

VARIATION WITH SEX AND AGE OF BLOOD PRESSURE IN THE INHABITANTS OF A "PURANA" VILLAGE IN SRI LANKA

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Summary. The blood pressures of 254 (132 males and 122 females) in the age range 1 to 80 years of a total of 353 inhabitants of Talkote, a Sinhalese *purana* village at the foot of Sigiriya, were recorded in 1989.

Variation in pressures between the sexes in the age range 1 to 18 years has been demonstrated. In the males, both systolic and diastolic pressures remain relatively constant upto the 10 to 14 age group and then increase steeply to reach the adult level at 18 years. In the females blood pressures increase progressively from 1 to 18 years.

In the adults, the systolic blood pressure curve of the females is more variable than that of the males. However in both sexes there is no progressive increase of blood pressure with age. In contrast to the island-wide cross-sectional study of 1949 by Bibile, Cullumbine, Kirthisinghe, Watson and Wikramanayake, both systolic and diastolic blood pressures of the females are lower than those of the males up to age 50.

Although totally rural, both systolic and diastolic pressures are higher in both sexes than those of the mixed urban/rural population studied by Bibile et al in 1949. As the inhabitants of Talkote are a breeding isolate, practising caste effective endogamy, it is postulated that the aetiology of the higher pressures may be genetic rather than environmental.

Key Words: Blood pressure, variation with age and sex, rural population.

INTRODUCTION

The only published work on the variation with age and sex of blood pressures in Sri Lankans was done in 1949 (1). In that study the brachial systolic and diastolic blood pressures of 7,000 individuals between the ages of 10 and 50 years were measured during an island-wide physical fitness survey.

The present study deals with the variation of blood pressure with age and sex of the inhabitants of Talkote, a *purana* village at the foot of Sigiriya. These villagers trace their ancestry to the times of the Sinhalese Kings of the 5th century A.D. The brachial systolic and diastolic arterial blood pressures of 254 individuals between the ages of 1 and 80 years were recorded as part of a comprehensive biometric study at Talkote in 1989 (2).

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POPULATION AND METHODS

Talkote village has 353 inhabitants, 188 males and 165 females, distributed between 63 households. In the biometric study two or three households were interviewed, examined and measured at each visit to the village. During the medical history taking and physical examination of the chest, subjects were seated at ease before the investigator. This took at least five minutes. The brachial systolic and diastolic pressures were then measured using an Accoson sphygmomanometer, with the arm of the subject resting on a table at the level of the chest. The pressures of the younger children were measured with the children seated on the mothers' laps. The arm of the child rested on the arm of the mother placed on the table as before. An infant cuff was used for children below 10 years. The reading at which muffling of the sounds occurred was taken as the diastolic pressure. Measurements were taken by the same investigator throughout the study. Each individual had this casual pressure recorded only once. During the interview the date of birth of the children and age in years of the adults were recorded.

RESULTS

Means of systolic and diastolic blood pressures (SP and DP respectively) measured in mm Hg and the standard error of the means are given in Table I. The results are presented graphically in Fig I. The results of age groups with less than 6 subjects are not included in the figure. The results of two males aged 68 and 70 years with hemiplegia of two months and three years duration and blood pressures of 120/80 and 100/70 respectively were excluded from the study. There was no history of any other chronic illness related to hypertension in the study group.

In the males, commencing with values of 88 mm and 54 mm Hg, both SP and DP remain relatively constant up to the 10 to 14 year age group. The pressures then rise steeply to reach values of 123 mm and 80 mm Hg around 18 years. The increase in the blood pressures, both SP and DP, from 18 to 55 years is not significant. The difference between values at 18 years and 55 years is 10 mm Hg for SP and 5 mm Hg for DP over a span of nearly forty five years. From 55 to 65 years there is a slight decrease in both SP and DP.

