.0 (at 1 h), and 8.5 (at 2 h) mmol/L, respectively, they were diagnosed with GDM (33). Under the guidance of doctors, patients with GDM could voluntarily choose to participate in either the general outpatient health education program or a one-day outpatient clinical program. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study protocol was approved by the ethics committee of Guiyang Maternal and Child Health Hospital (No. 2021-26). Informed consent was obtained from the women who participated.

Standard process

The subjects in the control group received ordinary health education including blood glucose tests, fetal movement count, and instructions on diet and exercise by the obstetrician and nursing staff.

The experimental group (one-day outpatient health management group) received standard management as listed in *Table 1*. The guidance group consisted of obstetrics outpatient doctors and nurses who implemented the one-day outpatient health management plan. Subjects in this group were only intervened once daily, and a family member was allowed to accompany them.

Observed factors

Medical record data of each examined subject were collected, including pregnancy weight, height, family history (including diabetes), and whether the following conditions were present in pregnant woman: polycystic ovary syndrome (PCOS), diabetes, lipid metabolic abnormalities, gynecological tumor, and attending a one-day outpatient health management program. The observed outcome indicators included the occurrence of premature birth, macrosomia, and low birth weight. Preterm birth, low birth weight and macrosomia was diagnosed according to the criteria established by Obstetrics and Gynecology (9th edition). Preterm birth was defined as delivery at ≥28 but <37 gestational weeks. Low birth weight was diagnosed if the neonatal birth weight <2,500 g, while a neonatal birth weight ≥4,000 g was defined as macrosomia.

Table 1 Standard process

Time course	Detailed steps
7:30	Venous blood for fasting was extracted to measure blood lipid, glycated hemoglobin, coagulation function, and fasting blood glucose. Pregnant women were guided to use a glucose meter in the fingertips and correct whether the glucose meter operated normally
8:00–9:00	Attend the nutrition canteen of our hospital for breakfast (standardized meal: buns 80 g + sugar-free soybean milk 150 g + egg 50–60 g), then return to the one-day clinic after breakfast
9:00–9:50	Lecture 1: What is diabetes?
9:50–10:20	Nurse leads the pregnant women to exercise (muscle relaxation training, etc.)
10:20–10:30	Nurses guide pregnant women to measure blood glucose 2 hours after breakfast, and then the pregnant women have an extra meal (delivered to the one-day clinic by the nutrition canteen of our hospital, 100 g of plain yoghurt)
10:40–11:40	Lecture 2: Diet treatment for diabetes
11:40–12:00	Blood glucose 30 minutes before lunch was measured
12:00–12:30	Eating Chinese food in the nutrition canteen: Kung Pao Chicken (chicken 60 g + carrot 30 g) + romaine lettuce (150 g) + stewed zucchini (100 g) + multigrain rice (corn 50 g + white rice 40 g)
13:00–14.00	Pregnant women go for a brisk walk outdoors (six-step method), and then return to the one-day clinic for rest
14:00–14:40	Lecture 3: Mental relaxation guidance during pregnancy
14:30	Blood glucose 2 hours after lunch was measured
14:45–15:30	Lecture 4: Monitoring of neonates with gestational diabetes
15:30–16:30	Lecture 5: GDM exercise guidance, blood glucose and obstetric monitoring. Additional meal (one apple 200 g + Haoyiduo fresh milk 250 mL), venous blood results
16:30–17:30	The doctor commented on the test results, the current blood glucose status, and assessed whether the blood glucose meter was normal
16:50	Blood glucose was measured 30 minutes before dinner
17:20	Eat dinner in the nutrition canteen: multigrain rice (corn 50 g + white rice 40 g) + shredded pork (lean pork 50 g) + cucumber salad (200 g) + cabbage and tofu soup (tofu 80 g + cabbage 150 g)
17:50	Go home after the meal and measure blood glucose at 7 pm and 12 pm
The second and third days	Implement a similar one-day outpatient diet and exercise program, exchange equal portions of food through the food exchange, share methods, and replace recipes on your own. Exercise (muscle relaxation training and six-step method) and monitor blood glucose continuously
The fourth day	Bring the blood glucose monitoring results to the hospital for treatment. The contents of treatment include blood pressure measurement, weight, uterine height, abdominal circumference, fetal heart sound measurement, personalized guidance on diet, and exercise and blood glucose monitoring in the future

The daily meals of the outpatient department were customized by the nutrition canteen in the hospital according to the needs of patients with gestational diabetes mellitus. GDM, gestational diabetes mellitus.

