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ESTIMATION OF ZINC LEVEL DURING PREGNANCY[+]

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Abstract:

Eighteen women from Basrah Centre, Southern Iraq were studied during 1999 to estimate the zinc level before . during and after pregnancy period Their ages ranged from 17 to 44 years. Parity of the women was 0-5. The mean ± SD serum zinc level during pre-pregnancy period was 89.11 ± 13.9 µg/100 ml .Serum zinc level rose slightly during the first trimester to 92.11 ± 9.4 µg/100 ml. Thereafter, the level fell progressively during the second and third trimesters to 80.44 ± 11.7 µg/100 ml and 75.55 ± 11.6 µg/100 ml respectively. Thirty days after delivery, zinc levels increased more rapidly to reach the normal values. Pregnancy outcome was also followed up.

المستخلص

شملت الدراسة ١٨ امراة خلال عام١٩٩٩ لتقدير مستوى الزنك قبل وخلال وبعد فترة الحمل تراوحت الاعمار من ١٧-٤٤ سنة وكان عدد الولادات لدى النساء من ٠ - ٥ .

كان معدل مستوى الزنك في المصل قليلا خلال الفصل الاول من الحمل الى معدل92,11 ± ١١,٧ مكرو غرام/١٠٠ مل بعد ذلك انخفض المستوى خلال كلا من الفصل الثاني و الثالث الى 80,44 ± 11,7 مكرو غرام /١٠٠مل و 75,55 ± 11,6مكرو غرام/١٠٠مل على التوالي.

أزداد مستوى الزنك بشكل سريع خلال ثلاثين يوما بعد الولادة الى المستوى الطبيعي .تم متابعة نتائج الحمل خلال الدراسة أيضاً.

Introduction:

Little is known about the metabolism of zinc in human pregnancy as the effects of zinc deficiency on the progress and outcome of pregnancy[1]. Several human studies[2-4]. have reported daily intakes of zinc and copper below the recommended dietary allowance[5].. A hypothesis was postulated and based on the reported greater incidence of malformation of the central nervous system among some populations in the Middle East , an area of the world where zinc deficiency related to diet, associated parasitic infections, and geophagia is endemic[6]., and on the teratogenic effect of maternal zinc deficiency in animals[7].

Subsequently, association's between low serum zinc in the first half of gestation and the occurrence of abnormal deliveries, preterm and dysmature infants, and congenital malformations

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were reported from Sweden[8].. However, there was no difference in either zinc or copper intake between the group who delivered normal babies and the group who delivered growth retarted babies[9-10].

Many of these apparent contradiction's might be explained by maternal physiologic adaptation to pregnancy especially in different race and mixed parity[11-12]. Furthermore, many of these women had been on mineral and vitamin supplements. Interaction between minerals has been reported[13] and there appears to be some relationship between mineral and vitamin metabolism[14].

Therefore, it would seem essential to study non-supplemented women as far as zinc status during pregnancy is concerned. The pregnancy outcome that may indirectly reflect zinc status is described for the first time in the country.

Materials and Methods:

Eighteen women from Basrah Centre, Southern Iraq were studied during 1999. Their ages ranged from 17 to 44 years. Parity of the women was 0-5.

They were given a full explanation of the purpose, potential benefits and agreed to be involved. The study was approved by the ethics committee of the College of Medicine, University of Basrah. None of the studied women was diabetic or having coronary heart diseases or other metabolic disorders.

Five ml of venous blood were collected from each women before pregnancy and mid of the first, second and third trimesters as well as 30 days after delivery. Serum was separated by centrifugation at 3000 r.p.m. for 10 min and kept at -20 °C until needed. Zinc level was determined by using an atomic absorption spectrophotometer (Pye-unicam series 2900) by direct aspiration of the sample after being diluted with deionized water (1:10).

Stool samples were collected and examined by direct smear method for detection of parasitic infections.

