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Association of Serum Adiponectin and Leptin with Blood Pressure and Dyslipidemia in Preeclampsia

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KEYWORDS:

Adiponectin, Dyslipidemia , Leptin, Pre-eclampsia

ABSTRACT:

Introduction: To assess serum adiponectin and leptin in preeclampsia then controls and evaluate the potential of adiponectin and leptin as a diagnostic and prognostic marker for preeclampsia.

Objectives: To assess serum adiponectin and leptin in preeclampsia then controls and evaluate the potential of adiponectin and leptin as a diagnostic and prognostic marker for preeclampsia.

Methods: This cross-sectional study included 100 preeclamptic pregnant women and 50 controls. The serum adiponectin and leptin concentrations were determined through the enzyme-linked immunosorbent assay method. Additionally, sociodemographic, and laboratory parameters were assessed.

Results: Mean serum adiponectin and leptin levels were significantly higher in the preeclampsia group compared to the control group. These levels were significantly positive correlation with blood sugars, BMI and dyslipidemia (P=0.001**).

Conclusions: Serum adiponectin and leptin levels are significantly elevated in preeclamptic pregnancies, supporting its potential as a diagnostic biomarker.

1. Introduction

Preeclampsia is a pregnancy-specific condition defined by the onset of hypertension (BP ≥ 140/90 mmHg) with proteinuria or other organ involvement, such as thrombocytopenia, impaired liver function, renal dysfunction, cerebral or visual disturbances, or pulmonary oedema after 20 weeks of gestation in a previously normotensive, nonproteinuric pregnant woman (1-3). It is linked to significant feto-maternal morbidity and mortality and affects 2–8% of pregnancies (4). According to recent research studies polycystic ovarian syndrome (PCOS), insulin resistance (IR), diabetes, obesity, and hyperinsulinemia are among the conditions linked and contribute to the development of PE (5-6).

Adiponectin and Leptin is adipocytokines involved in anti-oxidative, anti-inflammatory and anti-atherogenic, anti-diabetic, and blood pressure regulation in the tissues. The atherogenic properties of this adipokines has a protective effect against atherosclerosis and this will suppress the macrophage-to-foam cell transformation, inhibits the expression and the activity of the class A macrophage scavenger receptor (7-9). Several reports have reported the anti-inflammatory properties of adiponectin and leptin, includes the suppression of macrophage production of pro-inflammatory cytokines, interleukins and also exert its anti-inflammatory effects by preventing activation of the nuclear transcription factor NF-κB (10-11). Along with that, the serum adiponectin and leptin concentrations are significant and negatively associated with dyslipidemia, obesity, insulin resistance and hypertension. The recent hypothesis studies indicate that dysregulation of these adipokines concentrations associated with gestational diabetes and PE, because its strongly associated with these metabolic

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www.jchr.org
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manifestations, it is tempting to hypothesize that adiponectin and leptin play a role in the pathogenesis of preeclampsia, and specifically, in the metabolic derangements observed in PE (12-14). Adipokines are thought to be dysregulated in PE, and this may have pathophysiological and prognostic implications. Adiponectin–leptin (A/L) ratio changes have also been assessed for diagnosis, prognosis, and treatment of PE in the future. The present study aimed to assess the relationship between adiponectin and leptin concentrations in preeclampsia.

2. Objectives

To assess serum adiponectin and leptin in preeclampsia then controls and evaluate the potential of adiponectin and leptin as a diagnostic and prognostic marker for preeclampsia.

3. Methods

This case-control study was conducted recruited 100 patients with preeclampsia and 50 women with normal pregnancies. the preeclampsia patients were sub grouped based on their blood pressure, Mild preeclampsia is blood pressure 140 -170 mmHg and 90-110 mmHg (n=50, Group 2) and Severe Preeclampsia is diagnosed by systolic >170 mmHg and diastolic is >110 mmHg (n=50, Group 3). Additionally, age and Body Mass Index (BMI) matched normal pregnant women (n=50, Group 1) also included. In this study, women having age above 18 years and BMI>18.5 and Women having multiple pregnancies, pre-gestational and gestational hypertension, diabetes and renal disease were excluded.

