Original Article

Effect of Dietary Myo-Inositol Supplementation on Pregnant Obese Women to Prevent Gestational Diabetes Mellitus

Maryum Gul[1], Samina Mumtaz[2], Shazia Mushtaq[3], Farkhanda Saleem[4], Nusrat Rasheed[5], Sadia Saleem[6]

[1,4-6]Resident of Obstetrics & Gynecology, [2]Consultant Gynecologist, [3]Senior Registrar of Obstetrics & Gynecology, Dept, Obstetrics & Gynecology Recep Tayyip Erdoğan Hospital, Muzaffargarh

Correspondence: *Dr Maryum Gul*
Resident of Obstetrics & Gynecology, Recep Tayyip Erdoğan Hospital, Muzaffargarh
mariyamsaeed076@gmail.com

Abstract

Objective: To determine the effect of Myoinositol supplementation in pregnant obese and overweight women to reduce the incidence of gestational diabetes mellitus as well as improving maternal and neonatal outcomes compared to standard care alone.

Methodology: A randomized controlled trial was conducted at the Department of Gynecology and Obstetrics, Recep Tayyip Erdoğan Hospital, Muzaffargarh, from February 1, 2023, to August 1, 2023. Participants included obese and overweight pregnant women, divided into two groups. Group A (Intervention) received 2g oral myo-inositol plus 200µg folic acid twice daily until delivery and Group B (Control), received 200µg folic acid twice daily (placebo) until delivery.

GDM was diagnosed using a 2-hour 75g oral glucose tolerance test (OGTT) at 26–28 weeks of gestation. Primary outcomes (GDM incidence) were assessed at 28 weeks, while secondary outcomes (mode of delivery, neonatal outcomes) were recorded postpartum. Data were analyzed using SPSS version 22.0.

Results: GDM was observed in 19 (10%) patients in group A as compare to 27 (14.2%) patients in group B (P= 0.208). Term delivery was observed in 175 (92.1%) patients in group A as compare to 171 (90%) patients in group B, while preterm delivery was observed in 15 (7.9%) patients in group A and 19 (10%) patients in group B (P= 0.472).

Conclusion: Myoinositol supplementation in pregnant obese and overweight women did not significantly reduce the incidence of GDM, although it was associated with a slightly lower GDM rate compared to the control group.

Keywords: Overweight pregnancy, Myoinositol, Gestational diabetes mellitus

Cite this article as: Gul M, Mumtaz S, Mushtaq S, Saleem F, Rasheed N, Saleem S. Effect of Dietary Myo-Inositol Supplementation on Pregnant Obese Women to Prevent Gestational Diabetes Mellitus. J Soc Obstet Gynaecol Pak. 2025;15(2): 109-113. DOI. 10.71104/jsogp.v15i2.911

Introduction

Gestational diabetes mellitus (GDM), a challenging complication of pregnancy, typically manifests among pregnant females during either second phase or third phase of trimester,[1,2] explained by the glucose intolerance, insulin signaling dysfunction, and poor insulin secretion.[3] Gestational diabetes has significant perinatal and postnatal implications, compromising feto-maternal and neonatal health through putting them at increased risks of preeclampsia, preterm birth, macrosomia, polyhydramnios, perinatal asphyxia, neonatal hypoglycemia, and type 2 diabetes.[2,4]

According to a 2021 report of International Diabetes Federation around 21.1 million females of age 20–49 year were affected by hyperglycemic condition during pregnancy and 80.3% of them were diagnosed with GDM.[5] The prevalence of GDM considerably varies across studies from 2% to 38%, depending on demographic characteristics and screening criteria.[6]

Obesity, a well-established predisposing risk factor, elevates the risk of GDM development up to six-fold, further complicating the risk of perinatal and postnatal outcomes, and the reported estimates of 50% obese/overweight global pregnant population raises the concern among clinicians and researchers regarding GDM associated potential neonatal and maternal health risks.[7] Additionally, GDM development risk is 2-fold, 4-fold, and 8-fold higher among pregnant women who are obese, overweight, and have class III obesity,

Authorship Contribution:[1,4,6]Substantial contributions to the conception or design of the work or the acquisition, [3] Drafting the work or revising it critically for important intellectual content, [5]Active participation in methodology.[2]Final approval of the version to be published.

