

Effect of goal diversified nursing intervention on the perinatal period of patient with gestational diabetes *mellitus*

Efeito da intervenção de enfermagem com objetivos diversificados e orientada no período perinatal de pacientes com diabetes *mellitus* gestacional
Efectos de intervención de enfermería con objetivos diversificados y dirigida al período perinatal de pacientes con diabetes *mellitus* gestacional

Shanghai Sun¹  <https://orcid.org/0009-0006-9711-3766>

Chunli Chen¹  <https://orcid.org/0009-0006-5091-5892>

Songmei Qian¹  <https://orcid.org/0009-0004-6289-385X>

Yongxue Cai²  <https://orcid.org/0000-0002-6837-5015>

How to cite:

Sun S, Chen C, Qian S, Cai Y. Effect of goal diversified nursing intervention on the perinatal period of patient with gestational diabetes mellitus. Acta Paul Enferm. 2024;37:eAPE01773.

DOI

<http://dx.doi.org/10.37689/acta-ape/2024A000001773>



Keywords

Diabetes *mellitus*; Diabetes, gestational; Perinatal care; Neonatal nursing; Goals

Descritores

Diabetes *mellitus*; Diabetes gestacional; Assistência perinatal; Enfermagem neonatal; Objetivos

Descriptores

Diabetes *mellitus*; Diabetes gestacional; Atención perinatal; Enfermería neonatal; Objetivos

Submitted

July 26, 2023

Accepted

January 24, 2024

Corresponding author

Yongxue Cai
E-mail: caiyxsp@shu-edu.cn

Associate Editor (Peer review process):

Kelly Pereira Coca
(<https://orcid.org/0000-0002-3604-852X>)
Escola Paulista de Enfermagem, Universidade Federal de São Paulo, São Paulo, SP, Brazil

Abstract

Objective: To assess the effect of goal diversified nursing intervention on the perinatal period of patients with gestational diabetes mellitus (GDM).

Methods: In this prospective study, 96 patients with GDM treated from February 2020 to February 2023 were selected and randomly divided into observation group (n=48) and control group (n=48). The patients in control group were given routine nursing, based on which those in observation group received goal-oriented diversified nursing intervention. The incidence rates of perioperative complications and adverse neonatal outcomes, and blood glucose indicators, the Chinese Version of the Diabetes Management Self-efficacy Scale (C-DMSES) score and the Diabetes Specific Quality of Life Scale (DSQL) score before and after intervention were compared between the two groups.

Results: The levels of fasting plasma glucose, 2-hour postprandial blood glucose and glycosylated hemoglobin in the observation group during delivery were lower than those in the control group and before intervention ($P<0.05$). The C-DMSES score in each dimension in the observation group after intervention was higher than that in the control group and before intervention ($P<0.05$). After intervention, the scores of treatment, physiology, psychology and social relationship in DSQL in the observation group were significantly lower than those in the control group and before intervention ($P<0.05$). The incidence rate of perioperative complications in the observation group (10.42%) was significantly lower than that in the control group (31.25%) ($P<0.05$).

Conclusion: Goal-oriented diversified nursing intervention can effectively control the blood glucose indicators, improve self-management ability, reduce the incidence of perioperative complications and adverse neonatal outcomes.

Resumo

Objetivo: Avaliar o efeito da intervenção de enfermagem com objetivos diversificados e orientados no período perinatal de pacientes com diabetes mellitus gestacional (DMG)

Métodos: Estudo prospectivo de 96 pacientes com DMG tratadas entre fevereiro 2020 e fevereiro 2023, selecionadas e divididas aleatoriamente em grupo Observação (n=48) e grupo Controle (n=48). As pacientes do grupo Controle receberam cuidados de enfermagem de rotina, enquanto as do grupo Observação receberam intervenção de enfermagem com objetivos diversificados e orientados. As taxas de incidência de complicações perioperatórias e resultados neonatais adversos e indicadores de glicose no sangue, bem como a pontuação da versão chinesa da *Diabetes Management Self-efficacy Scale* (C-DMSES) e da escala Diabetes Specific Quality of Life Scale (DSQL) antes e após a intervenção foram comparados entre os dois grupos.

