

Serum Nitricoxide and Trace Elements in Pregnancy

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Summary

This study includes 125 cases; out of these 25 healthy non pregnant women, 25 normotensive pregnant first trimester, 25 normotensive pregnant IInd trimester, 25 normotensive pregnant women third trimester and 25 toxemia of pregnancy from each of these groups serum nitric oxide (NO) and trace elements such as Iron, Copper, Zinc and Manganese were analysed. Serum nitric oxide level was found to be in increasing order in I, II, IIIrd trimester, of pregnancy and significant increase ($P < 0.05$) in toxemia of pregnancy as compared to non pregnant women. Serum Iron level was significantly reduced ($P < 0.05$) in II & III trimester of pregnancy, while in toxemia of pregnancy it was significantly increased ($P < 0.05$) as compared to the control subjects i.e. non pregnant women. A significant increase in serum copper ($P < 0.05$) and decrease in serum zinc concentrations from Ist, IInd, IIIrd trimester were observed as compared to non pregnant women.

Significant increase in serum copper and fall in serum zinc levels was also noted in toxemia of pregnancy as compared to normotensive pregnancy. No significant change was observed in serum manganese levels in the study group.

Introduction

Although pregnancy is not a disease but normal function of female body, there is no doubt that a pregnant woman is exposed to stress and many serious risks to health that are peculiar to her conditions. Toxemia of pregnancy is a multifaceted syndrome with variable involvement of several key organ systems. The classical triad of hypertension, edema and proteinuria is the most common presentation for women with these disordered pregnancies. (Stephen et al 1983) Nitricoxide is a free radical and is highly active molecular which reach the cellular level. Recently nitric oxide (NO) has become of clinical interest because of its relaxant effects on smooth muscles of myometrium (Isabellaneri et al, 1995). The clinical importance of human nutritional deficiencies of iron have been recognized for many years. Recently it has become apparent that human beings can suffer, and

can have adverse effects from nutritional deficiencies of other essential trace elements including copper, zinc, manganese (Hambidge and Droegemuller 1974). The aim of this study was to determine serum Nitric oxide level and levels of trace elements such as iron, copper, zinc and manganese in non pregnant women, normotensive pregnant women without any complications, and pregnant women with toxemia.

Material and Method

The present study has been carried out in the department of Biochemistry, Dr. V. M. Medical College, Solapur and MIMER Medical College, Talegaon Dabhade. 125 women in the age group of 18 to 45 years, consisting of 25 healthy nonpregnant, 25 Ist trimester normotensive pregnant, 25 IInd trimester normotensive pregnant, 25 IIIrd trimester normotensive pregnant and

25 pregnant women with toxemia were chosen for the present study. For control group non pregnant healthy women were selected. Serum Nitric oxide was estimated by method of Cortis and Wakid (1990). Trace elements Iron, Copper, Zinc and Manganese were estimated by using Atomic Absorption Spectrophotometer (AAS) at the USC center Shivaji University Kolhapur. The results were statistically analysed using student "T" test and regression analysis was carried out.

Results

Serum Nitric oxide level was higher in the normotensive pregnant women throughout pregnancy in increasing order in I, II, III trimesters than in the non pregnant women. In the toxemia of pregnancy serum Nitric oxide level was significantly increased ($P < 0.05$) as compared to non pregnant women and normotensive pregnant women (table I). Serum Iron concentrations were significantly decreased ($P < 0.05$) in II & III trimester in normotensive pregnant women as compared to non pregnant women. Further it was found that serum iron level was significantly increased ($P < 0.05$) in toxemia of pregnancy as compared to normal pregnant women. There was a progressive rise in serum copper ($P < 0.05$) and fall in serum zinc levels from Ist trimester to IIIrd trimester was observed. In toxemia of pregnancy serum copper level was significantly increased ($P < 0.05$) and serum zinc level was significantly decreased ($P < 0.05$) as compared to non pregnant and normal pregnant women (Table I). In the present study we do not find any significant change of serum Manganese level in non pregnant, normotensive pregnant women and toxemia of pregnancy.