Statistical analyses

All analyses were conducted using R Project for Statistical Computing version 4.2.1 (Vienna, Austria). Continuous variables were expressed using mean with standard deviation (SD) and categorical variables were expressed using number with percentage. Univariate tests to assess differences between groups were carried out using chi-square test. Then, univariable logistic regression was used to detect the risk factors of single outcome indicators, and factors with a P value <0.05 were included in the multivariate logistic regression for adjustment. Multivariable logistic regression models were used to determine the relationship between one-day outpatient health management, controlling for

potentially biologically plausible and statistical confounding factors. P values <0.05 (two-sided) were considered statistically significant.

Results

Basic information

A total of 3,249 patients with GDM participated, including 380 premature infants, 315 low-birth-weight infants, and 198 macrosomia infants. The mean age of the patients was 31.85±4.91 years. There were 904 (27.8%) pregnant women aged over 35 years, and their pre-pregnancy body mass index (BMI) was 23.12±3.64 kg/m^2. There were 1,173 (36.1%) pregnant women with a pre-pregnancy BMI over 24 kg/m^2. A total of 798 (24.56%) pregnant women attended the one-day clinic. There were no statistically significant differences between the study and control groups with regard to ethnic groups, pre-pregnancy BMI, family history of diabetes, history of abnormal pregnancy, history of PCOS, gravidity, hyperthyroidism, or hypothyroidism. However, statistically significant differences were observed in the maternal age (P<0.05) and gravidity (P<0.001). The incidences of premature birth, low-birth-weight infant, and macrosomia in patients attending the one-day outpatient service were 9.6%, 8.1%, and 4.5%, respectively. The incidences of premature birth, low-birth-weight infant, and macrosomia in patients who did not attend the one-day outpatient service were 12.4%, 11.1%, and 7.5%, respectively (*Table 2*).

Preventive effects of the one-day outpatient service on premature delivery

Univariable logistic regression analyses showed that pre-pregnancy BMI and attendance of the one-day clinic were statistically correlated with preterm birth. Higher pre-pregnancy BMI [odds ratio (OR) 1.666, 95% confidence interval (CI): 1.195–2.323] acted as a significant risk factor of preterm birth, and one-day outpatient attendance (OR 0.757, 95% CI: 0.581–0.986) was a protective factor for preterm birth. After adjusting for maternal age, ethnic groups, BMI before pregnancy, family history of diabetes, history of abnormal pregnancy, history of PCOS, gravidity, hyperthyroidism and hypothyroidism, multivariate logistic regression analyses showed that pre-pregnancy BMI and attendance of the one-day clinic were still related factors (*Table 3*).

Preventive effects of the one-day clinic on macrosomia

Univariate logistic regression analysis results showed that pre-pregnancy BMI and attendance of the one-day clinic were statistically correlated with macrosomia. Higher pre-pregnancy BMI may increase the incidence of macrosomia. On the other hand, lower pre-pregnancy BMI (OR 0.398, 95% CI: 0.160–0.989) and one-day outpatient attendance (OR 0.578, 95% CI: 0.394–0.849) could reduce the incidence of macrosomia in GDM participants. After adjusting for maternal age, ethnic groups, BMI before pregnancy, family history of diabetes, history of abnormal pregnancy, history of PCOS, gravidity, hyperthyroidism and hypothyroidism, multivariate logistic regression analyses showed that pre-pregnancy BMI and attendance of the one-day clinic were still related factors (*Table 3*).

Preventive effects of the one-day clinic on low-birth-weight infants

Univariate logistic regression analysis results showed that attendance of the one-day clinic was statistically correlated with low-birth-weight infants. One-day outpatient attendance (OR 0.709, 95% CI: 0.530–0.948) was identified as having a protective role against low-birth-weight infants. After adjusting for maternal age, ethnic groups, BMI before pregnancy, family history of diabetes, history of abnormal pregnancy, history of PCOS, gravidity, hyperthyroidism and hypothyroidism, multivariate logistic regression analyses showed that attendance of the one-day clinic was still a related factor (*Table 3*).

Discussion

As a retrospective study, we selected pregnant and parturient women with GDM regularly receiving antenatal care in our hospital in 2019–2021 as the research subjects. The data volume was large, with 3,249 subjects included. The one-day outpatient management program was designed to improve the maternal and infant health levels of GDM and reduce short- and long-term complications. Logistic regression was applied to detect the association between one-day outpatient management and pregnancy risk events, including preterm birth, macrosomia, and low-birth-weight infants.

