

DIAGNOSTIC SIGNIFICANCE OF THE MATERNAL SERUM MAGNESIUM AND INTERLEUKIN 6 (IL-6) LEVELS FOR PREDICTION OF PRE-ECLAMPSIA IN PRIMIGRAVIDA

Biochemistry

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ABSTRACT

Introduction: Pre-eclampsia is a complication occurring in pregnant women generally occurs after 20 weeks of pregnancy. Pre-eclampsia leads to various complications like proteinuria, hypertension, seizures, autoimmune diseases etc. causing mortality in both mother and baby. **Aim:** Present study has been planned to evaluate the status of serum Magnesium and IL-6 for prediction of pre-eclampsia. **Material and method:** Present study was carried out in MGM Medical College, Indore during March 2022-February 2023. Total 100 study subjects were taken out of which 50 were control (normal pregnant women without history of pre-eclampsia) and 50 cases (normal pregnant women with history of pre-eclampsia). Blood samples were collected from subjects and analyzed for Serum Magnesium, IL-6 levels on fully automated biochemistry analyzer and kit based method respectively in the first trimester and follow up taken in second trimester for whether they suffering from preeclampsia or not. **Inclusion criteria:** Normal pregnant women of 25-35 years of age with and without family history of pre-eclampsia and without any associated complications.

Results:

- Increased serum IL-6 and decreased serum Magnesium level in pregnant women with family history of preeclampsia as compared to pregnant women without family history of preeclampsia.
- 44.11% cases found to suffer with preeclampsia who were having very low serum Magnesium level below 3.8 mg/ml and 25% cases found to suffer with preeclampsia who were having serum Magnesium level above 3.8 mg/ml.
- 25% cases have been suffering with preeclampsia who were having IL-6 level below 18.2 pg/ml and 52.6% cases found to suffer with preeclampsia who were having IL-6 level above 18.2 pg/ml.

Conclusion: Serum levels of Magnesium and IL-6 are associated with preeclampsia, collectively can be considered as the markers for early detection of the incidence of preeclampsia so that the prevention and management of preeclampsia become more easy.

KEYWORDS

Pre-eclampsia, primigravida, serum Magnesium, IL-6.

INTRODUCTION:

Preeclampsia (PE) is a major complication in pregnancy, and it has been described as new onset of maternal hypertension and proteinuria in the second half of pregnancy. PE has been reported in about 3%-10% of pregnancies⁽¹⁻³⁾. It is characterized by vasoconstriction, endothelial dysfunction, metabolic changes, increased inflammation, and reduced organ perfusion which ultimately leads to a multi systemic syndrome^(4,5).

However, several clinical studies demonstrate the relationship between elevation of hypertension and change in maternal serum level of various minerals during pregnancy^(6,7). In developing countries, the diet of pregnant mothers is not rich enough with essential minerals and vitamins⁽⁸⁾ and it has been found to have a great impact on Preeclampsia. Several studies have reported decreased levels of magnesium in pregnancy and unsatisfactory levels in preeclampsia⁽⁹⁻¹⁴⁾, which ultimately relates with the physiological role of magnesium; one of the important intracellular cations and an important cofactor for many enzymes.

Magnesium has a noteworthy role in pathophysiological regulation of blood pressure. It significantly affects contractility and tone of blood vessels⁽⁸⁾. However, many studies have also demonstrated minor changes in the serum magnesium levels of preeclamptic women as compared to normal pregnant women⁽¹⁵⁻¹⁷⁾.

Biochemical evidences suggest that interference in normal endothelial cell function could be a major reason in the pathogenesis of PE⁽¹⁸⁾. Endothelial dysfunction followed by increased levels of inflammatory markers. As a matter of fact, such markers have been demonstrated much higher levels in women with PE than those seen in normal pregnancy⁽¹⁹⁾.

Recent studies have suggested that in normal pregnancy a small degree of inflammation has been observed. It is still unknown that to what extent endothelial dysfunction in patients is caused by excessive maternal inflammation which subsequently develop PE⁽²⁰⁾. C reactive protein (CRP), interleukin 6 (IL-6), interleukin 8 (IL-8), interleukin 10 (IL-10) and tumour necrosis factor alpha (TNF-) are most extensively studied markers. Previous researches suggest that these markers play a significant role in the development of PE, but are not sure regarding their predictive value^(21,22,23).

Present study was aimed to determine serum magnesium levels and IL-6 levels of normal pregnant women with and without history of preeclampsia in first trimester of pregnancy and follow up study of occurrence of preeclampsia in second trimester to establish Serum Magnesium and IL-6 levels as risk factors for development of PE, and to evaluate their relevance for the prediction of this disorder.

MATERIAL AND METHODS

The study was conducted from March 2022-February 2023 at MGM Medical College, Indore, MP.

Inclusion Criteria For Cases:

- Total 100 study subjects were taken out of which 50 were control (normal pregnant women without family history of pre-eclampsia) and 50 cases (normal pregnant women with family history of pre-eclampsia).
- Normal pregnant women of 25-35 years of age with and without family history of pre-eclampsia without any associated complications.
- Normal pregnant women with primigravida.

Exclusion Criteria For Cases:

1. Age < 25 or > 35 years, pregnant women suffering from any other diseases, and any other pregnancy associated complications.
2. Pregnant women with multigravida.

Blood samples were collected from subjects and analyzed for Serum Magnesium, IL-6 levels on fully automated biochemistry analyzer and kit based method respectively.

