Abstract: BACKGROUND Menopause is the transient phase of the aging process during which a woman passes from the reproductive to non reproductive stage associated with increased chances of obesity and increased co morbidities like hypertension, hyper-cholestrelemia, impaired cognitive function and cardio vascular dysfunction. Hypertension is one of the major cardiovascular risk factor for the excess mortality and morbidity in postmenopausal women. AIM AND OBJECTIVE To study the effect of Body Mass Index and FSH on Blood Pressure in Pre,Peri and Post-Menopausal Women.DESIGN Descriptive with purposive sampling.PARTICIPANTS The study involved 300 women aged 40-55 years and divided into three groups based on the three definitions used for menopause self reported menstrual history (pre menopausal) with last menstrual period 60 days, peri menopausal women with LMP 60-365 days and post menopausal women with last menstrual period 365 days. Women who were diabetic, hypertensive, alcoholic, smoker, amenorrhoeic due to hysterectomy were identified and excluded from the study.METHODOLOGY Standardised measurements of weight, height and Blood Pressure were done. Blood samples were collected after overnight fast and FSH was measured using Serum Chemiluminescent immune metric assay. Statistical analysis was performed by chi-square test to find the association between Age, BMI and FSH on Blood pressure in pre, peri and post menopausal women.RESULTS The Peri and Post-menopausal women had significantly higher BMI, (p<0.05), and significant increase in Blood pressure (p<0.05). There is no significant difference in FSH among the three groups (P=0.292, 0.296, 0.596). Blood pressure is elevated among postmenopausal women when compared with Pre and Perimenopausal women (p<0.05).CONCLUSION These findings suggest that rise in BP after menopause appeared to be due to aging and increased BMI rather than declining ovarian function.Keyword :Menopause, Age, Body Mass Index, FSH , Blood Pressure.

INTRODUCTION: Menopause is a physiological phenomenon which is characterised by termination of menstrual cycle starting from the age of 40 but commonly observed around 51 years. The menopause does not occur as an abrupt event but as a continuous transition from a regular menstrual cycle to depletion of ovarian follicle. FSH level might be an indicative of menopause. FSH level starts increasing by 5-7 years before the menstrual cycle stops (STRAW -Stages of Reproductive Aging Workshop). Principally, menopause is the phenomenon of aging accompanied by reduced physical activity, decrease in energy metabolism, altered eating habits, genetic inheritance, change in mood leading to obesity. The hormonal changes during the menopause transition period contribute more to the abdominal fat deposition. Women tend to gain weight and prone to develop hypertension as age advances and the importance of high blood pressure as a risk factor in cardiovascular diseases is well established. Cardio vascular disease is the leading cause of mortality and morbidity in the post-menopausal woman. Menopause has an impact on women’s health and sense of wellbeing. Menopause is unique in mammals and only human beings have a longer life span after menopause. The declining ovarian function starts as early as 40 years of age, it is insidious and asymptomatic. As estrogen acts as a shield of protection, women are protected from cardiovascular dysfunction during reproductive phase and the chances are equal after menopause due to structural and functional changes involving cardiac muscles and valves.

Weight gain occurs in women with each decade and 20% weight gain occurs within the first 3 years of menopause. The pattern of fat distribution is more on abdomen, hip and buttocks which is also a predictor of coronary diseases. The altered hormonal status precipitate central adiposity which inturn leads to non communicable diseases like diabetes, dyslipidemia, hypertension, cardiovascular dysfunction and decline in cognitive function. The Body Mass Index is commonly used as an index to assess the overall obesity and the measurement of BP is considered as the parameter.
to evaluate hypertension and the risk of the development of cardiovascular dysfunction. Menopausal transition brings about changes in total body composition along with central adiposity and creates a compatible atmosphere for abnormal metabolism and aggravates cardio metabolic risk factors. Thus, menopausal status and associated obesity is the major predictor of metabolic aberrations over age in menopausal women. The measurement of BMI is easy and aid as non-invasive and effective tool to assess the health status of women. Hence the purpose of this study is to establish the relationship of age, BMI, FSH on BP and to identify their effectiveness for screening the post-menopausal women.

MATERIALS AND METHODOLOGY

This Cross sectional study was conducted in Research Laboratory, Department of Physiology, Coimbatore Medical College between June to October 2012. The study was explained to the subjects and written informed consent was obtained from all the subjects to participate in the study. Institutional Ethical Committee Clearance was also obtained. The study involved 300 women aged 40-55 years and divided into three groups based on the three definitions obtained. The study involved 300 women aged 40-55 years and post-menopausal women with last menstrual period >365 days, peri-menopausal women with LMP 60-365 days and post-menopausal women with last menstrual period >365 days.

Exclusion Criteria:

Women who were diabetic, hypertensive, alcoholic, smoker, amenorrhoeic due to hysterectomy were identified and excluded from the study. Anthropometric Measurements: Weight in (kg) was measured with the calibrated weighing scale and height in meters was determined with the stadiometer. The BMI was calculated using the Quetelet’s formula - BMI= weight in kg / height in m^2. All anthropometric measurements were taken using standard techniques.

