Role of Transcendental Meditation for Controlling Pre-Eclampsia

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Abstract

Background: Pre-eclampsia (PE) is one of three common causes of maternal mortality in the world. Critical cases, suffering from multiple organ failures and that may lead to maternal death.

Objectives: To estimate the effect of Transcendental Meditation (TM) for controlling PE.

Methodology: The thirty pre-eclamptic women were randomly assigned into two groups equal in number as follow: Group (A) (Control group): (13 primigravidae and 7 multigravidae, they were subjected to the regular antihypertensive treatment (Methyledopa) and Group (B): (Study group): (11 primigravidae and 9 multigravidae), they were subjected to TM aiming for relaxation about (3 sessions per week for 6 weeks) plus the same regular antihypertensive treatment (Methyledopa) as in Group (A).

Results: Comparison between both Groups (A & B) showed statistically non significant difference at (SBP) as well as (DBP), (PR) and proteinuria levels after 6 weeks of treatment (3 sessions/week) which in favor Group (B).

Conclusion: TM has a no added effect on SBP as well as DBP, PR & proteinuria levels in PE.


Introduction

PREECLAMPSIA (PE) is a common obstetric complication. It is a condition prior to eclampsia (Greek word “eklampsia” meaning sudden flashing). A high fetal morbidity and mortality rate is associated with prematurity, placental insufficiency and intrauterine growth restriction, which result from this disorder. The exact cause of PE is still unknown but the impaired placentation is one possible cause [1].

The incidence of PE is 3-7% in the nulliparous and 1-3% in the multiparous [2].

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Proteinuria exceeding 300mg/24 hours emerges for the first time after 20 weeks gestation accompanied with hypertension (systolic blood pressure (SBP) > 140 & dyastolic blood pressure (DBP) ≥90mmHg [3].

It is still uncertain whether PE is caused by the damaged ischaemic or reperfused placenta or by the inappropriate or exaggerated maternal inflammatory response towards the presence of the trophoblast, although the endothelium is associated with the pathophysiology of disease [4].

There is essential evidence that abnormalities in the development of placental vasculature early in pregnancy may lower the placental perfusion, hypoxia and/or ischemia. This in turn leads to oxidative stress and release of factors into the maternal circulation that alters maternal endothelial function and cause hypertension and other manifestations of the disease [3].

Risk factors for PE include (A) Age, (B) Body Mass Index (BMI) above 30m2/kg, diabetes and hypertension, (C) Ethnicity: The West African population, (D) Smoking: Is known to decrease the risk of developing PE [5].

Another risk factors include: (E) Familial factors, (F) Pre-existing medical conditions: Women with chronic hypertension or diabetes mellitus, thrombophilias, autoimmune disease, kidney disease are at a higher risk of PE more than others, (G) Infections and residence at high altitude, (H) Primipaternity and sperm exposure [6].

Also risk factors include the following: (I) Previous PE, (J) Primiparity (K) Birth interval: A birth interval of 5 years may double the risk of developing PE [8].
Signs & symptoms of PE include visual disturbance, such as blurring or flashing before the eyes, headaches, nausea and/or vomiting, epigastric pain/right upper quadrant (RUQ) pain below the ribs, decreased fetal movements, raised BP, sudden swelling of the face, hands or feet, hyper-reflexia and ankle clonus [7].

The TM technique is a simple, natural mental technique, practiced twice daily for 15 or 20 minutes each session, while sitting comfortably in a chair with eyes closed. The practice produces a unique state of restful alertness [8].

At (2011), a study was done to determine the effect of TM and muscle relaxation on BP as compared with lifestyle education on older African Americans. For women, the TM technique showed that SBP and DBP decreased 10.4mmHg and 5.9 mmHg respectively [9].

Regulation of breathing can controlling the autonomic nervous system by voluntarily changing the rate, depth, and pattern of breathing, the messages being sent from the body's respiratory system to the brain can be changed. Slow breathing improves vagal activity and therefore decreases baseline heart rate and BP [10].