In the females both SP and DP are lower than in the males up to age 50. Commencing with values of 84 mm Hg and 54 mm Hg respectively around 3 years, both SP and DP increase progressively to 120 mm Hg and 77 mm Hg around 18 years. After 18 years both SP and DP are more variable than in the males. There is a general trend for the pressures to increase with age after 50 years. The mean SP at 38 years was significantly ($p < 0.05$) higher than the pressure of 117 mm Hg at 33 years and 45 years.

Table 1. Mean systolic and diastolic blood pressures of the study population.

Age (Years)	Male					Female				
	n	Systolic Mean SE	Diastolic Mean SE	n	Systolic Mean SE	Diastolic Mean SE	n	Systolic Mean SE	Diastolic Mean SE	
1 - 5	17	82.9 1.8	55.9 1.4	6	75.6 5.8	56.7 4.5				
6 - 10	30	93.5 2.1	62.3 1.5	15	97.7 2.3	64.7 1.9				
11 - 15	12	96.7 1.8	63.8 2.2	14	110.4 3.8	72.1 2.9				
16 - 20	11	122.7 3.6	79.1 2.0	11	119.2 2.5	76.9 2.5				
21 - 25	10	126.0 4.5	78.0 1.9	19	121.1 2.9	75.8 1.5				
26 - 30	12	125.0 5.2	76.7 2.7	15	118.7 3.9	74.0 2.1				
31 - 35	11	129.1 3.0	80.0 2.2	13	116.9 3.2	76.9 1.9				
36 - 40	06	128.3 4.4	78.3 1.5	08	127.5 3.9	77.5 2.9				
41 - 50	06	125.0 5.1	78.6 2.8	08	117.5 5.2	72.5 2.3				
51 - 60	04	132.5 4.8	85.0 2.8	07	135.7 4.3	82.8 5.2				
61 - 70	09	125.8 5.2	78.3 2.2	03	145.0 12.2	95.0 4.0				
71 - 80	—	—	—	03	140.0 19.9	83.3 3.3				
>80	02	140.0 9.9	85.0 4.9	—	—	—				

Blood pressures were measured in mm Hg

SE = Standard error of mean

Table 2. Socio - demographic data of Telkote village

Number of households	63
Number of mating pairs	74
Number of consanguineous mating pairs	24
Number of outside mates	41



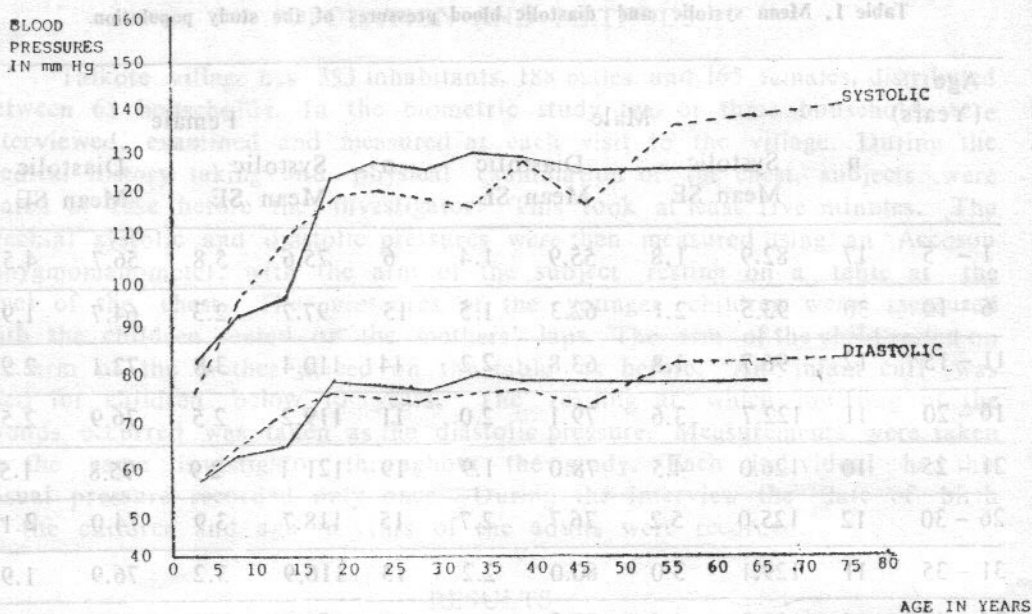


FIGURE 1

Mean systolic and diastolic blood pressures of the study population. — malefemale