Physiometric Measurements:

This includes measurement of systolic and diastolic blood pressure. Three consecutive values were recorded and averages were used for statistical analysis. The blood pressure was recorded using mercury sphygmomanometer in sitting position after a minimum of 10-15 minutes rest with the right fore arm placed horizontally on the table. Three consecutive BP were recorded and the mean value was used for statistical analysis. Blood samples were collected after overnight fast and serum FSH level was estimated using Serum Chemiluminescent immunoassay. Statistical Analysis: The results were tabulated as MEAN ± SD and statistical analyses was performed using Chi-square test to find the association between blood pressure, BMI and FSH in pre, peri and post-menopausal women.

RESULTS:

The Peri and Post-menopausal women had higher BMI, (p<0.05), and significant increase in Blood pressure (p<0.0001).There is no significant difference in FSH and BP among the three groups(P<0.292,0.296,0.596). Blood pressure is elevated among post menopausal women when compared with Pre and Peri menopausal women(p<0.05).

TABLE 3: MEAN AGE, BMI, SBP, DBP AND FSH OF PRE, PERI AND POSTMENOPAUSAL WOMEN

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre menopausal women</th>
<th>Peri menopausal women</th>
<th>Post menopausal women</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in yrs)</td>
<td>41.3 ± 7.8</td>
<td>46.3 ± 15</td>
<td>53.1 ± 16</td>
<td>&lt;0.05 Significant</td>
</tr>
<tr>
<td>BMI</td>
<td>22.2 ± 1.3</td>
<td>23.7 ± 2.7</td>
<td>28.8 ± 3.4</td>
<td>&lt;0.05 Significant</td>
</tr>
<tr>
<td>SBP</td>
<td>115.6 ± 11.3</td>
<td>122.6 ± 22.2</td>
<td>137.5 ± 26.0</td>
<td>&lt;0.05 Significant</td>
</tr>
<tr>
<td>DBP</td>
<td>72.8 ± 5.7</td>
<td>76.6 ± 10.4</td>
<td>82.8 ± 10.5</td>
<td>&lt;0.05 Significant</td>
</tr>
<tr>
<td>FSH</td>
<td>20.5 ± 2.4</td>
<td>40.7 ± 2.1</td>
<td>65.1 ± 1.2</td>
<td>&lt;0.24 Not Significant</td>
</tr>
</tbody>
</table>

BMI: Body Mass Index; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure; FSH: Follicle Stimulating Hormone. *SIGNIFICANT.

DISCUSSION:

Menopause is a physiological phenomenon that occurs in every women’s life and the biological changes associated with menopause are due to aging as well as declined ovarian activity. Both menopause and BP are influenced by factors such as BMI, socio economic status and physical activity. During this transient phase from pre-menopausal to post-menopausal state, women tend to gain weight and central fat distribution. The BMI of post-menopausal women was high in the over weight range ( 24.8 ± 3.4) p <0.05. Only 9.47% of the post-menopausal women were with normal BMI, 30.53% of women were overweight. Similar findings were observed in the studies on post-menopausal women in Zaria Nigeria where BMI of 25.96 were determined. The identification of menopausal women at risk of hypertension based on BMI supports the study on four population groups of Pune and DivyaBishnol et al., in Africa and Asia by Tesfaye F et al and by Hongwei Wang et al in Chinese women. A population study carried out among women around the menopause by Renata et al concluded that women are the vulnerable group to become hypertensive because of hormonal changes occurring with the advancing age. Kaufmann et al. 1996; Cooper et al. 1997 observed that Obesity and Hypertension increase in parallel across populations. As age advances the metabolic rate slows down and energy expenditure becomes less. In women who are entering the menopause, their metabolic rate decreases vigorously so they start gaining weight during menopause. The significant increase in body parameters and BP in post menopausal women due to lesser amount of estradiol as compared to pre menopausal women suggest careful management at right time like healthy habits and regular exercise can make this phase more comfortable. The BMI and BP showed a positive correlation with each other in the study conducted among Chinese men and women and stressing that the decreased estrogen secretion among post menopausal women resulting in increased bodyfat. As age advances the vascular structure and functions get affected resulting in increase in peripheral vascular resistance which leads to elevation of BP.

CONCLUSION:

Our study concludes that postmenopausal women are at risk of weight gain and a linear relationship between weight gain (increased BMI) and BP was also observed. Obesity, especially visceral obesity precipitates atherosclerotic changes and increases the risk of Hypertension and cardio vascular dysfunction. Hence life style modification with respect to diet and exercise have a potential role in the prevention of hypertension in women of post menopausal age group.

FIGURE

MEAN AGE, BMI, SBP, DBP AND FSH OF PRE, PERI AND POSTMENOPAUSAL WOMEN

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