¹Department of Nursing, The Second People's Hospital of Hefei, Hefei 230011, Anhui Province, China.

²Department of Obstetrics, The Second People's Hospital of Hefei, Hefei 230011, Anhui Province, China.

Conflicts of interest: nothing to declare.

Resultados: Os níveis de glicemia plasmática em jejum, glicemia pós-prandial de 2 horas e hemoglobina glicosilada no grupo Observação durante o parto foram inferiores aos do grupo Controle e antes da intervenção ($P<0,05$). A pontuação em cada dimensão da C-DMSSES no grupo Observação após a intervenção foi maior do que no grupo Controle e antes da intervenção ($P<0,05$). Após a intervenção, as pontuações de tratamento, fisiologia, psicologia e relacionamento social na DSQL no grupo Observação foram significativamente inferiores às pontuações do grupo Controle e antes da intervenção ($P<0,05$). A taxa de incidência de complicações perioperatórias foi significativamente inferior no grupo Observação (10,42%) em comparação ao grupo Controle (31,25%) ($P<0,05$).

Conclusão: A intervenção de enfermagem com objetivos diversificados e orientados para gestantes com Diabetes *Mellitus* pode controlar eficazmente os indicadores de glicemia, melhorar a capacidade de autogestão, reduzir a incidência de complicações perioperatórias e resultados neonatais adversos.

Resumen

Objetivo: Analizar los efectos de una intervención de enfermería con objetivos diversificados y dirigidos al período perinatal de pacientes con diabetes *mellitus* gestacional (DMG).

Métodos: Estudio prospectivo de 96 pacientes con DMG tratadas entre febrero de 2020 y febrero de 2023, seleccionadas y divididas de forma aleatoria en un grupo de observación ($n=48$) y un grupo de control ($n=48$). Las pacientes del grupo de control recibieron cuidados de enfermería de rutina, mientras que las del grupo de observación recibieron una intervención de enfermería con objetivos diversificados y dirigidos. Las tasas de incidencia de complicaciones perioperatorias y los resultados neonatales adversos e indicadores de glucosa en sangre se compararon entre los grupos, antes y después de la intervención, así como también el puntaje de la versión china de las escalas *Diabetes Management Self-efficacy Scale* (C-DMSSES) y *Diabetes Specific Quality of Life Scale* (DSQL).

Resultados: Los niveles de glucemia en plasma en ayunas, la glucemia posprandial de 2 horas y la hemoglobina glucosilada en el grupo de observación durante el parto fueron inferiores que los del grupo de control y antes de la intervención ($P<0,05$). El puntaje de cada dimensión de la C-DMSSES en el grupo de observación después de la intervención fue mayor que en el grupo de control y antes de la intervención ($P<0,05$). Después de la intervención, los puntajes de tratamiento, fisiología, psicología y relaciones sociales de la DSQL fueron significativamente inferiores en el grupo de observación que los puntajes del grupo de control y antes de la intervención ($P<0,05$). La tasa de incidencia de complicaciones perioperatorias fue significativamente inferior en el grupo de observación (10,42 %) en comparación con el grupo de control (31,25 %) ($P<0,05$).

Conclusión: La intervención de enfermería con objetivos diversificados y dirigidos a mujeres embarazadas con diabetes *mellitus* pudo controlar eficazmente los indicadores de glucemia, mejorar la capacidad de autogestión, reducir la incidencia de complicaciones perioperatorias y de resultados neonatales adversos.

Introduction

Gestational diabetes mellitus (GDM) is a multiple glucose metabolic disorder defined as the impaired glucose tolerance that first emerges in pregnancy, which is a common complication of pregnant women. Older age, higher pre-pregnancy body mass index, family history and obesity have been verified to be risk factors for GDM.⁽¹⁾ Pregnant women in a long-term hyperglycemic state are prone to overly rapid fetal development and the resulting complications such as macrosomia, uterine inertia and fetal distress, thereby threatening maternal and infant health, and even causing death in severe cases.⁽²⁾ The treatment principle of GDM is to keep the blood glucose indicators at normal levels, but the pathogenesis of GDM remains inconclusive at present, so prompt and scientific nursing intervention for pregnant women can contribute to smooth delivery.⁽³⁾ However, it is difficult to maintain good compliance with routine nursing mainly including health education for pregnant women and regular reexamination.⁽⁴⁾ Goal orientation is a management theory that sets goals and implements management and self-control

