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ORIGINAL ARTICLE

Comparison of serum zinc, serum calcium and serum magnesium levels between pre-eclampsia and normal pregnancies.

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ABSTRACT… Objective: To compare the levels of serum zinc, serum calcium and serum magnesium between preeclamptic patients and normal pregnant women. **Study Design:** Retrospective/ Comparative study. **Setting:** Department of Obs & Gynae, Social Security Landhi Hospital Karachi. **Period:** March 2019 to October 2019. **Material & Methods:** 90 pregnant women were included for this research. Patients were divided into two groups randomly, Group-A (Pre-eclampsia) and Group-B (Normal pregnancies). 45 patients were included in each group. At the time of antenatal booking, in Group-A patients, we advised CBC, LFT`s, Urine for Albumin, HbS. Ag, Anti HCV Antibody, Fasting blood sugar, serum zinc, serum calcium, serum magnesium level and ultra sound for fetal wellbeing while in Group-B patients only CBC, Fasting blood Sugar, Urine D/R, HbS Ag, Anti HCV antibody, serum calcium, serum zinc and serum magnesium level and ultra sound for fetal wellbeing. Compared mean age and B.M.I. of patients, mean gestational age, mean systolic and diastolic blood pressure, mean of serum zinc level, serum calcium level and serum magnesium level in both groups. **Results:** Serum Zinc, Serum Calcium and Serum Magnesium levels were significantly low in pre-eclamptic patients as compared with normal pregnant women. **Conclusion:** Mean serum zinc, calcium and magnesium level were low in pre-eclamptic patients.

Key words: Anti-oxidant, Serum Zinc, Serum Calcium, Serum Magnesium, Pre-eclampsia.

INTRODUCTION

Pre-eclampsia can be characterized as "Elevated or raised blood pressure with or without protein urea, associated pedal edema in the 3rd trimester of a pregnant lady". Elevated blood pressure may be characterized as systolic blood pressure > 140mmHg and diastolic blood pressure > 90mmHg at minimum in 2 varying readings within 6 hours. Throughout the world, pre-eclampsia is found to be the 3rd prominent reason of maternal mortality. Because of various complications during pregnancy, around 60 lac mothers lost their lives every year. Pre-eclampsia is the dominant reason of death in the world. There is a deficiency of different micro nutrient and mineral in the developing countries during pregnancies may contribute in in developing complications like pre-eclampsia. It is proved that low level of serum zinc may be responsible for malformation/ growth retardation of fetus, pre term birth and pre-eclampsia.[1] Worldwide prevalence of pre-eclampsia is 2-10%. Calcium is responsible for contraction of muscle and water balance in cells. Due to changing in calcium level in blood, alteration in blood pressure resulted.[2]

Micro nutrients and trace element play major role in conservancy of tissue function and in metabolism. Trace elements have anti-oxidant properties because of which they are essential element of potent anti-oxidant that defend the cell from injury.[3] Cases of pre-eclampsia found worldwide. Prevalence is increased in developing countries. Zinc has anti-oxidant effects. High blood pressure has an association with elevated oxidative stress, logically it has been assumed that sufficient level of serum zinc having its anti-oxidant properties may lower down blood

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pressure.[4] Magnesium plays important role and it is a key constituent in more than 300 metabolic reactions in the body. Zinc play a role in pre mature rupture of membranes at term.[5] Calcium and magnesium are essential micro nutrients while zinc, iron and copper having anti-oxidant properties. These elements should be used on daily basis in pregnant women. Deficiency of these elements can complicate pregnancy and may cause growth retardation of fetus.[6] Magnesium absorbed from gastrointestinal tract approximately 30-40%. Absorption of Magnesium is decreased in celiac disease, ulcerative colitis, Crohn's disease and in excessive intake of alcohol.[7]

There are many factors which are causing pre-eclampsia (PE).In some studies mentioned that pre-eclampsia is related with imbalance between decreased anti-oxidant and increased lipid peroxidase (LPO), zinc deficiency may cause increased lipid per-oxidation.[8] Better approaches for management and cure of pre-eclampsia depends on the knowledge of pathophysiology process of pre-eclampsia.[9] Multivitamins are necessary for pregnant women. Pregnant women can get most nutrients from fresh fruits and from whole meat, bread, eggs fish, pasta, butter and beans.[10]

MATERIAL & METHODS

Ninety women were selected in this study randomly from Department of Obs./Gynae, Social Security Landhi Hospital Karachi after taking permission from Chairman ethical committee/ Medical Superintendent with ref. No. SS/LH/ ADMN/2020-21/2275. In this study we compared levels of serum zinc, serum calcium and serum magnesium between two groups. Study design was retrospective/comparative. Sampling technique was convenient sampling. Duration of Study was eight months (March 2019-October 2019).

Two groups were made. Group-A was pre-eclampsia and Group-B was normal pregnant women. In each group 45 patients included with age 20 to 35 years and gestational age 28 weeks to 36 weeks. Patients were excluded who had Hypertension, cardiac diseases, diabetes, renal/adrenal and liver diseases. Detail history were taken from patients followed by physical and obstetrical examination, BMI in Kg/m^2 noted. Blood pressure was noted, if found to be more than 140/90 mm of Hg., than admitted in ante-natal ward for observation and repetition of blood pressure after 6 hours. During observational period Labs were sent in Group-A patients. While in Group-B patients with normal blood pressure were sent back to home after taking history, physical, examination, height, weight and BMI and advised laboratory investigation. Data was collected on proforma and data was analyzed by using SPSS software version 20.

RESULTS

Table-I Comparing different variables between group-A and group-B. Mean age of patients was 28.20 ± 4.71 years in Group-A while it was 28.50± 4.66 years in Group-B. Mean BMI was 29.80 ± 2.20 kg/m^2 in Group-A and 24.25 ± 3.60 kg/m^2 in Group-B. Gestational age was 32.20 ± 3.62 weeks in Group-A and 30.48 ± 4.40 weeks in Group-B. Mean systolic blood pressure was 160 ± 10 mm of Hg in Group-A and 105 ± 10 mm of Hg in Group-B. Mean diastolic blood pressure was 105 ± 10 mm of Hg in Group-A while it was 65 ± 10 mm of Hg in Group. Blood pressure value was significant in all parameters except age of the patients.

Figure-1 showing comparison of serum calcium between pre-eclampsia and normal pregnant patient. Mean serum calcium level was 7.2 mg/dl in Group-A while it was 9 mg/dl in Group-B with p value < 0.0001.

Figure-2 showing comparison of serum zinc level between pre-eclampsia and normal pregnant lady. Mean zinc level was 72 μg/dl in Group-A and 92 μg/dl in Group-B. Serum zinc level was low in Group-A with p value < 0.0001 (significant).

Figure-3 showing comparison of serum magnesium level between pre-eclampsia and normal pregnant patients. Mean magnesium level was 1.4 mg/dl in Group-A while 2 mg/dl in Group-B with p value < 0.0001.

Parameters	Pre-eclampsia n=45	Normal Pregnant Patients n=45	P-Value
Age (Years)	28.20 ± 4.71	28.50 ± 4.66	0.781
BMI (kg/m2)	29.80 ± 2.20	24.25 ± 3.60	<0.001
Gestational age (weeks)	32.20 ± 3.62	30.48 ± 4.40	0.002
Mean systolic blood pressure (mm of Hg)	160 ± 10	105 ± 10	<0.001
Mean diastolic blood pressure (mm of Hg)	105 ± 10	65 ± 10	<0.001

Table-I. Comparison of different parameters between pre-eclampsia and normal pregnants.

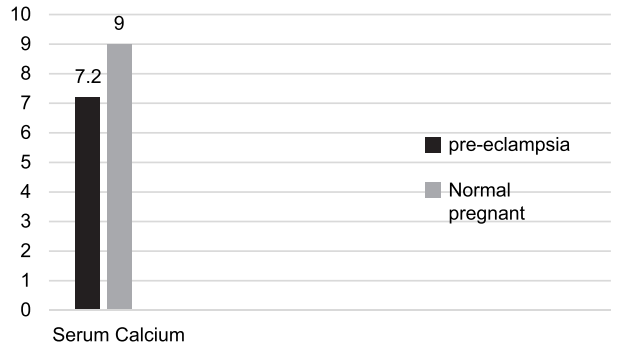

Figure-1. Comparison of serum calcium level between pre-eclampsia and normal pregnant patients.

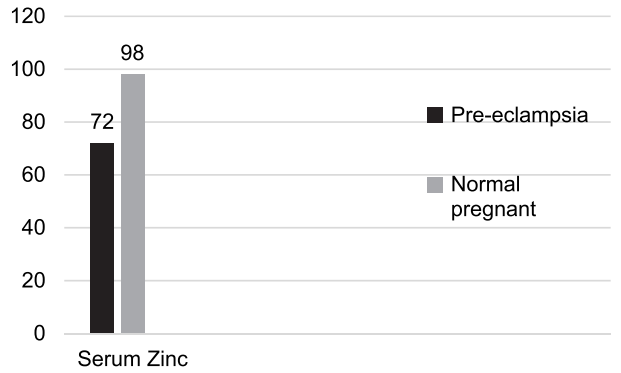

Figure-2. Comparison of serum zinc between pre-eclampsia and normal pregnant patients.

