Effect of Pregnancy on Selenium, Cupper ,Zinc and Others Biochemical Feacture

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Abstract:

Pregnancy is a stressful condition in which many physiological and metabolic functions are altered to a considerable extent . Pregnancy is a physiological state accompanied by a high-energy demand and an increased oxygen requirement. The present study aim to study selenium ,zinc cupper in the first trimester of pregnancy. The study group comprised of Fourty five pregnant women and twenty six non pregnant women as control . The samples were taken from pregnant women who come to several heath center in Baghdad city to cheak up. Laboratory investigations including Cupper, Ceruloplasmin, Total Antioxidant (TAA), malondialdehyde (MDA), glutathione (GSH), Zinc, Uric acid, and Selenium had been measured in pregnant women and control . There were significant difference in Cupper, Selenium, Ceruloplasmin, TAA, Zinc, GSH, and MDA, in the pregnant women whene compared to control group. In this study, a significantly positive association was observed between zinc [mg/dl] with ceruloplasmin [mg/dl] ($R = 0.47$ $p< 0.01$) and TAA [mmol/l] ($R= 0.42$ $p< 0.05$) , and negative association was observed between zinc [mg/dl]and cupper [mg/dl] ($R = 0.602$, $p< 0.01$) , a significantly negative association between ceruloplasmin [mg/dl] with cupper [mg/dl] ($R = 0.754$, $p< 0.01$) ,and positive with TAA [mmol/l]($R = 0.562$ $p<0.01$). The present study observed that pregnant women in first trimester were more susceptible to oxidative damage than in non pregnant as indicated by increased lipid peroxidation (MDA) and decreased other antioxidanta

Key words: Pregnancy, Cupper ,Zinc , Ceruloplasmin , MDA .

Introduction:

Pregnancy is associated with increased demand of all the micronutrients like Iron, copper, zinc, vitamin B12, folic acid and ascorbic acid [1]. The deficiency of these nutrients could affect pregnancy, delivery and outcome of pregnancy. Vitamins and minerals are collectively re-ferred to as micronutrients and have important influence on the health of pregnant women and growing fetus [2]. The trace elements namely zinc and copper are necessary during pregnancy and these elements should be supplemented as a daily requirement to the pregnant women [3, 4]. Zinc is essential for the growth and development of human life and has an active role in body function. During pregnancy, zinc is also used to assist the fetus to develop the brain [5]. The trace mineral selenium is an essential component of the selenoproteins, especially glutathione peroxidase, required for normal health and reproduction. Selenium deficiency in humans can result in an increased

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susceptibility to viral infections, cancer, cardiovascular disease, miscarriage [6,7]. Various studies have demonstrated that during pregnancy, the whole blood and plasma selenium concentrations, and the activity of glutathione peroxidase in red cells and plasma decline in a linear fashion from the first trimester to parturition, with the lowest levels at delivery [8]. It has also been demonstrated that the requirement of selenium is increased during pregnancy as a result of transport to the growing fetus [9] . Glutathione, an intracellular tripeptide of the amino acids cysteine, glycine and glutamic acid is the most abundant thiol-based antioxidant compound found in living animal and plant tissues. Glutathione participate directly in the neutralization of free radicals, reactive oxygen compounds and maintains exogenous antioxidants such as vitamins C and E in their active forms [10]. Glutathione also plays a role in the detoxification of many xenobiotics, it helps in the storage and transport of cysteine and maintain the reduced state of proteins and thiols [11]. The present study aim to study selenium ,zinc cupper in first trimester pregnancy.

Materials and Methods:

A Five ml of blood serum had been collected from each subject by vein puncture, centrifuged at 3000 rpm for 5 min after clotting at room temperature. Fourty five serum sample obtained from pregnant women age (19-35) years (M±SD: 27.4 ±3.44] . Twenty six healthy subjects age (19-35) years (M±SD: 26.5±3.82] , copper and zinc was estimated by atomic absorption spectrometry (AAS) method [12]. Serum ceruloplasmin was estimated by kinetic method [13]. Glutathione concentration was estimated by the method described by Tietz 1986 [14]. Selenium concentration of serum was measured using a spectrofluorometer by the modified method of Kho and Benson [15]. The operating conditions for the spectrofluorometer equipped with a UV lamp were an excitation wavelength of 369 nanometers and an emission wavelength of 525 nanometers. MDA was measured by Thiobarbituric acid reactive substances assay (TBRAS) method[16] The uric acid was measured by uricase method using Human diagnostics kit[17 -19]. Serum total antioxidants activity estimated by the method described by [20]. Statistical analyses of this study were performed using SPSS version 15.0 for Windows (Statistical Package for Social Science, Inc., Chicago, IL, USA). Descriptive analysis was used to show the mean and standard deviation of variables. The significance of the difference between mean values was estimated by Student T-Test. The probability $P< 0.05$ = significant, $P> 0.05$ = non-significant. Correlation analysis was used to test the linear relationship between parameters. ANOVA test was used to show the differences between variables of differentiated groups.

