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## GLUCOSE AND LIPID PROFILE IN PREGNANCY INDUCED HYPERTENSION (PIH) IN A LOCAL POPULATION: A CASE CONTROL STUDY

<sup>1</sup> Arif Malik, <sup>2</sup> Asia Parveen, <sup>3</sup> Shahzad Ahmad, <sup>4</sup> Sulayman Waquar, <sup>5</sup> Kishwer Nawaz, <sup>6</sup> Rabail Alam,  
<sup>7</sup> Qurat-Ul-Ain, <sup>8</sup> Ayesha Zahid, <sup>9</sup> Mahmood Rasool, <sup>10</sup> Mahmood Husain Qazi

<sup>1, 2, 4, 5, 6, 7, 8</sup> Institute of Molecular Biology and Biotechnology (IMBB), The University of Lahore,  
Lahore, Pakistan.

<sup>3</sup> Fatima Memorial Medical College, Lahore, Pakistan.

<sup>9</sup> Center of Excellence in Genomic Medicine Research, King Abdulaziz University Jeddah 21589, Saudi  
Arabia.

<sup>10</sup> Center for Research in Molecular Medicine (CRiMM), The University of Lahore, Lahore, Pakistan.

Corresponding author: Prof. Dr. Arif Malik, [arifuaif@yahoo.com](mailto:arifuaif@yahoo.com)

### ABSTRACT

**Objective:** To estimate the lipid profile and glucose level in pregnancy induced hypertensive versus normal pregnant women in local population.

**Design:** Cross Sectional case control study.

**Place & Duration of Study:** All biochemical samples were analyzed in Institute of Molecular Biology and Biotechnology (IMBB), UOL from March to December 2012 and Gynecology department of Jinnah hospital Lahore.

**Methods:** Total of 60 individuals who consented was divided into case and control groups. The cases included 30 hypertensive pregnant women and controls included 30 normal pregnant women. Blood samples were collected from Gynecology department Jinnah hospital Lahore. Detailed physical examinations were performed. Blood pressure, age and weight were recorded.

**Results:** The glucose level was found to be slightly high in hypertensive pregnant women but no significant change was observed in hypertensive (Mean $\pm$ SD: 95.93 $\pm$ 14.268 vs. 87.86 $\pm$ 17.83). The total cholesterol was found to be significantly higher in hypertensive pregnant women as compared to normal pregnant women (274.16 $\pm$ 37.55 vs. 171.00 $\pm$ 30.776). The TG level significant high in hypertensive then normal group

(175.06±32.20 vs. 114.86±20.58) and HDL level low in hypertensive group (49.4±8.15 vs. 55.42±7.98). The LDL level (171.66±29.98 vs 105.60±19.66) and VLDL level (34.90±6.47 vs. 22.83±4.06).

**Conclusions:** The women with very high BP had higher Cholesterol, TG, LDL and VDL as compared to pregnant women. In normal pregnant women the level of cholesterol, TG, HDL, LDL and VLDL are normal or slightly raised. For glucose level, it is considered a non-significant risk factor for hypertension.

**Key words:** Pre-Eclampsia, PIH, Lipid profile, Hypertension Pregnancy.

## INTRODUCTION

Pregnancy is basically the process of development of an embryo or fetus in the uterus of a woman as a result of fertilization. The duration of pregnancy is 40 weeks starting from last normal menstrual period (LNMP). Beginning with the ovulation and passing through the processes of fertilization, implantation and embryogenesis, female body undergoes many changes in preparation for conception. Prenatal development of fetus is in three periods of pregnancy which are termed as trimesters, each having duration of three months. Such women experiences physiological changes that supports fetal growth and development. The pregnancy is associated with significant variation of the normal serum lipid profile due to altered metabolism. Plasma lipid profile in the first trimester of pregnancy may be used as a serological marker for early diagnosis of pre-eclampsia (PE) [1].

