A STUDY ON TESTING BLOOD PRESSURES AMONG TWO MIGRANT GROUPS LIVING IN SIMILAR ECOLOGICAL CONDITIONS IN JALPAIGURI DISTRICT, WEST BENGAL, INDIA

ABSTRACT — A large number of studies on resting blood pressure has been conducted on people with diverse life styles and living in diverse ecological conditions. Recently some studies have shown that environment plays a major role in determining blood pressures and that blood pressure is directly influenced by migration.

Many studies have shown that blood pressure does not rise with age, hypertension is absent in many traditional societies and that age-related increase of blood pressure is not necessarily a part of physiological aging process.

In view of this, the present study was conducted on two genetically (ethnically) diverse populations, the Oraons and the Tamangs, both migrant groups living under similar ecological conditions and working as tea garden labourers in the Jalpaiguri district, West Bengal, India, to examine the nature of age-related changes in systolic and diastolic pressures and variation in blood pressure, if any, in relation to sex, migrational status and packed cell volume (PCV).

The results show that both male and female Oraons have higher values of both systolic and diastolic pressures compared with Tamangs.

The data on migrational status groups show that both Oraon and Tamang males of migrational status group M have higher systolic and diastolic pressures compared with the M1 status group. In Tamang females, M1 status group have higher values of both systolic and diastolic pressures compared with M group but in Oraon females, the M1 status group have higher values of both systolic and diastolic pressures.

The data on both Oraon and Tamang show that in both males and females, systolic and diastolic pressures increase with age and that correlation coefficients as well as linear regression coefficients are significantly different from zero at the 5 percent level. The slope of the regression line (blood pressure on age) is the steepest among Oraon females.

The multiple regression coefficient involving age and packed cell volume as the independent variables is non-significant at the 5 percent level.

KEY WORDS: Resting blood pressures — Systolic pressure — Diastolic pressure — packed cell volume — Age changes — Migration — tea garden labourers — Oraon — Tamang.

INTRODUCTION

A large number of studies on resting blood pressure has been conducted on diverse ecological conditions and on people with diverse ways of life (Scotch, 1900; Boydren, 1909; Huizinga, 1972; Cruz-Coke et al. 1973, Casell, 1974; Siegberg et al. 1976; Beaglholme et al. 1977; Boyce et al. 1978; Hanna and Baker, 1979; Bau et al. 1984).

It is generally believed that the resting blood pressures vary with respect to age, sex, body build, physical environmental conditions (e.g., altitude), socioeconomic conditions (e.g., occupation, education, migration, etc.), chronic diseases, haematological values, and certain biochemical parameters.

Recently many studies have shown that blood pressure does not rise with age, and hypertension is absent in many traditional societies (Lowenstein,
demonstrated hypoxia induced polythecytism with the resulting elevated blood viscosity and peripheral resistance being over compensated by vasodilatory effects of hypoxia, thereby leading to low blood pressure, particularly systolic in high altitude populations. In view of the above, the purpose of the present paper is to examine whether (I) migration has any effect on blood pressure, (II) length of exposure to residence in a new environment has any effect on blood pressure, (III) the nature of age changes is different between the males and females in different ethnic groups, (IV) the nature of age changes is different between systolic and diastolic pressure in different ethnic groups, (V) the haematological parameter packed cell volume (PCV) makes any contribution in determining blood pressure.

MATERIALS AND METHODS

With the advent of tea industry in the Duars in Jalpaiguri district, West Bengal, a large number of labourers was brought in mainly from Chotanagpur. The tea labourers of the Duars area comprise mostly of immigrant populations brought in over the last 100 years or so from Chotanagpur, Darjeeling hill areas as well as from Sikkim and Nepal (Grunings 1911; Choudhury, 1978).