Funding Source: none
Conflict of Interest: none

Received: Oct 9, 2024
Accepted: April 02, 2025

respectively.[8] Several systematic reviews also suggested a positive link between higher body mass index (BMI) and GDM development during pregnancy.[9,10] The progressively increasing global incidence of obesity and subsequent rise in GDM prevalence call attention to the need for preventive strategies to deal with unwanted consequences of obesity and hyperglycemia during pregnancy.[11]

Recent studies on gestational diabetes mellitus (GDM) management strategies suggest that myo-inositol supplementation may play a potential role in both preventing and improving GDM, though conclusive evidence remains to be established.[12] Myo-inositol, a cyclic carbohydrate with six hydroxyl groups and a glucose derivative, is naturally synthesized in the liver, kidneys, and brain. It plays a crucial role in cellular growth, survival, and glucose homeostasis.[13] Reduced levels of myo-inositol have been associated with aging, insulin resistance, and diabetes.[13]

A systematic review and meta-analysis indicated that myo-inositol may serve as a novel and safe preventive supplementation against GDM, demonstrating benefits in regulating 1-hour and 2-hour oral glucose tolerance test (OGTT) values and fasting glucose levels.[1]. Additionally, it may reduce GDM-related complications such as gestational hypertension and preterm delivery in obese and overweight pregnant women.[14] However, the authors noted insufficient evidence regarding myo-inositol's effects on GDM, highlighting the need for further investigation.[14]

Worldwide rising in obesity rates among women of reproductive age has contributed to the growing incidence of GDM, underscoring the urgent need for effective preventive strategies. Certain small-scale clinical studies have suggested that myo-inositol supplementation may improve insulin sensitivity and glycemic control in high-risk pregnant women. However, despite promising preliminary findings, evidence on its efficacy remains limited and inconsistent at local level, especially in obese pregnant populations who are at particularly high risk for GDM. Present study is justified by the growing public health burden of GDM and the need for safe, accessible, and cost-effective interventions. If proven effective, dietary myo-inositol supplementation could serve as a non-pharmacological strategy to reduce GDM incidence and associated complications, thereby improving maternal and neonatal outcomes. This study lies in its potential to fill an important knowledge gap, guide clinical practice, and inform nutritional recommendations for pregnant obese women, ultimately contributing to better maternal-fetal health and reduced healthcare costs.

Methodology

This randomized controlled trial was conducted at the Department of Gynecology and Obstetrics, Recep Tayyip Erdogan Hospital, Muzaffargarh, from February 2023 to August 2023. A total of 380 pregnant women aged 18 to 45 years, with a pre-pregnancy body mass index (BMI) ≥25 kg/m² and singleton pregnancies without pre-existing glucose intolerance, were enrolled through non-probability consecutive sampling.

Exclusion criteria included a known diagnosis of type 1 or type 2 diabetes mellitus prior to pregnancy, multiple pregnancies, chronic medical conditions such as polycystic ovary syndrome (PCOS), thyroid disorders, hepatic or renal impairment, and unwillingness to participate or adhere to the supplementation protocol.

The sample size was calculated using the OpenEpi calculator, referencing data from a previous study, with a 95% confidence interval and 80% power. The estimated incidence of GDM was 6% in the intervention group versus 15.3% in the control group. Participants were randomly assigned into two equal groups using double-blind randomization. Group A (intervention group) received 2 g of oral myo-inositol plus 200 mcg of folic acid twice daily, while Group B (control group) received only 200 mcg of folic acid twice daily. Supplementation continued until delivery.

Ethical approval was obtained (Letter No. IHHN_IRB_2022_04_012, dated 01-Feb-2023), and informed consent was secured from all participants. Baseline demographic and clinical data were collected. Laboratory investigations, including fasting glucose, glycated hemoglobin (HbA1c), and oral glucose tolerance tests (OGTT), were performed at baseline, 19–20 weeks, and 26–28 weeks of gestation. GDM was diagnosed based on a 2-hour 75 g OGTT conducted between 26–28 weeks.

