SJIF Impact Factor: 5.464

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 5.
Issue: 1.
Page N. 269-272
Year: 2021

Original Article www.wjahr.com

ANALYSIS OF PERINATAL AND MATERNAL OUTCOMES IN ANTENATAL WOMEN WHO HAD TWO HOUR PLASMA GLUCOSE BETWEEN 6.7 MMOL/L AND 7.8 MMOL/L WITH 75G OGTT

A. Geethalakshmi*[1], Mohana Priya[2], C. Anjalakshi[3] and V. Seshiah[4]

[1,2]Department of Obstetrics and Gynaecology, ISO-KGH, Triplicane, Chennai.
[3]Professor, Department of Obstetrics and Gynaecology, Madha Medical College, Chennai.
[4]Consultanat, Dr. V. Balaji Diabetes Care Centre and Dr. V. Seshiah Research Institute, Chennai.

Received date: 30 November 2020 **Revised date:** 20 December 2020 **Accepted date:** 10 January 2021

***Corresponding author: A. Geethalakshmi**

Department of Obstetrics and Gynaecology, ISO-KGH, Triplicane, Chennai.

ABSTRACT

Objective: To ascertain the maternal and fetal outcome in antenatal women (ANW) whose 2 hr PG is < 7.8 mmol/dl.

Materials And Methods: This is a retrospective study performed in a tertiary care hospital, Institute of Social Obstetrics at Govt Kasturba Gandhi Hospital (ISO-KGH), Chennai after obtaining ethical committee approval. This study analysed age, trimester and BMI of n = 1902 ANW who have undergone "A Single Test Diagnostic Procedure" of Diabetes in Pregnancy Study Group India (DIPSI) for diagnosing GDM with 2hr PG ≥ 7.8 mmol/l. ANW were categorized into three group: Group I < 6.7 mmol/dl Group II 6.7 – 7.8 mmol/l and Group III > 7.8 mmol/l. The study compared the incidence of polyhydramnios in the ANW and macrosomia in the new-borns whose birth weight > 3.5 kg. **Result:** Polyhydramnios in the antenatal woman and macrosomia in the new-borns were statistically significant in Group II *p value-0.0001. **Conclusion:** ANW who had 2hr PG between 6.7mmol/l and 7.8 mmol/l had adverse pregnancy outcomes in all trimesters. Hence this category requires cognisance.

KEYWORDS: Polyhydramnios, Macrosomia, ANW (Antenatal Women), Gestational Diabetes Mellitus (GDM), and Gestational Glucose Intolerance (GGI).

INTRODUCTION

GDM is an important public health issue because of future sequelae for both the mother and the neonates. Its prevalence is increasing globally as obesity, sedentary lifestyle and older age at pregnancy become more common. GDM is defined as carbohydrate intolerance of variable severity with its onset or first recognition during pregnancy.[1] Pregnancy is a form of stress that can cause latent diabetes to manifest just as do surgical operations or acute infections. In most of the cases, the carbohydrate intolerance will revert to normal by the end of puerperium. Women with GDM, though are at increased risk of pregnancy complications like pre-eclampsia, hydramnios, preterm labour and still birth, remains asymptomatic and hence screening of pregnant women for GDM is a must. Since South Asian ethnicity is at high risk of Diabetes, all pregnant women should ideally undergo screening at first visit, if negative at 24-28 weeks of gestation,[2] and if negative in third trimester between 32 and 34 weeks.

Diagnostic Procedure

International Association of Diabetes in Pregnancy Study Group (IADPSG) guideline is not followed as the diagnostic criteria was suggested based on the Hyperglycemia and Adverse Pregnancy Outcome Study (HAPO) which was performed in the caucasian population.[3] Further, even at centers, that accepted IADPSG recommendation, the approach varies and needs revision for standardization of the strategy for diagnosing GDM.[4] Screening strategy based on the IADPSG criteria may be cost effective for high resource settings ($61,503/QALY), but probably is too costly for most countries.[2]

DIPSI Procedure

In this single test procedure, GDM is diagnosed if 2 hr. PG is ≥ 7.8 mmol/l with 75gm oral glucose given to a pregnant woman in the fasting or non-fasting state irrespective of last-meal timing.[5] Diagnosis of GDM with 2-h PG ≥ 7.8 mmol/l and treatment is worthwhile

with a decreased macrosomia rate, fewer emergency caesarean sections, serious perinatal morbidity and may also improve the women's health-related quality life.[6,7,8] The guidelines and diagnostic criteria which are simple and feasible on the ground is important.[9] This evidence-based procedure is recommended by the Ministry of Health and Family Welfare, Government of India.[10] and approved by WHO,[11] FIGO,[12] & IDF.[13]