In the case of young age pregnancy it may present no glucose tolerance or peripheral sensitivity to insulin and their basal glucose production remains normal. Gestational diabetes may be caused due to the elevated levels of blood glucose in the pregnancy. Gestational diabetes is identified as one of the difficulties in the delivery because of increase in the fetal weight [2]. Most common medical condition or complication which one faces in the course of pregnancy remains Gestational diabetes mellitus (GDM) [3]. Such women experiencing GDM and dyslipidemia serves as a contributing risk factor in preeclampsia. It is suggested that women should undergo antenatal assessment for minimizing the risk and for the treatment of preeclampsia [4]. The concentration of total serum cholesterol, serum triglyceride (TG), high and low density lipoprotein (HDL and LDL) in normal pregnancy has been shown to increase with increasing gestational age. This increase has been attributed to the maternal switch from carbohydrate due to high energy demand [5].

The relation of changes of serum lipid profile with essential hypertension is well understood. The abnormal lipid profile is known to be strongly associated with atherosclerotic, cardiovascular and kidney diseases and has a direct effect on endothelial reference. The most important feature in toxemia of pregnancy is hypertension which is supposed to be due to vasoconstriction phenomenon in kidney, uterus, placenta and brain. Thus abnormal lipid metabolism seems important in the pathogenesis of pregnancy induced hypertension (PIH) as well. Obviously the association of serum lipid profile with PIH can be used as a diagnostic marker [6]. Less than 5 percent of hypertensive patients may develop malignant hypertension [7]. The changes in the plasma lipids during pregnancy are thought to be mostly due to changes in the hormonal levels like progesterone, insulin, level of lactogen in placenta and 17-B estradiol. Such variations in the levels are because of high metabolic urge of the mother in pregnancy. Pregnancy in the early age causes increase in the body fat storage it is thought to be associated with hyperphagia and with increased lipogenesis, whereas, in the case of pregnancy in lateral ages, there is an accelerated fat breakdown it plays an important role in the fetal development. Rate of lipid profile in the mother differs in different trimesters of pregnancy [6].

The pre-eclampsia is associated with substantial risk for the fetus and this includes intrauterine growth retardation, death and prematurity along with its associated complications whereas the mother is at risk of renal failure, pulmonary edema, nervous stroke or death [7]. Pre-eclampsia is a disorder which occurs in the course of pregnancy and postpartum period. It approximately occurs in 5% of all pregnancies affecting the mother and fetus. Women who present with chronic hypertension, diabetes or hyperlipidemia are more likely to exhibit intense vascular reactivity, which evokes important disorders of physiological conditions [8]. Poorly controlled diabetic mothers deliver large sized fetus that are at greater risk for intrauterine fetal death during the last 4 to 6 weeks of gestation [9]. Blood pressure recorded as 140/90 mm Hg after 20 weeks of gestation, if prior blood pressure is known and accompanied by proteinuria is considered sufficient for the diagnosis of preeclampsia. The diagnosis of preeclampsia in absence of protein urea is highly suggestive of PIH, hypertension is determined with the symptoms like blurred vision, abdominal pain, headache or certain abnormalities related with platelet count and increase in lipid enzymes [10]. The objective of this study is to estimate the lipid profile and glucose

level in hypertensive and normal pregnant women and to evaluate the role of glucose level in PIH in local population.

## **METHODS AND METHODOLOGY**

A total of 30 pregnant females with PIH were enrolled as cases, whereas 30 women with normal pregnancy were selected as controls. Age, BP, previous history were recorded in patient information form. All of the work was performed in Biochemistry Lab at (IMBB), UOL and Pathology Lab Jinnah Hospital Lahore, Pakistan.

### **Inclusion Criteria**

Pregnant women of the age (19-35 years), diagnosed with PIH.

### **Exclusion Criteria**

The patients with all maternal and fetal abnormalities like renal disease, diabetes, hepatic dysfunction, dyslipidemia and pre-existing hypertension.

### **Biochemical Analysis**

Lipid profile (TCh, TG, LDL, HDL) of all patients were assayed by the help of commercially available ELISA kits acquired from (Sigma).

### **Statistical Analysis**

All the data was processed using SPSS version 20 (SPSS, Inc Chicago, IL, USA). The numerical and categorical data were presented in the form of tables and bar charts. The probability of less than 5% ( $p < 0.05$ ) was considered significant.