to achieve desired goals.⁽⁵⁾ Diversified nursing refers to more individualized nursing intervention based on clinical conditions.⁽⁶⁾ Goal-oriented diversified nursing is a new type of intervention, which, based on goal orientation, solves the problems in the self-management of patients by setting up goals, and helps them establish a correct view of disease.⁽⁷⁾ Then it provides all-round and scientific nursing services for patients in combination with their needs, which can meet their physical, mental and spiritual needs to the maximum extent, enhance the therapeutic effect and improve the survival status.⁽⁸⁾ In this study, therefore, the effect of goal-oriented diversified nursing intervention on the perinatal period of GDM patients was explored, aiming to provide new ideas for reducing the incidence rate of perinatal complications.

Methods

In this prospective study, 96 patients with GDM treated from February 2020 to February 2023 were selected and randomly divided into an observation group ($n=48$) and a control group ($n=48$). In the

observation group, the patients were aged 27-38 years, with an average of (32.91 ± 3.97) years. The gestational age was 28-36 weeks, with an average of (32.49 ± 2.41) weeks. There were 31 primiparas and 17 multiparas. In the control group, the patients were aged 27-38 years, with an average of (33.29 ± 3.29) years. The gestational age was 28-36 weeks, with an average of (32.58 ± 2.47) weeks. There were 29 primiparas and 19 multiparas. Age, gestational age and maternal type had no significant differences between the two groups ($P > 0.05$).

The inclusion criteria were as follows: (1) patients who met the relevant diagnostic criteria for GDM,⁽⁹⁾ (2) those who and whose families signed the informed consent form for this study that had been approved by the medical ethics committee, (3) those with single pregnancy, and (4) those without disturbance of consciousness and able to cooperate with the study. The exclusion criteria involved: (1) patients complicated with severe dysfunction of the liver or kidney, (2) those with glucose metabolic disorders during pregnancy, (3) those with mental disorders, (4) those with habitual abortion, or (5) those with fetal intrauterine growth retardation.

The control group was given routine nursing. Blood glucose and blood pressure were measured, and patients were informed of the necessity of timely treatment in the case of abnormality. Patients were instructed to have a reasonable diet, have more meals a day but less food per time at a regular time and proper amount, and exercise moderately. The nursing staff provided routine psychological comfort and health education.

For the observation group, goal-oriented diversified nursing intervention was given based on nursing in control group. (1) A nursing intervention team was established, consisting of the supervisor of nursing care, senior nurses and dietitians. The supervisor as the team leader was responsible for decision-making and overall planning, nurses were responsible for the implementation of the nursing plan, and dietitians were responsible for balanced nutrition. All members received strict training on the special nursing strategies and methods for GDM. The nursing staff should determine the goal orientation through literature search, analysis and discussion in combination with the actual clinical

situation of the patients, actively communicate with the patients to understand their problems and questions in blood glucose management, and implement the plan according to the goal orientation.

(2) Goal orientation: The problems faced by GDM patients in nursing were analyzed and listed one by one to help them further understand the self-management problems in GDM treatment, the goals were defined and diversified nursing interventions were formulated. For example, the nursing staff should pay attention to such problems as an unreasonable diet, failure of timely blood glucose monitoring and lack of reasonable exercise, and put forward targeted solutions.

(3) Diversified nursing intervention: a) Diet nursing: The nursing staff should emphasize the importance of reasonable diet to the patient, and the dietitian should formulate daily recipes based on the patient's weight, gestational age and conditions, thereby maintaining the required nutrition and calorie of the patient during pregnancy and avoiding high glucose and hunger after meals. b) Blood glucose monitoring: The patient was instructed to strengthen blood glucose self-monitoring, the blood glucose was measured at fasting and 2 h after meal every morning, and the treatment and daily diet plans were adjusted according to the blood glucose level. c) Reasonable exercise: The importance of moderate exercise for blood glucose control was emphasized, common exercise methods were introduced to the patient, and the patient carried out exercises according to her own conditions. d) Psychological intervention: The psychological state and living habits of pregnant women were learned and recorded, and problems should be solved in time once found. Successful cases were regularly introduced to patients to build up confidence. e) Peer and family support: Communication activities were regularly held to encourage patients to actively share anti-diabetes experiences, thereby achieving emotional support and mutual promotion. The patient's family members were encouraged to actively participate in the treatment and master relevant knowledge and skills to supervise and help the patient, making the patient feel the care from the family.