Material and Methods

This study was carried out on forty volunteers pregnant women. All patients were medically diagnosed to have mild or moderate PE, they were selected from the Inpatient Department of Obstetrics & Gynecology of October 6 University from 2013 - 2014. They were randomly assigned into two groups equal in number. The first group (Control group) (Group A): Was 20 preeclamptic women (13 primigravidae and 7 multigravidae) their ages ranged from 26 to 38 years. They were subjected to the regular antihypertensive treatment. While, the second group (Study group) (Group B): Consisted of 20 preeclamptic women (11 primigravidae and 9 multigravidae) their ages ranged from 26 to 38 years. They were subjected to TM (3 sessions per week for 6 weeks) plus the same regular antihypertensive treatment as in Group (A).

Inclusive criteria: Their age ranged from 26-38 years old, their gestational age was exceeded 20 weeks gestation and their Body Mass Index (BMI) did not exceed 35kg/m².

Exclusive criteria: All pregnant women will be free from diabetes and/or cardiopulmonary diseases. Pregnant women suffering from repeated abortion as well as bleeding and intra uterine foetal growth anomalies or retardation or previous history of preterm labour, also women with twins will be excluded from this study.

Evaluative procedures:

All patients in both Groups (A & B) were subjected to all of the following evaluation protocols:

Detailed medical history and physical examinations including vital signs as (SBP) as well as (DBP) which were measured by sphygmomanometer and stethoscope, (PR) which was measured by pulse oximeter and urine analysis was used to evaluate proteinuria level before and after 6 weeks of treatment. Also Anthropometric measurements are weight; height and BMI were evaluated before treatment only.

Treatment procedures:

Informed consent form will be signed by each patient in both Groups (A & B) before participating in the study.

The doses of antihypertensive drug (Methyl-dopa) in milligrams which were taken daily by each preeclamptic woman in both Groups (A & B).

Informed consent form will be signed by each patient before participating in the study.

The doses of antihypertensive drug (Methyl-dopa) in milligrams which were taken daily by each woman in both Groups (A) and (B).

TM technique: After ensuring rest for 15min, baseline parameters like systolic BP, diastolic BP and PR. Then, all the patients were asked to perform mental relaxation and slow breathing for 10min each separated by a quiet period of 15min.

Mental relaxation: Patients were asked to lie down comfortably on the bed and to undergo complete mental relaxation by thinking of some pleasant thought for 10min. Patients were free to think about a real life event or some imaginary thing which could produce a pleasant effect over the mind. Disclosure of the nature of the thought was not required. The beginning and end of the session depended upon a signal from the therapist. All parameters were recorded continuously before, during and immediately after slow breathing as well as mental relaxation. Changes in the various parameters after both the techniques were analyzed.

Slow breathing: Patients were asked to sit comfortably in a chair. On receiving a signal from the investigator, they had to start taking slow and deep breaths, focusing their concentration on their breath,
thus feeling the movements of the air through the nostrils during inspiration as well as expiration. The respiratory rate was maintained at 6 breaths/min, both inspiration as well as expiration performed over 5s each. The exact timing was achieved by mentally counting from 1 to 5 during inspiration and from 6 to 10 during expiration.

**Statistical analysis:**

Statistical analysis was performed using paired \( t \)-test between pre and post within each group, in addition, independent \( t \)-test to compare between groups. A probability of (\( p<0.05 \)) was considered to be significant.

**Results**

The results obtained from both groups were calculated and compared in [(Tables 1,2) & Figs. (1-8)].

*Fig. (1):* Mean values of patient's physical characteristics between Group A and Group B.