Orons

Orons are the third largest group in Jalpaiguri district, West Bengal (Grunings, 1911). Linguistically they belong to the “Khurukh” or “Devriukan” group (Rasley, 1981). They are generally believed to have migrated from Southern India and settled in the Sahabad district of Bihar several centuries ago and some to have moved to Chotanagpur (Hunter, 1872; Roy, 1915). Orons started immigrating to the Duars area around 1830 as tea labourers. Many of them have eventually settled down as cultivators. The staple food of the Orons comprise rice, though wheat and millet are also used. Potato, green vegetables, fish, pork and milk products are also consumed. The alcoholic beverages are “haazhi” (rice beer) and sometimes “chhaung” the latter generally prepared by various Nepali groups.

Tamangs

In Tibetan language “Ta” means poney and “Mang” means male. According to some scholars, the Tamangs originated as a trading class in Tibet who used poney as a pack animal, and others believed that the word Tamang is derived from the Sanskrit word Tamra (copper) as they worked in copper mines in the past. They are essentially a middle altitude (i.e., 1000–1200 m) population in Nepal.

Tamangs started immigrating to the Duars area around 1874–75 with the advent of tea industry in this area. They are very crowdedly concentrated near the hills in somewhat elevated areas. Their staple food is rice. Wheat, green vegetable, beef, pork etc. are also consumed. Their common alcoholic beverage is “chhang” (rice beer) (Haimendorf, 1965; Census of India 1961).

With the migrant groups studied here are tea labourers and entitled to similar facilities like subsidised food items, free water supply, fuel, health, education in addition to standard wages. The two migrant groups were classified with respect to migrational status: M1 — those born of parents who themselves (or their parents/grand parents, etc.) were born in the Duars, and M2 — those born in the Duars. The data on systolic and diastolic pressure, age and packed cell volume are utilized in the present paper.

Blood pressures were measured on 119 Oron and 111 Tamang adults of both sexes. Blood pressures were taken after about a 15 minutes’ rest period, in a sitting position on the left arm by the auscultatory method using an inflatable blood pressure cuff, mercury sphygmomanometer and stethoscope and measured by the same observer on all subjects.

**RESULTS**

Table 1 shows that both male and female Ororns have higher values of both systolic and diastolic blood pressures compared with the Tamangs, and that significant differences are found in systolic blood pressure in both male and female.

**FIGURE 1.** Regression of systolic and diastolic pressures on age for Oron and Tamang males.
are significantly different from zero at 5 percent level and the difference between males and females in both the groups is non-significant at 5 percent level. Further, the difference between systolic and diastolic pressures is also non-significant at 5 percent level in both males and females in both the groups.

Since haematoacrit is generally believed to affect both systolic and diastolic blood pressures of the high and medium altitude populations, multiple regression coefficients were computed using age and packed cell volume (PCV) as predictor variables.

### Table 1: Mean and standard deviations of systolic and diastolic blood pressures by sex and ethnic group

<table>
<thead>
<tr>
<th>Population</th>
<th>Systolic (mm Hg)</th>
<th>Diastolic (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oroman</strong></td>
<td><strong>Mean</strong></td>
<td><strong>SD</strong></td>
</tr>
<tr>
<td>Males</td>
<td>120.47</td>
<td>24.06</td>
</tr>
<tr>
<td>Females</td>
<td>120.60</td>
<td>24.44</td>
</tr>
<tr>
<td><strong>Tamang</strong></td>
<td><strong>Mean</strong></td>
<td><strong>SD</strong></td>
</tr>
<tr>
<td>Males</td>
<td>121.83</td>
<td>24.64</td>
</tr>
<tr>
<td>Females</td>
<td>121.49</td>
<td>24.52</td>
</tr>
</tbody>
</table>

*Significant at 5 percent level.

It appears that the packed cell volume has no detectable effect since the regression coefficient is not significantly different from zero.

The data on migratory status groups (Table 3) show that both Oroman and Tamang males of migratory status group M1 have higher systolic and diastolic blood pressures compared with the M2 status group. In Tamang females, the M2 status group has higher values of both systolic and diastolic pressures compared with the M1 status group but in Oroman females the M1 status group has higher values of both systolic and diastolic blood pressures.

