

Malondialdehyde in preeclampsia

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Abstract

Background: Preeclampsia is multiorgan disorder, and important cause of maternal, fetal, neonatal morbidity and mortality ,It is characterized by hypertension and proteinuria. Lipid peroxidation is an important factor in the pathophysiology of preeclampsia.

Objective: To study the relation of lipid paroxidation which is measured by plasma Malondialdehyde (MDA) to preeclampsia.

Design: Case –control study.

Setting: The study was carried out at the Al-Imamain Al-Kadhemain Medical City/ Department of obstetrics and gynecology.

Methods: The study included 70 women. We studied 30 patient preeclamptic women 30 apparently healthy women, 10 apparently healthy non pregnant ladies. Their age range between 18-30 year ,gestational age is between 24-40week /primigravida/non smoker or have evidence of nutritional deficiencies. Lipid peroxidation assessed by (Fong etal)method ,and it is end products,particularly Malondialdehyde .

Results: We observed that serum malondialdehyde were significantly increased in preeclamptic women ($P < 0.000$) as compared to that of normotensive pregnant women.

Conclusion: Increased levels of lipid peroxidation product –MDA may contribute to pathophysiology of preeclampsia.

Key words: MDA ,preeclampsia, oxidative stress .

INTRODUCTION

Preeclampsia is an important cause of maternal, fetal and neonatal morbidity and mortality. ^(1, 2)

It is an unpredictable, multiorgan disorder unique to human pregnancy.⁽³⁾ It is characterized by hypertension to the extent of 140/90mm of Hg or more, proteinuria (≥ 300 mg/day) and edema induced by pregnancy after twentieth week.⁽⁴⁾ It contributes significantly to maternal and fetal morbidity and mortality. Recent studies have suggested the role of oxidative stress and altered endothelial cell function in preeclampsia. Lipid peroxidation is process normally occurring at low level in all cells and tissue.⁽⁵⁾ Its involves the oxidative conversion of fatty acids to primary metabolites. Commonly referred to as (free radicals) one of its end products is malondialdehyde.

So it can be defined as (the oxidative deterioration of polyunsaturated lipids).⁽⁶⁾

Malondialdehyde, is an aldehyde considered to be the terminal compound and the most important marker for monitoring lipid peroxidation and oxidative damage induced by reactive oxygen species (Ros) which is strongly associated with the development of severe disease. It is also considered as thiobarbituric reactive substance (TBARS).^(7,8)

The lipophilic interior of the cell membranes is rich in polyunsaturated fatty acids (e.g arachidonic acid) and the characteristics low melting point of these fatty acid may be responsible for the fluidity of the cell membranes. Oxidation increases the melting point of membrane fatty-acids and reduces membrane fluidity. The membranes eventually lose their selective

permeability and become leaky, predisposing cells to osmotic disruption.⁽⁹⁾ So the peroxidation is of immense practical importance because it leads to deterioration of tissue.⁽¹⁰⁾

PATIENTS AND METHODS

This study was conducted on 70 women attending Al-Imamain Al- Kadhemain medical city. Department of Obstetrics and Gynecology.

All the subjects were informed about the nature of the study and an informed consent was taken .

Their age ranged between 18-30 years , gestational age is between 24-40 weeks/primigravida/nonsmoker or have evidence of nutritional deficiencies.

We studied 30 preeclamptic women /15 of them presented with severe preeclampsia which was evidenced by a systolic blood pressure equal to or more than 160 mmHg, or diastolic blood pressure equal to or more than 100mmHg,measured at rest and in sitting position, with proteinuria of 5g/dl 24hours and or oedema

The other 15 who have mild to moderate pre-eclampsia which was evidenced by blood pressure of 140/90-159 mmHg measured on two occasions six hours apart with the patient at rest and in sitting position with proteinuria of <5g dl/24 hours and edema.⁽¹¹⁾

The control group were 30 apparently healthy pregnant women group and 10 apparently healthy non pregnant ladies.

Study design:

A full history was obtained from each women with a full physical and obstetrical examination. None of the patients had history and laboratory evidence of diabetes mellitus, essential hypertension or chronic renal disease. None of the preeclamptic have had hypertension before the 20th week of gestation.

Methods:

Ten milliliter of the patient's blood was aspirated. Centrifuged for 15 minutes, serum aspirated and collected into test tubes and kept in deep freeze for Malondialdehyde analysis.

Lipid peroxidation assessed by (Fong et al) method, and its end products, particularly Malondialdehyde react with thiobarbituric acid under acidic conditions, then mixture was heated to give pink color that is measured spectrophotometrically at a wavelength of 532 nm.