Table (1): Physical characteristics (age, weight, height & BMI) of both groups (A & B) showed a statistically non significant difference which denotes homogeneity of the groups.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Items</th>
<th>Before treatment</th>
<th>After treatment</th>
<th>( t )-value</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>Group A</td>
<td>29.06±1.10</td>
<td>29.47±0.94</td>
<td>1.04</td>
<td>0.279</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>29.47±1.10</td>
<td>29.47±0.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>Group A</td>
<td>78.22±2.93</td>
<td>79.78±2.19</td>
<td>1.651</td>
<td>0.110</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>79.78±2.19</td>
<td>79.78±2.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height (cm)</td>
<td>Group A</td>
<td>162.18±2.22</td>
<td>164.32±3.49</td>
<td>2.014</td>
<td>0.064</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>164.32±3.49</td>
<td>164.32±3.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>Group A</td>
<td>29.87±1.72</td>
<td>29.64±1.23</td>
<td>0.406</td>
<td>0.688</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>29.64±1.23</td>
<td>29.64±1.23</td>
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</tr>
</tbody>
</table>

*SD*: Standard deviation. 
\( p \): Probability. 
\( S \): Significance. 
NS: Non-significant.

**Fig. (2):** Improvement percentage of SBP in Group B.

Table (2): Comparative analysis of SBP, DBP, PR and proteinuria were showed statistically non significant difference before treatment between both groups (A, B). While, after end of treatment they showed statistically significant difference in SBP & DBP but in PR & proteinuria it showed statistically non significant difference between both groups (A, B).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Items</th>
<th>Before treatment</th>
<th>After treatment</th>
<th>( t )-value</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP (mmHg)</td>
<td>Group A</td>
<td>152.02±5.36</td>
<td>136.53±1.78</td>
<td>0.983</td>
<td>9.751</td>
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<tr>
<td></td>
<td>Group B</td>
<td>150.10±5.35</td>
<td>130.10±1.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( p&lt;0.05 )</td>
<td>NS</td>
<td>S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvement percentage</td>
<td>10.19%</td>
<td>13.32%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBP (mmHg)</td>
<td>Group A</td>
<td>107.20±2.84</td>
<td>96.31±5.17</td>
<td>0.637</td>
<td>3.483</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>107.79±3.86</td>
<td>91.47±1.49</td>
<td></td>
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<tr>
<td></td>
<td>( p&lt;0.05 )</td>
<td>NS</td>
<td>S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvement percentage</td>
<td>10.16%</td>
<td>15.14%</td>
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</tr>
<tr>
<td>PR (beat/min)</td>
<td>Group A</td>
<td>88.08±3.63</td>
<td>75.73±9.93</td>
<td>1.323</td>
<td>1.847</td>
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<tr>
<td></td>
<td>Group B</td>
<td>85.06±5.07</td>
<td>70.13±6.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( p&lt;0.05 )</td>
<td>NS</td>
<td>NS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvement percentage</td>
<td>14.02%</td>
<td>17.55%</td>
<td></td>
<td></td>
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<tr>
<td>Proteinuria (mg/dl)</td>
<td>Group A</td>
<td>2.83±0.69</td>
<td>2.48±0.60</td>
<td>0.332</td>
<td>0.434</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>2.91±0.65</td>
<td>2.37±0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( p&lt;0.05 )</td>
<td>NS</td>
<td>NS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvement percentage</td>
<td>12.37%</td>
<td>18.66%</td>
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</table>
Several studies have shown that 10-15min of daily breathing exercise for 8 weeks lowered the BP in hypertensive patients. But in one study, even without training, hypertensive patients who received a device to guide slow breathing significantly reduced their office BP if the total time spent in slow breathing over 8 weeks exceeded a threshold value of 180min \[12\].

In our study, it was difficult to control the thought process of the subjects during mental relaxation as real life setting could not be created.
to ensure emergence of a pleasant thought. But all the patients affirmed that they had indeed thought about a pleasant thing and it was supported by the presence of changes in their autonomic parameters.

Assessment of SBP as well as DBP, heart rate and the daily doses of the antihypertensive drug used were performed to each woman before starting and after the end of the study period (6 weeks).

Concerning the changes occurred in SBP, in Group (A) which was treated with Methyldopa only and was considered as a control group, the results were showed a statistically significant decrease.

While in Group (B) which was treated with TM assisted by DB exercises and Methyldopa, the SBP was considered a statistical significant decrease.