(1) The blood glucose indicators, including fasting plasma glucose (FPG), glycosylated hemoglobin (HbA1c) and 2-hour postprandial blood glucose (2hPG), were measured before intervention and during delivery using BS-620 automatic analyzer (Shenzhen Mindray Bio-Medical Electronics Co., Ltd., China).

(2) The self-management ability was compared between the two groups before and after intervention. The Chinese Version of the Diabetes Management Self-efficacy Scale (C-DMSES)⁽¹⁰⁾ was used, including four dimensions: scientific diet (11 items), regular exercise (2 items), medication according to doctor's advice (5 items) and regular blood glucose monitoring (2 items). Each item was scored from 0 to 10 points, and the higher the score, the better the self-management ability. The Cronbach's α of the scale was 0.930.

(3) The quality of life was compared between the two groups before and after intervention. The Diabetes Specific Quality of Life Scale (DSQL)⁽¹¹⁾ was used, including four dimensions: treatment, psychology, physiology and social relationship. With an aggregate score of 120 points, the score was inversely proportional to the quality of life. The Cronbach's α of the scale was 0.903.

(4) The incidence rate of perioperative complications was compared between the two groups, including amniotic fluid abnormality, postpartum infection, hypoglycemia and gestational hypertension.

(5) The incidence rate of adverse neonatal outcomes was compared between the two groups, in-

cluding neonatal asphyxia, macrosomia, premature delivery and neonatal hypoglycemia.

SPSS22.0 Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA) was used for statistical analysis. Measurement data were described by ($\bar{x} \pm s$), and compared by the independent-samples *t*-test between the two groups and by the paired-samples *t*-test within the same group. The count data were described by [n(%)] and compared by the χ^2 test between the two groups. *P*<0.05 was considered statistically significant.

Results

Blood glucose indicators before intervention and during delivery

There were no significant differences in the levels of FPG, 2hPG and HbA1c between the two groups before intervention (*p*>0.05). The levels of FPG, 2hPG and HbA1c in observation group during delivery were lower than those in control group and before intervention (*p*<0.05) (Table 1).

Self-management ability before and after intervention

The C-DMSES score in each dimension in observation group after intervention was higher than that in control group and before intervention (*p*<0.05) (Table 2).

Table 1. Blood glucose indicators before intervention and during delivery ($\bar{x} \pm s$)

Group	n	FPG (mmol/l)		24hPG (mmHg)		HbA1c (%)	
		Before intervention	At delivery	Before intervention	At delivery	Before intervention	At delivery
Observation	48	7.22±1.13	4.59±1.0 [*]	12.49±3.53	8.29±1.5 [*]	10.16±1.26	6.14±1.3 [*]
Control	48	7.19±1.36	5.86±1.0 [*]	12.13±2.71	10.37±1.8 [*]	10.42±1.15	8.34±1.3 [*]
t		0.117	6.040	0.560	5.904	1.055	8.073
p-value		0.906	<0.001	0.576	<0.001	0.293	<0.001

**p*<0.05, vs. before intervention; FPG - Fasting plasma glucose; 2hPG - 2-hour postprandial blood glucose; HbA1c - glycosylated hemoglobin

Table 2. Self-management ability before and after intervention ($\bar{x} \pm s$, point)

Group	n	A healthy diet		Regular exercise		Regular blood glucose monitoring		Medication according to medical advice	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Observation	48	60.29±4.86	93.57±6.7 ^{**}	12.49±2.86	8.57±3.6 ^{**}	20.27±2.94	39.74±2.5 [*]	9.41±2.53	13.24±2.4 [*]
Control	48	61.37±4.51	80.54±5.7 ^{**}	12.11±2.78	14.27±2.2 ^{**}	21.21±2.68	32.32±2.5 [*]	9.24±3.28	16.51±2.1 [*]
t		1.128	10.163	0.660	9.272	1.637	14.282	0.284	6.913
p-value		0.262	<0.001	0.510	<0.001	0.105	<0.001	0.776	<0.001

