

RESEARCH ARTICLE

Effect of Leptin Level in Pregnancy Complicated by Preeclampsia and Pregnancy Outcome

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ABSTRACT

In this research article, a descriptive study was applied during the period from January to August 2017 to evaluate maternal levels of leptin and make a comparison of serum leptin levels in typical pregnancies with those who are problematical by preeclampsia. A case study about (80) terms of primigravidas pregnant women who were attending AL Nomaan Teaching Hospital during the study period, 40 were known cases of preeclampsia and 40 were normotensive without another disease. Women have been monitored from admission time to delivery. Leptin levels have been determined in serum samples from the whole women. Mode of delivery and birth weight were identified as pregnancy outcome.

The results revealed a statistically significant association between the disease and both decreased birth weight (small for gestational age) ($p = 0.026$) along with the delivery via cesarean section ($p = 0.001$). While neonatal birth weights have been considerably lower in women with preeclampsia in comparison to the control group ($p < 0.001$).

Leptin levels have been greater in preeclamptic pregnant women as compared with normotensive, and high leptin in preeclampsia levels might be associated with increased adverse maternal and fetal outcome like low birth weight and raise the delivery hazard by cesarean section for different reasons.

Keywords: Birth weight, Delivery, Leptin, Preeclampsia, Pregnancy outcome.

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INTRODUCTION

Preeclampsia is a tricky situation of pregnancy which is categorized by hypertension. Proteinuria is a foremost supplier of fetal and maternal morbidity and mortality.^{1,2}

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It confuses 3–5% of all pregnancy that is considered by placental and maternal vascular dysfunction that possibly causes the opposing outcome.³ The prediction of an adverse event is in accordance with conventional variable and non-ambiguous eclampsia clinical indications of urine protein excretion, blood pressure, and symptoms creating the expectation of this adversative outcome very challenging.⁴ The ultimate cure for preeclampsia remains delivery of fetus and placenta, and although maternal and fetal risk must be weighed again in determining the timing of delivery, possible vaginal delivery is preferred to avoid the add physiological stressors of caesarian delivery.⁵ A relationship between the circulating leptin level with hypertension and associated cardiovascular complication morbidity has been reported recently.⁶ The human leptin has 167 amino acid sequences of one disulfide bond, its molecular weight is around 16 kDa. The foremost cause of leptin is adipose tissue; however, it may be as well produced through placenta (syncytiotrophoblast) ovaries, skeletal muscle, bone marrow, and pituitary gland.⁷

In pregnant women, leptin is created in and secreted from placental trophoblast into the maternal circulating flow at the substantial quantity and has been involved in platelet aggregation and arterial thrombosis.⁸ Plasma leptin levels are also elevated in a patient with hydatiform mole and choriocarcinoma, these findings suggest that leptin is an oval placenta-derived hormone in human.⁹ Leptin is shown to be involved in the cardiovascular complication of obesity and hypertension.¹⁰

Dysregulation of leptin metabolism is feasibly occupied in preeclampsia and intrauterine growth restriction (IUGR) pathogenesis. Placental ischemia as well clarifies speedy intensification in leptin concentration throughout the overdue 3rd trimester in PE.¹¹

The goal of this paper is to make a comparison of the serum leptin levels in typical pregnancies with those who are problematical by preeclampsia and to inspect the likelihood of leptin being as the possible predictor of increased risk of delivery by cesarean section in preeclampsia and other adverse birth outcomes.

SUBJECTS AND METHODS

A descriptive study was applied during the period from January to August 2017 in AL Nomaan Teaching Hospital in Iraq.

This study was performed on 80 pregnant women from whom 40 were known cases of preeclampsia and 40 were normal pregnant women as controls.

Inclusion Criteria

- Primigravidas women
- Singleton pregnancies
- With maternal ages ranged 18–32 years old
- Gestational age amid 37–40 weeks gestational age was calculated from the first day of the last menstruation period and set by ultrasound scan.