Five (5) mL of fasting blood samples were collected in plain tube and separated serum by centrifugation at 3000 RPM for 10 minutes. The separated serum samples were transferred into appropriately labeled aliquots and stored at -700 c until analysis was done. The lipid profile was determined by laboratory standard methods and the serum adiponectin, leptin levels was determined by using Enzyme Linked Immunosorbent Assay (ELISA).

Statistical Analysis

A Microsoft Excel spreadsheet was used for data entry, and SPSS version 21 statistical software was used for data analysis. The analysis of variance test was used to compare the variables between the study groups and pearson's correlation analysis used for correlation of serum adiponectin, leptin with blood pressure and dyslipidemia. A p-value of less than 0.05 was considered statistically significant.

4. Results

Table 1: Anthropometric, Demographic, biochemical and experimental parameters between study subjects

Table 1 demonstrates anthropometric, demographic, biochemical and experimental parameters of study subjects. The age, weeks of gestation, BMI, SBP, DBP significant between both groups of preeclampsia when compared controls (P=0.001**). There was a significant increased level of total cholesterol, triglycerides, VLDL, LDL, and decreased levels of HDL in both groups of preeclampsia when compared controls (P=0.001**). Serum adiponectin and leptin were significant and drastically elevated in both groups of preeclampsia when compared controls (P=0.001**).

Table 2: Correlation of serum adiponectin and leptin with other parameters of study

Table 2 illustrates correlation of serum adiponectin and leptin with other parameters of study. The serum adiponectin, leptin was significant positively correlated with weeks of gestation, BMI, SBP, DBP, total cholesterol, triglycerides, VLDL, LDL, and negatively correlated with HDL (P=0.001**). There was a significant positively correlation between adiponectin and leptin (P=0.001**).

Figure 1: The serum adiponectin and leptin between the study subjects

Figure 1indicates the serum adiponectin and leptin between the study subjects. The both groups of preeclampsia patients shown significant and drastically elevated levels of serum adiponectin and leptin when compared to controls.

5. Discussion

Our results showed that blood adiponectin and leptin levels were considerably greater in moderate preeclampsia and severe preeclampsia when compared to controls. Moreover, weight reduction in obese individuals is accompanied by an increase in plasma adiponectin concentrations, suggesting that adipose tissue inhibits adiponectin production (15-16). Insulin resistance, obesity, hyperlipidemia, and an exaggerated

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inflammatory response are associated with low adiponectin concentrations in the non-pregnant state. Preeclampsia, a disease of pregnancy, is associated with these conditions with accompanying high serum concentrations of adiponectin. The mechanisms underlying the paradoxical increase in serum adiponectin in patients with preeclampsia have not been elucidated (17-18). The preeclampsia, a disease of pregnancy, is associated with these conditions with accompanying high serum concentrations of adiponectin. Previous studies also reported higher serum adiponectin levels in preeclampsia and these levels positively associated with blood pressure and dyslipidemia (19-20). The determination of serum adiponectin might be useful for diagnosis, prognosis and treatment for preeclampsia.

According to recent researchers' multifactorial origin involving maternal and placental components, such as impaired placental development and endothelial dysfunction in PE. This study highlights the significance, as a potential predictive marker for PE, of leptin, a hormone predominantly secreted by adipose tissue and additionally produced by the placenta during pregnancy and it is act as a biomarker for early-onset PE (21-22). We also found serum leptin concentrations were significantly elevated in women who later developed PE, independent of BMI and other confounders. Leptin's involvement in metabolic dysregulation and physiological imbalances during pregnancy underscores its pivotal role in the onset and progression of PE. Our findings further support the potential role of leptin in PE pathogenesis, possibly via its influence on placental dysfunction and inflammatory pathways (23-24). This supports the hypothesis that leptin may act as a critical factor in the development of PE through its involvement in placental function and systemic inflammation. The elevated leptin expression is strongly linked to PE and holds promise as both a diagnostic indicator and a therapeutic target.

6. Conclusion

In our study, significantly elevated serum leptin and adiponectin levels in preeclamptic pregnancies support its potential role in disease prediction. Adiponectin and leptin consider as a clinical marker to early identification and risk stratification of preeclampsia.

