

Gestational Diabetes Mellitus and Correlation with Serum Total Cholesterol Levels

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ABSTRACT

Objective: The objective of this study was determine the frequency of GDM in females presenting in a tertiary care hospital and to compare total cholesterol level in females presented with or without gestational diabetes at term.

Material and Methods: This Cross Sectional Study was carried in Unit 3, Department of Obstetrics and Gynecology, Sir Ganga Ram Hospital Lahore. Study duration was six months from January, 2017 to June 2017. A total of 320 females, fulfilling the inclusion and exclusion criteria were selected in this study from OPD Department. Their demographic details including name, age, BMI, gestational age and parity was also be noted. Females were assessed for presence or absence of GDM. Fasting blood samples were drawn by using 5cc BD syringe. All samples were sent to laboratory of the hospital and reports were assessed. Total cholesterol level was noted on predesigned Performa.

Results: A total of 320 cases fulfilling the inclusion/exclusion criteria were enrolled to determine the frequency of GDM in females presenting in a tertiary care hospital and to compare total cholesterol level in females presented with or without gestational diabetes at term. Age distribution of the patients was done showing 37.19%(n=119) were between 18-25 years of age and 62.81%(n=201) were between 26-35 years of age, mean±sd was calculated as 26.61±4.06 years. Gestational age was calculated as 72.5%(n=232) were between 37-38 weeks of gestation and 27.5%(n=88) had 39 weeks of gestation, mean±sd was calculated as 37.90±0.80 weeks. Body mass index of the patients was calculated as 40%(n=128) between 18.5-24.9, 45.94%(n=147) had 25.0-29.9 while 14.06%(n=45) had >30, mean±sd was calculated as 26.12±3.82. Frequency of gestational diabetes was calculated as 6.88%(n=22) while 93.12%(n=298) had no findings of the morbidity. Comparison of total cholesterol in GDM versus non-GDM shows that 183.95±5.73 mg/dl in GDM group while 165.90±8.91mg/dl was recorded in non-GDM group, p value was calculated as 0.0001 showing a significant difference.

Conclusion: The study concluded that the frequency of GDM in females presenting in a tertiary care hospital is slightly higher than developed countries while on comparison of total cholesterol level, gestational diabetic females were having significantly higher total cholesterol than the females without it.

Keywords: Gestational diabetes mellitus, Term Pregnancy, Serum total cholesterol

INTRODUCTION

There are certain changes in Lipid levels during pregnancy . Abnormal levels of triglycerides are associated with pregnancy complications. Lipid levels during gestation changes substantially with lowest levels following conception and a peak at delivery.¹ Alterations in maternal lipid metabolism could affect fetus and the susceptibility for atherosclerosis in the offspring.² Increased serum cholesterol and triglycerides levels may have a role in the development of gestational diabetes mellitus (GDM) and its complications.³ Lipoprotein receptors and fatty acid binding proteins in the placenta allow the transfer of long-chain

polyunsaturated fatty acids to the fetus. Enhanced oxidative stress in pregnancy may be related to maternal hyperlipidemia.⁴

Although relative risk of pre-existing diabetes is less than 1% in most populations worldwide. In the UK 3 to 5% of women have biochemically diagnosed GDM.⁵ In Pakistan, a study conducted in Karachi observed 8% prevalence of GDM.⁶ The smaller and more dense LDL particles are associated with increased risk of cardiovascular disease and are susceptible to oxidative modification which could in turn impair physiology of nitric oxide and potentially placental blood flow. Although the cholesterol level changes are

quite subtle they may increase risk of cardiovascular disease especially with multiple pregnancies.⁷ Rationale of this study is to determine the frequency of GDM and then compare the total cholesterol level in females with or without gestational diabetes at term. This will also help us to attain local magnitudes and update guidelines and will also help to improve our practice.

Objective: The objective of this study was to determine the frequency of GDM in females presenting in a tertiary care hospital and to compare total cholesterol level in females presented with or without gestational diabetes at term.

MATERIALS AND METHODS

Study Design: Cross Sectional Study

Setting: Unit 3, Department of Obstetrics and Gynecology, Sir Ganga Ram Hospital Lahore

Duration of Study: Six months January 2017 – June 2017

Sample Size: Sample size of 320 cases with 95 percent confidence level, 3% margin of error and taking magnitude of GDM as 8% in women presenting at tertiary care setting.

Sampling Technique: Non probability, purposive sampling

SAMPLE SELECTION

Inclusion Criteria

- Females with age 18 to 35 years with parity <5 having singleton pregnancy (on USG) with gestational age of ≥ 36 weeks (by dating scan)

Exclusion Criteria

- Females already presented with evidence of chronic type I or II diabetes (on medical record)
- Post-partum women and patients with history or clinical features suggesting chronic liver disease (AST > 40 IU, ALT > 40 IU), RFT (serum creatinine > 1.2 mg/dl).
- Polycystic ovarian syndrome (on medical record).
- Morbidly obese females (BMI > 35).

