

Rural and Urban Variation of Blood Pressure and Anthropometric Measurements Among The Golla Females of Nellore District, Andhra Pradesh

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ABSTRACT In the present study rural urban variation of blood pressure and anthropometric measurements among the Golla females of Nellore district has been investigated. Data collected on 75 rural and 75 urban females between 20 and 60 years of age. The mean systolic and diastolic blood pressures were found to be higher in urban females than in the rural. The urban showed more body fat than the rural. The differences were explained due to the effect of urbanisation.

INTRODUCTION

Many studies demonstrated that blood pressure levels and body measurements of different populations vary from each other depending on socio-cultural, psychological, genetic and environmental factors. It was also reported that, populations under transition from traditional culture to urbanisation show more extreme distribution of hypertension (Ward, 1983). To identify the underlying causes for this change is difficult and still not clear. In such circumstances, it would be worthwhile to investigate the blood pressure levels and body measurements of the people of one ethnic group living in different environmental conditions.

The studies on rural urban variations of anthropometry and blood pressure levels revealed inconsistent results (Padmavathi and Gupta, 1959; Keil and Cowan, 1977; Thibault et al., 1985; Sambasivarao and Veerajulu, 1986; Talwar et al., 1990). Therefore present study was undertaken to investigate the range of variation in blood pressure and anthropometric traits of rural and urban Golla females and also to evaluate the effect of physique on blood pressure levels.

MATERIAL AND METHODS

Anthropometric and blood pressure measurements were taken on a randomly selected sample of 150 Golla females, 75 Urban and 75 Rural, whose age ranged between 20 and 60 years. The urban sample was drawn from Nellore town and the rural from Ravur village which is about 25 km away from the town limits. Regarding education and economy, the samples differed slightly.

Anthropometric measurements were taken according to Weiner and Lourie (1981). They include stature, weight, upper arm circumference, biceps sft, triceps sft and body mass index. Blood pressure readings were taken using mercury sphygmomanometer and stethoscope according to the procedure given by Rose et al. (1982). These readings were taken in the morning time in their home environment.

RESULTS AND DISCUSSION

Table 1 presents the comparison of anthropometric measurements between rural and urban Golla females in all the age groups including pooled data (all age groups combined). Rural females were found to be taller than the urban. Weight, subcutaneous fat and body circumferences showed higher values in urban people than the rural. Many of the differences were found to be significant. These results showed more fat deposition in urban females as they practice less physical activity.

Table 2 shows the comparison of blood pressure levels between rural and urban females in all age groups including pooled data. The

Table 1: Comparison of anthropometric measurements between rural and urban Golla females

Age group (in years)	Residence (N)	Stature (cm)		Weight (kg)		Upper arm circumference (cm)		Biceps Sft. (mm)		Triceps Sft. (mm)		Body Mass Index	
		Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD
20-29	Rural (31)	154.88 $\pm$ 5.69	49.97 $\pm$ 8.73	23.16 $\pm$ 2.78	2.68 $\pm$ 0.78	14.28 $\pm$ 4.33	20.00 $\pm$ 2.84						
	Urban (35)	153.65 $\pm$ 5.80	49.22 $\pm$ 8.77	24.04 $\pm$ 2.84	4.48 $\pm$ 1.85	13.64 $\pm$ 4.35	20.83 $\pm$ 2.98						
	t-value	0.87	0.34	1.28	5.07 ¹	0.59	0.22						
30-39	Rural (27)	150.80 $\pm$ 4.44	53.49 $\pm$ 9.41	23.90 $\pm$ 2.56	2.47 $\pm$ 1.07	13.90 $\pm$ 5.44	22.57 $\pm$ 3.37						
	Urban (20)	153.54 $\pm$ 6.12	52.50 $\pm$ 1.50	26.00 $\pm$ 3.93	4.37 $\pm$ 2.12	16.44 $\pm$ 5.29	22.52 $\pm$ 5.75						
	t-value	1.70	0.31	2.10 ¹	4.16 ¹	1.61	0.03						
40 above	Rural (17)	152.94 $\pm$ 6.51	55.23 $\pm$ 10.46	24.06 $\pm$ 2.18	2.82 $\pm$ 0.87	16.66 $\pm$ 4.03	23.53 $\pm$ 3.34						
	Urban (20)	151.18 $\pm$ 6.67	60.85 $\pm$ 10.68	27.85 $\pm$ 3.81	5.37 $\pm$ 3.31	16.47 $\pm$ 4.91	27.12 $\pm$ 5.07						
	t-value	0.81	1.61	3.78 ¹	0.31 ¹	0.13	2.58 ¹						
Pooled	Rural (75)	154.18 $\pm$ 5.45	52.42 $\pm$ 9.65	23.63 $\pm$ 2.61	2.64 $\pm$ 0.91	14.93 $\pm$ 4.80	22.18 $\pm$ 3.71						
	Urban (75)	152.96 $\pm$ 6.22	53.20 $\pm$ 11.16	25.58 $\pm$ 3.78	4.59 $\pm$ 2.32	15.05 $\pm$ 5.07	22.77 $\pm$ 4.99						
	t-value	1.28	0.46	3.71 ¹	6.78 ¹	0.15	0.83						