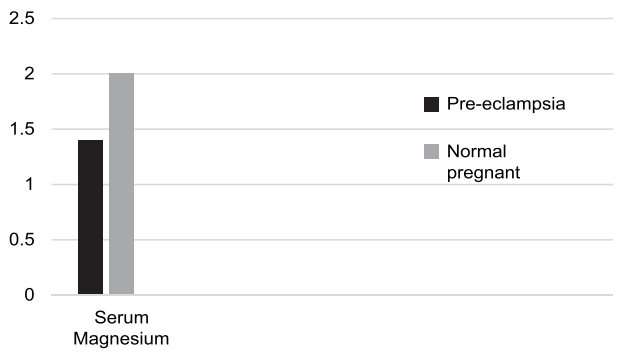

Figure-3. Comparison of serum Magnesium between pre-eclampsia and normal pregnants.

DISCUSSION

In a study mean systolic blood pressure was 106.73 ± 7.85 mmHg in normal pregnant while it was 147 ± 10.49 mmHg in pre-eclampsia. Mean diastole blood pressure was 65.40 ± 5.66 mmHg in normal pregnant while it was 95.13 ± 3.5 mmHg in pre-eclampsia group. Serum zinc, calcium and magnesium levels were 126.60 ± 42.14, 9.15 ± 0.46, 2.09 ± 0.30 in normal pregnant while these were 78.81 ± 15.15, 8.66 ± 0.71 and 1.67 ± 0.56 in pre-eclampsia with p value <0.001(significant).[6]

Mean serum calcium was 14.02 ± 5.7 mg/dl in normal pregnant and 13.9 ± 3.30 mg/dl in pre-eclampsia. Mean serum Magnesium was 4.2 ± 0.78 mg/dl in normal pregnant while in pre-eclampsia group it was 3.2 ± 1.10mg/dl. This study revealed that serum calcium and serum magnesium level were lower in pre-eclampsia, it is correlating with our study.[11]

Mean serum zinc level was 0.77 ± 0.05 mg/l in pre-eclampsia group while it was 0.98 ± 0.03 mg/l in normal pregnant patients.[12]

Mean systolic blood pressure was 112.50 ± 8.4 mm of Hg in normal pregnancy while it was 155.17 mm Hg in severe pre-eclampsia patients with p value <0.001. Mean diastolic blood pressure was 65.25 ± 6.40 mmHg in normal pregnant women while it was 101.63 mm of Hg in severe pre-eclamptic patients with p value <0.001. This study is also co-relating with our research.[13]

A study showed that mean serum calcium level was 1.94 ± 0.09 mmol/l in pre-eclampsia group while it was 2.45 ± 0.18 mmol/l in normal pregnant ladies. Mean serum magnesium level was 0.79 ± 0.13 mmol/l in normal pregnant women while it

was 0.62 ± 0.11 mmol/l in pre-eclampsia patients. Mean serum zinc level was 15.64 ± 2.4 μmol/l in normal pregnant women while it was 12.04 ± 1.4 μmol/l in severe eclamptic patients. P value was <005. This research revealed that serum zinc, calcium and magnesium levels were decreased in pre-eclamptic ladies with p value 0.05 co-relating with our study.[14]

In a research, mean serum calcium level was 8.1 mg/dl in normal pregnant ladies while it was 7.6 mg/dl in pre-eclamptic group. Mean serum magnesium level was 1.4 mg/dl in normal pregnant patients while it was 1.9 mg/dl in pre-eclamptic patients. Serum zinc level was 103.6 μg/dl in normal pregnant women while it was 108.0 in pre-eclamptic group. Serum calcium level was lower in pre-eclampsia patients while serum magnesium and serum zinc level were raised in pre-eclamptic group. This study does not correlate with our study.[15]

There were no significant difference between two groups regarding their age, gestaional age and BMI. Women with pre-eclampsia had significantly lower level of serum calcium 7.6 mg vs 8.1 mg/dl, P=0.032 and higher magnesium levels 1.9 vs 1.4 and P=0.003.[16]

It was reported in a study that mean serum magnesium and total calcium levels in normal pregnant women were 0.76±0.14 and 2.13± 0.35 m.mol/l were respectively. Statistically difference found in serum magnesium and total calcium in pre-eclampsia vs normal pregnant women with P value of 0.092 and 0.972 respectively.[17]

In a study mean serum magnesium in pre-eclampsia were significantly low than normal pregnant 1.72 ±0.38 mg/dl vs 2.2 ± 0.63 mg/dl and p<0.05.[18]

In a study it was mentioned that mean serum calcium were significantly lower in pregnancy induced hypertension group 8.15±0.37 mg/dl vs normal pregnancy it was 9.16±0.82 mg/dl. Mean serum magnesium was lower in PIH 1.78±0.70 as compared to normal pregnancy 2.08±0.46 mE/L.[19]

CONCLUSION

Serum zinc, serum calcium and serum magnesium levels are low in patients of pre-eclampsia group as compared with normal pregnant women.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Humaira Tahir	Managed the patients under my supervision and made the research idea.	
2	Mubushra Samina	Helped in data collection.	
3	Seema Ghani	Helped in searching literatures and compiled references.	
4	Sana Ashfaq	Helped in result analysis.	