References

1. Megahed MA, Dawoud SM, El-Sarha AI, et al. Maternal serum level of adiponectin and macroscopic changes of placentae in preeclampsia. Am J Biomed Sci. 2018;10(2):72–81.

2. Başol E, Ozdemir S. The analysis of serum calcium and urine calcium/creatinine ratio in diagnosis of preeclampsia. Bagcilar Med Bull. 2023;8(1):62-67.

3. Ozalp M, Yaman H, Demir Ö, Aytekin Garip S, Aran T, Osmanağaoğlu MA. The role of maternal serum catestatin in the evaluation of preeclampsia and fetal cardiac functions. Turk J Obstet Gynecol. 2021;18(4):272-278.

4. Tomimatsu T, Mimura K, Matsuzaki S, Endo M, Kumasawa K, Kimura T. Preeclampsia: maternal systemic vascular disorder caused by generalized endothelial dysfunction due to placental antiangiogenic factors. Int J Mol Sci. 2019;20(17):4246.

5. Mazaki-Tovi S, Romero R, Vaisbuch E, et al. Maternal serum adiponectin multimers in pre-ecampsia. J Perinat Med. 2009;37(4):349–63.

6. Khosrowbeygi A, Ahmadvand H. Maternal Serum levels of adiponectin in pre-eclampsia. J Ayub Med Coll Abbotabad. 2009;21(3):79–82.

7. Nien JK, Mazaki-Tovi S, Romero R, et al. Adiponectin in severe pre-eclampsia. J Perinat Med. 2007;35(6):503–12.

8. Thagaard IN, Hedley PL, Holm JC, et al. Leptin and Adiponectin as markers for preeclampsia in obese pregnant women, a cohort study. Pregnancy Hypertension. 2019;15:78–83.

9. Barrios-Correa AA, Estrada JA, Contreras I. Leptin signaling in the control of metabolism and appetite: lessons from animal models. J Mol Neurosci. 2018;66(3):390-402.

10. de Knegt VE, Hedley PL, Kanters JK, Thagaard IN, Krebs L, Christiansen M, et al. The role of leptin in fetal growth during preeclampsia. Int J Mol Sci. 2021;22(9):4569.

11. Mise H, Sagawa N, Matsumoto T, Yura S, Nanno H, Itoh H, et al. Augmented placental production of

Journal of Chemical Health Risks
www.jchr.org
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leptin in preeclampsia: possible involvement of placental hypoxia. J Clin Endocrinol Metab. 1998;83(9):3225-3229.

12. Miehle K, Stepan H, Fasshauer M. Leptin, adiponectin and other adipokines in gestational diabetes mellitus and pre-eclampsia. Clin Endocrinol (Oxf). 2012;76(1):2-11.

13. Gestational hypertension and preeclampsia: ACOG Practice Bulletin, number 222. Obstet Gynecol. 2020;135(6):e237-e260.

14. Stergiou GS, Palatini P, Parati G, O'Brien E, Januszewicz A, Lurbe E, et al. 2021 European Society of Hypertension practice guidelines for office and out-of-office blood pressure measurement. J Hypertens. 2021;39(7):1293-1302.

15. Taylor BD, Ness RB, Olsen J, Hougaard DM, Skogstrand K, Roberts JM, et al. Serum leptin measured in early pregnancy is higher in women with preeclampsia compared with normotensive pregnant women. Hypertension. 2015;65(3):594-599.

16. Hao S, You J, Chen L, Zhao H, Huang Y, Zheng L, et al. Changes in pregnancy-related serum biomarkers early in gestation are associated with later development of preeclampsia. PLoS One. 2020;15(3):e0230000.

17. Harish R, Reshma D, AshakiranS, Shetty VV. The Role of leptin in preeclampsia: insights into pathogenesis and potential therapeutic implications. Current Progress in Medicine and Medical Research. 2023;3:10-42.

18. Fondjo LA, Gyamfi EA, Owiredu WKBA, et al. Maternal serum adiponectin, leptin and adiponectin leptin ratio as possible biomarkers of pre-eclampsia. Edorium J Gynecol Obstet. 2016;2:41–7.