1. Significant at 5% level

Table 3: Age-wise variation of blood pressure with reference to Body Mass Index among Golla females

Age group (in years)	Body mass categories	Systolic blood pressure						Diastolic blood pressure					
		Rural			Urban			Rural			Urban		
		N	Mean $\pm$ SD	N	Mean $\pm$ SD	t-value	N	Mean $\pm$ SD	N	Mean $\pm$ SD	t-value	N	Mean $\pm$ SD
20-29	Below 19.9	11	99.09 $\pm$ 5.61	16	97.44 $\pm$ 10.61	0.52	11	51.27 $\pm$ 6.47	16	52.12 $\pm$ 9.19	0.28	16	55.62 $\pm$ 10.76
	20.0 - 24.9	16	94.75 $\pm$ 9.15	16	100.37 $\pm$ 11.13	1.56	16	49.75 $\pm$ 8.67	16	55.62 $\pm$ 10.76	1.70	16	56.50 $\pm$ 9.19
	25.0 - 29.9	2	137.00 $\pm$ 38.18	2	100.00 $\pm$ 2.83	1.36	2	78.00 $\pm$ 18.38	2	56.50 $\pm$ 9.19	1.48	2	62.00 $\pm$ 0.00
	30 above	—	—	1	110.00 $\pm$ 0.00	—	—	—	1	62.00 $\pm$ 0.00	—	1	50.50 $\pm$ 7.46
30-39	Below 19.9	6	101.33 $\pm$ 8.07	8	96.75 $\pm$ 7.78	1.07	6	54.67 $\pm$ 8.16	8	59.75 $\pm$ 10.33	0.98	8	59.75 $\pm$ 10.33
	20.0 - 24.9	12	101.83 $\pm$ 7.74	8	106.75 $\pm$ 7.25	1.45	12	56.25 $\pm$ 2.96	8	68.50 $\pm$ 4.95	0.93	8	68.50 $\pm$ 4.95
	25.0 - 29.9	6	107.33 $\pm$ 9.27	2	113.00 $\pm$ 15.56	0.49	6	59.33 $\pm$ 8.16	2	76.00 $\pm$ 22.63	1.89	2	76.00 $\pm$ 22.63
	30 above	—	—	2	131.00 $\pm$ 12.73	—	—	—	2	60.00 $\pm$ 0.99	—	2	60.00 $\pm$ 0.99
40 above	Below 19.9	3	118.00 $\pm$ 22.54	1	134.60 $\pm$ 0.00	—	3	62.00 $\pm$ 6.00	1	64.57 $\pm$ 9.50	—	1	64.57 $\pm$ 9.50
	20.0 - 24.9	11	117.64 $\pm$ 14.91	7	121.00 $\pm$ 9.64	0.58	11	64.91 $\pm$ 5.47	7	71.20 $\pm$ 10.73	2.45 ¹	7	71.20 $\pm$ 10.73
	25.0 - 29.9	5	120.00 $\pm$ 12.73	5	135.60 $\pm$ 24.38	1.27	5	58.40 $\pm$ 4.56	5	77.14 $\pm$ 11.42	1.39	5	77.14 $\pm$ 11.42
	30 above	2	121.00 $\pm$ 1.41	7	139.43 $\pm$ 14.99	4.92 ¹	2	71.00 $\pm$ 1.41	7	77.14 $\pm$ 11.42	1.39	7	77.14 $\pm$ 11.42