GDM, a global metabolic disorder, consists of 2 major types. The first type is diabetes diagnosed before pregnancy,

Table 2 Basic information

Characteristics	Attending the one-day clinic program, n (%)		Total (n=3,249)	Chi-square	P
	No (n=2,451)	Yes (n=798)			
Age (years)				6.50	0.011
<35	1,741 (71.0)	604 (75.7)	2,345 (72.2)		
35–50	710 (29.0)	194 (24.3)	904 (27.8)		
Ethnic groups				0.00	1.000
Han Chinese	1,836 (75.2)	601 (75.3)	2,447 (75.3)		
Minority	605 (24.8)	197 (24.7)	802 (24.7)		
BMI before pregnancy (kg/m^2)				1.43	0.699
<18.5	185 (7.5)	53 (6.6)	238 (7.3)		
18.5–23.9	1,388 (56.6)	450 (56.4)	1,838 (56.6)		
24–27.9	642 (26.2)	222 (27.8)	864 (26.6)		
≥28	236 (9.6)	73 (9.1)	309 (9.5)		
Family history of diabetes				0.00	1.000
Yes	206 (8.4)	67 (8.4)	273 (8.4)		
No	2,245 (91.6)	731 (91.6)	2,976 (91.6)		
History of abnormal pregnancy				0.57	0.449
Yes	168 (6.9)	61 (7.6)	229 (7.0)		
No	2,283 (93.1)	737 (92.4)	3,020 (93.0)		
History of PCOS				0.47	0.493
Yes	43 (1.8)	17 (2.1)	60 (1.8)		
No	2,408 (98.2)	781 (97.9)	3,189 (98.2)		
Gravidity				23.85	<0.001
Primigravidity	548 (22.4)	243 (30.5)	791 (24.3)		
Multigravidity					
<5 pregnancies	1,570 (64.1)	474 (59.4)	2,044 (62.9)		
≥5 pregnancies	333 (13.6)	81 (10.2)	414 (12.7)		
Hyperthyroidism				0.95	0.330
Yes	3 (0.1)	3 (0.4)	6 (0.2)		
No	2,448 (99.9)	795 (99.6)	3,243 (99.8)		
Hypothyroidism				0.03	0.864
Yes	98 (4.0)	33 (4.1)	131 (4.0)		
No	2,353 (96.0)	765 (95.9)	3,118 (96.0)		
Premature birth				4.29	0.042
Yes	303 (12.4)	77 (9.6)	380 (11.7)		
No	2,148 (87.6)	721 (90.4)	2,869 (88.3)		

Table 2 (*continued*)

Table 2 (*continued*)

Characteristics	Attending the one-day clinic program, n (%)		Total (n=3,249)	Chi-square	P
	No (n=2,451)	Yes (n=798)			
Low-birth-weight infant				5.43	0.020
Yes	253 (11.1)	62 (8.1)	315 (10.3)		
No	2,033 (88.9)	703 (91.9)	2,736 (89.7)		
Macrosomia				8.01	0.005
Yes	165 (7.5)	33 (4.5)	198 (6.7)		
No	2,033 (92.5)	703 (95.5)	2,736 (93.3)		

BMI, body mass index; PCOS, polycystic ovary syndrome.

Table 3 Risk factors of adverse pregnancy outcomes

Characteristics	OR			
	Unadjusted		Adjusted*	
	95% CI	P value	95% CI	P value
Premature birth				
Attending the one-day clinic program				
No	Reference		Reference	
Yes	0.757 (0.581, 0.986)	0.039	0.751 (0.576, 0.981)	0.035
BMI before pregnancy (kg/m^2)				
<18.5	0.967 (0.623, 1.501)	0.880	0.957 (0.614, 1.491)	0.845
18.5–23.9	Reference		Reference	
24–27.9	1.127 (0.876, 1.450)	0.353	1.115 (0.864, 1.439)	0.403
≥28	1.666 (1.195, 2.323)	0.003	1.611 (1.151, 2.256)	0.005
Macrosomia				
Attending the one-day clinic program				
No	Reference		Reference	
Yes	0.578 (0.394, 0.849)	0.005	0.567 (0.385, 0.834)	0.004
BMI before pregnancy (kg/m^2)				
<18.5	0.398 (0.160, 0.989)	0.047	0.378 (0.151, 0.942)	0.037
18.5–23.9	Reference		Reference	
24–27.9	1.632 (1.182, 2.255)	0.003	1.642 (1.184, 2.276)	0.003
≥28	2.004 (1.301, 3.088)	0.002	2.028 (1.312, 3.137)	0.001
Low-birth-weight infant				
Attending the one-day clinic program				
No	Reference		Reference	
Yes	0.709 (0.530, 0.948)	0.020	0.699 (0.522, 0.937)	0.017