Slow breathing is more effective than mental relaxation in lowering SBP, DBP, heart rate and respiratory rate while mental relaxation is more effective in reducing electromyographic activity and increasing peripheral skin temperature. It is therefore suggested that these techniques should be used on long-term basis as adjunctive treatment in essential hypertension so as to produce a sustained reduction of BP thereby preventing the long-term complications of hypertension [12].

These results were confirmed with many studies of which stated that there was a highly significant reduction in systolic and diastolic blood pressures in pregnant women with mild PE who received relaxation in the form of breathing exercise [13,14].

Slow breathing increases baroreflex sensitivity and reduces sympathetic activity and chemoreflex activation, it suggest a potentially beneficial effect in hypertension; where, baroreflex is the system in the body that regulates blood pressure by controlling heart rate, strength of heart contractions, and diameter of blood vessels. Slow breathing reduces blood pressure and enhances baroreflex sensitivity in hypertensive patients. These effects appear potentially beneficial in the management of hypertension [10].

Also these results come in agreement with Youssef et al., [15] who determined that relaxation in the form of Mitchell's simple physiological relaxation (as a form of physical relaxation) technique and calcium supplementation 2gm/day.

So, the decrease in PR after TM in this study was in disagreement with the results of Turankar et al., who reported a significant reduction in PR, SBP & DBP after using rhythmic slow deep breathing technique (pranayama) in the treatment of hypertensive patients [19].

The results also conflicted with the results of many studies in which the different relaxation techniques resulted in a highly significant reduction in heart rate in pre-eclamptic women [13-16].

In the present study, the level of proteinuria showed a non significant decrease.

These results disagree with the results previous studies in which different relaxation techniques resulted in highly significant reduction in the level of proteinuria in PE women [13-16].

This results may be meaning that the decrease in systolic and diastolic BP were temporary.
Finally, we can conclude that this study TM showed a statistically significant reduction in SBP, DBP and statistically significant reduction in PR and proteinuria.

References
هدف الدراسة: أجريت هذه الدراسة لتحديد تأثير التأمل الفائق للتحكم في تسمم الحمل.

خطوات الدراسة: وقد أجريت هذه الدراسة على ثلاثين سيدة من تعاينين من مرضى تسمم الحمل البيض والمتوسط؛ تم اختيارهن من المجموعة الداخلية لمستشفى النساء والتوليد - قصر العيني - كلية الطب البشرى - جامعة القاهرة. تم تقسيم جميع السيدات عشوائياً إلى مجموعتين متساويتين في العدد لكل مجموعة تتكون من عشرون سيدة. المجموعة الأولى هي مجموعة (A) (المجموعة الحاكمة) وتتكون من 12 سيدة حامل للمرة الأولى، و7 سيدات سبق لهن الحمل أكثر من مرة. وقد تم تقييم جميع المرضى باستخدام قياس ضغط الدم الشرياني، معدل البض، نسبة البروتين في البول، مجموعتي (B) (مجموعة الدراسة) وتتكون من المرضى اللاتي شاركن في تمارين التأمل الفائق لمدة ستة أسابيع كاملاً (18 جلسة، بواقع 3 جلسات كل أسبوع)، حوالي 11 سيدة حامل للمرة الأولى، و6 سيدات سبق لهن الحمل أكثر من مرة. وقد تم تقييم جميع المرضى باستخدام نفس وسائل التقييم كما في مجموعة (A).

النتيجة: وقد أوضحت النتائج أن هناك انخفاض ذو دلالة إحصائية في قياسات ضغط الدم الشرياني، لكن لم يحدث تغيير ذو دلالة إحصائية في معدل البض أو في نسبة البروتين في البول وذلك بعد إتمام ثلاثة أشهر كاملة باستخدام برنامج تمارين التأمل الفائق.

الخلاصة: وهكذا يمكن أن نستخلص أنه من غير المؤثر ممارسة تمارين التأمل الفائق للسيدات اللاتي تعاين من مرضى تسمم الحمل.