**ORIGINAL ARTICLE**

# Glucose Tolerance and Serum Total Triglycerides Status in Diabetic Related Pregnant Women

TAHIR USMAN, ASIFA ASHRAF, SHMYLA HAMID

## ABSTRACT

**Background:** Glucose plasma tolerance, and serum total triglycerides status deviate upward significantly from normal in pregnant women, who are not themselves known cases of diabetes mellitus [DM], but their first degree relatives [parents, off springs and siblings] do have established DM. The possible link between this relation in genetic lineage and expression of that under the stress of pregnancy [usually around 24 weeks] is widely accepted in medical literature, and this may be a physiological variable according to age and parity of pregnant women.
**Aim:** To know this relationship of genes of DM with their expression under physiological stress of pregnancy in non-diabetic pregnant women having probable propensity due to their first degree genetic relatives of already diagnosed DM.
**Methods**: Total 240 subjects, divided age wise into four groups, with raised blood sugar fasting [BSF] and serum total triglycerides compared with 50 controls.
**Results**: Insignificant graduated group wise increment in serum total triglycerides [r=0.122, p>0.05] revealed, but the change in BSF was in line with change in serum total triglycerides.
**Conclusion**: Deviated BSF and serum total triglycerides levels incline from upper normal cut off values may be an indicator of expression of genes of DM in pregnant women, whose first degree relatives are known patients of DM.
**Keywords:** Triglycerides, pregnant women, glucose tolerance

## INTRODUCTION

The biggest stress a woman has to face during reproductive period of her life is pregnancy. A lot of significant maternal physiological changes occur, and she has to adjust herself during gestation. This is possible due to changes in regulation of many body systems, particularly cardiovascular, and endocrinology. Endocrinological modulations continue from conception to parturition, and lactation.

Secretions of different hormones vary according to metabolic demand of mother and fetus. This, in turn, fluctuates the level of nutrients in mother's body; the most significant is that of blood glucose as well as lipids. It is essential to fulfill the constant demand of fuel supply to fetus too. Blood glucose tolerance in mother decreases to benefit fetus, whose primary source of energy, is glucose, while chief energy supply to mother is fatty acids, the level of those rises in mother's blood. These modifications are controlled by female hormones [estrogens and progesterone] during first half of pregnancy, while the placental hormones of hCS play significant actions during second half.

[1]*Associate Professor of Physiology, Gujranwala Medical College,*
[2]*Assistant professor of Biochemistry, Khawaja Safdar Medical College, Sialkot*
[3]*Assistant professor of physiology, Quaid -e- Azam Medical College, Bahawalpur*
*Correspondence to Dr. Tahir Usman, Email: tahir.usman123@hotmail.com*

Glucose intolerance and rising fatty acids levels are believed to be insulin antagonist actions of hormones during pregnancy both maternal as well as placental, the complex action of which results in reduced glucose tolerance, and raised serum levels of various types of lipoproteins i.e.cholesterol, triglycerides, LDL and VLDL.

Reduced insulin sensitivity or/and enhanced resistance of insulin receptors in target tissues, is the most probable mechanism, generally accepted. A remarkable glucose intolerance, which appears during pregnancy, is labelled as Gestational Diabetes Mellitus [GMD]. This is mostlikely due to multiple gene expression under the stress of pregnancy. Many studies suggested that such genetic clustering in women contribute to propensity towards GDM [florez at al 1999]. It is further suggested that first degree relatives, may, even be, significantly implicated in this dynamics. The concordance rate for diabetes mellitus in monozygotic twins with type 2 disease may be as high as 80% [Fauci at al 1998]. Similarly, features of Syndrome X [Insulin Resistance Syndrome] are found to be more common in first degree relatives of type 2 diabetes mellitus [Steward at al1995].Both studies are applicable as GDM is categorized as a variant of type 2 diabetes mellitus. Another study, suggested that women with sibling history of diabetes, were more likely to have the

history of GDM than other family history patterns [maternal and paternal] [Catherine et al 2009].

Pregnancy, being a known metabolic stress, is considered a stimulant of many genes expression, most commonly of DM. The complications and complexities of metabolic impacts of pregnancy in developing GMD, can be understood, if we have sound knowledge of these variables, which are hallmark of GDM. Planning can be chalked out on the basis of knowledge of degree of glucose intolerance, and serum total triglycerides, particularly in genetically predisposed women i.e., if either of their first degree relative is a known patient of type 2 diabetes mellitus. Such women can be managed early in pregnancy and, hence, can avoid complication, if any likely.