### Table 3: Blood pressure with respect to group migrational status

<table>
<thead>
<tr>
<th>Population</th>
<th>Sex</th>
<th>Systolic (mm Hg)</th>
<th>Diastolic (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tamang</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>27</td>
<td>122.96</td>
<td>14.97</td>
</tr>
<tr>
<td>Females</td>
<td>21</td>
<td>116.34</td>
<td>17.78</td>
</tr>
<tr>
<td>M2</td>
<td>25</td>
<td>119.10</td>
<td>10.79</td>
</tr>
<tr>
<td>Females</td>
<td>20</td>
<td>125.07</td>
<td>17.19</td>
</tr>
<tr>
<td><strong>Oroman</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>21</td>
<td>131.16</td>
<td>22.60</td>
</tr>
<tr>
<td>Females</td>
<td>22</td>
<td>140.04</td>
<td>23.96</td>
</tr>
<tr>
<td>M2</td>
<td>23</td>
<td>127.53</td>
<td>26.26</td>
</tr>
<tr>
<td>Females</td>
<td>22</td>
<td>121.87</td>
<td>27.53</td>
</tr>
</tbody>
</table>

Significant differences are found to occur between M2 and M1 status groups in systolic and diastolic pressures in all the groups barring Tamang females.

### Discussion

It is generally believed that both systolic and diastolic blood pressures are higher and that the nature of age-related increase is more pronounced in the migrants than in the sedentaries. We are unable to test this hypothesis directly since we do not have data on sedentary counterparts of both the groups. However, we can suggest from the present results that migration may have some role in determining blood pressure since there is a trend of age-related change in blood pressure in both the groups, which is generally considered to be indicative of the effect of modern urban way of living along with other modernization/urbanization effects; for example, the rate of rise of diastolic blood pressure with age increase significantly in the inhabitants of Easter Island when they migrated to South American Continent and that variance of blood pressure is directly influenced by migration (Cruz-Coke et al. 1964). Scott (1963) found that the recently migrant Zuans to large urban centres had higher blood pressure levels than those living in their rural setting and also higher than those who spent 10 years of their lives in the city. Stanler et al. (1967) found a lower rate of hypertention among the Blacks who migrated to Chicago less than 10 years ago compared with both the Chicago-born Blacks and those who migrated to Chicago more than 10 years ago.

Comparative data are not available for sedentary counterparts, and in the absence of such data, we are at present unable to test directly whether there has been any rise in blood pressure due to acculturation or Westernization, or any sharper age-related increases due to increased psychological stress associated with modern urban life style, as suggested by Scott (1960), Muddock (1961), Boyd (1969), Beaglehole et al. (1977) and Babal (1988).

However, our results on blood pressure differences among the migrational status groups within each ethnic group suggest that those possibilities might indeed be true.

The apparent similarity in the nature of age-related increase in blood pressure between males and females among both the groups is in conformity with the findings of Basu et al. (1964) but not so with many others (Fujiwang et al., 1972; Clegg et al., 1976; Boyce et al. 1978) for which no explanation can be offered.

A similar lack of any effect of haematological parameters on blood pressure is also apparent for the high altitude Ethiopian population which may be due to the increased peripheral vasodilation (Clegg et al., 1976), but in low altitude group the association may hold (Clegg et al. 1976). So Martorena et al. (1969) have reported that systolic and diastolic pressures, particularly the former, decrease with long term residence at altitude in non-natives and that with passage of time the blood pressure of the non-natives approached those of Peruvian natives living in the same altitude.

From the results it is possible to surmise that the lower blood pressures among the Tamangs may reflect their history of residence in medium altitude areas in Nepal (Bista, 1976), or alternatively, may be due to their different ethnic history.

### Acknowledgements

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### References


Beaglehole R., Salmond G. C., Hooper A., Must-