Discussion

Serum nitric oxide showed significant increase in normal pregnancy ($P < 0.0001$) and still higher levels reported in the patients with pre-eclampsia (Foshikatsu et al 1996). In the present study we have observed that serum nitric oxide level was in increasing order in I, II, III trimester in normotensive pregnant women. When compared with that of non pregnant women group. These findings may be because serum concentrations of Nitric oxide has been used in vivo and in vitro as an index of NO generation (Langer et al 1992). Significantly increased nitric oxide in toxemia of pregnancy is due to mediators such as rennin angiotensin aldosterone system. Endothelins and prostaglandins might cause vasospasm, which is the basic pathophysiology of preeclampsia and hypertension and the activated Nitric Oxide Synthetase (NOs) in the vascular epithelium in response to share the stress might compensatorily enhance the nitric oxide production in preeclamptic patients. Stephen and Richardson 1983 demonstrated that level of serum iron was increased in pregnant women with toxemia. Our study shows similar observations by way of statistically significant increase in serum iron ($P < 0.05$) in toxemia of pregnancy, several hypotheses were offered about the etiology of the changes in iron level, these includes 1) Hemolysis with release of hemoglobin bound iron into metabolic pool 2) Cytolysis of the reticuloendothelial tissues or liver cells with release of storage iron or 3) Acute depression of marrow with lack of uptake of iron. The present study revealed that there was a progressive rise in serum copper and fall in serum zinc levels from I trimester to III trimester as compared to non pregnant women. Rise in serum copper

Table I
Shows Serum Nitric Oxide, Trace Elements – Iron, Copper, Zinc & Manganese Levels in Various Groups

Variables	Non pregnant Women n=25	Normotensive Pregnant Women			Toxemia of Pregnancy n=25
		Ist Trimester n=25	IInd Trimester n=25	IIIrd Trimester n=25	
Serum Nitric oxide Umol/lit	16.3 ± 0.8	27.47 ± 2.56	30.06 ± 0.6	35.28 ± 1.03	45.36 ± 2.59
Iron Ug/dl	112.71 ± 9.74	108 ± 5.83	73.48 ± 4.98	69.00 ± 17.00	168 ± 5.27
Copper Ug/dl	112.61 ± 17.2	126.00 ± 18.2	191.00 ± 23.3	213.6 ± 23.2	225.5 ± 4.74
Zinc Ug/dl	106.00 ± 21.3	86.53 ± 14.21	69.53 ± 14.21	52.00 ± 13.2	56.36 ± 3.67
Manganese Ug/dl	21.32 ± 9.1	16.64 ± 3.07	18.01 ± 6.24	20.17 ± 3.07	19.16 ± 3.07

n indicates number of cases studied.

Values are expressed as mean ± SD.

is thought to be due to estrogen induced increased synthesis of ceruloplasmin and the fall in zinc due to altered binding affinity of zinc binding proteins. There have been many studies on pregnancy induced alterations in serum copper and zinc levels but there is no unanimity among the authors. Higher serum copper level was reported in PIH (Schenker et al 1969) but other (Friedman et al 1969) did not find any such correlation. Several workers (Henkin 1991) (Haisted et al 1968) have reported progressive fall in zinc level in pregnancy while others (Oltunbosum 1974) found no significant change. Present study shows significantly increased ($P < 0.05$) serum copper and significantly decreased serum zinc in toxemia of pregnancy as compared to the non pregnant and normal pregnant women. These findings are comparable to the results of longitudinal study by Schenker et al 1969 and Cherry et al 1981. However the physiological importance of these changes remains obscure. Recent literature has almost proved that nitric oxide is the key agent in the causation of many complications like toxemia of pregnancy, therefore from our study, we have arrived at the conclusion that nitric oxide may be used for the diagnosis and treatment of the patient with complicated pregnancy with associated disorders. In the present study the estimations of iron, copper, zinc & manganese have very limited use to diagnostic and prognostic aids in obstetrics.

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