Results:

The mean ± SD serum zinc level during pre-pregnancy period was 89.11 ± 13.9 µg/100 ml (Table 1 , Fig 1). Serum zinc level rose slightly during the first trimester to 92.11 ± 9.4 µg/100 ml. Thereafter, the level fell progressively during the second and third trimesters to 80.44 ± 11.7 µg/100 ml and 75.55 ± 11.6 µg/100 ml respectively (Table 1). Thirty days after delivery, zinc levels increased more rapidly to reach the normal values.

Only 4 cases of women were found to be infected by parasites (Table 2).

Pregnancy outcome was also followed up (Table 3). There were one baby with anencephaly, 2 cases with intra-uterine growth retardation and 3 women with gestational hypertension.

Table –1- Zinc level of pre, during and after pregnancy period among 18 women.

Time	Mean±SD (mg/100ml)
Pregnancy:	
First trimester	92.11 ± 9.4
Second trimester	80.44 ± 11.7
Third trimester	75.55 ± 11.6
Total	82.70 ± 8.5
After delivery	86.83 ± 9.9
Pre-pregnancy	89.11 ± 13.9

Table –2-The diagnosed parasitic infections among 18 pregnant women.

Parasitic	Pregnancy			After delivery	Non pregnant
	1st	2nd	3rd		
Blastoeyctis hominis	2	0	0	0	0
Giardia lamblia	0	1	0	0	0
Histolytica	0	0	1	0	0
Total	2	1	1	0	0

Table –3-Pregnancy outcome.

Birth weight	**3.35 ± 0.25 kg**
Complications	**No.**
Congenital malformation (anencephaly)	1
Intra-uterine growth retardation	2
Gestational hypertension	3

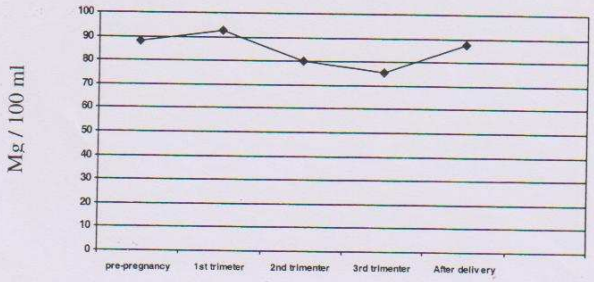

Fig-1-Serum zinc concentrations of pre , during and after pregnancy period.

Discussion:

Serum zinc concentrations fall during pregnancy as proved in this study. The physiological basis of this phenomenon has not been clearly explained , it may be an oestrogen effect and it does not necessarily signify a fall in the amount of zinc inoculating in the plasma pool[15]. Plasma volume expansion and hypoalbuminemia have been cited frequently as possible causes of the fall in plasma zinc concentration in pregnancy. Plasma volume increased by 30% and plasma zinc decreased by 14% between 14 and 35 weeks gestation[16].

Plasma volume is related to body size and the increase in plasma volume in pregnancy is related to birth weight of the baby[17] However, there was no association between intra vascular mass of zinc and percentile birth weight distribution[16].. This variability in plasma volume response to pregnancy makes interpretation of plasma nutrient concentrations very difficult.

Zinc is 60-85% bound to albumin and low levels of serum zinc have been reported to occur when serum albumin is lowered in certain diseases[18-19].. Serum albumin concentration also falls in pregnancy.

It has been suggested that the apparent hypozincemia and hypoalbuminemia of normal pregnancy are largely due to increasing plasma volume after the first trimester[16]. Also, results might be related to dietary habits. In Iraqi, most population consume a large amount of bread and rice in their meals. Since bread contains phytic acid which forms a complex substance and decreases zinc absorption[20].

Also food grains are minimal source for zinc, while meat considered as a rich source for it. Nevertheless, Iraq is consume less a mount of meat during the economic sanction years[21].

It seems that the parasitic infected low number of pregnant women has no effects on zinc status among the studied group.

However, these observations suggest the need for better definition of the role of zinc in human reproduction.

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