19. Peltokorpi A, Irina L, Liisa V, Risto K. Preconceptual leptin levels in gestational diabetes and hypertensive pregnancy. Hypertens Pregnancy. 2022;41(1):70-77.

20. Nonn O, Fischer C, Geisberger S, El-Heliebi A, Kroneis T, Forstner D, et al. Maternal angiotensin increases placental leptin in early gestation via an alternative renin-angiotensin system pathway: suggesting a link to preeclampsia. Hypertension. 2021;77(5):1723- 1736.

21. Wang Y, Bai X, Guo X, Gao X, Chen Y, Li H, et al. Bioinformatics analysis combined with clinical sample screening reveals that leptin may be a biomarker of preeclampsia. Front Physiol. 2023;13:1031950.

22. Veiga ECA, Korkes HA, Salomão KB, Cavalli RC. Association of LEPTIN and other inflammatory markers with preeclampsia: A systematic review. Front Pharmacol. 2022;13:966400.

23. El Shahat AM, Ahmed AB, Ahmed MR, Mohamed HS. Maternal serum leptin as a marker of preeclampsia. Arch Gynecol Obstet. 2013;288(6):1317-1322.

24. Rao S, Kumari A, Sharma M, Kabi BC. Predicting maternal serum adiponectin and leptin level as biomarkers of pre-eclampsia: a prospective study. J Obstet Gynaecol India. 2021;71(1):58-65.

Table 1: Anthropometric, Demographic, biochemical and experimental parameters between study subjects

Parameters	Controls	Mild Preeclampsia	Severe Preeclampsia	P-value
	Mean ± SD	Mean ± SD	Mean ± SD	
Age (Years)	28.02 ± 1.97	25.93 ± 2.22	25.92 ± 2.11	0.001**

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www.jchr.org
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Weeks of Gestation	26.05	±	2.06	27.03	±	1.41	31.95	±	1.70	0.001**
BMI (kg/m^2)	21.97	±	1.90	23.25	±	2.11	32.84	±	3.41	0.001**
SBP	135.17	±	6.20	154.00	±	8.87	172.92	±	1.82	0.001**
DBP	80.55	±	5.96	99.48	±	6.12	113.00	±	1.95	0.001**
Total Cholesterol	159.	±	15.	170.	±	11.19	272.	±	21.70	0.001**
(mg/dL)	78		37	60			38			
Triacylglycerides (mg/dL)	118.33	±	16.57	130.83	±	19.12	198.75	±	20.77	0.001**
HDL (mg/dL)	45.83	±	6.17	35.82	±	4.26	28.98	±	2.45	0.001**
VLDL (mg/dL)	22.88	±	3.53	25.89	±	4.15	41.01	±	3.98	0.001**
LDL (mg/dL)	89.36	±	9.44	106.80	±	12.42	203.71	±	17.19	0.001**

Journal of Chemical Health Risks
www.jchr.org
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Serum Adiponectin (mg/L)	5.57	±	1.31	7.73	±	1.13	10.15	±	0.80	0.001**
Leptin (ng/mL)	16.07	±	2.92	28.73	±	4.39	44.77	±	3.29	0.001**

Table 2: Correlation of serum adiponectin and leptin with other parameters of study

Parameters	**Serum Adiponectin (mg/L)**	**Serum Leptin (ng/mL)**	**P-Value**
	r- Value	**r-Value**	
Weeks of Gestation (Years)	0.711	0.746	0.001**
BMI (kg/m^2)	0.702	0.784	0.001**
SBP	0.799	0.904	0.001**
DBP	0.825	0.908	0.001**
HbA1C (%)	0.730	0.759	0.001**
Total Cholesterol (mg/dL)	0.760	0.847	0.001**
Triacylglycerides (mg/dL)	0.724	0.787	0.001**
HDL (mg/dL)	-0.717	-0.803	0.001**
VLDL (mg/dL)	0.732	0.795	0.001**
LDL (mg/dL)	0.789	0.883	0.001**
Serum Adiponectin (mg/L)	-	0.828	0.001**

Journal of Chemical Health Risks
www.jchr.org
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Leptin (ng/mL)	0.828	-	0.001 **

Figure 1: The serum adiponectin and leptin between the study subjects