BACKGROUND: High Blood Pressure is one of the important risk factors for cardiovascular diseases worldwide. It is estimated that Hypertension, the silent killer, is responsible for fifty percent of cardiovascular deaths. In India, studies show a steadily increasing prevalence of Hypertension since 1950 leading to deaths among young people. Scanty data exist regarding prevalence of Prehypertension among poor and ignorant population attending rural health facilities like Community Health Centres. OBJECTIVES: To determine prevalence of Prehypertension among adults attending outpatient department of CHC, Vellarada and to identify the risk factors. METHODOLOGY: Cross sectional study was conducted during a period of three months from 18th January 2010 among 18100 adults of 18 years and above attending CHC, Vellarada, a village situated 40 kilometres away from Thiruvananthapuram and nearer to Tamilnadu. Pretested questionnaire-based information was collected about diet, physical activity, and tobacco use and alcohol consumption. Standardized techniques were used for data on BP, weight, height and lipid profile. Using JNC-7 criteria, Prehypertension was defined as Systolic BP 120-139 mmHg and Diastolic BP 80-89 mm Hg. Statistical analysis was done using SPSS package. RESULTS: Prevalence of Hypertension was 35.14% (men 35.9%, women 34.6%) and Prehypertension 40.9% (men 40.56%, women 41.1%). On multivariate logistic regression analysis, Prehypertension showed significant positive association with BMI >23 kg/m2 (OR 1.79), age (OR 1.74), Serum Triglyceride >150 mg/dl (OR 2.2) and HDL cholesterol <40 mg/dl (OR 1.48). CONCLUSION: High prevalence of pre hypertensive and associated risk factors among young, economically productive group of rural population needed targeted interventions to reduce cardiovascular risk. It is beneficial if every health facility makes attempts for routine BP recording of young people so that prehypertensives may be subjected to life style modifications to prevent morbidity and mortality due to hypertension and prehypertension. KEYWORDS: CHC, Prehypertension, JNC-7 Criteria, Blood Pressure.

INTRODUCTION: Several research studies reveal that morbidity and mortality from cardiovascular diseases are common in individuals with high blood pressure or hypertension. High blood pressure is a silent killer and is responsible for fifty percent of cardiovascular deaths. High blood pressure is an important public health problem in India also.

The term ‘Prehypertension’ was coined in 1939 in the context of early studies linked with High Blood Pressure recorded for Life insurance purposes to subsequent morbidity and mortality. According to JNC 7 Criteria, Prehypertension is defined as Systolic BP 120-139 mm Hg and Diastolic BP 80-89 mm Hg. There are a few data about the impact of prehypertension on cardiovascular disease incidence. Studies show that Prehypertension is more prevalent in diabetic than nondiabetic participants. Impaired glucose tolerance or impaired fasting glucose also greatly
increase the cardiovascular disease risk in prehypertensive people. Obesity is associated with high prevalence of hypertension and diabetes. To prevent the occurrence of hypertension in high risk groups JNC 7\textsuperscript{10} recommends life style modifications. Life style modifications recommended by the JNC 7 are:

- Weight Reduction if overweight.
- Limitation of Alcohol intake.
- Increased Aerobic Physical Exercise (30-50 minutes daily).
- Reduced Sodium Intake (< 2.4 gm daily).
- Adequate dietary potassium (> 120 mmol/day).
- Cessation of Smoking.
- DASH Diet\textsuperscript{13} (Diet rich in fruits, vegetables, low-fat dairy products & reduced saturated and total fats).

In India, studies show steadily increasing prevalence of Hypertension since 1950 leading to cardiovascular deaths among young people. Recent studies have shown a high prevalence of hypertension among adults in both urban and rural areas.\textsuperscript{2}

The risk of cardiovascular disease in the individuals with prehypertension was observed to increase with presence of risk factors such as obesity and dyslipidaemia. Scanty data exist on the prevalence of Prehypertension among poor and ignorant population attending rural health facilities like Community Health Centres in India. Hence the present study was conducted with the objectives:

1. To determine Prevalence of Prehypertension among adults attending outpatient department of CHC, Vellarada, Thiruvananthapuram District.
2. To identify the risk factors of Prehypertension.

**METHODOLOGY:**

**Study Design:** Cross Sectional Study.

**Study Area:** Community Health Centre, Vellarada.

**Study Population:** Adults of the age group 18-59 years attending Outpatient department of CHC, Vellarada, Thiruvananthapuram district, Kerala, South India during the study period. The study area is about forty kilometers away from Thiruvananthapuram city and nearer to Panachamoodu, an area close to Tamil Nadu state.

