

Original Research Article

A study among the Gestational Diabetes Mellitus and Non-Gestational Diabetes Mellitus pregnant women highlighting the variations in lipid parameters attending ante natal clinics at Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha, India

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ABSTRACT

Background: Wide variation in the lipid profile in pregnancy is quite common. Exaggerated changes in insulin and lipid levels in women with GDM during pregnancy, lead to significant alterations in lipid levels in comparison to normal pregnancy. Lipid metabolism during pregnancy has a significant role to play in the aetiology and pathogenesis of GDM as is indicated by various studies previously.

Methods: A hospital-based case control study was conducted at Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha in the Department of Endocrinology. The sample size was 100 pregnant women. Study period was of one year from June 2018 to June 2019. In women of both the groups, i.e., with GDM and without GDM the mean age of presentation were 20-25 yrs. Out of the 100 cases, we took 50 patients of GDM in the cases group and 50 patients of non GDM pregnant women as control group. Fasting lipid profile was sent to the hospital laboratory analyzed by Tindler's methods. The results thus obtained were analyzed using student 't' test for statistical significance using SPSS version 20.

Results: There was no statistical difference in age and parity between control and case group. Triglyceride (cases-286.4±77.60 mg/dl) (controls-166±26mg/dl), total cholesterol (cases-256.5±41.7 mg/dl) (controls - 202.5±20.18mg/dl), VLDL (cases-53.4±13.2 mg/dl) (controls-46.6±13.1mg/dl) showed statistically significant values (p value<0.001). HDL and LDL values did not show any statistical significance (p value >0.5) among GDM and non GDM group. Lipid profile was performed predominately in women in II trimester.

Conclusions: In comparison to non GDM women, it was observed that serum triglyceride, total cholesterol and VLDL level are significantly higher in woman with GDM. Whether lipid profile can be used as a predictor for gestational diabetes mellitus in future needs further research.

Keywords: Gestational Diabetes Mellitus, Lipid parameters, Non-Gestational Diabetes Mellitus, Serum triglyceride, Total cholesterol, Very-low-density lipoprotein

INTRODUCTION

In pregnancy, wide variation in the lipid profile is quite common. Exaggerated changes in insulin and lipid levels in women with GDM during pregnancy, lead to

significant alterations in lipid levels in comparison to normal pregnancy. Gestational diabetes mellitus (GDM), defined as glucose intolerance first diagnosed during pregnancy, is increasing in prevalence worldwide.¹ GDM affects around 22% of all pregnancies and this prevalence may be higher under new diagnostic criteria.² Around 24-28 weeks of gestation, physiological insulin resistance is present in all pregnancies and it progresses through the third trimester. In pregnancy, changes in maternal lipid metabolism is quite common with modest increases in lipids early in pregnancy and significant elevations of lipids later in pregnancy, specifically, triglycerides and to a lesser extent phospholipids and cholesterol.^{3,4} Due to exaggeration of the physiological changes in insulin and lipids in GDM women, it is an indication towards underlying metabolic dysfunction that transiently manifests during pregnancy.⁵ There have been extensive studies on the circulating lipid patterns in GDM versus normal pregnancy, and higher triglyceride levels across all trimesters of pregnancy in women with GDM have been observed in most of them.³ Insulin resistance is mediated through hormonal changes during pregnancy such as increased levels of progesterone, cortisol, estradiol and human chorionic somatomammotropin (hCS).⁶ Lipid metabolism during pregnancy has a significant role to play in the aetiology and pathogenesis of GDM as is indicated by various studies previously. This study aims to study the variations in the lipid parameters in GDM and non GDM women.

METHODS

A hospital-based case control study was conducted at Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha in the Department of Endocrinology. Sample size of 100 pregnant women referred to the Endocrinology OPD were taken. Study period of one year from June 2018 to June 2019. Ethical committee clearance was taken and consent from control and cases was taken. Women who consented for the study and with no previous history of diabetes, cardiac or kidney problems were included. Women who did not consent or had any co-morbidities were excluded. In women of both the groups, i.e., with GDM and without GDM the mean age of presentation were 20-25 yrs. Out of the 100 cases, 50 patients of GDM were taken in the cases group and 50 patients of non GDM pregnant women as control group. In the OPD all pregnant women were subjected to OGTT with 75 grams of glucose. Irrespective of the last meal glucose load was administered, and plasma glucose was measured two hours later. Cut off value of 140 mg/dl was taken into consideration. Fasting lipid profile was sent to the hospital laboratory, for both controls and cases, predominately of women in 2nd trimester. Fasting lipid profile parameters were analyzed by Tindler's methods and reported. The results thus obtained were analyzed using student 't' test for statistical significance using SPSS version 20.

RESULTS

During the study period of one year, cases were the 50 GDM patients while controls were 50 non GDM women with normal OGTT. There was no statistically significant difference in age and parity between the two groups. In the GDM women who were diagnosed in 2nd trimester, fasting lipid parameters such as serum total cholesterol, triglyceride, HDL, LDL, VLDL were analyzed to obtain the results using Tindler's method, p value was obtained for all the lipid parameters and statistical significance was analyzed using SPSS version 20. Serum total cholesterol (cases 256.5 ± 41.7 mg/dl), (controls 202.5 ± 20.18 mg/dl) (p value <0.001); serum triglyceride (cases 286.5 ± 77.60 mg/dl), (controls 166 ± 26 mg/dl) (p value <0.001); serum VLDL level (cases- 53.4 ± 13.2 mg/dl) (controls- 46.6 ± 13.1 mg/dl) (p value <0.001) were significantly higher in women with GDM as compared with controls. In contrast serum HDL, LDL, did not show any difference between GDM and control pregnancies.