**p*<0.05, vs. before intervention

Table 3. Quality of life before and after intervention ($\bar{x} \pm s$, point)

Group	n	Treatment		Physiology		Psychology		Social relations	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Observation	48	18.26 $\pm$ 3.49	13.53 $\pm$ 2.6 ^{3*}	15.28 $\pm$ 2.46	10.51 $\pm$ 2.5 ^{3*}	16.63 $\pm$ 2.18	10.27 $\pm$ 1.4 ^{3*}	11.41 $\pm$ 1.89	7.19 $\pm$ 1.5 ^{3*}
Control	48	18.16 $\pm$ 3.59	15.54 $\pm$ 2.4 ^{3*}	15.43 $\pm$ 2.49	13.29 $\pm$ 2.1 ^{9*}	16.21 $\pm$ 2.16	13.43 $\pm$ 1.9 ^{6*}	11.52 $\pm$ 1.43	9.96 $\pm$ 1.8 ^{3*}
t		0.138	3.841	0.296	5.755	0.948	9.023	0.321	8.045
p-value		0.890	<0.001	0.767	<0.001	0.345	<0.001	0.748	<0.001

*p<0.05, vs. before intervention

Table 4. Incidence rate of perioperative complications [n(%)]

Group	n	Abnormal amniotic fluid	Postpartum infection	Hypoglycemia	Pregnancy induced hypertension	Total occurrence
Observation	48	2(4.17)	1(2.08)	1(2.08)	1(2.08)	5(10.42)
Control	48	3(6.25)	3(6.25)	4(8.33)	5(10.42)	15(31.25)
χ^2						6.315
p-value						0.011

Table 5. Incidence rate of adverse neonatal outcomes [n(%)]

Group	n	Neonatal asphyxia	Fetal macrosomia	Premature birth	Neonatal hypoglycemia	Total occurrence
Observation	48	1(2.08)	0(0.00)	1(2.08)	0(0.00)	2(4.17)
Control	48	2(4.17)	1(2.08)	2(4.17)	3(6.25)	8(16.67)
χ^2						4.018
p-value						0.045

Quality of life before and after intervention

There was no significant difference in the DSQL scores between the two groups before intervention ($P>0.05$). After intervention, the scores of treatment, physiology, psychology and social relationship in DSQL in observation group were significantly lower than those in control group and before intervention ($p<0.05$) (Table 3).

Incidence rate of perioperative complications

The incidence rate of perioperative complications in observation group (10.42%) was significantly lower than that in control group (31.25%) ($p<0.05$) (Table 4).

Incidence rate of adverse neonatal outcomes

The incidence rate of adverse neonatal outcomes in observation group (4.17%) was significantly lower than that in control group (16.67%) ($p<0.05$) (Table 5).

Discussion

With the improvement of people's living conditions and the changes in lifestyle, plus the pressure of

work and life in recent years, eating disorders and lack of exercise have developed in most women, thus increasing the incidence of GDM.⁽¹²⁾ GDM is a common complication during pregnancy in women, which can increase the risk of gestational hypertension, polyhydramnios, macrosomia and prematurity, seriously harming maternal and fetal health.⁽¹³⁾ At present, no effective treatment means are available for GDM in clinic, and blood glucose control is usually the major treatment method. However, there are actually many influencing factors for the blood glucose indicators, so patients often have poor compliance due to insufficient GDM-related knowledge and low cooperation in treatment, thus leading to unsatisfactory blood glucose control. Therefore, effective nursing intervention is of great significance during the treatment of GDM.⁽¹⁴⁾