**Study Duration:** 3 months from 18-01-2010.

**Study Tool:** Using a Pretested questionnaire, data were collected on Diet, Physical Activity, consumption of Tobacco & Alcohol and Socio demographic characteristics after obtaining consent from the participants. Height and Weight were measured using standardized techniques and Body Mass Index for each participant was calculated using the formula, $\text{BMI} = \frac{\text{Weight in kilograms}}{\text{Height in meter}}$.\textsuperscript{2}

- Blood Pressure was measured on the left arm in a sitting position after 5 minutes of rest in a quiet room using reliable sphygmomanometer. Those participants showing Systolic BP 120-139 mm Hg and Diastolic BP 80-89 mm Hg are considered as Prehypertensives as per JNC 7 criteria.\textsuperscript{10}
• Prehypertensives were repeated for second BP measurement for confirmation.
• Standardized techniques were used for collecting data on lipid profile.
Participants who were not willing for examination were excluded from the study.
Statistical Analysis was done using SPSS-12 Package.

RESULTS AND DISCUSSION: 18100 Adults of the age group 18-59 years attending Outpatient department of CHC, Vellarada, Thiruvananthapuram district, Kerala, South India were subjected to anthropometric measurements, Blood Pressure measurement, estimation of fasting Lipid profile after entering the socio-demographic details in the pre tested questionnaire.

<table>
<thead>
<tr>
<th>Study Population</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>6665</td>
<td>36.8</td>
</tr>
<tr>
<td>Females</td>
<td>11435</td>
<td>63.2</td>
</tr>
<tr>
<td>Total</td>
<td>18100</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 1: Distribution of Study Population

- Total adults studied - 18100.
- No. of Prehypertensives - 7402 (40.9%).
- Prehypertensives (Males) - 2703 (40.56%).
- Prehypertensives (Females) - 4699 (41.1%).
- Prevalence of Prehypertension - 40.9%.
- Population prevalence - 40.2 to 41.6% (95% C.I).

Prevalence of Prehypertension in the present study is 40.9%.
National & International Studies show similar prevalence of prehypertension among adult population.14,16 A study conducted in rural Africa by Stewart de Ramiraz et al shows a prevalence of 44%. Study conducted in North India by Prabhakaran. D et al and a study by Yadav. S. et al16 reported a prevalence of 44% and 47% respectively.

The overall prevalence of prehypertension was high (80%) in a study conducted among a healthy adult military population in India.17 A survey conducted in nine States of India by the National Nutrition Monitoring Bureau reported the pooled estimate of prehypertension in rural men to be about 45 per cent.18 A few studies from different regions of India have showed the prevalence of prehypertension in the range of 40-60 per cent.18,19

<table>
<thead>
<tr>
<th>Category</th>
<th>Component of category</th>
<th>Prehypertensive group</th>
<th>Z</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
<td>Percentage</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>&lt; 40</td>
<td>3713</td>
<td>39.7</td>
<td>3.42</td>
</tr>
<tr>
<td></td>
<td>≥ 40</td>
<td>3689</td>
<td>42.2</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>2703</td>
<td>40.6</td>
<td>0.610</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4699</td>
<td>41.1</td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Characteristics of the Prehypertensive Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>≥ 23</th>
<th>&lt; 23</th>
<th>5627</th>
<th>1775</th>
<th>76.2</th>
<th>16.6</th>
<th>158.8</th>
<th>P &lt; 0.001</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STG</td>
<td>≥ 150</td>
<td>&lt; 150</td>
<td>5924</td>
<td>1478</td>
<td>80.6</td>
<td>13.7</td>
<td>117.7</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>HDL</td>
<td>≤ 40</td>
<td>&gt; 40</td>
<td>5428</td>
<td>1974</td>
<td>72.1</td>
<td>18.7</td>
<td>89.38</td>
<td>P &lt; 0.001</td>
</tr>
</tbody>
</table>

Presence of prehypertension showed significant association with advancing Age, high Body Mass Index, high Serum Tri Glyceride and low High Density Lipid levels. On multivariate logistic regression analysis, Prehypertension showed significant positive association with BMI >23 kg/m² (Odds Ratio 1.79), Age (Odds Ratio 1.74), Serum Triglyceride >150 mg/dl (Odds Ratio 2.2) and HDL cholesterol <40 mg/dl (Odds Ratio 1.48). Many other National and International studies17 show almost similar findings.

Prehypertension showed significant positive association with Salt restricted diet (Odds ratio 2.18), but negative association with tobacco use and alcohol consumption in our study.

CONCLUSION: The rural population attending a Community Health Centre in South Kerala showed a prevalence of Prehypertension 40.9%. This high prevalence of Prehypertension and associated risk factors among young and economically productive group of rural population needed targeted Interventions to reduce cardiovascular risk.

RECOMMENDATIONS: It is beneficial if every health facility makes attempts for routine BP recording of very young people also so that prehypertensives may be detected early and subjected to early lifestyle modifications3,11 recommended by JNC 7 criteria to prevent morbidity and mortality due to pre hypertension and hypertension. Also health education among school children will be highly useful to prevent obesity and associated complications such as hypertension, diabetes, coronary artery disease and cancer.

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REFERENCES:


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