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Original Article

Serum Copper level in Term women

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Abstract :

Pregnancy is associated with an extraordinary metabolic demand both for the mother and developing fetus. Cu is essential for growth and development of normal human body. To measure serum Cu level in full term mother and non pregnant women. A total number of 55 subjects were included in this study; among them 27 were full term delivery mothers (group B) with age range from 20-40 years, taken as study group and 28 non pregnant women (group A) with age range from 20-30 years were taken as a control group. Statistical analysis was done by using appropriate method as applicable. Mean serum Cu level were significantly higher ($p<0.001$) in full term pregnant mother in comparison to that of non pregnant women. The present study revealed a higher level of Cu in full term mother than non pregnant women. The increased serum Cu level in full term mother than non pregnant women suggested that compensatory mechanism to counteract anemia this is accompained by increased synthesis of ceruloplasmin.

Introduction

Pregnancy is associated with increased demand of all the nutrients like vitamin, Iron, and some minerals have important influence on the health of pregnant women and the growing fetus[1]. Micronutrients needed in minute quantities are essential for development and normal function of the body. Cu plays a definitive role in this regard[2]. Cu found in trace amount in all tissues in the body and an essential nutrient that plays a role in the production of hemoglobin, myelin, collagen and melanin. It also help to make a component of connective tissue by binding with vitamin C[3], essential co-factor for many enzymes are transported bound to ceruloplasmin; the rest is bound to albumin, transcuprien and copper amino acid complex[4].

Cu is important for normal fetal development[5,6]. Physiological changes during pregnancy increase serum copper concentration due to increase of ceruloplasmin as a result of elevated levels of estrogen and move across the placenta by passive transfer[7].

Deficiency of copper may occur during pregnancy due to low estrogen level, low dietary intake and metabolic defect[8,9]. Low serum copper during pregnancy strongly affects fetal growth as well as length of gestation. Again, low serum copper status in pregnant mother may occur due to severe protein calorie malnutrition, malabsorption states and prolonged diarrhea or gastrointestinal (GIT) disturbance which contributes to the depletion of the hepatic stores for copper[10].

Materials and Method :

A total number of 55 subjects were included in this study; among them 27 were full term delivery mothers (group B) with age range from 20-40 years, taken as study group and 28 non pregnant women (group A) with age range from 20-30 years were taken as a control group. Subjects having history of any microbial and metabolic diseases were excluded from the study. All the pregnant mothers were collected from emergency labor word in Sir Salimullah Medical College, Mitford Hospital and non-pregnant women were selected from personal contact. After selection of the subjects, the objectives and benefits of the study were explained and written informed consent was taken from the subjects. With all aseptic precautions 5ml of maternal blood were drawn from medial cubital vein by disposable syringe. Blood was centrifuged at

3000 rpm for 20 minutes. After that supernatant serum was collected in labeled eppendroff tube and from it 1 ml of serum was transferred in a plain glass test tube for estimation of serum total protein and albumin by standard laboratory technique[10] in the laboratory of Physiology Department, SSMC, Dhaka. Another 1 ml was taken in deionized tube for estimation of serum copper level by spectrophotometric method[11] in the laboratory of Atomic Energy Commission. The statistical analysis was done by Independent-samples t test and Pearson's correlation by using SPSS, Version-15.

Results:

In the **Table I** Mean (± SD) serum Cu level was significantly ($p<0.001$) higher in group B in comparison to that of control group A. Again Mean (± SD) blood Hb concentration was significantly ($p<0.001$) lower in group B when compared to that of group A.

Table I: Mean ± SD of Serum Copper (Cu) and Hemoglobin (Hb) concentration in different groups (n=55)

Groups	n	Cu (µg/dl)	Hb (g/dl)
A	28	120.89 ± 17.7	11.16 ± 0.80
B	27	186.00 ± 50.45	8.89 ± 0.65

Statistical analysis

	p value	
A vs B	**0.001*** **	**0.001*** **

Data were expressed as Mean ± SD. Figures in parentheses indicate ranges. Statistical analysis was done by unpaired "t" test.

In the **Table II** Mean (± SD) total protein, albumin and A/G ratio were higher in group B in comparison to that of control group A but it was not statistically significant.

On the other hand, mean (± SD) serum globulin levels were almost similar and no statistically significant difference was observed between groups A vs B.

Table II: Serum Total Protein, Albumin, Globulin and Albumin/Globulin ratio in different groups (n=55)

Groups	n	Total Protein (g/dl)	Albumin (g/dl)	Globulin (g/dl)	A/G ratio (g/dl)
A	28	7.18 ± 0.91	4.79 ± 0.88	2.39 ± 0.75	2.23 ± 0.87
B	27	7.40 ± 1.52	4.81 ± 1.14	2.58 ± 1.13	2.26 ± 1.16

Statistical analysis

	p value			
A vs B	**0.528^{ns}**	**0.938^{ns}**	**0.462^{ns}**	**0.907^{ns}**

Data were expressed as Mean ± SD. Figures in parentheses indicate ranges. Statistical analysis was done by unpaired "t" test.

Discussion :

In this study, higher serum Cu level has been found in full term mother then non-pregnant women. This finding is in agreement with those of some other researchers[12]. Mother's nutrition from the moment for conception is an important factor in the development of the infant's metabolic pathway and future well being[13]. It has been suggested that high serum Cu concentration during pregnancy might be due to increase binding affinity with ceruloplasmin, increase ceruloplasmin production, and passive transfer across the placenta[14,7].

An inadequate dietary intake before and during pregnancy is high risk factor both for mother and fetus[14]. Prolonged nutritional deprivation of the fetus may cause intrauterine growth restriction and initiation of preterm labor[15]. However, lower level of serum Cu in full term mother might be due to its low dietary intake, increase body demand, malabsorption, increase urinary excretion and impaired utilization[15,16]. Again, decrease serum copper can alter the concentration of Cu binding protein in the circulation[15].

In the present study, hypercupremia was observed in full term mothers than those of non pregnant women. Is most likely due to increased level of binding protein, as the observed levels of them were also higher. In addition, the increased copper may be due to estrogen induced ceruloplasmin synthesis during pregnancy. Again, low level of hemoglobin in full term mother than non pregnant women suggested that compensatory mechanism to counteract anemia and this is accompanied by increased synthesis of ceruloplasmin, which has feroxidase like activity About 90-95% of copper binding with ceruloplasmin and small fraction diffuse through the placenta for maintains copper level of neonates. In conelusim, this study suggests that high level of copper is found in full term mother in comparisons to non Pregnant mother and this high level of copper is essential for the Proper Graneth of fetus

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