

فلک جنبش زمین آرام از او یافت

به نام آن که، هستی نام از او یافت

Management of Diabetes in Pregnancy

Standards of Medical Care in Diabetes -2018

Diabetes Care 2018 ;41(Suppl.1):S137-S143

American Diabetes Association

استاد راهنما :

آقای دکتر ابوالفضل زنده دل (دانشیار گروه آموزشی داخلی)

ارائه دهندگان :

فاطمه محمدی و امیرحسین یادگار (کارآموزان گروه داخلی)

Introduction

- The Prevalence of diabetes in pregnancy
- Types of diabetes
- Risks of uncontrolled diabetes in pregnancy

PRECONCEPTION COUNSELING

Recommendations

- Starting at puberty, preconception counseling should be incorporated into routine diabetes care for all girls of childbearing potential. **A**
- Family planning should be discussed and effective contraception should be prescribed and used until a woman is prepared and ready to become pregnant. **A**
- Preconception counseling should address the importance of glycemic control as close to normal as is safely possible, ideally A₁C <6.5% (48 mmol/mol), to reduce the risk of congenital anomalies. **B**

PRECONCEPTION COUNSELING

- Routine diabetes care
- Family planning and effective contraception
- A1C <6.5% (48 mmol/mol)
- Education

Preconception Testing

Recommendation

- Women with preexisting type 1 or type 2 diabetes who are planning pregnancy or who have become pregnant should be counseled on the risk of development and/or progression of diabetic retinopathy. Dilated eye examinations should occur before pregnancy or in the first trimester, and then patients should be monitored every trimester and for 1-year postpartum as indicated by the degree of retinopathy and as recommended by the eye care provider. **B**

Preconception Testing

- Diabetic retinopathy
- Dilated eye examinations
 - Before pregnancy or in the first trimester
 - Every trimester and for 1-year postpartum
- Virus Tests

Preconception Testing

- Pap smear
- Prenatal vitamins
- Smoking
- Diabetes specific testing
- Teratogenic drugs

GLYCEMIC TARGETS IN PREGNANCY

Recommendations

- Fasting and postprandial self-monitoring of blood glucose are recommended in both gestational diabetes mellitus and preexisting diabetes in pregnancy to achieve glycemic control. Some women with preexisting diabetes should also test blood glucose preprandially. **B**
- Due to increased red blood cell turnover, A₁C is slightly lower in normal pregnancy than in normal nonpregnant women. The A₁C target in pregnancy is 6–6.5% (42–48 mmol/mol); <6% (42 mmol/mol) may be optimal if this can be achieved without significant hypoglycemia, but the target may be relaxed to <7% (53 mmol/mol) if necessary to prevent hypoglycemia. **B**

GLYCEMIC TARGETS IN PREGNANCY

- Fasting and post prandial self-monitoring
- HbA_{1c}: 6 –6.5% (42–48 mmol/mol)
 - <6% (42 mmol/mol)
 - <7% (53 mmol/mol)

GLYCEMIC TARGETS IN PREGNANCY

- Insulin-independent glucose uptake
- Diabetogenic placental hormones
- Consistent amounts of carbohydrates

GLYCEMIC TARGETS IN PREGNANCY

- Insulin Physiology
- Glucose Monitoring
- American College of Obstetricians and Gynecologists

GLYCEMIC TARGETS IN PREGNANCY

- Fasting <95 mg/dL (5.3 mmol/L) and either
- One-hour postprandial <140 mg/dL (7.8 mmol/L) or
- Two-hour postprandial <120 mg/dL (6.7 mmol/L)

*Women with type 1 diabetes

A₁C in Pregnancy

- A₁C <6 – 6.5% (42 – 48 mmol/mol)
- An individualized target of <6% (42 mmol/mol) to <7% (53 mmol/mol)
- A₁C levels fall during normal pregnancy
- A secondary measure of glycemic control

