A Comparative Study on Serum Magnesium in Pre-eclampsia and Non Pregnant Women

Heera Lal Roy*1, Susmita Nargis2, Farhana Ferdaus3

Abstract

Introduction: There are many Hypertensive disorders in pregnancy like preeclampsia, eclampsia etc. Pre-eclampsia is the most common medical complication of pregnancy associated with increased maternal and infant mortality and morbidity. Some studies have implicated that low serum calcium levels may have a role in pre-eclampsia but other studies failed to find relation between low levels of these trace elements and pre-eclampsia. Materials and Methods: This cross sectional study was carried out in the Department of Biochemistry, Sylhet MAG Osmani Medical College in collaboration with the Department of Obstetrics and Gynaecology, Sylhet MAG Osmani Medical College Hospital during the period from January 2016 to December 2016. This Study was occurred in among 31 pre-eclampsia patients, aged 20 to 40 years, and gestational age ranges from 20 to 40 weeks and 31 age matched normotensive non-pregnant women having no proteinuria. Serum magnesium was measured by Colorimetric method. Results: The mean serum magnesium level was 3.24 (±1.42) mg/dl in pre–eclampsia and was 3.30 (±1.5) mg/dl in normal women. The mean serum magnesium level did not differ significantly between the subjects of pre–eclampsia and normal women (t=0; p<.05). Conclusion: The means of both data sets are equal. So we can conclude that there is no significant difference between them.

Keywords: Pre-eclampsia, Magnesium.

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Introduction:

Preeclampsia is one of the commonest causes of maternal mortality and morbidity1. The incidence of preeclampsia in developing countries is estimated to be 4–18%2. Thus, 16% of all maternal death in developed countries and 9% of maternal deaths in Asia and Africa are said to be due to hypertensive disorders in pregnancy3,4. A worldwide perinatal and neonatal mortality rate of 10% is associated with preeclampsia1. Current evidence suggests that the endothelial dysfunction seen in preeclampsia may persist years after the episode, and therefore preeclamptic women may be at high risk of cardiovascular diseases later in life5. Though the etiology of preeclampsia remains unclear, many theories suggest abnormal placental implantation and abnormal trophoblastic invasion as possible causes7. The molecular basis of this condition is unresolved in study8. It has been postulated that fluctuations in maternal serum ions may be the precipitating cause of elevated blood pressures in preeclampsia9,10. Dietary deficiency of mineral ions has been shown to have a harmful effect on the pregnant mother and growing fetus and possibly complicate preeclampsia11. Dietary deficiency of magnesium has been established to play a role in blood pressure regulation and hence development of preeclampsia12. Evidence supporting routine magnesium supplementation for all pregnant women has not been substantiated by research, though most studies have reported reduced magnesium levels in pregnancy and worse levels in preeclampsia13. However, other studies have also reported a nonsignificant change in the serum magnesium levels of preeclamptic women compared to normal women14.

Materials and Methods:

This cross-sectional study was carried out in the Department of Biochemistry, Sylhet MAG Osmani Medical College in collaboration with the Department of Obstetrics and Gynaecology, Sylhet MAG Osmani Medical College Hospital during the period from January 2016 to December 2016. 31 pre-eclamptic patients, aged 20 to 40 years, and gestational age ranges from 20 to 40 weeks and 31 age matched normotensive non pregnant women having no proteinuria were included in group-A and Group-B respectively. Pregnant subjects were Primi & having essential hypertension, systemic or endocrine disorders, malabsorption syndrome, and patients on magnesium supplementation were excluded. Detailed history about present pregnancy regarding pre-eclampsia and exclusion criteria were asked. Data were collected from the selected subjects on variables of interest using a semi-structured questionnaire by interview, observation, clinical examination, investigation and from the history. Blood pressure was measured in supine position or sitting position. Urine was tested for gross proteinuria (heat coagulation test).
The pre-eclamptic patients were diagnosed by the presence of persistent hypertension (more than 140/90 mm of Hg).

Results:
The mean age was 28.45 (±7.54) years in pre–eclampsia and 31.03 (±8.9) years in normotensive non-pregnant women; difference was not significant (t=0, p< .05) (Table I), the means of both data sets are equal so we can conclude that there is no significant difference between them.

Table-I: Age of the respondents.

<table>
<thead>
<tr>
<th>Age of pre-eclampsia women</th>
<th>Number</th>
<th>Percentage</th>
<th>Age of pre-eclampsia women</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>4</td>
<td>13.79</td>
<td>&gt;20</td>
<td>13</td>
<td>41.93</td>
</tr>
<tr>
<td>20-24</td>
<td>14</td>
<td>45.16</td>
<td>20-24</td>
<td>13</td>
<td>41.93</td>
</tr>
<tr>
<td>25-29</td>
<td>6</td>
<td>19.35</td>
<td>25-29</td>
<td>3</td>
<td>9.67</td>
</tr>
<tr>
<td>30-34</td>
<td>4</td>
<td>12.90</td>
<td>30-34</td>
<td>2</td>
<td>6.45</td>
</tr>
<tr>
<td>≥40</td>
<td>5</td>
<td>16.12</td>
<td>≥40</td>
<td>10</td>
<td>32.25</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>100</td>
<td>Total</td>
<td>31</td>
<td>100</td>
</tr>
</tbody>
</table>

Mean age 26.45 (±7.54) years in pre–eclampsia and 31.03 (±8.9) years in normotensive non-pregnant women (t=0; p<.05) (Table- II). The means of both data sets are equal so we can conclude that there is no significant difference between them.

