ASSOCIATION OF SERUM LEPTIN LEVELS WITH BODY MASS INDEX IN PRE-ECLAMPSIA

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ABSTRACT

Introduction: Leptin is the product of obesity gene (ob lep), located on chromosome 7 in humans. Plasma leptin concentration is proportional to the amount of adipose tissue and is markedly increased in obese individuals. It is also synthesized and secreted by placenta and may contribute to circulating leptin concent-ration during pregnancy. It has been suggested that increase in BMI is responsible for the increase in maternal levels in pre-e clampsia, in several studies since adipose tissue is a source of leptin. Present study was conducted to confirm the association between serum leptin levels and BMI in pre-eclampsia.

Objective: To determine the association between serum leptin levels and body mass index in pre-eclampsia.

Material and Methods: This study was conducted at Gynae Deptt: HMC & LRH, Peshawar for a period of 6 months. This was a case control study in which sample size was 80 subjects, 40 normal pregnant females and 40 preeclampsia patients. Serum leptin levels were estimated by Elisa and body mass index was calculated by measuring weight and height of cases and controls. Cases were further subdivided into two groups Mild & Severe Pre-eclampsia. Inclusion criteria include all pregnant patients having gestational age more than 20 weeks. Exclusion criteria were twin pregnancies, patients having heart disease or kidney disease and gestational age of less than 20 weeks.

Results: The mean age of cases was 27 years and controls were 24.9 years. Mean period of gestation of both cases and controls was 35.3 weeks. Mean age at marriage of caseswas 20.0 years and mean at marriage of controls was 21.8 years.Mean leptin levels were 9.57 ng/ml in controls. In mild pre-eclampsia, leptin levels were 25.57 ng/ml and in severe pre-eclampsia, the levels were 36.47 ng/ml. Mean weight of cases was 74.6 kg and mean weight of controls was 72.3 kg. Mean BMI of cases was 28.4 kg/m2 and mean BMI of controls was 27.5 kg/m2.Serum leptin levels were not found to be associated with BMI of normal pregnant & preeclampsia patients. Only weak correlation was found between serum leptin levels and BMI.

Conclusion: From this comparative study, it is concluded that serum leptin levels are not associated with body mass index of pre-eclampsia patients.

KEYWORDS: Leptin, Body mass index, Pre-eclampsia, Elisa.

INTRODUCTION

Leptin is a Greek word (laptos) meaning "thin" is a 16KDa adipokine[1,2]. Its discovery is a major scetific avancement, done by Coleman and Friedman in 1995[3]. It plays a major role in regulation of energy intake and expenditure[4]. The human leptin receptors are encoded by (db) gene, located on short arm of chromosome 1[5]. Leptin circulates in blood in both free and bound form[6] and acts on hypothalamus to regulate food intake[4]. Leptin levels follow diurnal rhythm, that can be moied by meal timings[7]. It is eliminated via the kidney[8]. Athough leptin reduces appetite as a circulating signal, obese individuals generally exhibit unusually high concentrations of leptin[9]. Sustained high concentrations develop resistance[10,11]. It functions by counteracting the effects of neuropeptideY (NPY) and anandamide, both potent feeding stimulants[12]. Two signals leptin and inslin have been identified and found to lower food intake and body weight[13]. Obese childrens like adults have high concentration of serum leptin, which are correlated with body weight. Increase adipose tissue in children is associated with increase serum leptin concentration. In comparison with boys, girls had increased leptin concentration independent of adiposity[14]. Leptin receptors are also expressed in pituitaryglands and gonads, thus major player in infertility[15,16]. During pregnancy, it has marked effect on weight gain, energy expenditure and hormonal status. The significant increase in maternal circulating leptin during the first and second trimester of normal pregnancy is suggested to be due to these changes. The rise in leptin concentration in early pre- gnancy also suggests hormonal factors to be responsible[17]. Objective of the present study was to determined the association between serum leptin levels and body mass index in pre-eclampsia

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MATERIALS AND METHODS:

A total of 40 pregnant female with pre-eclampsia were re selected for this case control study from the admitted patients and patients visiting outpatient departments of tertiary care hospitals of Gynae and obstetrics deptt: Hayatabad Medical Complex and Lady Reading Hospital for a period of six months as per the inclusion and exclusion criteria. These patients were com- pared with 40 pregnant female without pre-eclampsia. After the full explanation of the study, written informed consent was obtained from each study subject. Demographic and anthropometric details like age, weight, period of, number of previous pregnancies, previous history of other illnesses and related complications of pre-elamsia were recorded for all the study subjects. The diagnosis of pre-eclampsia was based on history of the patients, presenting complaints, phy- sical findings, raised blood pressure and presences of proteins in urine of the patient. Criteria include: Blood pressure more than 140/90 mmHg, twice 6 hours apart. Proteinuria more than or equal to 1+ on urine dipstick metmethod[18]. For descriptive analysis means and standard deviation were calculated for numerical variables and proportion of all the categorical variables in the study.

BMI DEFINITION

The body mass index (BMI) is defined as the weight in kilograms divided by the square of thSe height in meters, is 23.0 kg/m2 for normal weight subjects and 35.0 kg/m2 in obese subjects19.

CASES

Inclusion Criteria

All pre-eclampsia patients from 20-35 years age. Cases were identified and grouped based on maternal criteria for pre-eclampsia. Mild pre-eclampsia was defined as elevated blood pressure (140/90mmHg or greater on two measurements that are obtained six or more hours apart, with proteinuria equal +1 on urine dipstick testing. Severe pre-eclampsia is defined as blood pressure ≥160/100 mmHg with greater than +1 urine dipstick testing. Gestational age more than 20 weeks.