## SUBJECTS AND METHODS

Two hundred and ninety subjects, including fifty control, were randomly selected for this cross sectional study.Most of subjects were selected from outpatient department of Obstetrics and Gynecology of Shaikh Zayyad Hospital, and Jinnah Hospital Lahore. After getting informed consent from every subject on prescribed proforma, they were interviewed about their past and present health status. A thorough examination was performed including general physical examination for arterial pulses, blood pressure, and skin fold thickness of biceps, and triceps muscle with the help of spring loaded caliper. All subjects were instructed to follow a diet that provide at least 150gm carbohydrates 12 hours before blood sampling for blood sugar fasting, and serum total triglycerides.

The study group was divided into five; four group were apparently healthy second trimester pregnant women, having first degree relative with documented history of DM, fifth group was a control with no documented history of family diabetes. Study groups were formulated on the basis of ages; Group A 20-24 years, Group B 25-29 years, Group C 30-34 years, Group D 35-40 years, Group E [control] 20-40 years.

A 3ml fresh sample of blood for each subject was drawn, and 1.5ml was placed in a fluoride EDTA tube for plasma glucose estimation, and rest was allowed to clot in plastic tube. After 1-2 hours, the plastic tube was centrifuged and a clear serum was collected for total triglycerides estimation. Plasma glucose estimation was done [Widdowson and Penton, 1988] by hexokinase UV method on Technicon RA 2010. Using Elitech kit, with the resultant formulation of phosphogluconate+ NADH+H+. Total serum triglycerides [Trinder, 1996] was determined by enzymatic hydrolysis, liberating glycerol, which was phosphorylated, and oxidized by Glycerol-3-phosphate oxidases, generating H2O2. Peroxidase released nascent oxygen which converts 4-aminophynazone to pink Quinone mine.

## RESULTS

Table: Serum total triglycerides [mg/dl] and blood sugar fasting [mg/dl] [mean-+sem] comparison with control

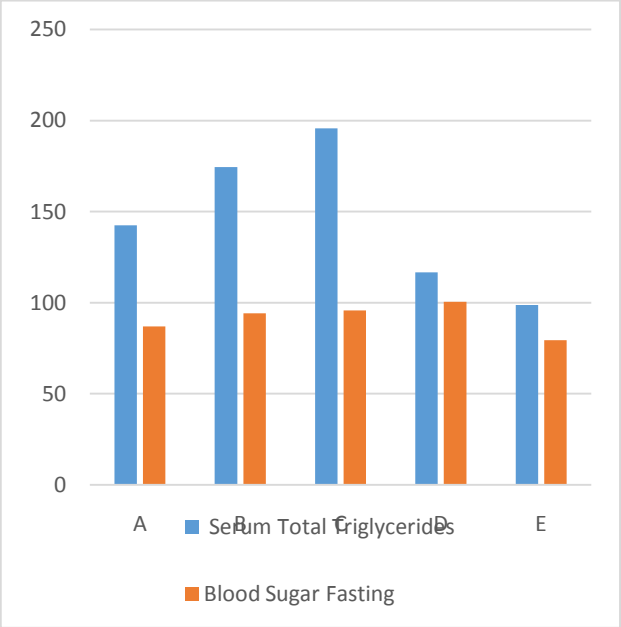
| | A | B | C | D | E |
|---|---|---|---|---|---|
| Serum Total Triglycerides | 140.40± 5.29 | 174.48± 5.70 | 195.65±6.65 | 116.68±5.88 | 98.70±3.59 |
| P. Value | <0.001 | <0.001 | <0.001 | <0.001 | -- |
| Blood Sugar Fasting | 87.0±2.63 | 94.15±1.8 | 95.83±.22 | 100.43±1.49 | 79.44±2.33 |
| P.Value | <0.05* | <0.001** | <0.001** | <0.001** | -- |

*=Significant **=highly significant

All data shows the range value of both variables in all groups. There is very high significance of differences [P<0.001] between group A and C, and group B and D for serum total triglycerides. For blood sugar fasting, the bottom value is 87.0±2.63mg/dl in group a, and top value is 100.43±1.49mg/dl in group D. again, in comparison of group A with group C, and group B with D, there are significant differences [P<0.01]. Similarly, there is highly significant difference [P<0.001], when test groups are compared with control except group A, where it is just significant [P<0.05], while mean value of control [79.44±2.33] is only about 10mg/dl less than the minimum of test groups [i.e., 87.0-+ 2.3mg/dl

This shows the changes in blood sugar fasting is not very marked, but influence the serum total triglycerides, [.particularly in group B and C], which rises markedly with small raise of blood sugar fasting. Similar results have been shared by a study [Torres-Rasgado E et al,2015],where they have shown that first degree relatives of type 2 diabetes patients have elevated total triglycerides in a class of obese persons, despite normal glucose tolerance. GDM is a variant of type 2 diabetes; there is a majority consensus.