## **RESULTS**

The study was conducted among the local population which explains the lipid levels in the patients of PIH (pregnancy induced hypertension). Results show that level of glucose in the patients of hypertension were elevated and recorded as  $(95.93 \pm 14.268)$  while in controls it was recorded as  $(87.86 \pm 17.83)$  likewise TCh, LDL and TG were increased in the patients of PIH when compared with controls, TCh, LDL and TG in patients were  $(274.16 \pm 37.55, 171.66 \pm 29.98$  and  $175.06 \pm 32.20)$  whereas, in the controls they remained  $(171.00 \pm 30.776, 105.60 \pm 19.66$  and  $114.86 \pm 20.58)$  respectively results are highly significant with  $p < 0.05$ . While level of HDL was decreased in the PIH patients when compared with healthy controls. In PIH it was recorded as  $(49.4 \pm 8.15)$  while in controls it remained  $(55.42 \pm 7.98)$ .

**DISCUSSION**

In normal pregnancy there is increases demand of energy providing nutrients for fetal and placental growth, some of the increased nutrients protect maternal and fetal health while others affect birth outcome and infant health [11]. In our present study we investigate the of glucose, cholesterol, TG, HDL, LDL and VLDL in normal pregnant and in pregnancy induced hypertensive women, the most common complication of pregnancy induce hypertension are, It causes multiple maternal health problems and also effect fetal health. They increase risk multiple complications like maternal coronary artery disease and cesarean section, preterm delivery, and small for-gestational age babies. Increase lipid profiles exaggerate insulin resistance and estrogen and progesterone levels, which play an important role in pathogenesis of gestational hypertension [12]. The results of our study have highlighted that the cholesterol, TG, LDL and VLDL are increase in pregnancy but slightly high in pregnancy induced hyper intensive women. Another two studies reports; there is a significant elevation in the levels of serum TG and LP (a) in PIH cases when compared to the control [13]. An increase observed in LDL, HDL, TG scores, which shows predominance of small, dense LDL sub-fractions towards the end of pregnancy. Disorder like oxidative stress is thought to be related with atherosclerosis and particularly with the hypertension and development of endothelial dysfunction (Roberts and Hubel, 1999). In women with PIH (pregnancy induced hypertension) are often supplemented with vitamin C and E, hence it proves beneficial in the prevention of PIH and disorders like pre-eclampsia [14]. If one has diagnosed with pre-eclampsia it has an additional impact on the cardiac health of mother in future, while women are at lower risk of developing CVD who did not have pre-eclampsia [15]. Current study has found out several reasons which contribute in development of long-term CVD in the women population, such women who are exposed more than once with pregnancy are at higher risk of cardiovascular disease initially.

Commonly, Insulin resistance is associated with essential hypertension, the relation between insulin resistance and hypertension in pregnancy is ambiguous may be due to renal sodium reabsorption, activation of sympathetic nervous system activity, and stimulation of cell membrane cation transport [16]. In the present study, the glucose level is slightly high in pregnancy induced hypertensive women as compared to the normal group and the result obtained is non-significant as declared by another study [17]. High cholesterol level in the

serum of our patients and controls as compared to normal pregnant women are in line with another study [18]. The significant value indicates that the blood pressure rises due to the increase of cholesterol [17]. Hypercholesterolemia may cause obesity in pregnant women [5].

In the current study the significantly high cholesterol level in cases versus controls showed a positive correlation between serum triglycerides and the systolic as well as diastolic blood pressure in pregnancy induced hypertensive women. Also the women with pre Eclampsia (PE) had higher level of circulating serum triglycerides which is an essential step in lipid mediated endothelial dysfunction. These results are similar to another study [19]. The significantly high HDL level seen in PIH cases in comparison with controls. This decreases HDL level and high level of TG correlate with causes PE and this result is agreement with the work of Tabassum. The value of LDL is comparatively higher in PIH cases than controls. This result is in agreement with another study [18]. This result shows that BP increase due to increase of LDL because 75% LDL is present in the cholesterol. In the present study the value of VLDL was measured high in hypertension pregnant women but low normal pregnant women and the result is high significant ( $p = 0.05$ ) these high value indicates that hypertension cause due to the high level of lipid profile. These results were correlated with the work of Anjum [1].

## **CONCLUSION**

The lipid profile concentration increases as the pregnancy advances in pre-eclampsia females. This rise may be attributable to pregnancy related hormonal changes. There is minimal rise, if any, in the glucose concentration in PIH. The abnormal levels of lipid profile especially TG, LDL and VLDL may be responsible for hypertension in pregnant women.