Exclusion Criteria

It has been exactly perceived and takes account of:

- Preexisting chronic hypertension
- Preexisting diabetes mellitus (DM)
- Gestational diabetes
- Any chronic disease such as liver, kidneys, endocrine diseases or cardiovascular disease
- Fetal abnormalities
- Smoker

Study participants have been monitored from the admission time to labor-ward to delivery. Control includes women who admitted for spontaneous onset of labor and preeclamptic women who were known cases of pulmonary embolism (PE) who started labor spontaneously, admitted for induction or severe PE all were followed and mode of delivery recorded. Levels of leptin were measured at the time of admission to hospital, serum samples from 80 pregnant women (40 with PE, and 40 uncomplicated).

The blood samples were collected under aseptic measures, a sample of 2.5 mL of venous blood was drawn into tubes. Each sample was labeled with patient's name and identification number

After the delivery weight of each baby and mode of delivery have been recorded.

To obtain and clarify serum, the samples were left to stand at room temperature for at least 30 min to allow the blood to clot, and serum was separated by centrifuge at 4000 rpm for 10-minute room temperature then centrifuged, serum was separated and stored frozen at -25°C until required for analysis. After rewarming the serum to room temperature serum leptin, concentrations were measured by enzyme-linked immunosorbent

assay (ELISA) kit according to the guidelines of the manufacturer.

RESULTS

Each pregnant patient assigned a serial identification number. The data have been revised and prepared and double checked using Statistical Package for Social Sciences (SPSS) simulator package.

- The continuous variables were shown as mean, standard deviation, median and interquartile range.
- The categorical variables were shown by (frequency and percentages in tables).
- Pearson's Chi-square and Fisher's exact investigations have been adopted to evaluate the statistical association between categorical data.
- Independent student and Mann-Whitney U tests have employed to evaluate the difference amid the continuous variables depending on its normality of distribution.
- Pearson's correlation between the level of leptin and the perinatal outcomes.

A level of p value lower than 0.05 has been in substantial results.

The sample of this study consisted of 80 pregnant women, 40 have complained of preeclampsia and another 40 with normal pregnancy.

The results showed that there was no important change in the ages between the study collections and no significant difference in the prepregnancy body mass index (BMI), while neonatal birth weights were considerably lower in women with preeclampsia in comparison to the control group ($p < 0.001$), as shown in Table 1 and Graph 1.

In Table 2, the results revealed a statistically significant association between the disease and both decreased birth weight (small for gestational age) ($p = 0.026$) besides the delivery via. cesarean section ($p = 0.001$).

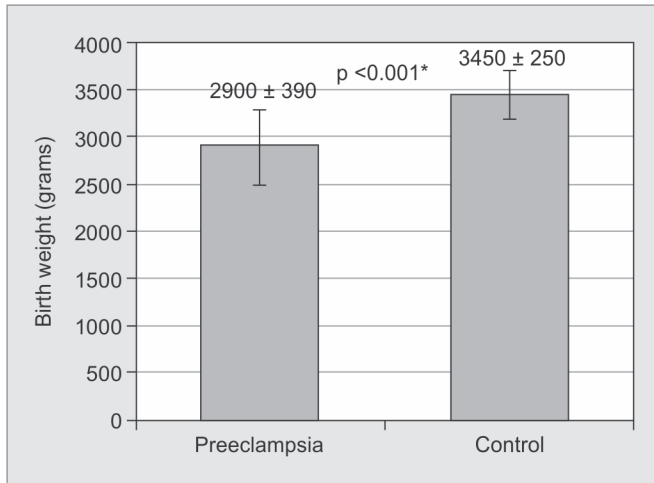
Considering the level of leptin, we can clearly see that it was meaningfully greater in the diseased group in comparison to the ($p < 0.001$) controls as shown in Table 3 and Graph 2.

We also found that the level of leptin had a significant inverse correlation with the neonatal birth weight and this correlation was a week ($r = -0.396$, $p < 0.001$) as well it had significantly inverse moderate correlation with 1st minute Apgar score for the neonate ($r = -0.429$, $p < 0.001$).