Statistical Analysis:

Statistical analysis was conducted using SPSS. Data were represented as Mean $\pm$ SD. Comparison were analyzed by student t test and p value.

OBSERVATION AND RESULT:

Table 1: Comparative study of Serum Magnesium and IL-6 levels in the Control group and Cases

S.N.	Parameter	Control Mean $\pm$ SD (n = 50)	Cases Mean $\pm$ SD (n = 50)	p value
1.	Magnesium (mg/ml)	8.5 $\pm$ 0.81	5.8 $\pm$ 1.02	0.005
2.	IL-6 (pg/ml)	4.19 $\pm$ 0.24	26.9 $\pm$ 2.28	0.005

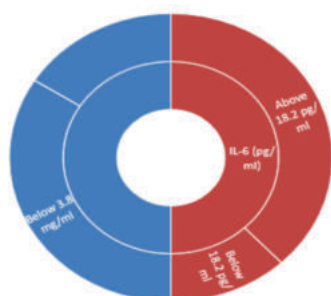
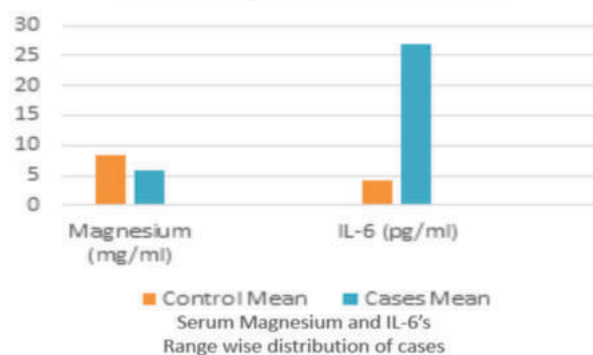
Cases (pregnant women with history of preeclampsia) were distributed according to the range decided for Serum Magnesium and IL-6 levels and follow up taken in second trimester for both control group as well as in cases that whether they are diagnosed with preeclampsia or not.

After follow up in second trimester it has been found that no women suffer from preeclampsia among this group.

Table 2: Serum Magnesium and IL-6's Range wise distribution of cases (Serum Magnesium and IL-6's Range) & Number of cases diagnosed with preeclampsia after taking follow up in second trimester.

Parameter		Number of cases With family history of preeclampsia	Number of cases Diagnosed with preeclampsia after follow up	%
Magnesium (mg/ml)	Below 3.8 mg/ml	34	15	44.11%
	Above 3.8 mg/ml	16	4	25%
IL-6 (pg/ml)	Below 18.2 pg/ml	12	3	25%
	Above 18.2 pg/ml	38	20	52.6%

Comparative study of serum Magnesium and IL-6 levels in control group and cases



Results reveal that;

1. Increased serum level of IL-6 in pregnant women with family history of preeclampsia as compared to pregnant women without family history of preeclampsia.
2. Decreased serum level of Magnesium in pregnant women with family history of preeclampsia as compared to pregnant women without family history of preeclampsia.
3. 44.11% cases have been found to suffer with preeclampsia who were having very low serum Magnesium level below 3.8 mg/ml and 25% cases have been found to suffer with preeclampsia who were having serum Magnesium level above 3.8 mg/ml.
4. 25% cases have been found to suffer with preeclampsia who were having IL-6 level below 18.2 pg/ml and 52.6% cases have been found to suffer with preeclampsia who were having IL-6 level above 18.2 pg/ml.
5. No cases have been found to suffer with preeclampsia among control group.

DISCUSSION:

Preeclampsia has been commonly reported in pregnant women. It is an important disease to screen, as it has notable health outcomes and increases maternal and perinatal mortality. Although many screening tests have been proposed to diagnose preeclampsia over the decades but no test has been able to appropriately screen for the disease so far^(24,25).

The present study demonstrates that serum magnesium level has been significantly reduced in cases compared with the healthy control group.

A study by Seydoux J revealed that serum magnesium lowers down as the pregnancy progresses⁽²⁶⁾, but the design of our study was different from previous studies. This was the first investigation, where serum magnesium level along with IL-6 were measured in the initial stage of pregnancy, first trimester of pregnant women with history of preeclampsia and was compared with the healthy control group.

A significantly higher maternal serum IL-6 level has been reported in pregnant women with history of preeclampsia as compared to healthy control group in the first trimester of pregnancy. It demonstrates that there is an increased inflammatory response in pre-eclampsia compared to normal pregnancy and is in agreement with other researches⁽²⁷⁾.

In preeclampsia there is vascular events like endothelial and neutrophil activation in association with progressive inflammatory response. IL-6 and its receptor trans-signalling demonstrates the pathogenesis of inflammation-associated disorders, as in cardiovascular diseases and diabetes^(28,29).

IL-6 level of maternal serum remarkably describe an endothelial dysfunction, and along with serum magnesium may be considered as a potential marker for prediction of preeclampsia.

Limitation of study:

- There was a small number of patients included.
- Serum Magnesium and IL-6 levels not accessed during second trimester.

CONCLUSION:

At present preeclampsia is still a public health problem due to its high incidence rate. This is one of the main causes of higher percentage of maternal complication & maternal and foetal morbidity and mortality and no markers are available for prediction of preeclampsia. The present research related to Serum levels of magnesium and IL-6 associated with first trimester of preeclampsia, can be a matter for consideration and early detection of the incidence of preeclampsia so that the prevention and management of preeclampsia can become more earlier and easier.

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