DATA COLLECTION PROCEDURE

Three hundred twenty females, fulfilling the inclusion and exclusion criteria were selected in this study from OPD Department of Obstetrics &

Gynecology, Sir Ganga Ram Hospital Lahore. Informed consent was taken. Their demographic details including name, age, BMI, gestational age and parity was also noted. Females were assessed for presence or absence of GDM (as per operational definition). Fasting blood samples were drawn by using 5cc BD syringe. All samples were sent to laboratory of the hospital and reports were assessed. Total cholesterol level was noted (as per operational definition) on predesigned Performa by researcher herself.

DATA ANALYSIS

Data was entered and analyzed by SPSS version 17. Mean and Standard deviation for age, BMI, gestational age and total cholesterol level was calculated. Frequency and percentage of GDM was calculated. Frequency was calculated for parity. T-test was used for comparison of total cholesterol level in both groups. P value ≤ 0.05 was taken as significant. Data was stratified for BMI (normal, over weight and obese).

RESULTS

A total of 320 cases fulfilling the inclusion/exclusion criteria were enrolled to determine the frequency of GDM in females presenting in a tertiary care hospital and to compare total cholesterol level in females presented with or without gestational diabetes at term. Age distribution of the patients was done showing 37.19% (n=119) were between 18-25 years of age and 62.81% (n=201) were between 26-35 years of age, mean \pm sd was calculated as 26.61 ± 4.06 years. (Table No. 1)

Table 1: Age Distribution (n=320)

Age(in years)	No. of patients	%
18-25	119	37.19
26-35	201	62.81
Total	320	100
Mean\pmSD	26.61\pm4.06	

Table 2: Gestational Age (n=320)

Gestational Age (in weeks)	No. of patients	%
37-38	232	72.5
39	88	27.5
Total	320	100
Mean\pmSD	37.90\pm0.80	

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Gestational age was calculated as 72.5%(n=232) were between 37-38 weeks of gestation and 27.5%(n=88) had 39 weeks of gestation, mean±sd was calculated as 37.90±0.80 weeks. (Table No. 2)

Body mass index of the patients was calculated as 40%(n=128) between 18.5-24.9, 45.94%(n=147) had 25.0-29.9 while 14.06%(n=45) had >30, mean±sd was calculated as 26.12±3.82. (Table No. 3)

Frequency of gestational diabetes was calculated as 6.88%(n=22) while 93.12%(n=298) had no findings of the morbidity. (Table No. 4)

Comparison of total cholesterol in GDM versus non-GDM shows that 183.95±5.73 mg/dl in GDM group while 165.90±8.91mg/dl was recorded in non-GDM group, p value was calculated as 0.0001 showing a significant difference. (Table No. 5)

Stratification for age, gestational age and BMI with regards to total cholesterol in GDM versus non-GDM are recorded and presented in Table No. 6, 7 & 8 respectively.

Table 3: BMI of The Patients (n=320)

BMI	No. of patients	%
18.5-24.9	128	40
25.0-29.9	147	45.94
>30	45	14.06
Total	320	100
Mean±SD	26.12±3.82	

Table 4: Frequency of Gestational Diabetes Mellitus (n=320)

GDM	No. of patients	%
Yes	22	6.88
No	298	93.12
Total	320	100

Table 5: Comparison of Total Cholesterol in GDM Versus Non-GDM (n=320)

Total Cholesterol (mg/dl)			
GDM		No GDM	
Mean	SD	Mean	SD
183.95	5.73	165.90	8.91

P value=0.0001

Table 6: Stratification for Age with Regards to Total Cholesterol in GDM Versus Non-GDM (n=320)

Age (in years)	Total Cholesterol (mg/dl)				P Value
	GDM		No GDM		
	Mean	SD	Mean	SD	
18-25	184.10	4.95	164.83	9.19	0.01
26-35	183.83	6.52	166.51	8.71	0.01

Table 7: Stratification for Gestational Age with Regards to Total Cholesterol in GDM Versus Non-GDM (n=320)

Gestational Age (in weeks)	Total Cholesterol (mg/dl)				P Value
	GDM		No GDM		
	Mean	SD	Mean	SD	
37-38	184.06	6.45	166.44	6.24	0.01
39	183.67	3.56	164.49	7.86	0.00

Table 8: Stratification for BMI with Regards to Total Cholesterol in GDM Versus Non-GDM (n=320)

BMI	Total Cholesterol (mg/dl)				P Value
	GDM		No GDM		
	Mean	SD	Mean	SD	
Normal weight (18.5-24.9)	184.89	7.01	166.29	8.40	0.001
Over weight (25.0-29.9)	182.63	5.07	165.94	9.23	0.000
Obese(>30)	184.40	4.83	164.63	9.40	0.001

