Evaluation of serum trace elements among preeclampic women in Kirkuk city

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Abstract- Preeclampsia is one of the major causes of maternal and fetal morbidity and mortality. Thought the etiology is obscure; studies indicate the role of ant oxidative stress and antioxidants in the prevention of preeclampsia. Micronutrient such as copper and zinc act as antioxidant, Mg also has role in prevention of preeclampsia this mineral act as calcium channel blocker and prevent hypertension. This study done in Azady Teaching Hospital in Kirkuk to asses serum level of zinc copper and magnesium for 30 healthy pregnant women and 60 mild preeclampsic women. Results obtained from this study showed that zinc and magnesium levels were significantly lower in preeclampsic patient in comparison with normal pregnant women, while the level of copper was statistically not significant. Increase knowledge about the importance of specific antioxidant micronutrient and their role as successful pregnancy should be one of the guide lines to the pregnant women and addition this micronutrient to pregnant women may have causal role in decreasing this disease.

Key Words: - Preeclampsia, Zinc, Copper, Magnesium,Hypertention,antioxidant,trace element

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Introduction-Preeclampsia is one of the most common complications of pregnancy; the disorder complicates approximately 5-7% of pregnancies (1). Preeclampsia is pregnancy–specific condition characterized by high blood pressure, platelet aggregation and protein in the urine. Hypertension in preeclampsia is characterized systolic blood pressure of $\geq$ 140 mmHg and diastolic blood pressure $\leq$ 90 mmHg at least two measurement within 6 hr or more (2).

In preeclampsic women there is risk of both mother and the fetus regarding fetus is liable to develop intrauterine growth retardation, pre mature birth and death, where as the mother is at risk of seizures, renal failure, pulmonary edema, stroke and death (3).

Trace elements, such as Zinc (Zn), Magnesium (Mg) and Copper (Cu) Display antioxidant activity, while other such as Calcium (Ca) and Magnesium are essential micronutrient. The disturbance in the metabolism of these elements may be a contributing factor in development of certain diseases such as preeclampsia in pregnant women (4).

Zinc acts as intracellular signaling molecule which able to communicate between cells by controlling extracellular stimuli to intracellular signals, thus alteration of zinc homeostasis and dysfunction may cause pathogenesis of several diseases including Preeclampsia (5,6), low Zinc intake associated with risk of low birth weight and also preterm delivery < 37 week (7).

Copper is involved in the function of several Cu proenzymes that are essential for life (8). Ceraloplasmin which contains copper catalyses the conversion of ferric iron to the ferrous form, favoring the absorption of iron from gastrointestinal tract, it also plays role in the mobilization of iron to plasma from the tissue store (9). Copper through many Cu dependant enzyme act as strong antioxidant defense system (10). Magnesium deficiency may be possible cause of preeclampsia, preterm delivery and low birth weight (11, 12).

study Design and Data Collection:-

This case-Control study was carried out in Azady teaching hospital in Kirkuk city, from March 2014 to February 2015. Ethical permission was taken from the ethical community of the hospital for study purpose (60) cases of preeclampsia was collected, all cases was diagnosed by specialize gynecologists in the same hospital. All collected cases were of gestational period < 20 weeks, and for comparison (30) normotensive pregnant women (in the third trimester of pregnancy in the same floor before delivery) was taken as control cases. All of control women were have normal proteinuria, no raised creatinin, no neurological symptom and signs including headache, visual disturbance, confusion, papilloedema and clonus, also other criteria of the both control and preeclampsic women were as physically healthy, single pregnancy. The Exclusion Criteria included diagnosis of abnormal embryo in ultrasound, having chronic disease such as diabetes, Chronic hypertension, chronic and sever disorder in the kidneys, adrenal, liver, thyroid, parathyroid , cardio vascular diseases, blood disorders, indigestion disorder, infertility disorder. All pregnant women (control + preeclampsic) were asked if they taking supplementary drugs and types of supplementary drugs. The sampling was done through

Characteristic	Normal pregna Mean± SD	Mild pre-eclampsic (60) Mean ± SD	P< Value
Zinc	40.03±20.17 µg/dl	33.42±10.16 µg/dl	P< 001 t=4.23
Magnesium	2.50±0.66 mg/dl	2.42±0.11 mg/dl	P< 001 t=4.63
Copper	297±147 µg/dl	253±119 µg/dl	NS.

simple random sampling method and data collection instruments were determined content validity. For the spectrophotometer device reliability and accuracy were assured by one person, by using zinc kit wave length 560nm, copper kit at wave length 580nm, magnesium kit at wave length 546nm all these tests were done in biochemistry laboratory (College of Medicine).

results:-

Most subjects in both groups were of gestational period >20 weeks. The mean and (SD) of age was 23.03 ± 3.12 for normal pregnant women and 27.01 ± 51 for preeclampsic women where there were significant different in age between the two groups. As it was expected the mean (SD) of systolic and diastolic blood pressure in preeclampsic women were significantly higher than normal pregnant women (table1).