A₁C in Pregnancy

- A₁C <6% (Second and third trimesters)
- Hypoglycemia → LBW

MANAGEMENT OF GDM

Recommendations

- Lifestyle change is an essential component of management of gestational diabetes mellitus and may suffice for the treatment of many women. Medications should be added if needed to achieve glycemic targets. **A**
- Insulin is the preferred medication for treating hyperglycemia in gestational diabetes mellitus as it does not cross the placenta to a measurable extent. Metformin and glyburide may be used, but both cross the placenta to the fetus, with metformin likely crossing to a greater extent than glyburide. All oral agents lack long-term safety data. **A**
- Metformin, when used to treat polycystic ovary syndrome and induce ovulation, need not be continued once pregnancy has been confirmed. **A**

MANAGEMENT OF GDM

- Life style change
 - Insulin
 - Metformin and Glyburide
- Oral agents lack long-term safety data
- Metformin in Polycystic ovary syndrome

MANAGEMENT OF GDM

- GDM Complications
- Diet, exercise and lifestyle counseling

MANAGEMENT OF GDM

1-Lifestyle Management

- Fasting <95 mg/dL (5.3 mmol/L) and either
- One-hour postprandial, 140 mg/d L (7.8 mmol/L) or
- Two-hour postprandial, 120 mg/dL (6.7 mmol/L)

MANAGEMENT OF GDM

- 70 – 85% of GDM patients

MANAGEMENT OF GDM

- 2-Medical Nutrition Therapy
- Individualized nutrition plan
- Adequate calorie intake
- Dietary Reference Intakes (DRI)

MANAGEMENT OF GDM

- 175 g of Carbohydrate
- 71 g of Protein
- 28 g of Fiber

MANAGEMENT OF GDM

3-Pharmacologic Therapy

- Insulin is the first-line agent
- Sulfonylureas
- Metformin

-ovulation induction in polycystic ovary syndrome

MANAGEMENT OF PREEXISTING DM₁ and DM₂ IN PREGNANCY

Insulin Use

Recommendation

- Insulin is the preferred agent for management of both type 1 diabetes and type 2 diabetes in pregnancy because it does not cross the placenta, and because oral agents are generally insufficient to overcome the insulin resistance in type 2 diabetes and are ineffective in type 1 diabetes. **E**

MANAGEMENT OF PREEEXISTING DM₁ and DM₂ IN PREGNANCY

1-Insulin Use

- Preferred agent
- The physiology of Insulin in pregnancy

MANAGEMENT OF PREEXISTING DM₁ and DM₂ IN PREGNANCY

2-Preeclampsia and Aspirin

- Low-dose aspirin 60–150 mg/day
- From the end of the first trimester until the baby is born

MANAGEMENT OF PREEEXISTING DM₁ and DM₂ IN PREGNANCY

3-Type 1 Diabetes

- Risk of hypoglycemia
- Pregnancy: a ketogenic state

MANAGEMENT OF PREEEXISTING DM₁ and DM₂ IN PREGNANCY

4-Type 2 Diabetes

- Weight gain
 - Overweight women:15 –25 lb
 - Obese women:10 –20 lb
- Associated hypertension and other comorbidities

Preeclampsia and Aspirin

Recommendation

- Women with type 1 or type 2 diabetes should be prescribed low-dose aspirin 60–150 mg/day (usual dose 81 mg/day) from the end of the first trimester until the baby is born in order to lower the risk of preeclampsia. **A**


PREGNANCY AND DRUG CONSIDERATIONS

Recommendations

- In pregnant patients with diabetes and chronic hypertension, blood pressure targets of 120–160/80–105 mmHg are suggested in the interest of optimizing long-term maternal health and minimizing impaired fetal growth. **E**
- Potentially teratogenic medications (i.e., ACE inhibitors, angiotensin receptor blockers, statins) should be avoided in sexually active women of childbearing age who are not using reliable contraception. **B**

PREGNANCY AND DRUG CONSIDERATIONS

- Target of blood pressure in hypertensive patients
- Avoidance of Teratogenic drugs
 - ❖ ACE inhibitors
 - ❖ ARB
 - ❖ statins

- 
- Blood pressure in pregnant versus nonpregnant patients
 - The adverse effect of low blood pressure on fetus

Drugs

- Safe drugs
- Unsafe drugs and adverse effects
 - ❖ ACE inhibitors-ARB
 - ❖ Statins
 - ❖ Diuretics

Postpartum care

- Psychological
- Support for self care
- Lactation and benefits of breastfeeding

Gestational Diabetes Mellitus

- Initial Testing
- Postpartum Follow-up
- Prevention of progression to type 2 diabetes

Conclusion

- GDM prevalence is increasing due to obesity
- Preconception testing includes; lab data, screening tests, drug review
- Physiology of insulin during pregnancy
- Treatment targets
- Management of GDM
- Management of preexisting DM₁ and DM₂
- Pregnancy and drug consideration

Questions?