MATERIALS AND METHODS

In this retrospective 12-month cohort study between December 2018 to November 2019 at ISO-KGH, all women with 2-hour 75gm of oral glucose test (DIPSI Procedure) done in all the three trimesters were studied. Values less than 6.7 mmol/l -Group I, 6.7 -7.8 mmol/l--Group II, 7.8 mmol/l and above -- Group III were studied using case records. Their maternal and perinatal outcomes were compared. The three cohorts were matched for age, parity and body mass index (Pre-Pregnancy BMI) (Table -2). The newborns birthweight is given importance in this study because it is strongly associated with mortality risk during the first year and, to a lesser degree, with developmental problems in childhood and the risk of various diseases in adulthood. Neonates birthweight > 3.5 kg is considered to be abnormal.

Inclusion and Exclusion Criteria

All pregnant women who have done a single test diagnostic procedure in all three trimesters were included. Women with overt diabetes, Women with previous history of renal disease, hypertension, heart disease, Bleeding Disorders and multiple gestations were excluded.

Statistical analysis

Using SPSS software, Pearson chi-square tests.

RESULTS

A total number of n = 1902 ANW were followed up in all three trimesters and their outcomes were analysed. Among n = 604 ANW in group II and n = 1098 ANW in group I were compared for incidence of polyhydramnios and macrosomia. (Table-1) The above both groups were compared with n = 200 ANW in group III who were on treatment with medical nutrition therapy and or drug intervention and their outcomes were compared. In this study group, amniotic fluid index more than 25 is considered as polyhydramnios. Birth weight more than 3.5kg (90^{th} percentile) is considered as fetal macrosomia.

The outcome data showed that perinatal and maternal adverse outcome are high in Group II when compared to Group I and also to Group III (GDM) P = 0.0001 which is statically significant. Group III woman were treated with MNT and or drug intervention to maintain the 2hr Plasma Glucose between 6.1 and 6.7 mmol/l.

Table 1: Of ANW with Polyhydramnios and Macrosomia.

TYPES	Group I	Percentage	*Group II	Percentage	Group III	Percentage
No of ANW's	1098	57.7%	604	31.8%	200	10.5%
Polyhydramnios	82	13.6%	169	28%	35	17.5%
Macrocosmic New - Born's	11	1.8%	36	6%	10	5%

*p value- 0.0001 statistically significant.

Table 2: Anthropometric Data.

Group -I			Group -II			Group -III		
AGE	**No of ANW**	**Percentage**	**AGE**	**No of ANW**	**Percentage**	**AGE**	**No of ANW**	**Percentage**
20	267	24.3%	20	130	21.5%	20	35	17.5%
21-25	258	23.5%	21-25	148	24.5%	21-25	43	21.5%
26-30	278	25.34%	26-30	160	26.69%	26-30	56	28%
>30	295	26.86%	>30	166	27.48%	>30	66	33%
BMI			**BMI**			**BMI**		
<18	240	21.85%	<18	142	23.5%	<18	38	19%
18-25	289	26.32%	18-25	158	26.15%	18-25	48	24%
25-30	244	22.24%	25-30	162	26.82%	25-30	56	28%
>30	325	29.59%	>30	142	23.52%	>30	58	29%
PARITY			**PARITY**			**PARITY**		
PRIMI	220	20.03%	PRIMI	145	24.01%	PRIMI	59	29.5%
II GRAVIDA	326	29.69%	II GRAVIDA	166	27.47%	II GRAVIDA	55	27.5%
III GRAVIDA	345	31.42%	III GRAVIDA	188	31.15%	III GRAVIDA	48	24%
> III	207	18.85%	> III	105	17.37%	> III	38	19%

Age P = 0.279
BMI P = 0.065 ⟶ Statistically Not Significant Among Three Groups.
Parity P = 0.051

Table 3: Suggested classification of hyperglycaemia in pregnancy.

2hr plasma glucose	In Pregnancy	Outside Pregnancy
≥ 11.1 mmol/l	Diabetes	Diabetes
≥ 7.8 mmol/l	GDM	IGT
6.7 to 7.8 mmol/l	GGI*	----
< 6.7mmol/l	normal	Normal

*Gestational Glucose Intolerance
During pregnancy any glycemic level above normal to be considered as abnormal.