Data processing and statistical analysis

The data processing and statistical analysis was done by the computer using the available statistical software, and data was presented in simple statistical measures of frequency, percentage, mean and standard deviation (SD) and analyzed by using unpaired student's T test.

Histograms for estimating the significance of the difference for quantitative data of two groups were performed.

The difference in the mean values of the two groups was regarded as statistically significant , if the P-value was less than 0.05 and it was taken as highly significant , if P-value was less than 0.001 correlation coefficient was detected using coefficiental correlation.

RESULTS

The demographic characteristics of the cases of preeclampsia enrolled in this study compared to healthy pregnant (in their third trimester of pregnancy) and non- pregnant healthy women is shown table (1).

There was no statistically significant difference in parity and age between preeclamptic, healthy pregnant and non-pregnant P-value (p>0.05).

The other results will be shown and compared according to the materials used.

Malondialdehyde (MDA)

In comparison with apparently healthy pregnant women in their third trimester of pregnancy or non-pregnant women, there was significant (P < 0.05) difference in MDA level.

There was significant difference in MDA level (P < 0.05) in mild-moderate preeclampsia in comparison with apparently healthy pregnant and further increase in severe preeclampsia (fig 1, table 3).

Table 1: The demographic characteristics of women with pre-eclampsia, healthy pregnant and non-pregnant enrolled in this study.

		Pre- eclampsia		Healthy pregnant (3 rd trimester)	Non-pregnant	P
		Mild-mod.	severe			
Age	Range	21-37	18-39	20-38	19-36	
	Mean	28.2	26.8	27.4	28.6	> 0.05
No. of patients		15	15	10	10	

Table (2): Plasma MDA in normal pregnant, non-pregnant and pre-eclamptic patients.

	Plasma MDA nmol/ml	
	Mean	SD
Non- pregnant	2.5	1.52
Mild- moderate preeclampsia	7.22	3.27
Severe preeclampsia	11.93	2.49
Normal healthy pregnant	6.68	2.06

The result are expressed as mean ± SD. The relation significant at P < 0.05 in comparison with preeclampsia and normal healthy pregnant women.

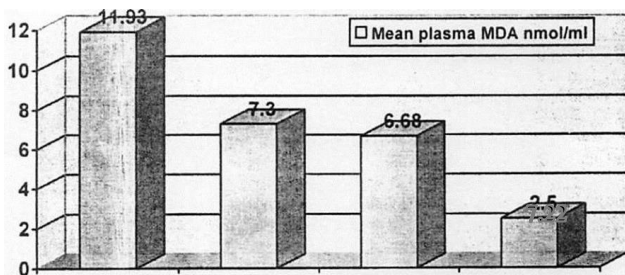


Fig1: The mean values of serum MDA in preeclamptic women, and healthy pregnant women and non- pregnant women.

DISCUSSION

Basic research during the past decades had led to increased awareness of the role of lipid peroxidation in various physiological and pathophysiologic processes.⁽¹²⁾

A number of reports indicates that preeclampsia is associated with elevated blood level of lipid peroxidation. In view of its potentially destructive character, uncontrolled lipid peroxidation has been suggested as an etiologic factor in preeclampsia.⁽¹²⁾

In the present study we found that serum lipid peroxidation product assessed by MDA level is significantly higher in patients with preeclampsia than in normal pregnant women.

These results appear to be similar to results which had been reported previously regarding maternal serum MDA. Kharb, - S (2000) found that preeclamptic women had significantly increased MDA level.⁽¹³⁾

Similar observations were noted by others (Kashinakuntisv et al,⁽¹⁴⁾ 2010; sheena psetal, 2010; shikna saxena et al, 2014).^(15,16)

Panburana, - P et al (2000) also found that lipid peroxide (measured by malondialdehyde) in both mild and sever preeclampsia were significantly increased when compared with normal pregnancy.⁽¹⁷⁾

Du- D et al (1995).⁽¹⁸⁾ Concluded that the decrease of red cell deformability due to the increase of plasma malondialdehyde level may be the underlying mechanism of pregnancy induced hypertension. This is also noted by Anjum sayyed et al 2013.⁽¹⁹⁾

In contrast to our study ,few studies have reported that there no evidence of increased lipid peroxidation in preeclampsia. Rajimaker MT et al(2004).⁽²⁰⁾ Bowen RSet al(2001)⁽²¹⁾

CONCLUSION:

We conclude that preeclampsia is associated with free radical generation. Thus estimation of MDA may have a predictive role in the assessment of the extent of endothelial damage in preeclampsia and may help preventing or foreseeing of complication in preeclampsia.

RECOMMENDATION

As oxidation stress can provoke endothelial cell dysfunction , pregnant and preeclamptic woman should be supplemented with antioxidants to prevent over whelming effect of oxidative stress.

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