

Assessment of Maternal Plasma Homocysteine levels among Sudanese Pregnant Ladies with Preeclampsia

Rasha Eltayeb Ahmed and Nour Mahmoud Abdelatif Ali

Department of hematology, faculty of medical laboratory science, Al Neelain University, Khartoum, Sudan

Received 02 Dec 2017, Accepted 03 Feb 2018, Available online 10 Feb 2018, Vol.6 (Jan/Feb 2018 issue)

Abstract

Objective: The aim of this study was to evaluate if there is association between preeclampsia and plasma homocysteine levels and moreover to investigate its association with the severity of the disease.

Material and method: A case control study was performed on a total of 61 pregnant patients, classified to 31 preeclamptic ladies and 30 normotensive pregnant ladies. Homocysteine levels were assessed using A15 analyzer.

Results: Plasma homocysteine levels were significantly higher in preeclamptic ladies than normotensive pregnant ladies (13.25 ± 4.35 $\mu\text{mol/L}$ with significant difference (P .value: 0.000). Higher levels of plasma homocysteine with a mean (16.4585) $\mu\text{mol/L}$ were associated to the severity preeclampsia with significant difference (P .value: 0.000).

Conclusion: Plasma homocysteine levels were significantly increased in preeclamptic ladies

1. Introduction

Preeclampsia is a pregnancy related hypertensive disorder occurring usually after 20 weeks of gestation. Preeclampsia has remained a significant public health threat in both developed and developing countries (Fernando A, 1994) the problem is compounded by the continued mystery and unpredictable nature of the disease. (Gary CF *et al.*, 2005). The exact cause of preeclampsia is undecided, endothelial dysfunction with associated intense vasospasm has been implicated in its causation. Recently homocysteine a metabolite of essential amino acid methionine has been postulated to produce oxidative stress and endothelial dysfunction and thereby producing preeclampsia (Ueland PM, 1995). The association of hyper homocysteinemia and preeclampsia has been suggested initially by Decker *et al* and has not been confirmed by many authors although majority of evidence suggest a positive association (Mali now MR, Boston AG, Krauss RM, 1999)

Homocysteine is sulfur containing amino acid derived from demethylation of dietary methionine, which is abundant in proteins of animal origin? It is an essential amino acid required for growth of cells and tissues in human body. Elevated circulating homocysteine is a risk factor of endothelial dysfunction and vascular disease such as atherosclerosis and occlusive disorders (Malinow MR, Boston AG, Krauss RM, 1999).The vascular effect of

hyperhomocysteinemia have been proposed to include endothelial cell injury and thrombus formation (Kanan Avinash Yelikar, Sonali Satish Deshpande, manisha Laxmi Kant Kulkarni , 2016)

Level of maternal serum homocysteine normally decrease with gestation, either due to physiological response to pregnancy, increase in estrogen, hemodilution from increased plasma volume or increased demand for methionine by both mother and fetus (Walker MC *et al.* ,1999 .,Hogg BB Tamura T *et al.* ,2000., Volley set SE, *et al.*, 2000) . Maternal hyper homocysteinemia has been associated with number of placenta-mediated diseases such as preeclampsia. The homocysteine mediated vascular changes are similar to these associated with preeclampsia, therefore a hypothesis has been proposed that hyper homocysteinemia may be associated with this condition. (Laskowaka M, 2010).

Materials and methods

A case control study was designed to assess the plasma homocysteine levels among Sudanese pregnant ladies with preeclampsia (31) and normotensive pregnant ladies (30) normotensive pregnant women. The study was conducted at departments of obstetrics and gynecology of Bahry hospitals from May to October 2017. Patients with diabetics, hypertension, connective tissue disorder, chronic renal disease, multiple pregnancy and smokers were excluded from study.

Preeclampsia group was divided in two mild preeclampsia when a blood pressure higher than 140/90

*Corresponding author's ORCID ID: 0000-0002-2483-0012

DOI: <https://doi.org/10.14741/ijmcr.v6i01.10919>

mm Hg and proteinuria was +1, +2 on dipstick urinalysis. Severe preeclampsia were diagnosed when a blood pressure at least 160/110 mm Hg or higher) (Khosrowbeygi A *et al.*, 2011)

3ml of EDTA anticoagulated venous blood were collected. Samples were centrifuged for 5min at 3rpm and were kept at -20C° until use. Homocysteine levels were assessed by A15 analyzer using enzymatic reaction kit. The principle depends on absorbance value of sample at 340nm due to oxidation process of NADH to NAD .The assessed values of homocysteine are directly proportional to quantity of oxidized NADH.

Results

A total of 61 pregnant ladies were recruited in this study, 31 were pregnant ladies with preeclampsia with a mean age of (28.58). And 30 were normotensive pregnant ladies with a mean age of (27.56).

The results showed that the mean for plasma homocysteine in preeclamptic ladies was significantly high (13.25 ± 4.35) μmol/L in comparison to control group with significant difference (P. value: 0.000) as shown in (table 1).

Homocysteine concentration was correlated to the severity of preeclampsia, among those with severe preeclampsia (13) the mean was (16.45) μmol/L, which was high compared to the levels among mild preeclamptic ladies (18) with a significant difference (P.value: 0.000) as shown in (table 2).