- How do we manage GDM?
- What are our treatment goals in diabetic pregnant women?

References

- 1. Holmes VA, Young IS, Patterson CC, et al.; Di-abetes and Pre-eclampsia Intervention Trial Study Group. Optimal glycemic control, pre-eclampsia, and gestational hypertension in women with type 1 diabetes in the Diabetes and Pre-eclampsia Intervention Trial. *Diabetes Care* 2011;34:1683–1688
- 2. Dabelea D, Hanson RL, Lindsay RS, et al. Intra-uterine exposure to diabetes conveys risks for type 2 diabetes and obesity: a study of discordant sibships. *Diabetes* 2000;49:2208–2211
- 3. Guerin A, Nisenbaum R, Ray JG. Use of maternal GHB concentration to estimate the risk of congenital anomalies in the offspring of women with prepregnancy diabetes. *Diabetes Care* 2007;30:1920–1925
- 4. Jensen DM, Korsholm L, Ovesen P, et al. Peri-conceptual A1C and risk of serious adverse pregnancy outcome in 933 women with type 1 diabetes. *Diabetes Care* 2009;32:1046–1048
- 5. Charro n- Pr oc ho w nik D, S ere ik a SM, Be ck er D, et al. Long-term effects of the booster-enhanced READY-Girls preconception counseling program on intentions and behaviors for family planning

References

- 6. Peterson C, Grosse SD, Li R, et al. Preventable health and cost burden of adverse birth outcomes associated with pregestational diabetes in the United States. *Am J Obstet Gynecol* 2015;212:74.e1-74.e9
- 7. Charron-Prochownik D, Downs J. Diabetes and Reproductive Health for Girls. Alexandria, VA, American Diabetes Association, 2016
- 8. Bullo M, Tschumi S, Bucher BS, Bianchetti MG, Simonetti GD. Pregnancy outcome following exposure to angiotensin-converting enzyme inhibitors or angiotensin receptor antagonist: a systematic review. *Hypertension* 2012;60:444-450
- 9. Taguchi N, Rubin ET, Hosokawa A, et al. Pre-natal exposure to HMG-CoA reductase inhibitors: effects on fetal and neonatal outcomes. *Reprod Toxicol* 2008;26:175-177
- 10. Bateman BT, Hernandez-Diaz S, Fischer MA, et al. Statins and congenital malformations: cohort study. *BMJ* 2015;350:h1035
- 11. Manderson JG, Paterson CC, Hadfield DR, Traub AI, Ennis C, McCance DR. Preprandial versus postprandial blood glucose monitoring in type 1 diabetic pregnancy: a randomized controlled clinical trial. *Am J Obstet Gynecol* 2003;189:507-512
- 12. de Veciana M, Major CA, Morgan MA, et al.

References

- 13. Jovanovic-Peterson L, Peterson CM, Reed GF, et al. Maternal postprandial glucose levels and infant birth weight: the Diabetes in Early Pregnancy Study. The National Institute of Child Health and Human Development-Diabetes in Early Pregnancy Study. Am J Obstet Gynecol 1991;164:103–111
- 14. Committee on Practice Bulletins—Obstetrics. Practice Bulletin No. 137: Gestational diabetes mellitus. Obstet Gynecol 2013;122:406–416
- 15. Nielsen GL, Møller M, Sørensen HT. HbA1c in early diabetic pregnancy and pregnancy outcomes: a Danish population-based cohort study of 573 pregnancies in women with type 1 diabetes. Diabetes Care 2006;29:2612–2616
- 16. Suhonen L, Hiilesmaa V, Teramo K. Glycaemic control during early pregnancy and fetal malformations in women with type 1 diabetes mellitus. Diabetologia 2000;43:79–82
- 17. Maresh MJA, Holmes VA, Patterson CC, et al.; Diabetes and Pre-eclampsia Intervention Trial Study Group. Glycemic targets in the second and third trimester of pregnancy for women with type 1 diabetes. Diabetes Care 2015;38:34–42