Exclusion Criteria:

- Twins/triplets pregnancy.
- Pregnant women having heart disease, kidney disea- se and liver diseases with essential hypertension.
- Diabetic patients.

CONTROLS

Inclusion Criteria

All normotensive pregnant females with gestational age more than 20 weeks.

EXCLUSION CRITERIA:

- Twins/triplets pregnancy.
- Having heart disease, kidney diseases and liver diseases with essential HTN.
- Diabetic patients.

BIOCHEMICAL ANALYSIS

Serumleptin levels were measured by enzyme linked immunosorbent assay (ELISA), which is an enzyme immunoassay for the quantitative measurement of serum/plasma leptin. The kit used was leptinELISA kit (IBL International, Germany RE531- 51), which is a solid phase enzyme linked immune sorbent assay (ELISA) based on the sandwich principle. Urine proteins were determined through dipstick method. Test strips used were Comber test (Cobas) Ref: 11379208

ETHICAL CONSIDERATION

The present study was approved by institutional ethical committee of Postgraduate Medical Institute (PGMI/HMC).

STATISTICAL ANALYSIS

Data was entered and analyzed into statistical product for services solutions (SPSS) version 17. All the variables were categorized in appropriate categories. Age, age at marriage, period of gestation, weight, BMI. Serum leptin levels were estimated in all three groups of patients. Probability value (p value) of less than 0.05 was taken as statistically significant. For descriptive analysis Mean and standard deviation were calculated for numerical variables and proportion of all the categorical variables in the study.

RESULTS

Mean age of cases was 27 + 5.3 years while mean age of controls was 24 + 5.2 years.Mean age at marriage of cases was 20 + 3.4 years, while mean age of controls was 21.8 + 3.7 years.Mean period of Gestation of cases was 35.3 + 2.8 weeks, while mean period of gestation of controls was 35.3 + 2.9.

Mean weight of cases was 74 + 16.8Kg, while mean weight of controls was 72 + 9.8 Kg.Mean Body Mass Index (BMI) of cases was 28.4 + 6.4Kg/m2, while that of controls was 27.5 + 3.7Kg/m2.Mean leptin levels in cases was 32.3 + 14.6 ng/ml, while in controls was 9.5 + 8.9 ng/ml. Serum leptin levels were divided into 2 categories and compared with the severity of pre-eclampsia. Levels less than 15ng/ml Levels more than 15ng/ml. Results showed that 20% (3) of mild pre-eclampsia cases and 12% (3) of severe pre-eclampsia cases have levels less than 15ng/ml,

TABLE 1: Socio Demographic And Reproductive Characteristics Of The Study Subjects

	Group	No of Patients	Mean	Standard Deviation (SD)
Age (yrs)	Cases	40	27.02	5.33
	Control	40	24.90	5.32
Age at Marriage (yrs)	Cases	40	20.07	3.45
	Control	40	21.85	3.79
Period of Gestation (weeks)	Cases	40	35.35	2.86
	Control	40	35.30	2.93
Weight (kg)	Cases	40	74.67	16.89
	Control	40	72.35	9.82
BMI (kg/m^2)	Cases	40	28.45	6.43
	Control	40	27.56	3.74
Leptin level (ng/ml)	Cases	40	32.38	14.69
	Control	40	9.57	8.95

Table 2: Association Of Serum Leptin Levels With Mild And "Severe Pre-Eclampsia.

	Leptin level		
	<15 ng/ml	>15 ng/ml	Count
Mild	3 (20%)	12 (80%)	15
Severe	3 (12%)	22 (88%)	25
Total	6 (15%)	34 (85%)	40 (100%)

Table 3: Correlations Between Serumleptin Levels And Bmi In Both Groups.

CORRELATIONS BETWEEN SERUM LEPTIN LEVELS AND BMI IN BOTH GROUPS	
Pearson Correlation	0.269
p-value	>0.001

while 80% (12) of mild Pre-eclampsia and 88% (22) of severe Pre-eclampsia have levels more than 15ng/ml. Correlation between serum leptin levels and BMI was evaluated through correlation test and no significant correlation was found (p value >0.001).

DISCUSSION

In pregnancy, maternal plasma leptin levels rise in the first trimester before the mother gain significant weight suggesting hormonal factors to be responsible. The main sources are increase in maternal adipose tisue and secretion from placenta in second trimester[72,73]. Highman etal in his study evaluated the association between maternal serum leptin levels and maternal BMI, but no significant association was found which were consistent with the results of this study73. Fthermore, Highman etal observed that leptin increases significantly during early pregnancy before any major changes in body fat and metabolic rate occurred73. Dalamaga Metal in his study also found no significant correlation between serum leptin levels and BMI, body weight and height among cases of pre-eclampsia. In a longitudinal analysis of maternal plasma leptin conctions during nomal pregnancy and pre-eclampsia done by AnimNyame in 2000 determined serum leptin levels in 19 women with pre-eclampsia and 13 normal pregnant controls found and report for the first time that leptin concentration are elevated before pre-eclampsia is clinically evident and showed that maternal BMI were correlated with the leptin concentrations in pre-eclasia. The results of this study are not in concordance with the present study.It has been suggested that increase in BMI was responsible for the increase in maternal levels in pre- eclampsia, in several studies since adipose tissue is a source of leptin[84]. In pregnancy, however the BMI does not reflect the accurate fat mass, because the fetus, placenta, amniotic fluid, increased plasma volume and increased extra cellular fluid accumulate which increase maternal weight[72,73].

CONCLUSION

From this comparative study, it is concluded that the increase in serum levels of leptin are not associated with BMI in pre-eclampsia.

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