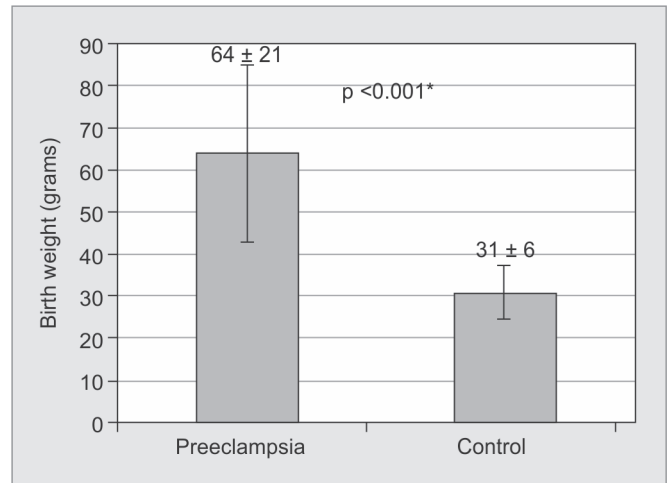
Table 1: Comparison of main characteristics of preeclampsia and control groups of the included pregnant women, $n = 80$

Characters	Preeclampsia ($n = 40$) Mean \pm SD	Control ($n = 40$) Mean \pm SD	p value ^a
Maternal age (years)	22.3 \pm 3.5	23.7 \pm 3.8	0.09 (NS)
Birth weight (g)	2900 \pm 390	3450 \pm 250	<0.001*

^aIndependent t-test, SD = Standard deviation, NS = Not significant, *Significant at $\alpha < 0.05$



Graph 1: Comparison of the mean birth weights between preeclampsia and control groups for the neonates of the included pregnant women, n = 80



Graph 2: Comparison of the mean level of leptin between preeclampsia and control groups of the included pregnant women, n = 80

Table 2: Comparison of the incidence of SGA and the cesarean section between preeclampsia and control groups of the included pregnant women, n = 80

Characters	Preeclampsia (n = 40)	Control (n = 40)	p value
	No. (%)	No. (%)	
Small for gestational age ^F	6 (15.0)	0 (0.0)	0.026*
Cesarean section ^P	27 (67.5)	17 (42.5)	0.001*

^PPearson's Chi-square, ^FFisher's exact test, NS = not significant, *significant at alpha < 0.05

Table 3: Comparison of the mean level of leptin between preeclampsia and control groups of the included pregnant women, n = 80

Parameters at delivery	Preeclampsia (n = 40)	Control (n = 40)	p value
	No. (%)	No. (%)	
Leptin (ng/mL)	64 ± 2	31 ± 6	<0.001*

^aIndependent t-test, SD = standard deviation, *significant at alpha < 0.05

Table 4: Pearson's correlation between the level of leptin and the perinatal outcomes, n = 80

Variables	Leptin (ng/mL)	p value
Birth weight (g)	-39.6	<0.001*
Apgar score	-42.9	<0.001*

*Significance level alpha < 0.05

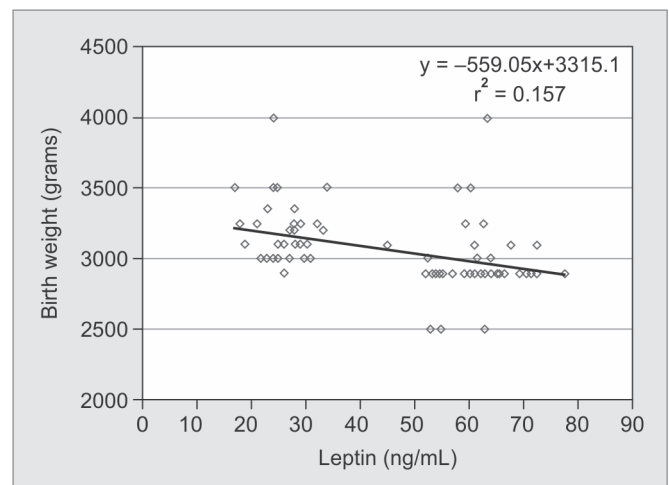
Inverse correlation means that; any increase in the Leptin level will affect neonatal birth weight and 1st minute Apgar score for the neonate and make them decrease as stated in Table 4.

The correlation is shown in Graph 3 illustrates that ($r^2 = 0.157$) which means that about (16%) of the variation in the response variable (birth weight) can be explained by the explanatory variable (level of leptin).

The results have shown a statistically noteworthy association amid elevated leptin level and the delivery via the cesarean sector as it can be observed from Table 5.