*, multivariable logistic regression analysis adjusting for maternal age, ethnic groups, BMI before pregnancy, family history of diabetes, history of abnormal pregnancy, history of PCOS, gravidity, hyperthyroidism and hypothyroidism. BMI, body mass index; PCOS, polycystic ovary syndrome; OR, odds ratio; CI, confidence interval; BMI, body mass index.

called "diabetes combined with pregnancy", which was excluded from our study criteria. The second type refers to elevated blood glucose levels and decreased sensitivity to insulin, resulting from the changed body structure of pregnant women and abnormal fluctuations of placental lactogen, estrogen, progesterone, cortisol, and placental insulinase in middle and late pregnancy. However, this glycometabolic disorder can return after delivery. In this study, only the second type of GDM, identified by the International Diabetes and Pregnancy Research Group diagnostic criteria, was incorporated. According to previous epidemiological data, the morbidity of GDM in China is 5.12–33.3%, which is rising because of the increase in elderly parturient women (34-37). As a special type of diabetes, patients with GDM suffer a higher risk of T2DM after delivery. Also, during delivery, the risk of eclampsia increases for both the mother and infant (38). Hyperglycemia and adverse pregnancy outcome study also showed that the risk of adverse outcomes (39), such as macrosomia, increases with rising blood glucose levels. Therefore, the timely detection of GDM and interventions in the lifestyle and nutrition of pregnant women are effective means by which to reduce the adverse pregnancy outcomes of GDM, especially for macrosomia.

As mentioned in the introduction, non-drug therapy is gradually being regarded as an effective means of blood glucose management in patients with GDM, which mainly includes diet management and physical exercise. In particular, the awareness of GDM management strategies to improve implementation in these patients has a greater impact on blood glucose management. Blood glucose management consists mainly of periodic blood glucose detection and irregular publicity and education. In clinical practice follow-up, it was found that after routine blood glucose management, pregnant women with GDM still suffered a higher risk of fasting blood glucose fluctuation. Therefore, a more effective mode should be exploited and applied to manage patients with GDM. Health professionals are constantly looking for practical methods to encourage a healthy lifestyle in patients with GDM, such as long-term guidance through internet applications (40). The one-day outpatient service is a multimodal management plan conducted through the face-to-face guidance of professional doctors and the personal experience of comprehensive nursing services at one-day intervals (41). The one-day outpatient health management program translated the abstract concept to the concrete feelings of pregnant women to establish effective interaction between medical staff, pregnant women, and their families, thereby enhancing the effects of health education on the whole perinatal health management.

Our hospital started the one-day outpatient service for GDM in 2015, and the relevant management content and level have improved based on clinical practice. This retrospective analysis of the data profile in 2019–2021 revealed that only 24.56% of patients with GDM were likely to attend the one-day outpatient clinic, indicating the low popularity of the one-day outpatient clinic, which may be because of an insufficient rate of GDM management education for pregnant women at the time of the first diagnosis.

A total of 798 pregnant women with GDM participated in the one-day outpatient service. From univariable and multivariable logistic regression analyses, the one-day outpatient service can effectively prevent the occurrence of premature birth, low-birth-weight infants and macrosomia. Although many studies have shown that a one-day clinic can prevent macrosomia occurrence (42,43), the results were less convincing owing to the small sample size. However, the data profile of our retrospective analysis is extensive and more convincing. Therefore, combined with the data of other scholars, pregnant women who attended the one-day outpatient service suffered a lower occurrence of macrosomia. The function of the one-day clinic in preventing premature delivery and low birth weight is still controversial. Barakat *et al*. (26) found that the incidence of premature birth in the group participating in a one-day clinic was 5.6%, lower than the 7.2% in the control group; however, there was no statistical difference. Liao *et al*. (27) found that the rate of premature birth for patients with GDM who attended the one-day clinic was 7.5%, which was significantly lower than 14.0% in the control group, similar to the incidence rate of low-birth-weight children. Yang *et al*. found that the proportion of low-birth-weight children in their study group was 5.3%, which was almost the same as that in the control group (28,29). The reason for these discrepancies may be the different methods and management strategies adopted in different one-day outpatient departments. For example, GDM strategies focused mainly on blood glucose management through exercise and diet control, whereas those for preterm and low-birth-weight infants focused mainly on nutrition support therapy.