In this study, the scores of treatment, physiology, psychology and social relationship in DSQL in observation group after intervention were significantly lower than those in control group and before intervention ($P<0.05$). The levels of FPG, 2hPG and HbA1c in observation group during delivery were lower than those in control group

and before intervention ($P < 0.05$). It can be seen that goal-oriented diversified nursing intervention can significantly ameliorate the glucolipid metabolism indicators and improve self-management ability of patients with GDM. The reason is that routine nursing for GDM is mainly based on the patient's own conditions and focuses on following the doctor's advice and observing the condition, but it is less comprehensive and targeted, so the nursing effect is not ideal.⁽¹⁵⁾ With the changes in the medical model, goal-oriented diversified nursing has been gradually popularized. This nursing mode based on goal orientation transforms the expected goal into reality, helps patients clear their thoughts, and develops intervention plans according to the patient's individual circumstances. Then using the goal-setting strategy, it solves the patients' problems in self-management and helps patients establish a correct view of disease, such as dietary supplement, blood glucose monitoring and reasonable exercise. Besides, through peer and family participation and support, patients can feel the care and warmth from family and society, thereby stimulating their subjective initiative and self-management ability. In this way, patients' self-management behavior and blood glucose level can be improved.^(16,17)

Adverse effects of GDM on pregnant women and fetuses have been verified,⁽¹⁸⁾ and most reports⁽¹⁹⁾ suggest that pregnant women with long-term hyperglycemia will concurrently develop preeclampsia, premature delivery and macrosomia. In this study, the incidence rates of perioperative complications and adverse neonatal outcomes in observation group were lower than those in control group, suggesting that goal-oriented diversified nursing intervention can reduce the incidence of perinatal complications. The reason is that goal-oriented diversified nursing intervention, which is patient-centered, initiates active self-management, and fully respects and cares for patients based on the goal-oriented theory. It lists the problems faced by GDM patients in nursing one by one and puts forward targeted solutions, making patients know the importance of blood glucose control. Moreover, through diet and exercise guidance, it effectively reduces blood glucose fluctuation and promotes healthy fetal development.⁽²⁰⁾ In addition, the quality of life of

patients was significantly ameliorated after the implementation of goal-oriented diversified nursing intervention. This is because this nursing mode aims at controlling and monitoring blood glucose, keeping blood glucose levels within a reasonable range, and avoiding hypoglycemia as far as possible. By controlling diet and exercise, it can help patients gradually develop scientific diet and exercise habits, which provides an effective basis for clinical treatment and nursing, thereby improving patients' self-care ability, developing a healthy lifestyle, and better controlling relevant clinical indicators. Moreover, peer and family support also offers strong emotional support for patients, reduces negative emotions, and thus raises patients' quality of life.⁽²¹⁾

Conclusion

In conclusion, goal-oriented diversified nursing intervention can effectively control the blood glucose indicators, improve self-management ability, reduce the incidence of perioperative complications and adverse neonatal outcomes, and ameliorate the quality of life of GDM patients in the perinatal period. Nevertheless, this study has limitations. First, the sample size is small. Second, the duration of study is not long enough. Third, this is a single-center study. Thus, the results may have bias. Long-term multicenter studies including more cases are ongoing in our group to confirm the conclusion.

Collaborations

Sun S, Chen C, Qian S and Cai Y contributed to study design, data analysis and interpretation, article writing, relevant critical review of intellectual content and approval of the final version to be published.

References

1. Marshall NE, Abrams B, Barbour LA, Catalano P, Christian P, Friedman JE, et al. The importance of nutrition in pregnancy and lactation: lifelong consequences. *Am J Obstet Gynecol.* 2022;226(5):607–32.