DISCUSSION

Women with a history of GDM are at increased risk of future diabetes, predominately type 2 diabetes, and are their children. GDM is associated with risks to the fetus and new-born, including shoulder dystocia, birth injuries, hyperbilirubinemia and it has also been shown to pose maternal risks including preeclampsia, caesarean delivery and an increased risk of developing type 2 diabetes later in life. Beard and Hoet commented that GDM is a clinical entity associated with increased fetal and maternal morbidity.[14]

Glucose normally acts as fuel for developing fetus, but in hyperglycaemic state it becomes deleterious for the growing fetus. This gave rise to hypothesis, "fuel-mediated teratogenesis".[15] This proposed, the explanation for the association of excessive growth of fetus. Maternal insulin does not cross the placenta freely while maternal glucose does and in response, the fetal pancreas tries to balance by secreting more insulin. This in turn acts as fetal growth hormone and becomes responsible for promoting growth and adiposity. Further conversion of excess glucose into fat results in foetal hypoxia which stimulates adrenal catecholamines resulting in hypertension, cardiac hypertrophy, stimulation of erythropoietin, red cell hyperplasia, and increased haematocrit, poor circulation, and postnatal hyperbilirubinemia.[16]

Established risk factors like sedentary life, obesity, family history of diabetes etc… were found more frequently in GDM group, but women without risk factors also developed GDM. Hence, there is a need for universal screening. It has been demonstrated that perinatal and maternal morbidity among GDM can be reduced with application of a systematic approach to the identification and management of hyperglycaemia. Early screening ensures identification of previously undiagnosed diabetic women and women with early onset diabetes. This would help in appropriate counselling and management of hyperglycemia.

A recent publication mentioned that higher maternal plasma glucose concentrations, even below gestational diabetes mellitus (GDM) thresholds, are associated with adverse offspring outcomes.[16] Yet, another study observed that ANW who had 2hr PG between 6.7 and 7.8 mmol/l had newborn babies' birthweight of > 3.5 kg.[17] indicating that plasma glucose in this range predisposes to increased birth weight. Similarly, Paul W Franks et al in his study on young Pima Indian offspring noticed that the maternal glycemia of 2 hrs plasma glucose > 6.7 mmol/l during pregnancy was associated with increased birth weight.[18] Jacqueline et al in their study found that birthweight was positively related to maternal glucose levels even in non-diabetic pregnancies[16]. Seshiah et al documented that the occurrence of macrosomia is continuum as the 2hr plasma glucose increased from 6.7 mmol/l.[19]

In the present study there was no statistically significant difference in the new-borns birth weight of GDM and NGT category, this could be due to GDM mothers received treatment for glycaemic control. Neonates born to Group-II mothers had birth weight > 3.5 kg since this category is not considered as abnormal at present and not treated. The newborns birthweight is given importance in this study because it is strongly associated with mortality risk during the first year and, to a lesser degree, with developmental problems in childhood and the risk of various diseases in adulthood.[20] Neonates birthweight > 3.5 kg is considered to be abnormal.[21]

CONCLUSION

The adverse perinatal outcome and maternal outcome occurs not only in GDM (Group III) women but also in Group II (6.7 to 7.8mmol/l) women and the incidence is more in Group II than Group III because of the treatment in Group III. Antenatal Counseling early testing and initiating intensive management of hyperglycaemia will significantly decrease the risk of congenital malformations, polyhydramnios and macrosomia. Early detection of glucose intolerance during pregnancy and the care given results in good fetal outcome similar to that of non-diabetic pregnancy. This study establishes that "a Single test diagnostic procedure" of DIPSI with 75g Oral Glucose value between 6.7 -7.8 mmol/l in any of the three trimesters have adverse outcomes. Hence it

is necessary to start medical nutrition and drug therapy if necessary, to achieve treatment target values of fasting < 5.0 mmol/l and 2hr postprandial value of < 6.7 mmol/l and to follow-up these persons to avoid maternal and perinatal adverse outcomes. It is probably time to think of classifying glucose intolerance in pregnancy as GDM 2hr PG =/> 7.8 mmol/l Gestational Glucose Intolerance (GGI) 2hr PG between 6.7 and 7.8 mmol/l and Normal glucose tolerance (NGT) 2hr PG < 6.7 mmol/l in pregnancy (Table-3).