The primary outcome was the incidence of GDM at 28 weeks. Secondary outcomes included mode of delivery and neonatal outcomes, which were assessed post-delivery. Data confidentiality was maintained throughout the study. Statistical analysis was performed using SPSS version 22.0.

Results

Overall mean age of patients was 27.35 ± 5.12 years in Group A and 26.49 ± 5.38 years in Group B (p = 0.654). Mean weight was 76.65 ± 3.27 kg in group A and 75.84 ± 3.44 kg in group B (p = 0.274). Term deliveries occurred in 92.1% of Group A and 90% of Group B (p = 0.472). SVD rates were 34.7% and 40% (p = 0.289), while cesarean sections were 65.3% and 60%, in group A and B respectively. Frequency of macrosomia was seen in 4.7% of Group A and 2.1% of Group B (p = 0.158). NICU admissions were 9.5% versus 10% (p = 0.863), and shoulder dystocia rates were 1.6% versus 0.5% (p = 0.315) as shown in table I.

Table I: Comparison of demographic and clinical parameters in both groups.

	Group A (n=190)	Group B (n=190)	P-value
Age (years)	27.347±5.12	26.489±5.38	0.654
Weight (Kg)	76.647±3.27	75.842±3.44	0.274
Height (cm)	158.126±4.41	162.857±4.74	0.096
Term of delivery			
Term	175 (92.1%)	171 (90%)	0.472
Preterm	15 (7.9%)	19 (10%)	
Total	190 (100%)	190 (100%)	
Mode of delivery			
SVD	66 (34.7%)	76 (40%)	0.289
C-section	124 (65.3%)	114 (60%)	
Total	190 (100%)	190 (100%)	
Macrosomia			
Yes	9 (4.7%)	4 (2.1%)	0.158
No	181 (95.3%)	186 (97.9%)	
Total	190 (100%)	190 (100%)	
NICU admission			
Yes	18 (9.5%)	19 (10%)	0.863
No	172 (90.5%)	171 (90%)	
Total	190 (100%)	190 (100%)	
Shoulder Dystocia			
Yes	3 (1.6%)	1 (0.5%)	0.315
No	187 (98.4%)	189 (99.5%)	
Total	190 (100%)	190 (100%)	

Based on comparison of GDM incidence between the two groups showed that 10% of women in Group A developed GDM, compared to 14.2% in Group B. However, this difference was not statistically significant (p = 0.208), indicating similar rates of GDM between the groups as shown in table II.

Table II: Comparison of GDM in both groups.

GDM	(n=190) Group A	(n=190) Group B	P Value
Yes	19 (10%)	27 (14.2%)	0.208
No	171 (90%)	163 (85.8%)	
Total	190 (100%)	190 (100%)	

Among women aged 18 to 30 years, 10.2% in Group A and 13.7% in Group B developed gestational diabetes, with no significant difference between the groups (p = 0.368). For women aged 31 to 45 years, 9.4% in Group A and 15.9% in Group B had gestational diabetes, and this difference was also not statistically significant (p = 0.335). Indicating the risk of gestational diabetes was similar between the two groups, regardless of age as shown in table III.

Table III: GDM with respect to age in both groups.

For Age 18-30 years			
Group	GDM		P value
	Yes	No	
A	14(10.2%)	123(89.8%)	0.368
B	20(13.7%)	126(86.3%)	
For Age 31-45 years			
Group	GDM		
	Yes	No	
A	5(9.4%)	48(90.6%)	0.335
B	7(15.9%)	37(84.1%)	

Discussion

GDM is a most frequently reported hyperglycemic condition of pregnancy resulting from impaired carbohydrate metabolism. The GDM screening during initial days of pregnancy involves fasting glycaemia test, however, if remained undetected, further screening is performed during 24-28 gestational weeks.[15] Studies suggest that the global increase in gestational diabetes mellitus (GDM) cases is closely linked to the rising prevalence of obesity.[16,17] Present study aimed to evaluate the effect of dietary myo-inositol supplementation on preventing GDM in pregnant obese women with overall mean age 27.35 ± 5.12 years in group A and 26.49 ± 5.38 years in group B, while the control group had a marginally greater mean height (162.86 ± 4.74 cm vs. 158.13 ± 4.41 cm). Consistently Santamaria et al[18] reported that the placebo group had a slightly higher mean age and pre-pregnancy BMI compared to the intervention group (32.7 ± 5.3 vs. 32.1 ± 4.8 years and 27.1 ± 1.3 vs. 26.9 ± 1.3 kg/m², respectively). In contrast, D'Anna et al[19] found that both mean age and BMI were higher in their placebo group (31.6 ± 5.6 years and 23.6 ± 3.1 kg/m²) compared to the intervention group (31.0 ± 5.3 years and 22.8 ± 3.1 kg/m²). These comparisons showed slight variations in baseline characteristics which may due to the variation in sample size of the studies and sample selection criteria.