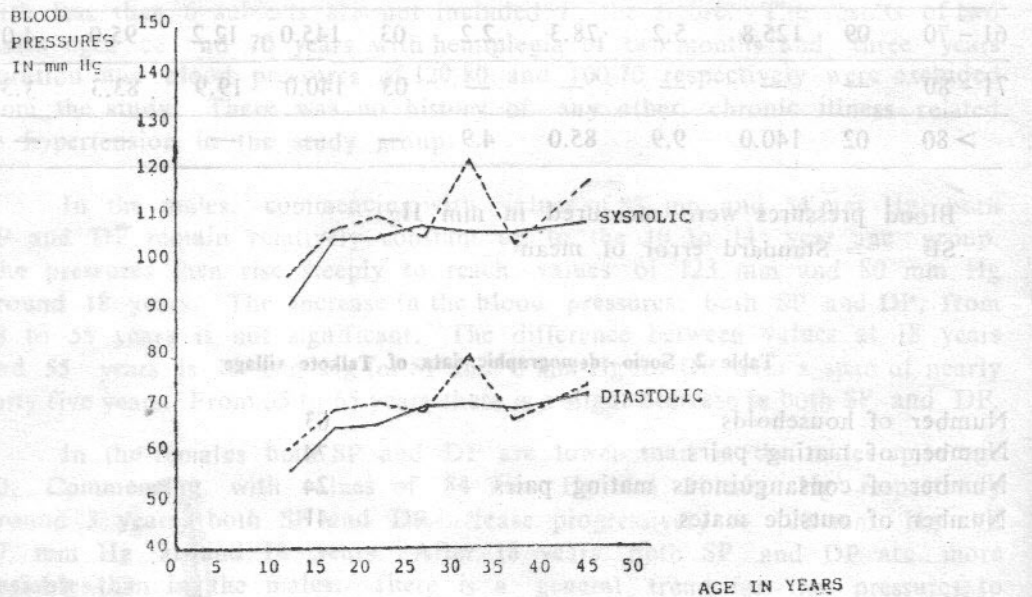


FIGURE 2

Mean systolic and diastolic blood pressures of the 1949 study. — malefemale

DISCUSSION

A span of forty years separates the only published study of variation of blood pressure with age and sex in Sri Lanka from the present study. That study was cross-sectional and although it included 7,000 individuals, was limited to the age range 10 to 50 years. The subjects were selected on a physical fitness test. In contrast, the present study is on a whole population including 252 of the 353 inhabitants of a small isolated village, in the age range 1 to 80 years and in good health. As such the two studies are not directly comparable. However, as the previous study has been quoted to reflect the variation with age and sex of blood pressure in a developing country in the tropics, a comparison must be attempted. Using the data given and adjusting the age ranges to those of the present study the results of the previous study are represented graphically in Fig 2. In the males both SP and DP reach a maximum at 18 years, of 104 mm Hg and 64 mm Hg. From 18 to 50 years both SP and DP remain constant. In the females both SP and DP are higher than in the males. The mean SP and DP values at 28 years and 38 years are significantly ($p < 0.001$ and 0.01) lower than those at 33 years.

The middle part of the curve of the present study corresponds to the whole of the previous study. In most populations mean blood pressures of adults rise progressively with increasing age (3). However in both studies in Sri Lanka the progressive increase with age is not seen, the curves remaining basically at a plateau. In the females the SP peaks at 33 years in the previous study. The SP peak is at 38 years in the present study. At 33 years a peak of DP is also seen in the previous study. In the present study however the DP in the females remains relatively constant between 18 and 45 years. The pressures, both SP and DP, in the females up to age 50 are higher than those in the males in the previous study whereas they are lower than those in the males in the present study. In some population groups in the tropics and subtropics the pressures of the males have been reported to be higher, whilst those of females were higher in others (4).