Characteristic	Normal pregnant(30) Mean± SD	Mild pre-eclampsic (60) Mean ± SD	P value
Age(years)	23.03±3.12	27.01±51	<0.001
Systolic blood pressure	115.50±7.011(mmHg)	148±4.33(mmHg)	<0.001
Diastolic blood pressure	71.44±6.1(mmHg)	95.33±3.91(mmHg)	<0.001

Table(1) Showed Mean & SD of Age, Systolic & Diastolic blood pressure of normal and preeclampsic pregnant women.

The serum zinc level were significantly higher in normal pregnant women (40.03 ± 20.17µg/dl) in comparison with preeclampsic women (33.42 ± 10.16µg/dl) t=4.23 P< 0.001. The mean and (SD) of serum magnesium level in preeclampsic women were significantly lower in comparison with normal pregnant women t =4.63 P<0.001 (table 2). Regarding copper in spite of mean and (SD) of copper was lower in preeclamptic women 253 ± 119µg/dl than normal pregnant women 297 ± 147µg/dl but it was statistically not significant. Thought our questionnaire we found that only 10 of preeclampsic women were taking supplementary drug and just 4 of them their drugs were contain minerals, while 20 of normal pregnant women were taking supplementary drug 9 of them their drugs contain minerals Table (2).

Table (2) Value of Zinc, Magnesium, Copper in both preeclampsic and normal pregnant women.

discussion:-

Preeclampsia is a condition that is characterized by clinical trial of hypertension, edema and proteinuria, the etiology of preeclampsia remain unknown, but the reason may be due to that the maternal organism adapt poorly to pregnancy due to combination of genetic, immunological and environmental factors. A defective trophoblastic invasion of spiral arterioles causes hypoxia in the placenta with release of factors that determined endothelial dysfunction with increase vascular resistance (13, 14).

Copper and Zinc dependent superoxide dismutase is an enzyme that act by catalyzing the dismutase reaction of the superoxide radical (O_2) in to hydrogen peroxide (H_2O_2) and O_2 in the presence of proton H+ and it is involved in the cellular protection against the toxicity caused by reactive oxygen species (15, 16).

Results obtained from this study showed that there was a significant decrease in Zinc value in preeclampsia women in comparison with normal control women, this suggest possible effect of zinc in pathogenesis of preeclampsia where similar results found in different country of the world like Iran, Banghaladish, Brazil, India and Israel respectively (17,18,19,20,21). Locally the same result obtained by Alghazali *et al* (22) who compared zinc value between maternal and fetal blood of normal and preeclampsia women their result showed that zinc value were significantly higher in fetal and maternal blood of normal healthy women in comparison with mild and severe preeclampsic women.

In this study although copper value in preeclampsic women were lower than healthy women but it was statistically not significant, while its level in other studies (18, 20, 21) were significant (lower in preeclampsic women in comparison with normal women), while in study done by Farziz &Sajadi (17) they showed that there was no significant different in copper concentration between normal and preeclampsic women.

Normally during pregnancy there was a decline in zinc level this increase as pregnancy progresses due to decrease in zinc binding receptors and increase transfer of zinc from maternal to fetal (22). The decreasing of zinc level is more in preeclampsia women in comparison to normal women, the normal decreasing in zinc concentration may be as physiological response to hemodilution during pregnancy but Farzin (17) Showed that there was no significant difference in Hbc and Total WBC in normal pregnant and preeclampsic women, whatever be the cause there was no doubt that zinc level will decrease as pregnancy progress and it considered as one of the important minerals for fetal development that's why, in recent years, zinc is one of the supplementary material for pregnant with other supplementary like iron and folic acid.

Regarding Magnesium serum, magnesium levels in preeclampsic women were significantly lower than normal healthy women $P < 0.001$ t value 4.23 this result agree with many studies around the world like in Iran, India, pakistan also in south of Iraq (17, 20. 23, 24)) all these studies found that Mg play important role in pathogenesis of preeclampsia it is usually measured with calcium level in pregnant women Since Ca alone cause contraction of blood vessels and thus causing raising the blood pressure, while Mg act as Ca channel blocker to lower blood pressure. The hypomagnesaemia increase the risk of pregnancy complication like preeclampsia (25), it's important to mention that one of the drugs that treat severe preeclampsia is magnesium sulfate (26).

conclusions & recommendations:--

It is concluded that decreased levels of serum Zinc and serum Magnesium found in our study confirms the strong relationship with preeclampsia. Zinc and Mg supplement can be used in pregnant women for the Prevention of preeclampsia since the body doesn't store zinc so recommended dose of zinc is 8 mg for normal women and 11_{mg}/day mg for pregnant women and 12_{mg}/day for nursing mothers also Mg is important for nearly every function and tissue in the body. It is recommended that the recommended dose for Mg is 360 $_{mg}$ /day for pregnant women. Pregnant women should receive Advice about nutrients that are rich in this micronutrient. Further Studies with larger sample size are recommended to confirm these results.

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