The mean serum magnesium level was 3.24 (±1.42) mg/dl in pre–eclampsia and 3.30 (±1.5) mg/dl in normal women. The mean serum magnesium level did not differ significantly between the subjects of pre–eclampsia and non pregnant women (t=0; p<.05) (Table - II). The means of both data sets are equal so we can conclude that there is no significant difference between them.

Table-II: Serum Mg+ level of the respondents.

<table>
<thead>
<tr>
<th>Serum Mg+ of pre-eclampsia women mg/dl</th>
<th>Number</th>
<th>Percentage</th>
<th>Serum Mg+ of Non-pregnant women mg/dl</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2.9</td>
<td>15</td>
<td>48.38</td>
<td>1-2.9</td>
<td>15</td>
<td>48.38</td>
</tr>
<tr>
<td>3-4.9</td>
<td>12</td>
<td>38.70</td>
<td>3-4.9</td>
<td>11</td>
<td>35.48</td>
</tr>
<tr>
<td>5-6.9</td>
<td>4</td>
<td>12.90</td>
<td>5-6.9</td>
<td>5</td>
<td>18.12</td>
</tr>
<tr>
<td>≥7.9</td>
<td>0</td>
<td>0</td>
<td>≥7.9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>100</td>
<td>Total</td>
<td>31</td>
<td>100</td>
</tr>
</tbody>
</table>

Mean 3.24 (±1.42) mg/dl in pre–eclampsia and 3.30 (±1.5) mg/dl in normal women.

The mean body mass index was 26.45 (±2.17) Kg/M² in pre-eclampsia and 19.26 (±7.9) mg/M² in normotensive non-pregnant women. The mean body mass index in pre-eclampsia was significantly higher compared to normotensive non-pregnant women (t=6.601; p<0.001). Several other studies did not show significant difference of body mass index between the two groups (p>0.05)4, 5. But Akhtar et al.23 found that the mean body mass index of the subjects with pre–eclampsia was 25.30 (SEM 0.36) Kg/M² and normal women was 23.48 (SEM 0.28) Kg/M². There was a significant difference of body mass index between the two groups (p<0.001).

Table-III: BMI of the respondents.

<table>
<thead>
<tr>
<th>BMI of pre-eclampsia women Kg/M²</th>
<th>Number</th>
<th>Percentage</th>
<th>BMI of Non-pregnant women Kg/M²</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;18</td>
<td>0</td>
<td>4</td>
<td>&gt;18</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>18-20</td>
<td>0</td>
<td>7</td>
<td>18-20</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>21-25</td>
<td>4</td>
<td>14</td>
<td>21-25</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>24-26</td>
<td>8</td>
<td>4</td>
<td>24-26</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>27-29</td>
<td>19</td>
<td>2</td>
<td>27-29</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>100</td>
<td>Total</td>
<td>31</td>
<td>100</td>
</tr>
</tbody>
</table>

Mean 26.45 (±2.17) in pre–eclampsia and 19.26 (±7.9) in normotensive non-pregnant women.

Discussion:
Serum concentrations of various macrominerals are altered during pregnancy with changes in the mother’s physiology and the requirements of growing fetus. Changes on serum level of Magnesium (Mg) during pregnancy were estimated. In addition, it has been reported that reduction in serum level of Mg during pregnancy might be possible contributors in etiology of pre-eclampsia (PE), and supplementation of these minerals to diet may be of value to prevent PE15. The mean age was 28.45 (±7.54) years in pre–eclampsia and 31.03 (±8.9) years in normotensive non-pregnant women (Table I), the means of both data sets are equal so we can conclude that there is no significant difference between them. This result was consistent with the study of Golmohammad Lou et al.16 that the mean age of the pre-eclampsia women was 25.70 ± 1.20 years. Akhtar et al.17 that the mean age of the pre-eclampsia mother was 25.20 ± 4.85 years also supported this result.

In the current study, the mean serum magnesium level was 3.24 (±1.42) mg/dl in pre–eclampsia and was 3.30 (±1.5) mg/dl in normal women. The mean serum magnesium level did not differ significantly between the subjects of pre–eclampsia and normal women (t=0; p<0.05). This result was supported by different studies18,19,20 that there was no significant difference between the plasma magnesium of the patients and controls. But several other studies21,22 showed that there was significantly lower serum magnesium in pre-eclampsia than that of normal pregnancy.

The mean body mass index was 26.45 (±2.17) Kg/M² in pre-eclampsia and 19.26 (±7.9) mg/M² in normotensive non-pregnant women. The mean body mass index in pre-eclampsia was significantly higher compared to normotensive non-pregnant women (t=6.601; p<0.001). Several other studies did not show significant difference of body mass index between the two groups (p>0.05)4, 5. But Akhtar et al.23 found that the mean body mass index of the subjects with pre–eclampsia was 25.30 (SEM 0.36) Kg/M² and normal women was 23.48 (SEM 0.28) Kg/M². There was a significant difference of body mass index between the two groups (p<0.001).

Conclusion:
Serum Magnesium is very essential during pregnancy. This study showed that serum magnesium level did not differ significantly between pre-eclamptic and non pregnant women. It may be concluded that serum magnesium have no association in occurrence of pre-eclampsia. However further multicenter study involving large sample needed should be carried out to find the association between preeclampsia and serum calcium.

Conflict of Interest: None.

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References: