

Blood Pressure and Body Composition in Adult Bania Females of Punjab

Sharda Sindhu and Kanta Kumari¹

Department of Human Biology & Human Genetics, Guru Nanak Dev University, Amritsar 143 005, Punjab, India

1. Department of Physiology, Medical College, Amritsar 143 005, Punjab, India

KEY WORDS Blood Pressure, Body Fat, Fat Free Mass, Bania Females, Punjab.

ABSTRACT In 120 adult Bania females of Punjab, aged 20 to 45 years, the relationship among blood pressure, total body fat and fat free mass was studied. The highly significant correlations were observed between blood pressure and total body fat but no significant correlation existed between fat free mass and any measure of blood pressure.

Numerous variables are related to blood pressure but a positive correlation between blood pressure and body weight has long been recognized in adults (Boe and Weidervag, 1957; Stamler et al., 1978; Sidhu and Kumari, 1988). Few previous studies of the determinants of blood pressure have been based on measures of body composition that allow a separation of total body mass into lean body mass and total body fat (Voors et al., 1977; Siervogel et al., 1982). But, in India, little attention has been paid to the assessment of the influence of total body fat on blood pressure. In the present study, an attempt has been made to study the relationship of total body fat and fat free mass with blood pressure in Bania females of Punjab.

MATERIAL AND METHODS

A sample of 120 Bania females between the age of 20-45 years was taken from the Moga City which is a tehsil headquarters of district Faridkot in the Punjab State (India). Banias form the main commercial elements of the population of northern and north-western India. Most of the Bania communities reside in cities. They hold large business, earn a lot of money and are considered to be the rich. But now most of the younger generations have shifted to the civil services. The females of this community lead a very

sedentary and comfortable life.

Blood pressure levels were measured after anthropometric measurements to put the subject at ease. For blood pressure measurements, the recommendations of Rose and Blackburn (1968) were followed. Three consecutive readings were taken with a mercury Sphygmomanometer for both systolic and diastolic blood pressure and their mean values were used in the subsequent analysis. Pulse pressure (systolic blood pressure - Diastolic blood pressure) was calculated using the method given by Siervogel et al. (1982).

For body fat estimation, body density has been calculated using equations of Durnin and Womersley (1974). Body density is then converted into percent body fat by applying equation of Brozek et al. (1963) i.e.

$$\text{Percent body fat} = \frac{4.57}{\text{Body density}} - 4.142 \times 100$$

Total body fat has been computed by the following equation:

$$\text{Fat (kg)} = \frac{\text{percent body fat} \times \text{Body weight (kg)}}{100}$$

Fat free mass i.e. Body weight - Body fat has been estimated as suggested by Durnin and Rahman (1967).

For calculating total body-fat and fat free mass, the measurements included are weight, triceps, biceps, subscapular and suprailiac skin folds. The techniques as given by IBA/HA growth sub-committee (Weiner and Lourie, 1969) were followed for taking these measurements.

RESULTS AND DISCUSSION

Table 1 presents the mean and standard deviation of some blood pressure variables and body composition variables among the Bania adult females of Punjab ranging in age from 20-45 years. The effect of age on blood pressure has been identified by earlier investigators (Hamilton et al., 1954; Sambasivaro and Veerajau, 1981). This was also observed in our sample as based on R^2 (Table 1). Therefore, the age effect was removed for determining the relationship between the body composition and the blood pressure.

Table 1: Age adjusted variables, the proportion of total variation accounted for by the age and partial correlation between body composition variables and blood pressures of Bania females of Punjab

Variables	Mean	S.D.	Total variation accounted for by age R^2	Partial correlation TBF	FFM
SBP	110.1	10.2	0.11	0.26 ^a	0.10
DBP	70.3	8.9	0.20	0.35 ^a	0.04
PP	39.8	7.6	0.02	0.06	0.09
Total	14.2	6.11	0.06	-	-
body fat					
Fat free mass	45.9	4.2	0.10	-	-

SBP - Systolic Blood Pressure DBP - Diastolic Blood Pressure PP - Pulse Pressure

R^2 - Coefficient of determination ^a $P < 0.01$

There is evidence that the increased body weight in adults is due to an increase in the amount of fat (Forbes, 1978). The association of blood pressure with body weight could be due to the increased total body fat (Siervogel et al. 1982). In the present study, there is a positive

relationship between the total body fat and systolic and diastolic blood pressure but there is no association between the fat free mass and blood pressure. This indicates that the increased fatness, rather than the increased body mass may be responsible for the association between the blood pressure and the weight.

REFERENCES

- Be, J.H.S. and Wedervag, R.: The blood pressure in a population: Blood pressure reading and height and weight determinations in the adult population of the city of Bergen. *Acta. Med. Scand.*, 157 (Suppl. 321): 4 (1957).
- Brozek, J., Grande, F., Anderson, J.T. and Keys, A.: Densitometric analysis of body composition: Revision of some quantitative assumptions. *Ann. N.Y. Acad. Sci.*, 110: 113-141 (1963).
- Dumin, J.V.G. and Rahman, M.M.: The assessment of the amount of fat in the human body from measurements of skinfold thickness. *Brit. J. Nutr.*, 21: 681-689 (1967).
- Dumin, J.V.G. and Womersley, J.: Body fat assessed from total body density and its estimation from skinfold thickness measurements on 481 men and women aged 16-72 years. *Brit. J. Nutr.*, 32: 77-97 (1974).
- Forbes, G.B.: Body composition in adolescence. PP. 239-272. In: *Human Growth Vol. 2 Postnatal Growth*. P. Falkner and J.M. Tanner (Eds.) Plenum Press, New York (1978).
- Hamilton, M., Pickering, G.W., Roberts, J.A.F. and Sowry, G.S.C.: The aetiology of essential hypertension. I. The arterial pressure in general population. *Clin. Sci.*, 13: 11-35 (1954).
- Rose, G.A. and Blackburn, H.: Cardiovascular survey methods. WHO, Monograph Series No. 56: 90-95 (1968).
- Sambasivaro, R. and Veerajau, P.: Influence of body weight on blood pressure in a rural population of coastal Andhra Pradesh. *Ind. Practit.*, 34: 129-139 (1981).
- Sidhu, S. and Kumari, K.: Influence of body weight and age on blood pressure in scheduled caste females of Punjab. *Proc. 6th Ann. Conv. Nat. Sem. Statist. Med. Hlth. Nutr.*, Hyderabad (1988).
- Siervogel, R.M., Roche, A.F., Chumlea, W.C., Morris, J.G., Webb, P. and Knittle, J.L.: Blood pressure, body composition and fat tissue cellularity in adults. *Hypertension*, 4: 382-386 (1982).
- Stamler, R., Stamler, J., Riedlinger, W.F., Algera, G. and Roberts, R.H.: Weight and blood pressure: Findings in hypertension screening of 1 million Americans. *J.A.M.A.*, 240: 1607 (1978).
- Voors, A.W., Webber, L.S., Frerichs, R.R. and Berenson, G.S.: Body weight and body mass as determinants of basal blood pressure in children: The Bogalusa Heart Study. *Am. J. Epidemiol.*, 106: 101 (1977).
- Weiner, J.S. and Lourie, J.A.: *Human Biology: A Guide to Field Methods*. IBP Handbook No. 9. Blackwell Scientific Publications, Oxford (1969).