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A Comparative Study of Fasting Plasma Insulin Level Between Normotensive and Pre-Eclamptic Women

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ABSTRACT

OBJECTIVE:To compare the level of fasting plasma insulin levels in normotensive and preeclamp-tic women and to assess the elevation of fasting plasma insulin level in relation to severity of the disease.

METHODS-We measured insulin levels in 70 patients with preeclampsia who formed the case group and 30 normotensive pregnant women in 3rd trimester who formed the control groups. The study wasconducted at the Institute of obstetrics and Gynaecology,MMC over a duration of 10 months from 2013-2014

RESULTS-: Compared with controls, the patients with preeclampsia had significantly elevated levels of fasting plasma insulin ($p<0.000$).

The levels of fasting insulin positively correlated with the degree of preeclampsia

CONCLUSION-

These observations indicate that insulin resistance may play a role in the pathogenesis of pregnancy induced hypertension.

KEYWORDS Hyperinsulinemia, fasting Insulin, Insulin resistance,preeclampsia

INTRODUCTION-

Hypertensive disorders of pregnancy include i) new onset of hypertension in pregnancy (gestational hypertension and preeclampsia) ii) pre existing hypertension and iii) exacerbation of existing hypertension. [2] Preeclampsia is hypertension accompanied by significant proteinuria. [1]

Preeclampsia is frequently described as a state of insulin resistance. [3] Many features of insulin resistance like hypertension, hyperinsulinemia, glucose intolerance and lipid abnormalities are associated with this condition. [2]

Multiple studies have shown associations between markers of insulin resistance and hypertensive pregnancies. [2] The metabolic changes during pregnancy may provide an early means of assessing future risk for chronic diseases. [1]

In several studies conducted postpartum, women with a history of preeclampsia have been shown to be more insulin resistant when compared with women with normotensive pregnancy. [5]

The aim of the study was to assess the levels of fasting insulin in normotensive and hypertensive pregnancies.

MATERIAL AND METHODS- This is a case control cross sectional study conducted on 100 pregnant women in their third trimester.Fasting insulin levels were calculated in both the groups.Its association with preeclampsia and its severity was analysed.All pregnant women between 26-38 wks gestational age were included in the study.30 normotensive pregnant women taken as control and 70 hypertensive pregnant women were taken as cases.

INCLUSION CRITERIA

Pregnant women with preeclampsia were taken as cases and normotensive pregnant women were taken as control group(26-38 wks)

EXCLUSION CRITERIA

-Diabetes mellitus
-Chronic hypertension
-Renal disorder
-Liver disorder
-Coagulopathy
-Collagen vascular disorder

After obtaining proper consent for the study,all the women were subjected to a detailed history,examination and all were verified for the use of iron,folic acid,vitamin supplements and any other drug intake.

- Routine investigations and investigations pertaining to preeclampsia were done.All the patients were subjected to fasting plasma insulin levels.

-Fasting plasma insulin level was measured by taking 3 ml of blood from the antecubital vein after an overnight fasting.All the blood samples were transported to the laboratory within 2 hrs of collection.The specimens were centrifuged for 6-8 minutes at 2000rpm.Clear serum separated was stored in a refrigerator until analysis.Thereafter the samples were subjected to chemiluminescent immunoassay technique using FDA approved reagent and kit.

RESULTS AND ANALYSIS

TABLE 1

SEVERITY OF HYPERTENSION

GROUP	NUMBER	PERCENTAGE
MILD PREECLAMPSIA	24	24%
SEVERE PREECLAMPSIA	46	46%

GROUP	NUMBER	PERCENTAGE
CONTROL(NORMO-TENSIVE)	30	30%
TOTAL	100	

TABLE 2
PERIOD OF GESTATION AT THE TIME OF SAMPLING

GROUP	26-32 WKS	33-38 WKS
CONTROL	5(16.7%)	25(83.3%)
MILD PREECLAMPIA	10(14.3%)	14(20%)
SEVERE PREECLAMPSIA	20(28.6%)	26(37.1%)