REFERENCES

1. Seshiah V, Balaji V, Balaji MS, Paneerselvam A, Arthi T, Thamizharasi M, et al.; Prevalence of gestational diabetes mellitus in South India (Tamil Nadu)—A community-based study. J Assoc Physicians India, 2008; 56: 329-33.
2. Seshiah V, Balaji V, Balaji MS, Sanjeevi CB, Green A; Gestational diabetes mellitus in India. J Assoc Physicians India, 2004; 52: 707– 11.
3. International Association of Diabetes & Pregnancy Study Groups (IADPSG) Recommendations on the diagnosis and classification of hyperglycemia in pregnancy. IADPSG Consensus panel, Diabetes Care, 2010; 33(3).
4. Annunziata Lapolla, Boyd E. Metzger The post-HAPO situation with gestational diabetes: the bright and dark sides- Acta Diabetologica, 2018; 55: 885-892.
5. A Single Step Procedure to Diagnosis Gestational Diabetes Mellitus. C. Anjalakshi, V. Balaji, Madhuri S. Balaji, S. Ashalatha, Sheela Suganthi, T. Arthi, M. Thamizharsai, V. Seshiah.
6. Gayle C, Germain S, Marsh MS, et al. Comparing pregnancy outcomes for intensive versus routine antenatal treatment of GDM based on a 75 gm OGTT 2- h blood glucose (>140 mg/dl). Diabetologia, 2010; 53(1): S435.
7. Jitendra Singh et al. Prevalence of Gestational Diabetes Mellitus (GDM) and Its Outcomes in Jammu. JAPI, April 2011; (59).
8. Balaji V, Madhuri Balaji, Anjalakshi C, Cynthia A, Arthi T, Seshiah V. Diagnosis of gestational diabetes mellitus in Asian-Indian women. Indian J Endocrinol Metab, July 2011; 15(3): 187-190.
9. Karolin Karglund Nelison, Anil kapur, V.Seshiah et al factors influencing timely initiation and completion of gestational diabetes mellitus screening and diagnosis.BMC pregnancy and childbirth aug1, 2017.
10. Maternal Health Division Ministry of Health & Family Welfare Government of India, www.mohfw.gov.in & www.nhm.gov.in, February 2018.
11. Stephen Colagiuri, Maicon Falavigna, Mukesh M. Agarwal, Michel Boulvain, Edward Coetzee, Moshe Hod, Sara Meltzer, Boyd Metzger et al. Strategies for Implementing the WHO Diagnostic Criteria and Classification of Hyperglycaemia First Detected in Pregnancy. DRCP, 2014; 103: 364-372.
12. Moshe HOD, Anil Kapur, David A. Sacks, Eran Hadar, Mukesh Agarwal, Gian Carlo Di Renzo et al: The International Federation of Gynecology and Obstetrics (FIGO) Initiative on Gestational Diabetes Mellitus; A Pragmatic Guide for Diagnosis, Management and Care. Int J Gynaecol Obstet, 2015 Oct; 131 Supply 3: S173-211. doi: 10.1016/S0020-7292(15)30033-3.
13. Chittaranjan N Purandare (FIGO), Shaukat Sadikot (IDF), Nam Cho Han (IDF), Moshe Hod (FIGO). FIGO-IDF Joint Statement and Declaration on Hyperglycemia in Pregnancy. IDF Congress. Abu Dhabi, 6th December 2017. www.diabetesatlas.org / atlas@idf.org.
14. Beard RW, Hoet JJ; Gestational diabetes a clinical entity? Diabetalogia, 1982; 23: 307 – 312.
15. Maternal Non-glycemic Contributors Fetal Growth in Obesity and Gestational Diabetes: Spotlight on Lipids. Linda A. Barbour, Teri L. Hernabez. Current Diabetes Report, 2018; 18: 37.
16. Seabra, G., Saunders, C., de CarvalhoPadilha, P. Et al. Association between maternal glucose levels during pregnancy and gestational diabetes mellitus: an analytical cross-sectional study.DiabetolMetabSyndr, 2015; 7: 17.
17. Shankar, R., Ramarajan, A., Rani, S. et al. Anthropometric and Skin Fold Thickness Measurements of Newborns of Gestational Glucose Intolerant Mothers: Does it Indicate Disproportionate Fetal Growth?. J Obstet Gynecol India, 2020. https://doi.org/10.1007/s13224-020-01340-6.
18. Prakash GT, Das AK, HAbeebullah S, et al. Maternal and neonatal outcome in mothers with gestational diabetes mellitus. Indian J Endocr Metab. 2017; 21: 854.
19. Seshiah v, balaji.v,et al abnormal fasting plasma glucose during pregnancy, diabetes care, 2008; 31(12): e92.
20. On the importance—and the unimportance— of birthweight Allen J Wilcox International Journal of Epidemiology, December 2001; 30(6): 1233 1241, https://doi.org/10.1093/ije/30.6.1233.
21. Macrosomia (big baby) Approved by the BabyCenter India Medical Advisory Board.