DISCUSSION

Gestational diabetes mellitus is diabetes diagnosed in the second or third trimester of pregnancy that was not clearly over diabetes prior to gestation.⁷ There is clearly a significantly increased risk of developing metabolic dysfunction including hyperlipidemia after pregnancy in women with GDM.⁸ It has been seen that in many studies that women with GDM have increased levels of triglycerides, LDL-C and total cholesterol and lower levels of HDL-C, but these are inconsistent findings.³ In the normal physiology of pregnancy, there is alteration in maternal lipid metabolism with an early accumulation of lipids in maternal tissue and this leads to development of hyperlipidemia in the latter part of pregnancy.⁴ Increased lipid synthesis and hyperphagia causes fat accumulation in the early part of pregnancy, while decreased adipose tissue lipoprotein lipase activity in the last trimester of pregnancy halts the fat accumulation process. Due to reduced lipoprotein lipase activity, hypertriglyceridemia is generally observed towards the end of pregnancy. Fetal macrosomia can be attributed to hypertriglyceridemia, as it is thought to be one of its key drivers. Increased adipose tissue in the first trimester of GDM women can lead to accumulation of increasing free fatty acid levels, which may be a mechanism for markedly increased triglyceride levels, as increased free fatty acids can worsen insulin resistance.⁹ Significantly elevated levels of triglycerides, total cholesterol, VLDL levels have been observed in women with GDM as compared to women without insulin resistance. Lack of proper information has been a hindrance to account for other potential sources of confounding such as race/ethnicity, genetic risk for GDM, smoking and other socio demographic risks in this study. During the second trimester of pregnancy, the greatest difference in the triglyceride levels are appreciated between GDM and non GDM women, traditionally the period when GDM is mostly diagnosed. It is beyond the scope of this study to establish the causal

relationships between triglyceride levels and GDM, but it is apparent that triglycerides are elevated early in pregnancy while other lipid subtypes are not. This leads us to assume that probably the lipid levels, particularly triglycerides are not elevated pre pregnancy in women with GDM compared with those without insulin resistance. It has been suggested in several studies that lipid patterns may be used to identify women at risk for developing GDM by coupling triglyceride measurements with other markers of oxidative stress and insulin resistance such as cytokines, glucose and essential fatty acids. And this may turn out to be an important diagnostic criterion for identifying women at risk for developing GDM. On comparing the results of the studies with that of Asare-anane H et al, Ryckman et al, it was found that the results are in sync with the findings of their study.^{10,11}

CONCLUSION

In comparison to non GDM women, it was observed that serum triglyceride, total cholesterol and VLDL level are significantly higher in woman with GDM. Whether lipid profile can be used as a predictor for gestational diabetes mellitus in future needs further research.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Ferrara A. Increasing prevalence of gestational diabetes mellitus: a public health perspective. *Diabetes care.* 2007 Jul 1;30(Supplement 2):S141-6.
2. Jenum AK, Mørkrid K, Sletner L, Vange S, Torper JL, Nakstad B, et al. Impact of ethnicity on gestational diabetes identified with the WHO and the modified International Association of Diabetes and Pregnancy Study Groups criteria: a population-based cohort study. *Euro J Endocrinol.* 2012 Feb;166(2):317-24.
3. Herrera E, Ortega-Senovilla H. Disturbances in lipid metabolism in diabetic pregnancy—are these the cause of the problem?. *Best Pract Res Clin Endocrinol Metab.* 2010 Aug 1;24(4):515-25.
4. Alvarez JJ, Montelongo A, Iglesias A, Lasuncion MA, Herrera E. Longitudinal study on lipoprotein profile, high density lipoprotein subclass, and postheparin lipases during gestation in women. *J Lipid Res.* 1996 Feb 1;37(2):299-308.
5. Carpenter MW. Gestational diabetes, pregnancy hypertension, and late vascular disease. *Diabetes Care.* 2007 Jul 1;30(Supplement 2):S246-50.
6. Carr DB, Gabbe S. Gestational diabetes: detection, management, and implications. *Clini Diabetes.* 1998 Jan 1;16(1):4-12.
7. American Diabetes Association. 2. Classification and diagnosis of diabetes: standards of medical care in diabetes-2019. *Diabetes Care.* 2019 Jan 1;42(Supplement 1):S13-28.
8. Warth MR, Knopp RH. Lipid metabolism in pregnancy: V. Interactions of diabetes, body weight, age, and high carbohydrate diet. *Diabetes.* 1977 Nov 1;26(11):1056-62.
9. Van de Woestijne AP, Monajemi H, Kalkhoven E, Visseren FL. Adipose tissue dysfunction and hypertriglyceridemia: mechanisms and management. *Obesity Rev.* 2011 Oct;12(10):829-40.
10. Asare-Anane H, Bawah AT, Osa-Andrews B, Adanu R, Ofori EK, Tagoe SB, et al. Lipid profile in Ghanaian women with gestational diabetes mellitus. *Inter J Sci Tech Res.* 2013 Apr 25;2(4):168-75.
11. Ryckman KK, Spracklen CN, Smith CJ, Robinson JG, Saftlas AF. Maternal lipid levels during pregnancy and gestational diabetes: a systematic review and meta-analysis. *BJOG: Inter J Obstetr Gynaecol.* 2015 Apr;122(5):643-51.

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