References

- 18. Nielsen LR, Ekbom P, Damm P, et al. HbA1c levels are significantly lower in early and late pregnancy. *Diabetes Care* 2004;27:1200–1201
- 19. Mosca A, Paleari R, Dalfr`a MG, et al. Reference intervals for hemoglobin A1c in pregnant women: data from an Italian multicenter study. *Clin Chem* 2006;52:1138–1143
- 20. Metzger BE, Lowe LP, Dyer AR, et al.; HAPO Study Cooperative Research Group. Hyperglycemia and adverse pregnancy outcomes. *N Engl J Med* 2008;358:1991–2002
- 21. Bain E, Crane M, Tieu J, Han S, Crowther CA, Middleton P. Diet and exercise interventions for preventing gestational diabetes mellitus. *Cochrane Database Syst Rev* 2015; 4: CD010443
- 22. Koivusalo SB, Ronn`o K, Klemetti MM, et al. Gestational diabetes mellitus can be prevented

References

- 23. Wang C, Wei Y, Zhang X, et al. A randomized clinical trial of exercise during pregnancy to prevent gestational diabetes mellitus and improve pregnancy outcomes in overweight and obese pregnant women. *Am J Obstet Gynecol* 2017; 216 :340–351
- 24. Metzger BE, Buchanan TA, Coustan DR, et al. Summary and recommendations of the Fifth International Workshop-Conference on Gestational Diabetes Mellitus. *Diabetes Care* 2007; 30 (Suppl. 2): S251–S260
- 25. Mayo K, Melamed N, Vandenberghe H, Berger H. The impact of adoption of the International Association of Diabetes in Pregnancy Study Group criteria for the screening and diagnosis of gestational diabetes. *Am J Obstet Gynecol* 2015; 212 :224.e1–224.e9
- 26. Mendez-Figueroa H, Schuster M, Maggio L, Pedroza C, Chauhan SP, Paglia MJ. Gestational diabetes mellitus and frequency of blood glucose monitoring: a randomized controlled trial. *Obstet Gynecol* 2017; 130 :163–170
- 27. Han S, Crowther CA, Middleton P, Heatley E. Different types of dietary advice for women with gestational diabetes mellitus. *Cochrane Database Syst Rev* 2013; 3: CD009275
- 28. Viana LV, Gross JL, Azevedo MJ. Dietary intervention in patients with gestational diabetes mellitus: a systematic review and meta-analysis of randomized clinical trials on maternal and newborn outcomes. *Diabetes Care* 2014; 37 :3345–3355

References

- 29. Hartling L, Dryden DM, Guthrie A, Muise M, Vandermeer B, Donovan L. Benefits and harms of treating gestational diabetes mellitus: a systematic review and meta-analysis for the U.S. Preventive Services Task Force and the National Institutes of Health Office of Medical Applications of Research. *Ann Intern Med* 2013;159:123–129
- 30. Rowan JA, Hague WM, Gao W, Battin MR, Moore MP; MiG Trial Investigators. Metformin versus insulin for the treatment of gestational diabetes. *N Engl J Med* 2008;358:2003–2015
- 31. Gui J, Liu Q, Feng L. Metformin vs insulin in the management of gestational diabetes: a meta-analysis. *PLoS One* 2013;8:e64585
- 32. Langer O, Conway DL, Berkus MD, Xenakis EM-J, Gonzalez O. A comparison of glyburide and insulin in women with gestational diabetes mellitus. *N Engl J Med* 2000;343:1134–1138
- 33. Brown J, Martis R, Hughes B, Rowan J, Crowther CA. Oral anti-diabetic pharmacological therapies for the treatment of women with gestational diabetes. *Cochrane Database Syst Rev* 2017; 1: CD011967
- 34. Nachum Z, Zafran N, Salim R, et al. Glyburide versus metformin and their combination for the treatment of gestational diabetes mellitus: a randomized controlled study. *Diabetes Care* 2017;40:332–333