Results and Discussion:

There is no significant different in age between pregnant women and control group as shown in table 1.

Table(1): The mean and standard deviation of Age and Gastation in 1st pregnancy in trimester women group and control group.

Characteristic	Pregnant women mean±SD	Control mean±SD	P Vale
Age (year)	27.4 ±3.44	26.5±3.82	N.S
Gastation Age (week)	10.51±1.01	- - - - - - - -	

In pregnant women the mean cupper**,** ceruloplasmin ,and MDA had significantly increased ($p<0.01$), ($p<0.05$) and ($p<0.001$) respectivity . TAA, zinc, and GSH were found to be significantly decrease with P value < 0.05 ,selenium was significantly decreased($p<0.01$) . There were no significant difference in level of uric acid in pregnancy women group when compared to control group as shown in Table 2.

Table (2): The mean and standard deviation of cupper, Ceruloplasmin,TAA, MDA ,GSH, zinc , uric acid and selenium in pregnancy in 1st trimester women group and control group.

Characteristic	Pregnant women mean±SD	Control mean±SD	P Vale
Cupper (mg/dl)	157±12.36	130.8±17.87	<0.01
Selenium(mg/ml)	59.66±3.6	68.22±3.76	<0.01
Ceruloplasmin (mg/dl)	41.28±5.7	34.9±7.07	<0.05
TAA (mmol/l)	1.6±0.13	1.8±0.13	<0.05
Zinc (mg/dl)	76.42	79.53±9.52	<0.05
GSH(mg/dl)	41.8±2.8	46.94±3.55	<0.05
MDA (m mol/l)	4.30±8.81	1.51±0.24	<0.001
Uric acid (mg/dl)	3.87±0.74	3.6±0.64	N.S