DISCUSSION

Gestational diabetes mellitus (GDM) is defined as diabetes diagnosed during pregnancy that is not clearly overt diabetes. Gestational diabetes has

implications both for foetus and mother, and diagnosis and treatment of GDM improves pregnancy outcome. GDM is associated with increased long-term risks of diabetes, metabolic

syndrome and increased cardiovascular disorders both in mother as well as in offspring. Women with apparent diabetes and impaired glucose tolerance should be identified by postpartum screening. We planned this study to determine the frequency of GDM and then compare the total cholesterol level in females with or without gestational diabetes at term. Previously, it is observed that total cholesterol level seems to be significantly higher with GDM but controversial results are also present in literature which has shown that in females without GDM has more total cholesterol level as compared to GDM females. Through this study we wanted to confirm that whether total cholesterol level is higher among GDM females or not. So that we may plan management of females with GDM accordingly as some obstetricians ignore lipid profile of such females which may lead to severe complications. In our study, 37.19%(n=119) were between 18-25 years of age and 62.81%(n=201) were between 26-35 years of age, mean±sd was calculated as 26.61±4.06 years, mean±sd was calculated as 37.90±0.80 weeks, mean body mass index of the patients was calculated as 26.12±3.82, frequency of gestational diabetes was calculated as 6.88%(n=22), on comparison of total cholesterol in GDM versus non-GDM shows that 183.95±5.73 mg/dl in GDM group while 165.90±8.91mg/dl was recorded in non-GDM group, p value was calculated as 0.0001 showing a significant difference. Our findings regarding frequency of gestational diabetes is higher than UK where 3 to 5% of women have biochemically diagnosed GDM.⁵ On the other hand, we found similar findings in Pakistan, where a study conducted in Karachi observed 8% prevalence of GDM,⁶ however, in our study slightly lower frequency of this morbidity was observed. Regarding total cholesterol in patients with and without GDM are in agreement with a study reported that total cholesterol was significantly higher (p<0.05) in GDMs (7.26±0.016mmol/L) than controls (5.85±1.06mmol/L),⁷ our findings are in contrast with another study who reported that total cholesterol was insignificantly differ (p=0.09) in GDMs (182.3±4.2mg/dl) than controls (192.4±4.1mg/dl).⁸ Another recent study⁹ recorded lipid profile in women with gestational diabetes mellitus and recorded that mean values (GDMs vs controls in mmol/L) of TG (2.29± 0.07 vs 1.75±0.08, p <0.001), TCHOL (7.26±0.16 vs 5.85±1.65, p <0.001), LDL (4.71 ± 0.17 vs 3.83±0.16 p<0.001) and VLDL (1.12±0.03 vs 0.80±0.04 p<0.001),

respectively were significantly higher in GDMs than the controls. Mean HDL for the GDMs was significantly lower in GDMs compared to controls (1.2±0.07 vs 1.46±0.08 p=0.023). Mean cortisol concentration for GDMs (509±12.02ng/ml) was significantly higher than controls (402.70±13.12ng/ml) (p<0.05). Also, mean progesterone was significantly higher in GDMs (46.41±2.75ng/ml) than controls (33.06±1.66ng/ml) (p <0.05). It was shown that generally, lipid parameters [LDL, total cholesterol, VLDL] were significantly higher in GDMs compared with controls. However, HDL was significantly higher in controls compared with GDM, which supports our study. These findings also support our results. Amraei and Azemati¹⁰ who reported a significant increase in the concentration of triglycerides levels in pregnancy complicated by glucose intolerance as compared to normal pregnancy.¹¹ However, did not find significant difference in triglycerides concentration between women with previous GDM cases and controls. The discrepancies could be as a result of differences in the method of selection of subjects for the study. In part, the GDM group of the subjects studied by Koivunen and colleagues,¹² involved women with previous gestational diabetes mellitus, some of whom were treated with insulin and others with diet and it is possible that the treatment as well as the time period between the time they had the GDM and the time of the study, could affect the lipid profile patterns. The significant increase in total cholesterol concentrations in GDM compared with controls in this study is as a result of the fact that GDM significantly alters cholesterol metabolism leading to dyslipidaemia. These findings are consistent with reports by Amraei and Azemati,¹⁰ who reported significant difference in total cholesterol levels between pregnancy complicated by GDM and normal pregnancy. These findings also support our study. The limitation of our study was that we investigate total cholesterol only and complete lipid profile was not ruled out, however, in coming trials it may also be investigated and recorded for further reference, to attain local magnitudes(as we lacked local magnitudes) and update guidelines to improve our practice.

CONCLUSION

The study concluded that the frequency of GDM in females presenting in a tertiary care hospital is slightly higher than developed countries while on comparison of total cholesterol level, gestational

diabetic females were having significantly higher total cholesterol than the females without it.

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