fisher's exact test p=0.008 HS

TABLE 3
FASTING INSULIN AMONG CASES AND CONTROLS

	N	MEAN	SD	SE
NORMO-TENSIVE	30	2.2417	1.84956	0.33768
PREEC-LAMPSIA	70	19.9337	11.62100	1.38898

F=164.516 P=0.000 VHS

TABLE 4
INSULIN LEVELS WITH SEVERITY OF PREECLAMPSIA

	N	MEAN	SD	SE
MILD PREEC-LAMPSIA	24	7.3571	2.30602	0.4715
SEVERE PREEC-LAMPSIA	46	26.4954	8.71688	1.28

F=164.516 P=<0.000 HS

DISCUSSION

This study represents that the mean value of fasting plasma insulin levels among normotensive group was 2.24 microunits/ml and preeclamptic group was 19.9337 microunits/ml and the results were comparable with that of studies of Chandana Tripathy et al ,Lei Q et all,Solomon et al

There is growing evidence to indicate that preeclampsia is related to insulin resistance and may represent an early manifestation of insulin resistance syndrome. [1]

Insulin resistance and the resultant hyperinsulinemia are characteristic of normal pregnancy and are maximal in the third trimester. This is probably mediated by several hormonal changes including elevations in levels of human placental lactogen, progesterone, cortisol and estradiol. [2]

Plasma levels of renin, angiotensin and aldosterone are increased. Despite these changes the blood pressure decreases slightly in normal pregnancy due to decreased systemic vascular resistance and increased resistance to angiotensin and other pressors. [6] In women whose pregnancies are complicated by hypertension, there appears to be an exaggeration of insulin resistance. [2]

In our study the fasting serum insulin levels were higher in women with pregnancy induced hypertension than in the controls. Mid pregnancy fasting hyperinsulinemia has been associated with subsequent development of pre eclampsia [7] Myles wolf et al, 2002 has identified through reduced sex hormone binding globulin [SHBG] levels, a significant association between 1st trimester insulin resistance and subsequent risk of pre eclampsia [8].

Hyperinsulinemia may directly predispose to hypertension by increasing the renal sodium reabsorption and stimulation of the sympathetic nervous system. [2] Since pregnancy induced hypertension is also characterised by sodium retention and increased level of catecholamines it is suggested that insulin resistance may play a role in the pathogenesis of hypertension in pregnancy. [1]

Similar to hyperinsulinemia, elevated total cholesterol, triglyceride and free fatty acid levels during pregnancy have preceded the development of pre eclampsia. [11,12]

Pregnancy induced hypertension has been associated with hyperinsulinemia in both cross sectional designs and cohort studies. Ichiro Yasuhi et al, 2001 has documented that mid pregnancy C-peptide concentrations were associated with later development of pregnancy induced hypertension independent of pre pregnancy obesity [13].

The results of a cohort study by Brenda et al, 2003 has found significant associations between hypertensive disease of pregnancy and the development of hypertension and other associated diseases in later life [14].

A retrospective study conducted by Gordon et al, 2001 has reported that women who had a diagnosis of pre eclampsia had a twofold risk of ischemic heart disease over the next 15-20 yrs. The findings of the cohort study by Henrik U Irgens et al, 2001 indicates that the long term risk of death from cardiovascular causes is associated with a maternal genetic predisposition to eclampsia [16].

Thus pregnancy may be viewed as a stress test for glucose intolerance, hypertension and other abnormalities associated with insulin resistance syndrome. [1]

CONCLUSION

To conclude the fasting insulin levels are elevated in preeclampsia as compared to normotensive pregnancies and this was emphasised in the present study with the supportive results.The fasting plasma insulin levels in control,mild ,severe preeclampsia were 2.2417 microunits/ml,7.3517 microunits/ml and 26.4954 microunits/ml p value of <0.000 .The results were statistically significant

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