Original Research Article

Deficiency of Antioxidant Vitamins and Some Hematological Indices of Pre-Eclamptic Subjects

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Abstract

Pre-eclampsia is an important clinical syndrome with an elevated blood pressure and marked proteinuria and may be associated with haemolysis, elevated liver enzymes and low platelets (HELLP) syndrome. Recently, oxidative stress is thought to play a role in the pathogenesis of pre-eclampsia. The current research consisted of 77 women with pre-eclampsia and 45 normotensive subjects attending Rasheed Shekoni specialist hospital and General hospital Dutse. Serum antioxidant vitamins A, C, E and some hematological indices were analyzed in both groups. Results revealed a statistical decrease (p<0.005) of vitamin A, C, E and platelet in pre-eclamptic compared to normotensive women. Antioxidant and platelet concentrate supplementation may supress the development of pre-eclampsia.

Keywords: Pre-eclampsia, Antioxidant vitamins, Oxidative stress, hematological parameters.

INTRODUCTION

Pre-eclampsia is a clinical syndrome affecting about 7% of pregnant women characterized by hypertension and proteinuria at the second half of gestation [1, 2]. It is one of the leading causes of maternal morbidity and mortality [3, 4]. Pre-eclampsia can progress into an advanced clinical condition known as HELLP syndrome (hemolysis, elevated liver enzymes and low platelet counts) [5]. Roberts and Hubel [6] and Roberts and Escudero [7], both agreed that the placenta is central in the pathogenesis of pre-eclampsia due to the fact that removal of the placenta regresses pre-eclampsia. It is further noted that endothelial dysfunction observed in pre-eclamptic subjects may be due to release of some factors from the placenta [8, 9]. Oxidative stress may be defined as the situation where by free radicals generation such as reactive oxygen and peroxides overwhelmed the antioxidant capacity in the body system [10]. It has been reported by Vanderlelie *et al.*, [11] and Rayman [12], that all antioxidant enzymes were drastically reduced in women with pre-eclampsia. An increased mRNA gene expression of fetal hemoglobin (HbF) and subsequent accumulation of the protein could play a key role in the pathological mechanisms in both placenta and maternal endothelium observed in preeclampsia leading to oxidative stress [13]. Recently, it has been suggested that oxidative stress may contribute to the development and advancement of pre-eclampsia due to damage of lipids, proteins and DNA from the blood and placenta [14, 15]. The present research aimed at reporting the serum levels of antioxidants and some hematological indices among pre-eclamptic subjects in Dutse metropolis Jigawa, Nigeria.

MATERIALS AND METHODS

Study Area: The study was conducted at Antenatal clinics of Rasheed Shekoni Specialist hospital and General Dutse both located in Dutse.

Study Design: The current research is an analytical case control study.

Study Population: The study consisted of 77 pre-eclamptic women attending antenatal clinic of either Rasheed Shekoni specialist hospital Dutse or General hospital Dutse. Pre eclampsia was diagnosed with blood pressure of ≥140/90 mmHg at two different occasions

with at least interval of 6hrs in the second half of gestation.

Exclusion and Inclusion Criteria: Participants with history of chronic hypertension, chronic renal failure, diabetes, liver disorders, multiple gestations or with any chronic medical condition were excluded.

Blood specimen: Five (5) mills of blood were collected from the medial cubital vein and delivered into EDTA and plain container for analysis of hematological indices and serum antioxidant vitamins.

Antioxidant vitamins assessment: Vitamin A, C and E were determined chemically in accordance with method of Bassey *et al.,* [16], Reo and Keuther [17] and Neil and Pierson [18] respectively.

Hematological indices: All hematological parameters were determined using automatic hematology analyzer (Sysmex).

RESULTS
All results were presented as Mean±Standard deviation.

Table-1: Distribution of antioxidant vitamins in pregnant women with and without pre-eclampsia

PARAMETERS	PEW(n=77)	N.P.W (n=45)	Level of sig.
B.P (mm/Hg)	153.2±3.6/99.7±4.4	101.0±7.9/84.2±3.8	S.S
Vitamin A (µg/dl)	26.8±1.00	39.6±1.20	S.S
Vitamin C (mg/dl)	0.44±0.05	1.03±0.09	S.S
Vitamin E(mg/dl)	0.43±0.05	1.23±0.23	S.S

KEY: PEW; BP=Blood pressure; PEW; Pre-eclamptic woman; NPW; Normotensive pregnant women; n=number of subjects; SS=statistically significant.

Table-2: Body mass index and some hematological parameters of Pre-eclamptic and Healthy pregnant women

	BMI(kg/m^2)	PCV (%)	WBC(x10^9/l)	Hb(g/dl)	PLT(x10^9/l)
PEW(n=77)	32.8±0.95	35.6±3.5	7.3±0.22	12.9±0.2	229.2±4.0
NPW(n=45)	22.2±1.22	35.9±2.7	7.4±0.25	12.6±0.4	239.8±2.2
Level of Sig.	S.S	N.S	N.S	N.S	S.S

KEY: PCV=Packed Cell Volume; WBC=White Blood Cells; Hb=Hemoglobin; BMI= Body Mass Index; PLT=Platelet; PEW=Pre-eclamptic woman; NPW; Normotensive pregnant women; n=number of subjects; NS=Not significant.

Table-3: Percentage of antioxidant vitamins deficiencies in pre-eclampsia and normotensive subjects

Parameters	Subjects	
	Pre-eclamptic	Normotensive
Vitamin A	81%	8%
Vitamin C	76%	4%
Vitamin E	89%	12%

*Values in table1.0 of the control mean were used as the reference.

DISCUSSION
There is no doubt that placenta favours the generation of reactive oxygen species due to exposure to high oxygen tension [19, 20]. Results of current findings shows a statistical decreased (p<0.005) of all the measured antioxidant vitamins in women with pre-eclampsia when compared to normotensive pregnant women. The vitamins depletion results from overwhelming usage by the body system in scavenging and delaying the deleterious effects of free radicals. Similarly, levels of oxidative modifications of protein, lipoprotein and antioxidants have been reported to be lower in women with pre-eclampsia [21, 22]. According to the results obtained, women with pre-eclampsia tend to have higher BMI and this may be one of the predisposing factors in the development of hypertension. This is also in line with the work performed by Pipkin [23], Sukonpan [24] and Akhtar [25]. Concentration of maternal hemoglobin revealed no statistical difference between pre-eclamptic and normotensive subjects (Table-2), Cordina *et al.,* 26] reported no variation between the two groups, and however, this is in contrast with findings of Ceyhan *et al.,* [27] which showed a decreased Hb concentration in pre-eclamptic subjects. The present study revealed low (p<0.005) platelet count in pre-eclamptic subjects than in normotensive subjects. This is equally reported by Razia *et al.,* [28].

CONCLUSION
In conclusion, reduced serum antioxidant vitamins and low platelet counts were observed in pre-eclamptic subjects compared to normotensive. High BMI is a predisposing factor associated with pre-eclampsia.

RECOMMENDATION
It is recommended that pregnant women undergo screening for pre-eclampsia before the second half of gestation, preferably preconceptionally. Supplementation of antioxidant vitamins should be given to all pregnant women at risk of pre eclampsia

and platelet concentrate should be considered for pre-eclamptic patients.

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