Figure: Blood sugar fasting [<110mg] versus serum total triglycerides [<150mg]




R=0.122, p>0.05

## DISCUSSION

Pregnancy is a diabetogenic state, characterized by an exaggerated rate of secretion, and amount of insulin, but an apparent decline in sensitivity to insulin actions at cellular level. Glucose tolerance deteriorates in all women, but only 2-3% pregnancies, is this deterioration sufficiently remarkable to fulfill the criteria GDM [Kohl, 1999].Glucose is essential metabolite of feotal development and growth. Lipids in maternal blood modify the glucose level, and feotal development and growth [Kitajima et al 2001]. Therefore, in present study, the emphasis was to elaborate the possible alteration in glucose tolerance and serum total triglycerides in local women during second trimester of pregnancy. Previously, a variety of biochemical parameters have been applied for screening this altered carbohydrates, and total triglycerides metabolism in pregnant women. In this study, we want to know the response of genes of DM in women, who are under most common stress of pregnancy. In selecting such women, the only non-laboratory method is family pedigree. First degree relative with known DM are most probable to transmit /share the genes in such women. Whether or not, their genes are under the stress of pregnancy in descendent women is the objective of this study.

## CONCLUSION

This study has supported the finding of other workers, that serum total triglyce- rides were towards higher sides in glucose intolerant pregnant ladies.

## REFRENCES

1. Catherine KIM, Tiebin LIU, Rodolfo VALDEZ, Gloria L.BECKLES, Does frank diabetes in first degree relatives of a pregnant women affect the likelihood of developing gestational diabetes mellitus or non-gestational diabetes? Am J Obstet Gynecol. 2009 Dec; 201[6]; 576. El-576.eb.
2. Fauci FA, Yronne MO, Meara F. Pathology of lives. Harrison Principles of Internal Medicines 14th Ed. Mc Graw Hill Inc. USA; 1998:2064.
3. Florez H, Ryder E, Campose G, Fernandez V, Moraine's LM, Balbuena H, Women relatives of Hispanic patients with type 2 diabetes are prone to exhibit metabolic disturbances. Invest Clin1999; 40:127-42.
4. Kitajima M, Oka S, Yasuhi I, Maternal serum triglycerides at 24-32 weeks gestation and new born weight in non-diabetic women with positive diabetic screen, Obstet Gynecol 2001;97:776-80.
5. Kohl C, Insulin secretion and insulin resistance in pregnancy and GDM, Implication for diagnosis and management. Diabetes1991; 40:1824.
6. Patrizia Brizzi, Giancario Tonolo, Franca Esposito. Lipoprotein metabolism during normal pregnancy. Am J Ostet Gynecol .1999; 181:430-4.
7. Stewart MW, Humphriss DB Berrish TS, Barriocanal LA, Trajano LR, Albert KG, Walker M, Features of syndrome X in first degree relatives of NIDDM patients. Diabetes Care. 1005; 18:1020-2.
8. Torres-Rasgado E, Porchia LM, Ruiz Vivanco G, Gonzalez-Mejia ME, Baez-Duarte, Pulido-perez, Romero JR, Perez Fluentes R. Obese first degree relatives, of patients with type 2 diabetes, with elevated triglycerides levels, exhibit increase beta-cell function.Metab Syndr Relat Disord 2015 feb; 13[1]:45-51 doi:10.1089/met. 2014.0095, Epub 2014 Nov.25.
9. Trinder P.Triglycerides. Randox manual procedure. In; Randox manual procedure, 4th edition. United Kingdom, Crunlin Co, Antrium, 1996; 155.
10. Widdowson and Penton. Glucose other sugars and ketones. In: Gowenloch AH, McLacuhlan DM [eds], Varley's practical clinical biochemistry, 6th edition, Heinemann Medical Books, 1988; 326.