1. Significant at 5% level

Table 2 : Comparison of blood pressure levels between rural and urban Golla females

Age group (in years)	Residence (N)	Systolic blood pressure (mmHg) Mean $\pm$ SD	t-value	Diastolic blood pressure (mmHg) Mean $\pm$ SD	t-value
20 - 29	Rural (31)	101.87 $\pm$ 12.99	0.03	58.47 $\pm$ 8.23	-0.18
	Urban (35)	101.74 $\pm$ 17.10		58.25 $\pm$ 6.48	
30 - 39	Rural (27)	102.29 $\pm$ 8.83	1.06	58.03 $\pm$ 5.16	1.71
	Urban (20)	105.80 $\pm$ 12.71		62.05 $\pm$ 9.56	
40 above	Rural (17)	115.99 $\pm$ 13.45	2.65 ¹	63.76 $\pm$ 5.85	2.62 ¹
	Urban (20)	128.85 $\pm$ 16.12		70.80 $\pm$ 10.27	
Pooled	Rural (75)	105.22 $\pm$ 13.15	1.75	58.98 $\pm$ 8.85	2.31 ¹
	Urban (75)	110.05 $\pm$ 19.99		62.62 $\pm$ 10.43	

1. Significant at 5% level

data insignificantly showed increase in systolic and diastolic blood pressure levels with age. In almost all the age groups including pooled data, urban folk showed higher mean blood pressure values than the rural.

Table 3 shows the agewise variation of blood pressure with reference to body mass index (BMI) in rural and urban females. The analysis reveal that females with lower BMI have lower blood pressure than those with higher BMI in both rural and urban samples. Some differences are statistically significant. Both in systolic and diastolic blood pressure levels an increasing trend is observed with increase in the BMI. It is also clear from the table that both systolic and diastolic blood pressure with respect to BMI are higher in urban community than the rural.

Table 4 shows the incidence of normotensives, border line cases and hypertensives according to WHO classification (World Health Organisation, 1962). The incidence of

hypertensives and border line cases is more in urban people than the rural.

Padmavathi and Gupta (1959), Indrayan et al. (1972), Srivastava et al. (1977), Gupta et al. (1979) and Sambasivarao and Veerajju (1986) showed lower blood pressure values in rural population than in the urban. The studies of Berkson et al. (1960), Gampel et al. (1962, 1967) and Benson et al. (1966) in America and other countries showed higher blood pressure levels in urban populations than the neighbouring rural populations. Results of the present study also coincide with the existing literature and reveal higher systolic and diastolic blood pressure levels and greater incidence of hypertension in urban people than the rural.

Higher levels of blood pressure and greater incidence of hypertension in the urban can be explained as follows. Urban people practice less physical activity than the rural, since the later has to undertake many heavy works at fields, domestication of animals etc. (Gupta

Table 4 : Incidence of normotensives, borderline case and hypertensives according to WHO classification

	Urban				Rural			
	SBP alone		DBP alone		SBP alone		DBP alone	
	N	%	N	%	N	%	N	%
Normotensives females	70	93.33	73	97.33	74	98.66	74	98.66
Borderline cases	1	2.66	1	1.33	—	—	1	1.33
Hypertensives	3	4.00	1	1.33	1	1.33	—	—

et al., 1979 ; Sambasivarao and Buci, 1983). Also, urban people are more exposed to pollutants which cause stress in them, resulting higher blood pressure levels. In a study on a Caribbean population, it was hypothesized that stress created by cultural environment can produce physiological abnormalities like elevation of blood pressure (Hutchinson, 1986). The stress hypothesis also reported that the populations under transition from traditional life to modern life usually have higher blood pressure levels than those whom they are emulating.