Table 1: Homocysteine levels among preeclamptic and normotensive pregnant ladies

	Group	Mean±SD	P.value
Homocysteine level (mm/L)	Preeclamptic ladies	13.25±4.35	0.000
	Control	6.77±0.88	

Table 2: Homocysteine levels among mild and sever preeclamptic pregnant ladies

	Preeclampsia severity	Mean±SD	P.value
Homocysteine level (mm/L)	Mild	10.99±3.14	0.000
	Sever	16.45±3.80	

Discussion

Homocysteine is naturally occurring amino acid produced due to methylation process. Increased levels of plasma homocysteine has begun recognized as risk factor for vascular damage and seen as potential predict of health problems such as cardiovascular disease, neurological complication, cognitive impairment, pregnancy complication. (Boushey, CJ *et al.*, 1995).

61 pregnant ladies were examined for homocysteine, 31 were preeclamptic and 30 were normotensive. The results revealed a significant increase in plasma

homocysteine levels among both mild and severe preeclamptic ladies, in comparison to normal pregnant ladies with a significant difference (P.value: 0.000). Homocysteine concentration was correlated to the severity of preeclampsia, higher levels were detected among those with severe preeclamptic ladies with a significant difference (P.value: 0.000).

The previous results were in agreement with a study done In Bangladesh , by Khosrowbeygi A *et al.*, (2011), which showed an increase in maternal homocysteine levels in both mild and sever preeclamptic ladies.

The findings of this study were also similar to the findings of Kanan Avirasn *et al.*, (2016), which appeared an association between preeclampsia and maternal homocysteine levels and it and the level were higher as the severity of preeclampsia.

On another hand the results of current study were disagreed with Zee man *et al.*, (2003) in which, no significant difference was detected in maternal homocysteine levels between preeclamptic and normal pregnant ladies.

Also faith Sanlikan *et al.*, (2015) evaluated homocysteine levels among a total of 114 pregnant ladies classified into 3 groups, 30 with severe preeclampsia, 24 with mild preeclampsia and 60 healthy pregnant ladies. Their results were inconsistent with this study, as no association was detected with the disease severity. While they found that plasma homocysteine levels were significantly elevated in preeclamptic ladies which as the same as that found in the current study.

Conclusion

Results showed significant increase in maternal plasma homocysteine levels in preeclamptic ladies compared to normotensive pregnant ladies.

References

- [1]. Boushey CJ, Beres Ford SA, Omenn GS, motulsky AG, Aquartative assessment of plasma homecysteine as risk factor for vascular disease. JAMA.1995, 274, 1049-1057.
- [2]. Fatih Sanlikan, Fatma Tufan, Ahmed Gocmen, Ceyda Kabaday, Erkan Sengiil. The evaluation of homocysteine level in patients with preeclampsia. Ginekol Pol. 2015, 86, 287-291.
- [3]. Fernando A. Hypertensive disorders in pregnancy. In: Practical guide to high risk pregnancy and delivery. 3rd eds. Philadelphia: mosby., 1994: 183-207.
- [4]. Gary CF, Leveno KJ, Bloom SL, Hauth JC, Gilstrap L, wensform KD. Pregnancy hypertension. In: William obstetrics, 23rd Ed. New York: McGraw Hill., 2005: 706-14.
- [5]. Hasasan Zaden M, Ayatollahi H, Farazadnia M, Ayatis, Khoob MK. Elevated plasma total homocysteine in preeclampsia. Saudi med j 2008; 29:875-8.
- [6]. Hogg BB Tamura T, Johnston KE, Du Bard MB, Goldenberg MA, Goldenberg RL. Second trimester plasma homocysteine level and pregnancy. Induced hypertension, preeclampsia, and intrauterine growth restriction. Am Jobstet. Gyen Col. 2000; 183: 805-9.

- [7]. Kanan Avinash Yelikar, Sonali Satish Deshpande, Manisha Laxmi Kant Kulkarni. Associational maternal serum homocysteine level with severity of preeclampsia
- [8]. Khosrowbeygi A, Ahmad Vand H. Circulating level of homocysteine in preeclamptic women, Bangladesh med Res Coun Bull 2011., 37: 106-109.
- [9]. Laskowaka M. Analysis of the homocysteine levels in maternal serum in pregnancies complicated by severe preeclampsia Lublin Poland; 2010.
- [10]. Malinow MR, Boston AG, Krauss RM, Homocysteine, diet and cardiovascular disease: A statement for health care professionals from the Nutrition committee, American Heart Association circulation, 1999., 99:178-82.
- [11]. Report of national high blood pressure education programme working group on high blood pressure in pregnancy.
- [12]. Ueland PM, Homocysteine species as components of plasma redoxthiol status. Clin chem.. 1995; 41:340-2.
- [13]. Vollset SE, Refsum H, Irgens LM, Emblem BM, Tverdal A, Gjes. Sing HK, Monsen AI, Ueland PM. Plasma total homocysteine, pregnancy complications, and adverse pregnancy outcomes: The Hordaland Homocysteine study. Am J Clin Nutr. 2000; 71: 962-8.
- [14]. Walker MC, Smith GN, Perkins SL, Keely EJ, Garner PR. Changes in homocysteine levels during normal pregnancy. Am J Obstet Gynecol. 1999., 180: 660-4.
- [15]. Zeeman GG, Alexander JM, Melntive DP, Devarajs Levenok J. Homocysteine plasma concentration levels for the prediction of preeclampsia in women with chronic hypertension Am J Obstet Gynecol 2003., 189: 574-6.