DISCUSSION

The intention of this research was to inspect the relation between maternal leptin level in preeclamptic and



Graph 3: Correlation between the level of leptin and neonatal birth weight, n = 80

normotensive pregnant women and adverse pregnancy results. The result of the current this study revealed an important increased serum levels of leptin in preeclamptic term pregnant women compare to normotensive term pregnant women p value < 0.001. This study confirms the finding of Mohamed Youssry et al. in 2016 and Anim-Nyame et al. in 2000,^{6,12} similar finding found by

Table 5: Comparison of the validity of leptin level for detection of cesarean section in the included sample, n = 40

Leptin level	Mode of delivery		
	Cesarean section	Normal vaginal	Total
Elevated	26	1	27
Normal	1	12	13
Total	27	13	40

Gursoy et al. where maternal leptin concentrations of the preeclamptic group were considerably greater than the control cluster.¹³ Similarly, Mumtaz et al. concluded that plasma leptin level can be augmented in preeclampsia with increasing gestational age. It can be taken individually or together with other limitations as indicators for strictness of preeclampsia. Thus, preventing the risk consequences of preeclampsia to mother and fetus.¹⁴ This was also reported by Sharma et al. in an Indian population. They show that leptin has considerably upper concentration for the duration of PE.¹⁵ Iftikhar et al. in Pakistan also showed similar finding, the serum leptin levels have been raised in the preeclamptic group than normal pregnancy group. For made comparison based on preeclampsia severity, the serum leptin levels were elevated in the severe group than mild group signifying the potential leptin function in the preeclampsia pathogenesis. Correspondingly, the increased leptin level can motivate the disease prediction and serve as an indicator of preeclampsia severity.¹⁶ In divergence to our research findings, Doster et al. and Martinez–Abundis et al. found no noteworthy variances in serum leptin concentration amongst the patients with mild, severe preeclampsia and normotensive pregnant women.^{17,18} Also, Lam et al. found that median leptin concentrations have been meaningfully lower in women with preeclampsia as compared with normal pregnant women.¹⁹ Similarly, in Asnafi et al. in Iran, serum leptin level determined in all pregnant mothers explained that there was no noteworthy variance in serum leptin levels amid normal and preeclamptic women that can be because of the existence of some mild preeclamptic women in that patient's cluster.²⁰ In our study, we found also that the level of leptin had a significant inverse correlation with the neonatal birth weight in both groups of study $p < 0.001$ and this correlation was weak $r = 0.396$. Lam et al. found maternal leptin concentrations did not correlate with birth weight.²⁰ In Rytlewski et al. in Poland study the negative correlation between leptin and neonatal birth weight were presented, which seems to be in agreement with the theory of the placental hypoxia resulting in the poor perinatal outcome, but without the IUGR complication.²¹ Sumawan et al. opposes our study and in line with them, the maternal leptin concentrations in IUGR are less than the usual fetus in preeclampsia circumstances. Nonetheless, there was

not adequate verification to validate that leptin is related to birth weight in IUGR. Spearman correlation investigation among birth weight and maternal serum leptin levels in IUGR did not validate a substantial correlation, with $r = 0.0321$ ($p = 0.168$).²² However, Pighetti et al. in 2003 in Italy, maternal serum leptin concentrations are greater in the case of a growth restricted fetus. This increase is feasible because of an intrinsic placental mechanism in which minor placentas create more leptin as a compensatory method or too early hypoxia.²³ Taghreed et al. in 2012 in Iraq lowered maternal serum leptin level than women who had normal fetuses, and she found that IUGR pregnancy complicated with PE the highest leptin levels.¹¹ In this study, it has been the validity of leptin level can be a marker for prediction the increased risk of delivery by cesarean section in preeclamptic pregnant women, similar finding by Sumawan et al. in Poland that leptin is possibly been as risk indications of cesarean section in hypertension pregnancy complaints with nearly 3-fold intensification in the risk related to the leptin concentration increase.²²

CONCLUSION

Leptin levels have been found to be greater in preeclamptic pregnant women as compared with normotensive. High leptin in preeclampsia levels can be related to increased adverse maternal and fetal outcome like low birth weight and raise the delivery risk by cesarean sector for different reasons.

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