Comparative Study on Serum Calcium in Pre-Eclampsia and Non Pregnant Women

Susmita Nargis¹, Heera Lal Roy*²

Abstract

Introduction: There are many Hypertensive disorders in pregnancy like pre-eclampsia, 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. Objectives: To evaluate serum calcium in pre-eclampsia & non pregnant women. Materials and Methods: This cross sectional study was carried out 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 calcium was measured by Colorimetric method. Results: The mean serum calcium level was 5.91 (±2.12) mg/dl in pre-eclampsia and was 5.72 (±2.46) mg/dl in normal women. Conclusion: The mean serum calcium level did not differ significantly between the subjects of pre–eclampsia and normal women (t=0; p<.05). The means of both data sets are equal so we can conclude that there is no significant difference between them.

Keywords: Pre-eclampsia, Calcium, BMI.

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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. A worldwide perinatal and neonatal mortality rate of 10% is associated with preeclampsia⁴. 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 causes⁶. The molecular basis of this condition is unresolved in study⁷. It has been postulated that fluctuations in maternal serum ions may be the precipitating cause of elevated blood pressures in preeclampsia⁸⁹. Dietary deficiency of different minerals has been shown to have a harmful effect on the pregnant mother and growing fetus and possibly complicate preeclampsia¹⁰. Evidence supporting routine calcium supplementation for all pregnant women has not been substantiated by research, though most studies have reported reduced calcium levels in pregnancy and worse levels in preeclampsia¹¹. However, other studies have also reported a nonsignificant change in the serum calcium levels of preeclamptic women compared to non pregnant women¹².

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 40weeks and 31 age matched normotensive non pregnant women having no proteinuria were included in group-A and Group-B respectively. Study population was selected by consecutive and convenient sampling and sample size was calculated by Guilford and Frucher’s formula. Pregnant subjects were primi & having essential hypertension, systemic or endocrine disorders, malabsorption syndrome, and patients on calcium 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).

Result:
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. The mean serum calcium level was 5.91 (±2.12) mg/dl in pre–eclampsia and was 5.72 (±2.46) mg/dl in normal women. The mean serum calcium level did not differ significantly between the subjects of pre–eclampsia and normal 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 body mass index was 26.45 (±2.17) Kg/M² in pre–eclampsia and 19.26 (±7.9) Kg/M² in normotensive non-pregnant women. (Table III), the mean body mass index in pre-eclampsia was significantly higher compared to normotensive non-pregnant women (t=6.601; p<0.001).

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 Non-pregnant women</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>14</td>
<td>45.16</td>
<td>20-24</td>
<td>13</td>
<td>42</td>
</tr>
<tr>
<td>25-29</td>
<td>6</td>
<td>19.35</td>
<td>25-29</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>30-34</td>
<td>4</td>
<td>12.90</td>
<td>30-34</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>35-39</td>
<td>2</td>
<td>6.45</td>
<td>35-39</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>≥40</td>
<td>5</td>
<td>16.12</td>
<td>≥40</td>
<td>10</td>
<td>32</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: 28.45 (±7.54)

Table II: Serum Ca+ level of the respondents

<table>
<thead>
<tr>
<th>Serum Ca+ of pre-eclampsia women mg/dl</th>
<th>Number</th>
<th>Percentage</th>
<th>Serum Ca+ of Non-pregnant women mg/dl</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3.9</td>
<td>6</td>
<td>19.35</td>
<td>2-3.9</td>
<td>9</td>
<td>29</td>
</tr>
<tr>
<td>4-5.9</td>
<td>10</td>
<td>32.25</td>
<td>4-5.9</td>
<td>9</td>
<td>29</td>
</tr>
<tr>
<td>6-7.9</td>
<td>10</td>
<td>32.25</td>
<td>6-7.9</td>
<td>7</td>
<td>23</td>
</tr>
<tr>
<td>8-9.9</td>
<td>4</td>
<td>12.90</td>
<td>8-9.9</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>≥10</td>
<td>1</td>
<td>3.22</td>
<td>≥10</td>
<td>2</td>
<td>6</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: 5.91 (±2.12)

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 Non-pregnant women Kg/M²</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;18</td>
<td>0</td>
<td>0</td>
<td>&gt;18</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>18-20</td>
<td>0</td>
<td>0</td>
<td>18-20</td>
<td>7</td>
<td>22</td>
</tr>
<tr>
<td>21-23</td>
<td>4</td>
<td>13</td>
<td>21-23</td>
<td>14</td>
<td>45</td>
</tr>
<tr>
<td>24-26</td>
<td>8</td>
<td>26</td>
<td>24-26</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>27-29</td>
<td>19</td>
<td>61</td>
<td>27-29</td>
<td>2</td>
<td>7</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 BMI: 26.45 (±2.17)

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 Calcium (Ca) during pregnancy were estimated. In addition, it has been reported that reduction in serum level of Ca 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 PE. 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., that the mean age of the pre-eclampsia women was 25.70 ± 1.20 years. Another result of the mean age of the pre-eclampsia mother was 25.20 ± 4.85 years also supported this result. In this study, mean serum calcium level was 5.91 (±2.12) mg/dl in pre–eclampsia and was 5.72 (±2.46) mg/dl in normal women. The mean serum calcium level did not differ significantly between the subjects of pre–eclampsia and normal women (t=0; p<.05). This result was supported by different studies showing that there was no significant difference between the plasma calcium of the patients and controls. This is in contrast with several studies suggesting hypocalcemia as a possible cause for preeclampsia. All these studies reported significantly lower calcium levels in preeclampsia patients than normal. The mean body mass index was 26.45 (±2.17) Kg/M² in pre-eclampsia and 19.26 (±7.9) Kg/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). But Akhtar et al 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:
Macro minerals are very essential during pregnancy. This study showed that serum calcium level did not differ significantly between pre-eclamptic and non-pregnant women. It may be concluded that serum calcium have no association in occurrence of pre-eclampsia. However further multi-centre study involving large sample needed should be carried out to find the association between pre-eclampsia and serum calcium.

Ethical clearance: Taken from Sylhet M.A.G Osmani Medical college ethical committee.

Conflict of Interest: None.

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References