According to this study, term delivery occurred in a higher number of patients in Group A (175; 92.1%)

compared to Group B (171; 90%), while preterm delivery was slightly lower in Group A (15; 7.9%) than in controls (19; 10%), (p = 0.472). Similarly, cesarean section rates were higher in Group A (124; 65.3%) than in Group B (114; 60%) (p = 0.289). In aligns to this study D'Anna et al[20] reported more cesarean and preterm deliveries in the placebo group compared to the myo-inositol group (46.1% vs. 43.3% and 9.6% vs. 3.1%, respectively), without statistically significant differences (p = 0.68 and 0.06). Likewise, Godfrey KM et al[21] observed higher rates of preterm and cesarean deliveries in the control group versus the intervention group, with no significant differences (p = 0.43 and 0.99). These studies suggest a potential beneficial effect of myo-inositol on pregnancy outcomes related to GDM, but the lack of significant differences highlights the need for further, larger-scale research to confirm these trends.

In the present study, macrosomia was observed in 9 patients (4.7%) in the intervention group (Group A) and in 4 patients (2.1%) in the control group (Group B), with no statistically significant difference (p = 0.158). NICU admissions were slightly higher in the control group (10%) than in the intervention group (9.5%), though this difference was also not statistically significant (p = 0.863). Shoulder dystocia occurred in 3 patients (1.6%) in Group A compared to 1 patient (0.5%) in Group B, again with no significant difference between the groups (p = 0.315). Consistent with our findings, Santamaria et al.[18] reported lower rates of macrosomia and shoulder dystocia in the myo-inositol group (1% and 0%, respectively) compared to the control group (4.9% and 1%), with statistically significant differences (p < 0.05). However, they observed no difference in NICU admissions between groups (1% each, p = 0.09). Conversely, D'Anna et al[20] found macrosomia and shoulder dystocia to be slightly more common in the myo-inositol group (5.1% and 1%) than controls (4.8% and 0.9%), with non-significant differences (p = 0.89 and 0.96). They also reported significantly higher NICU admissions in the placebo group (4.8%) compared to none in the intervention group (p = 0.03).

In the present study, gestational diabetes mellitus (GDM) was diagnosed in 19 patients (10%) in Group A and 27 patients (14.2%) in Group B; however, this difference was not statistically significant (p = 0.208). In contrast, Santamaria et al.[22] reported a significantly lower incidence of GDM in the myo-inositol intervention group (11%) compared to the placebo group (25.3%), indicating a potential benefit of supplementation in reducing GDM risk. They found that myo-inositol treatment reduced the risk of GDM onset by 66%, with notable improvements in fasting glucose and 2-hour OGTT values (p < 0.001). Similarly, another study by Santamaria et al[18] showed a significant reduction in GDM incidence among myo-inositol-treated overweight women (11.6%) versus controls (27.4%) with p < 0.05, indicating a 67% decreased risk of developing GDM. The findings of the studies suggest that myo-inositol supplementation may effectively reduce GDM risk, although our study did not reach statistical significance, possibly due to the several study limitations like sample size, conducted at a single center, additionally dietary intake and physical activity levels of participants were not closely monitored and the follow-up period was also limited to pregnancy; long-term maternal and neonatal outcomes were not evaluated. Hence future multicenter randomized controlled trials with larger and more diverse populations are recommended to confirm these findings with strictly monitoring of lifestyle factors and longer follow-up to evaluate both immediate and lasting effects of myo-inositol supplementation on gestational diabetes.

Conclusion

Myo-inositol supplementation in overweight pregnant women resulted in a slightly lower incidence of gestational diabetes mellitus (GDM) (10%) compared to the control group (14.2%); however, the difference was not statistically significant. No significant differences were observed between the groups in key maternal and neonatal outcomes, including term and preterm delivery rates, cesarean section, macrosomia, NICU admission, and shoulder dystocia. Although prior studies have indicated potential benefits of myo-inositol in GDM prevention, this study did not provide conclusive evidence supporting its efficacy in overweight women. This may be attributed to several study limitations. Therefore, larger-scale studies involving more diverse populations and rigorous control of confounding factors are warranted to more definitively assess the role of myo-inositol supplementation during pregnancy.

References

1. Sun C, Shen J, Fang R, Huang H, Lai Y, Hu Y, et al. The impact of environmental and dietary exposure on gestational diabetes mellitus: a comprehensive review emphasizing the role of oxidative stress. Front Endocrinol (Lausanne). 2025 Apr 2;16:1393883. https://doi.org/10.3389/fendo.2025.1393883
2. Kong D, Kowalik O, Garratt E, Godfrey KM, Chan SY, Teo AK. Genetics and epigenetics in gestational diabetes contributing

to type 2 diabetes. Trends Endocrinol Metab. 2025 Apr 24. https://doi.org/10.1016/j.tem.2025.03.014

3. Yu W, Miao H, Gong Y. Lymphocyte subsets and cytokine changes in women with gestational diabetes mellitus: a systematic review. J Diabetes Res. 2025;2025(1):3494697. https://doi.org/10.1155/jdr/3494697
4. Su Z, Liu L, Zhang J, Guo J, Wang G, Zeng X. A scientometric visualization analysis of the gut microbiota and gestational diabetes mellitus. Front Microbiol. 2025 Jan 30;16:1485560. https://doi.org/10.3389/fmicb.2025.1485560
5. Zhuang M, Wang B, Shi Y, Zhou Z. Multi-organ regulation mechanisms and nutritional intervention strategies in gestational diabetes mellitus. J Nutr. 2025 Apr 11. https://doi.org/10.1016/j.tjnut.2025.04.008
6. Salmen BM, Reurean-Pintilei D, Trofin D, Durdu CE, Neagu AC, Bohiltea RE. Investigating the role of skin autofluorescence in gestational diabetes mellitus: a systematic review. Int J Mol Sci. 2025 Mar 26;26(7):3022. https://doi.org/10.3390/ijms26073022
7. Santa Cruz TE, Sarasqueta C, Muruzábal JC, Ansuategui E, Sanz O. A systematic review and meta-analysis of exercise-based intervention to prevent gestational diabetes in women with overweight or obesity. BMC Pregnancy Childbirth. 2025 Jan 4;25(1):5. https://doi.org/10.1186/s12884-024-07021-w
8. Mashayekh-Amiri S, Mohammad-Alizadeh-Charandabi S, Abdolalipour S, Mirghafourvand M. Myo-inositol supplementation for prevention of gestational diabetes mellitus in overweight and obese pregnant women: a systematic review and meta-analysis. Diabetol Metab Syndr. 2022 Jul 6;14(1):93. https://doi.org/10.1186/s13098-022-00862-5
9. Najafi F, Hasani J, Izadi N, Hashemi-Nazari SS, Namvar Z, Mohammadi S, et al. The effect of prepregnancy body mass index on the risk of gestational diabetes mellitus: a systematic review and dose-response meta-analysis. Obes Rev. 2019 Mar;20(3):472–86. https://doi.org/10.1111/obr.12803
10. Viecceli C, Remonti LR, Hirakata VN, Mastella LS, Gnielka V, Oppermann ML, et al. Weight gain adequacy and pregnancy outcomes in gestational diabetes: a meta-analysis. Obes Rev. 2017 May;18(5):567–80. https://doi.org/10.1111/obr.12521
11. Yao D, Chang Q, Wu QJ, Gao SY, Zhao H, Liu YS, et al. Relationship between maternal central obesity and the risk of gestational diabetes mellitus: a systematic review and meta-analysis of cohort studies. J Diabetes Res. 2020;2020(1):6303820. https://doi.org/10.1155/2020/6303820
12. Kamaruddin MA, Soe MK, Mazlan MA, Rishdi WM, Ta PT. A systematic review: an analysis of the promising effects of myo-inositol and probiotics on the prevention of gestational diabetes mellitus. J Pharm Sci Drug Discov. 2025;4(1):1–3.
13. DiNicolantonio JJ, O'Keefe JH. Myo-inositol for insulin resistance, metabolic syndrome, polycystic ovary syndrome and gestational diabetes. Open Heart. 2022 Mar 1;9(1):e001989. https://doi.org/10.1136/openhrt-2022-001989
14. Wdowiak A, Bakalczuk S, Filip M, Laganà AS, Unfer V. The clinical use of myo-inositol in IVF-ET: a position statement from the Experts Group on Inositol in Basic and Clinical Research and on PCOS (EGOI-PCOS), the Polish Society of Andrology, and the International Scientific Association for the Support and Development of Medical Technologies. J Clin Med. 2025 Jan 16;14(2):558. https://doi.org/10.3390/jcm14020558
15. Ramonienė G, Malakauskienė L, Savukynė E, Maleckienė L, Gruzdaitė G. Pregnancy complications and outcomes in obese women with gestational diabetes. Medicina (Kaunas). 2025 Jan 1;61(1):51. https://doi.org/10.3390/medicina61010051
16. Law KP, Zhang H. The pathogenesis and pathophysiology of gestational diabetes mellitus: deductions from a three-part longitudinal metabolomics study in China. Clin Chim Acta. 2017 May 1;468:60–70. https://doi.org/10.1016/j.cca.2017.02.008
17. Macrì F, Di Pasquo E, Rizzi S, Lanzone A, De Carolis S, Pitocco D, et al. Gestational weight gain as an independent risk factor for adverse pregnancy outcomes in women with gestational diabetes. Eur Rev Med Pharmacol Sci. 2018 Jul 15;22(14).
18. Santamaria A, Di Benedetto A, Petrella E, Pintaudi B, Corrado F, D'Anna R, et al. Myo-inositol may prevent gestational diabetes onset in overweight women: a randomized, controlled trial. J Matern Fetal Neonatal Med. 2016 Oct 1;29(19):3234–7. https://doi.org/10.3109/14767058.2015.1121478
19. D'Anna R, Scilipoti A, Giordano D, Caruso C, Cannata ML, Interdonato ML, et al. Myo-inositol supplementation and onset of gestational diabetes mellitus in pregnant women with a family history of type 2 diabetes: a prospective, randomized, placebo-controlled study. Diabetes Care. 2013 Apr 1;36(4):854–7. https://doi.org/10.2337/dc12-1371
20. D'Anna R, Di Benedetto A, Scilipoti A, Santamaria A, Interdonato ML, Petrella E, et al. Myo-inositol supplementation for prevention of gestational diabetes in obese pregnant women: a randomized controlled trial. Obstet Gynecol. 2015 Aug 1;126(2):310–5. https://doi.org/10.1097/AOG.0000000000000958
21. Godfrey KM, Barton SJ, El-Heis S, Kenealy T, Nield H, Baker PN, et al. Myo-inositol, probiotics, and micronutrient supplementation from preconception for glycemia in pregnancy: NiPPeR international multicenter double-blind randomized controlled trial. Diabetes Care. 2021 May 1;44(5):1091–9. https://doi.org/10.2337/figshare.13874705
22. Santamaria A, Alibrandi A, Di Benedetto A, Pintaudi B, Corrado F, Facchinetti F, et al. Clinical and metabolic outcomes in pregnant women at risk for gestational diabetes mellitus supplemented with myo-inositol: a secondary analysis from 3 RCTs. Am J Obstet Gynecol. 2018 Sep 1;219(3):300.e1. https://doi.org/10.1016/j.ajog.2018.05.018
23. Matarrelli B, Vitacolonna E, D'Angelo M, Pavone G, Mattei PA, Liberati M, et al. Effect of dietary myo-inositol supplementation in pregnancy on the incidence of maternal gestational diabetes mellitus and fetal outcomes: a randomized controlled trial. J Matern Fetal Neonatal Med. 2013 Jul 1;26(10):967–72. https://doi.org/10.3109/14767058.2013.766691