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## CONFLICT OF INTEREST

Authors declare no conflict of interest.

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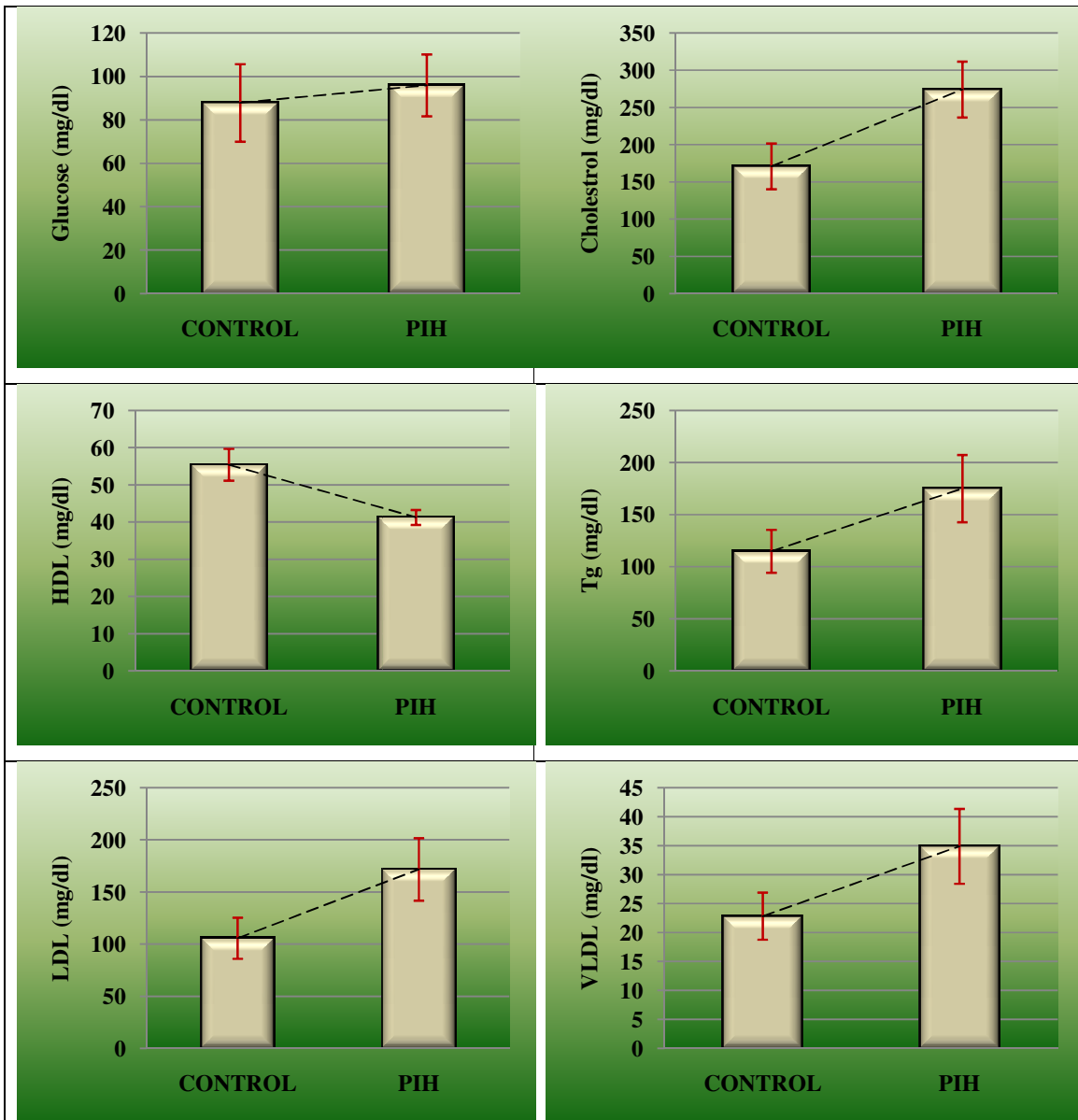


FIGURE 01: COMPARISON OF LIPID PROFILE AND GLUCOSE LEVEL IN WOMEN WITH PIH VERSUS NORMAL PREGNANCY IN LOCAL POPULATION