The most striking feature in the present study when compared to the 1949 study, however, are the higher pressures both SP and DP in both males and females. These differences are significant at all ages in the males, the probabilities varying from $p < 0.05$ to $p < 0.001$ in the different age groups. In the females the differences are significant only in the younger age groups. The authors of the previous study comment that the "figures given for this group are lower than those usually quoted for Western races". They postulate that the lower blood pressures may be due to the fact that the population was selected on a physical fitness test. The diastolic end-point used in the previous study is not stated. The present study used the muffling of sounds as the end point. Difference in methodology may explain the differences in the DP but not those of the SP.

Blood pressures are reported to be lower in rural than in urban populations (4). However the higher pressures of the present study cannot be explained on the basis of rural versus urban environment since the population is totally rural, whilst that in the previous study was mixed rural/urban.

The 7,000 subjects of the 1949 study were mixed in ethnic origin, too, consisting of Sinhalese, Ceylon Tamil, Indian Tamil, Ceylon Moor, Burgher and Malay. The authors report that "the variation of blood pressure with age and sex is the same for all the races examined." Table 2 gives the socio-demographic data for the Talkote village. Of a total of 353, 271 share one of three "ge" names. The sharing of "ge" names, and the fact that 24 matings are between first cousins and that only 41 of the 148 mates are from outside the village demonstrate that caste-effective endogamy is still practised to a significant degree in this village. Genetic heterogeneity in the Sinhalese at several red cell antigen, G6PD and hairy pinnae loci has been highlighted (5). Talkote represents a breeding isolate of the Sinhalese. The higher pressures in the present study may well reflect another parameter of genetic heterogeneity. Further studies on blood pressures in other breeding isolates of the Sinhalese are necessary to confirm this.

Variation in pressures between the sexes from 1 to 18 years has also been demonstrated in the present study. In the males blood pressures, both SP and DP, remain relatively constant up to the 10 to 14 age group and then increase steeply to reach a maximum at 18 years. In the females blood pressures increase progressively from 1 to 18 years. Further research is necessary to confirm this variation and its relationship to the differing growth curves of males and females.

In conclusion, although the sample size of the present study is small, because it is on a whole population practising caste effective endogamy and leading a uniform traditional rural lifestyle, the results of the variation with sex and age of blood pressures can be interpreted meaningfully.

ACKNOWLEDGEMENTS

The biometric study at Talkote village was funded by the Human Settlements Programme of the Cultural Triangle Fund. We acknowledge with thanks the help of Mr R M C Ekanayake and Mr S R Masakorale and Miss Chitrangani de Silva of the Department Anatomy in the preparation of the manuscript.

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Key Words: Anthropometry of adults, secular change, BMI and energy balance, total body fat from body mass.

INTRODUCTION

There have been no studies on the anthropometry of Sri Lankan adults drawn from different districts since those of Marrett (1) in 1937/39, published posthumously by Steudt in 1962, and of Cullumbine and colleagues in 1947/49 (2,3). Both these studies showed inter-ethnic and inter-district differences. After a study of 333 medical undergraduates in 1974 Balasinghe (4) concluded that difference between two major ethnic groups, the Sinhalese and Tamils, no longer existed. Such a conclusion is supported by recent studies on school children (5,6,7).

This is a report of a study carried out in 1983/89 on sportsmen and sportswomen drawn from several districts in the country. The aims of the study were to obtain values for height, weights and BMI for adults that could be used by planners to compare these values with values reported earlier to look for inter-district and inter-gender differences in various anthropometric characteristics and to study the applicability of a body mass index less than 18.5 as an indicator of chronic energy deficiency in adults.

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