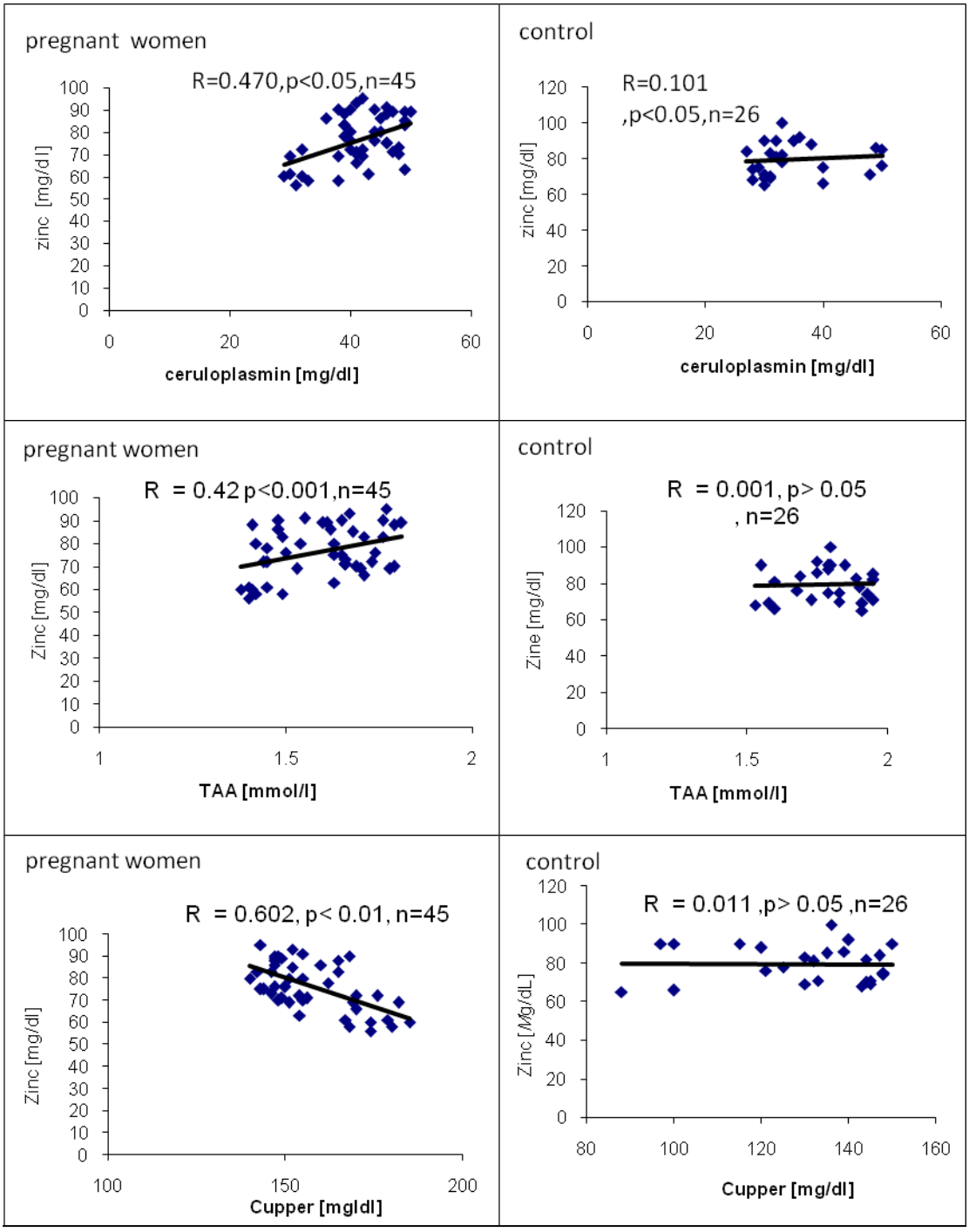

Fig (1): Correlation between zinc with ceruloplasmin ,TAA and cupper in pregnancy and non pregnant women.

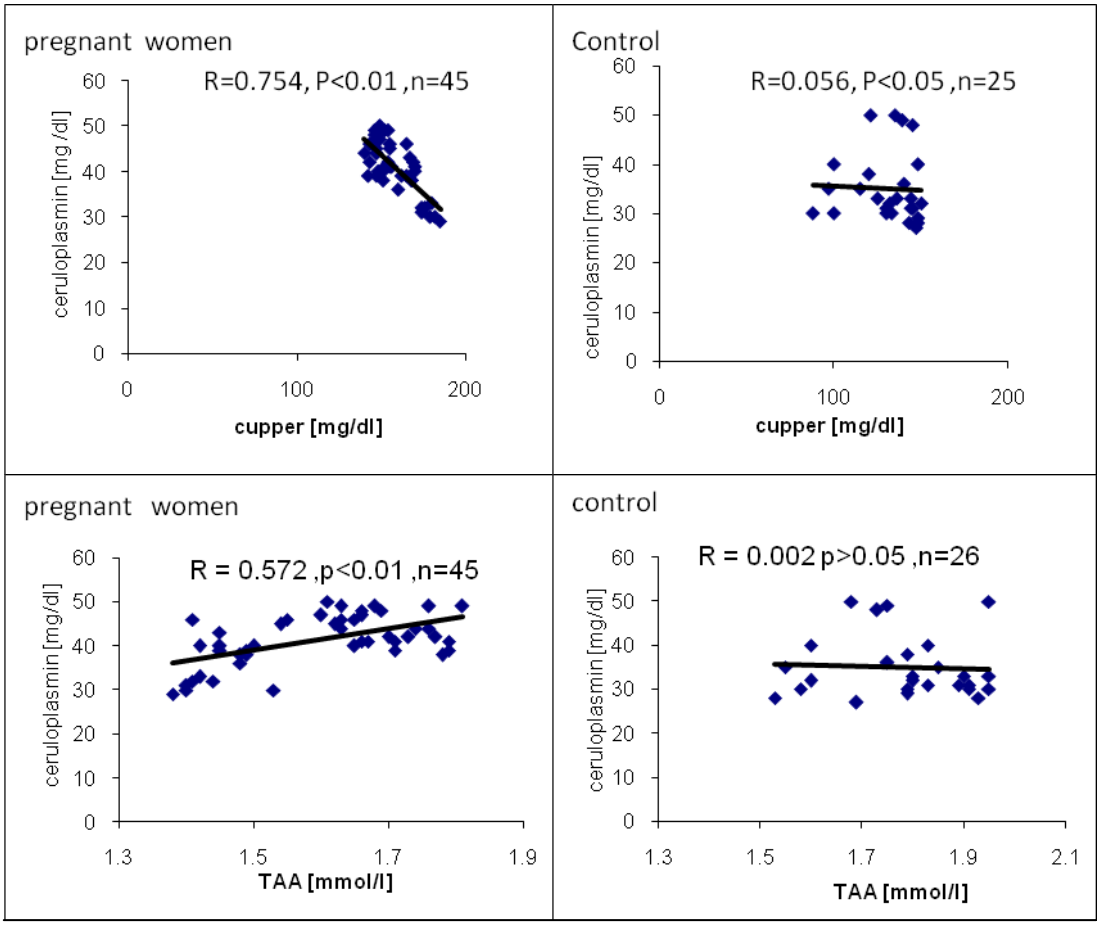

Fig (2) : Correlation between ceruloplasmin with ,TAA and cupper in pregnancy and non pregnant women.