REFERENCES

- Benson, H., Costos, R., Garcia Palmieri, M.R., Felikerti, M., Aixala, R., Balanton, J.M. and Colon, A.A. : Coronary heart disease risk factors : A comparison of two Puerto Rican populations. *Am. J. Pub. Health*, 56 : 1057 (1966).
- Berkson, D.M., Stambler, J., Lindberg, H.A., Miller, W., Malthias, H., Lasky, H. and Hall, Y. : Socio-economic correlates of atherosclerotic and hypertensive heart disease. *Ann. N.Y. Acad. Sci.*, 84 : 835 (1960).
- Gampel, M.B., Slane, C., Scotch, N. and Abramson, J.H. : Urbanization and hypertension among Zulu adults. *J. Chronic Dis.*, 15 : 67 (1962).
- Gupta, S.P., Siwach, S.B. and Gupta, M.S. : Hypertension and blood pressure trends and in the general population of Haryana (based on total community survey). *J. Assoc. Phys. Ind.*, 27 : 119-126 (1979).
- Hutchinson, J. : Association between stress and blood pressure variation in a Caribbean population. *Am. J. Phys. Anthropol.*, 71 : 69-79 (1986).
- Indrayan, A., Srivastava, R.N. and Bagchi, S.C. : Age regression of blood pressure in an urban population of 15-19 years. *IJMR*, 60 : 966 (1972).
- Keil, J.E. and Cowan, B. : Prevalence of hypertension in females of Punjab state, India : Relationship with age, residence, heart rate, occupation and obesity. *Hum. Biol.*, 49 : 641-650 (1977).
- Padmavathi, S. and Gupta, S. : Blood pressure studies in urban and rural groups of Delhi. *Circulation*, 19 : 395-405 (1959).
- Rose, G.A., Blackburn, H., Gillum, R.F. and Prineas, R.J. : Cardiovascular survey methods. *WHO Publications*, No. 56 (1982).
- Sambasiva Rao, R. and Buci, B.R. : Physical activity and blood pressure (A study among slum dwellers). *Bombay Hosp. J.*, 25 : 35-40 (1983).
- Sambasivarao, R. and Veeraj, P. : Blood pressure study in rural, semirurban and urban populations of Visakhapatnam district, South India. *Studies in Human Ecology*, 7 : 95-111 (1986).
- Srivastava, R.N., Verma, B.L., Kumar, A. and Srivastava, J.P. : Blood pressure in a rural adult population : Percentile distribution by age and sex. *IJMS*, 65 : 142-149 (1977).
- Stamler, J., Berkson, D.M., Linolberg, H.A., Miller, W.A., Stamler, R. and Collette, R. : Socio-economic factors in the epidemiology of hypertensive disease. In : *The Epidemiology of Hypertension*. Stamler et al. (Eds.). New York.
- Talwar, I., Sharma, K. and Kapoor, R. : Anthropometry and blood pressure of urban and rural young adult female. In : *Contemporary Studies in Human Genetics*. Bhagwan Ray (Ed.), Indian Institute of Bio-social Research of Development, Calcutta (1990).
- Thibault, H.W., Laplante, L., Tanguay, R. and Demirjian, A. : Anthropometric differences between rural and urban French-Canadian school children. *Hum. Biol.*, 57 : 11-29 (1985).
- Ward, R.H. : Genetic and socio-cultural components of high blood pressure. *Am. J. Phys. Anthropol.*, 62 : 91-105 (1983).
- Weiner, J.S. and Lourie, J.A. (Eds.) : *Practical Human Biology*. Academic Press, London (1981).
- World Health Organisation : Arterial hypertension and is-chemic heart disease; preventive aspects. *Tech. Rep. Ser.*, 321 (1962).