2. Laredo-Aguilera JA, Gallardo-Bravo M, Rabanales-Sotos JA, Cobo-Cuenca AI, Carmona-Torres JM. Physical Activity Programs during Pregnancy Are Effective for the Control of Gestational Diabetes Mellitus. *Int J Environ Res Public Health*. 2020;17(17):6151.
3. Jones EJ, Hernandez TL, Edmonds JK, Ferranti EP. Continued disparities in postpartum follow-up and screening among women with gestational diabetes and hypertensive disorders of pregnancy: a systematic review. *J Perinat Neonatal Nurs*. 2019;33(2):136–48.
4. Ali AM, Kunugi H. Intermittent fasting, dietary modifications, and exercise for the control of gestational diabetes and maternal mood dysregulation: a review and a case report. *Int J Environ Res Public Health*. 2020;17(24):9379. Review.
5. Wang XH, Zhou Y, Wang Q, Yan X, Huang YH. Effects of goal-oriented nursing intervention on postpartum depression. *Medicine (Baltimore)*. 2022;101(37):e30651.
6. Wang Z, Liu X, Cui Q, Wang Z, Li X. Application of diversified nursing mode in clinical nursing of patients with gestational diabetes mellitus. *Minerva Med*. 2021;112(6):832–4.
7. Chen Y, Wei Y, Lang H, Xiao T, Hua Y, Li L, et al. Effects of a goal-oriented intervention on self-management behaviors and self-perceived burden after acute stroke: a randomized controlled trial. *Front Neurol*. 2021;12:650138.
8. Huifen Z, Yaping X, Meijing Z, Huibin H, Chunhong L, Fengfeng H, et al. Effects of moderate-intensity resistance exercise on blood glucose and pregnancy outcome in patients with gestational diabetes mellitus: a randomized controlled trial. *J Diabetes Complications*. 2022;36(5):108186.
9. Mensah GP, Ten Ham-Baloyi W, van Rooyen DR, Jardien-Baboo S. Guidelines for the nursing management of gestational diabetes mellitus: an integrative literature review. *Nurs Open*. 2019;7(1):78–90. Review.
10. Hailu FB, Moen A, Hjortdahl P. Diabetes Self-Management Education (DSME) - effect on knowledge, self-care behavior, and self-efficacy among type 2 diabetes patients in ethiopia: a controlled clinical trial. *Diabetes Metab Syndr Obes*. 2019;12:2489–99.
11. Wang L, Yan N, Guo R, Pu L, Dang Y, Pan R, et al. Mediating role of depressive symptoms on the association between neighborhood social cohesion and quality of life in individuals with type 2 diabetes mellitus. *Patient Prefer Adherence*. 2022;16:1085–92.
12. Homayouni A, Bagheri N, Mohammad-Alizadeh-Charandabi S, Kashani N, Mobaraki-Asl N, Mirghafurvand M, et al. Prevention of gestational diabetes mellitus (GDM) and probiotics: mechanism of action: a review. *Curr Diabetes Rev*. 2020;16(6):538–45. Review.
13. Sushko K, Menezes HT, Strachan P, Butt M, Sherifali D. Self-management education among women with pre-existing diabetes in pregnancy: a scoping review. *Int J Nurs Stud*. 2021;117:103883. Review.
14. You H, Hu J, Liu Y, Luo B, Lei A. Risk of type 2 diabetes mellitus after gestational diabetes mellitus: a systematic review & meta-analysis. *Indian J Med Res*. 2021;154(1):62–77. Review.
15. Li Y, Wu L, Lin Y. Study on the effect of outpatient nursing intervention on medical compliance of diabetes mellitus during pregnancy. *Minerva Med*. 2022;113(4):730–3.
16. Karavasileiadou S, Almegwely W, Alanazi A, Alyami H, Chatzimichailidou S. Self-management and self-efficacy of women with gestational diabetes mellitus: a systematic review. *Glob Health Action*. 2022;15(1):2087298. Review.
17. Zhang M, Zhou Y, Zhong J, Wang K, Ding Y, Li L. Current guidelines on the management of gestational diabetes mellitus: a content analysis and appraisal. *BMC Pregnancy Childbirth*. 2019;19(1):200.
18. Barati Z, Iravani M, Karandish M, Haghighizadeh MH, Masihi S. The effect of oat bran consumption on gestational diabetes: a randomized controlled clinical trial. *BMC Endocr Disord*. 2021;21(1):67.
19. Ren X, Jin J, Chen Y, Jin J. Research on the Effect of Nursing Methods for Gestational Diabetes Mellitus Based on Comprehensive Nursing Intervention. *Comput Math Methods Med*. 2022;2022:2396658.
20. You H, Lei A, Xiang J, Wang Y, Luo B, Hu J. Effects of breastfeeding education based on the self-efficacy theory on women with gestational diabetes mellitus: a CONSORT-compliant randomized controlled trial. *Medicine (Baltimore)*. 2020;99(16):e19643.
21. Pantartzis KA, Manolopoulos PP, Paschou SA, Kazakos K, Kotsa K, Goulis DG. Gestational diabetes mellitus and quality of life during the third trimester of pregnancy. *Qual Life Res*. 2019;28(5):1349–54.