The glutathione level showed a significant decreased (P<0.05) pregnant women as in agreement with previous reports [21]. Depletion in serum level of glutathione has also been linked with lipid peroxidation [22], which occurs as a result of hypertension and thus the production of free radicals that damage the endothelial tissues [23]. In the present study, the serum concentration of malondialdehyde (MDA) is higher in 1st pregnant women than control. This is in agreement with earlier study by Patil *et al* [22, 24] . This may be due to increased generation of ROS because of increased oxygen demand during pregnancy [25], reduction in the activities of antioxidant enzymes such as superoxide dismutase and glutathione peroxidase, and reduction in plasma vitamin C and vitamin E concentration during pregnancy [26].

The present study observed a significant decrease in all the trace elements in Pregnant women when compared to the control group. This suggests a possible involvement of zinc, copper, selenium in the development and pathogenesis of Pregnancy , cureent data agrees with that of Mahomed et al.[27]who reported reduced zinc concentration in women with Pregnancy .Decrease in the level of selenium is known to enhance Pregnancy by its resultant effect on glutathione peroxidase. This is important as increased oxidative

stress as a result of low density lipoproteins has been confirmed in Pregnancy and this complication is strictly regulated by antioxidants of which selenium forms a part (Witztum, 2001)[28]. The present study showed that the concentration of ceruloplasmin was high compared to the non-pregnant controls ($p<0.05$). Elevated concentrations of ceruloplasmin in pregnancy represent perhaps a response to an oxidative injury [29].

In this study, a significantly positive association was observed between zinc [mg/dl] with ceruloplasmin [mg/dl] ($R = 0.470$, $p< 0.01$), TAA [mmol/l] ($R= 0.42$ $p< 0.05$) , and negative association was observed with cupper [mg/dl] ($R = 0.602$, $p< 0.01$) , in pregnant women while there was no significant correlation observed in the non pregnant women group as shown in figure 1. a significantly negative association was observed between ceruloplasmin [mg/dl] with cupper [mg/dL] ($R = 0.754$, $p< 0.01$),and positive association was observed with TAA [mmol/l]($R = 0.562$,$p < 0.01$) in pregnant women while there was no significant correlation was observe in the non pregnancy women group as shown in figure 2.

Conclusions :

Increased in lipid peroxidation MDA and decreased in TAA, Selenium, Cupper, zinc and other Antioxidants in the present study may be due to oxidative damage in pregnant women and counteract the cellular changes mediated by free radicals.

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تاثير الحمل على السلينيوم والنحاس والزنك وبقية العوامل الكيميائية الحياتية

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الخلاصة :

الحمل هو حالة من التوتر في العديد من الوضائف الفسيولوجية والتمثيل الغذائى وهو حالة الفسيولوجية يرافقها طلب متزايد للاوكسجين والطاقة .هدفت الدراسة الحالية هو دراسة تاثير السلينيوم والزنك النحاس في فترة الثلث الاول من الحمل .شملت الدراسة 45 من النساء الحوامل و 26 من النساء غير الحوامل (كمجموعه ضابطة) من النساء اللواتي يراجعن المركز الصحي في بغداد للاطمئنان على الصحة .شملت الفحوصات المختبرية قياس النحاس والسيلينيوم والسيروبلازمين والزنك و MDA و TAA وحامض اليوريك وGSH في النساء الحوامل ومجموعة السيطرة . لوحظ وجود زيادة مقبولة احصائيا في النحاس والسيلينيوم والسيروبلازمين والزنك و TAA وحامض اليوريك وGSH في النساء الحوامل فقط عند مقارنتها بالمجموعة القياسية . وقد اشارت الدراسة الى وجود علاقة خطية مقبولة احصائيا بين الزنك والسيروبلازمين ($p <05$ ، $r = 0.42$)وTAA ($R=0.42, p< 0.05$) و النحاس($R=0.602, p< 0.01$) وبين السيروبلازمين و النحاس ($P<0.01$,$R=0.754$) وTAA ($R= 0.562, p< 0.001$) للنساء الحوامل ، بينما لاوجود لهذة العلاقة عند النساء غير الحوامل .اوضحت الدراسة الحالية ان النساء الحوامل في المرحلة الاولى من الحمل اكثر عرضة لضرر الاكسدة من النساء غير الحوامل كما مشار الية بزيادة MDA وانخفاض مضادات الاكسدة الاخرى .