Based on statistical analyses and clinical experience regarding the one-day outpatient service in our hospital, the reasons for preventing adverse pregnancy outcomes in the one-day outpatient service can be summarized in 3 points.

First, it improved the compliance of pregnant women with GDM. Patients with GDM who attended the one-day outpatient management service showed higher awareness of disease prevention and compliance with medical advice than other patients with GDM. The one-day outpatient health management program further improved pregnant women's compliance, including diet control and exercise (42). The participation of the patient's family members, especially the improvement of their knowledge about GDM, assisted daily management efficiently. The second reason is the efficient, whole process, and the professional health education of the medical staff. Unlike traditional education during pregnancy, medical staff are required to accompany pregnant women all day in the process of a one-day outpatient clinic. Through interesting courses, food models, video clips, and other methods, pregnant women can grasp the general knowledge of GDM prevention in a relaxing atmosphere and gradually master the self-management of blood sugar, which could lay a solid foundation for the home management of blood sugar in the late pregnancy period. Studies have shown that a one-day outpatient clinic can enhance the knowledge awareness rate of GDM and improve the self-management ability at home (27). The third reason is the power of peer effects, namely, companions, including healthcare workers and the pregnant women's partners. In the one-day outpatient clinic, pregnant women are accompanied by medical staff in the whole process and receive mutual encouragement and support from other pregnant women (43). Therefore, they are psychologically satisfied, with reduced anxiety and depression, and are more likely to accept disease prevention knowledge and improve self-management ability. Finally, we believe that the main management strategies of the one-day outpatient service should be further researched and demonstrated through clinical practice.

The main strategies of this one-day outpatient service are diet management, exercise management, blood glucose monitoring, and professional education of GDM. This involves nutritional medicine, sports medicine, diabetes, gynecology, and obstetrics. Therefore, multidisciplinary experts must devise a management strategy for the one-day outpatient service and revise it based on clinical practice. Moreover, individualized management strategies should be developed for individual patients with GDM after the one-day outpatient service to improve their knowledge of GDM management to maintain their blood glucose and weight at home.

Some studies have added other methods based on the traditional one-day outpatient service which further improved the pregnancy outcomes for GDM, for example guiding pregnant women to join the internet home-care platform after attending the one-day outpatient service for GDM and assigning specialized nurses to provide long-term guidance on the internet platform. Gardsten *et al.* (44) adopted continuous follow-up based on the one-day outpatient service and established GDM tracking cards for relatives to solve the potential problem in a timely manner. In summary, the one-day outpatient service is a management strategy that combines multidisciplinary guidance and linkage. Thus, a professional one-day outpatient service strategy should be developed for pregnant women.

This study has 2 advantages. First, it had a large sample size. Although this was a retrospective study, the research data were complete and reliable. Second, multivariate logistic regression was used to control confounding factors, such as maternal age and pre-pregnancy BMI, which initially confirmed that the one-day clinic program was an independent protective factor for premature birth, low-birth-weight infant and macrosomia.

Lack of research

The shortcomings of this study are as follows: (I) the level of evidence in retrospective studies is low. As a public welfare project of the hospital, a one-day outpatient clinic aims to control the blood glucose level of patients with GDM. From the perspective of ethics, a randomization scheme cannot be implemented. (II) Pregnant women willing to attend the one-day clinic tended to have better compliance, personal management, and glycemic control, which could have been important confounding factors that may have influenced the study results. (III) We cannot measure the adherence to the one-day management intervention and test the adherence-outcome relationships due to the retrospective design. There may have been some errors in the final results when exploring the relationship between one-day outpatient health management and adverse pregnancy outcomes.

Conclusions

The degree of acceptance of patients with GDM to a one-day outpatient health management program is still low. This one-day outpatient health management may reduce the incidence of adverse pregnancy outcomes in women with GDM to a certain extent. In the future, regular follow-up should be introduced in clinical practice to further improve the effects of one-day programs.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at https://tp.amegroups.com/article/view/10.21037/tp-22-324/rc

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://tp.amegroups.com/article/view/10.21037/tp-22-324/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study protocol was approved by the ethics committee of Guiyang Maternal and Child Health Hospital (No. 2021-26). Informed consent was obtained from the women who participated.

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