

## A Study on Bilateral Asymmetry in Skinfold Thickness Measurements

R. Gupta

### ABSTRACT

The possibility of bilateral asymmetry in skinfold thickness measurements at triceps and subscapular sites has been investigated using data from Mirpur village, district Midnapore, West Bengal. The sample comprises 56 male adults and 49 male children. Measurements were made, using Lange Skinfold Caliper, following standard methods, on the left and right sides of the body, with the subject standing in a relaxed condition. The analysis shows that the differences between the left and right sides, with regard to both triceps and subscapular measurements, are insignificant with respect to their means and variabilities.

### Introduction

Studies have shown that bilateral asymmetry exists in many biological traits<sup>1, 2, 3, 4</sup>. For instance, paired organs of the human body, generally, are not identical in shape, size and position between the left and right sides. Paired internal organs, e. g., lungs, kidneys, testes, ovaries, and external ones, e. g., hands, legs, ears, eyes, breasts, show unlikeness of form and size between the two sides. The positions of most of the unpaired viscera, e. g., heart, and liver are not exactly medial<sup>5</sup>.

Bilateral asymmetry with regard to dermatoglyphic traits and anthropometric measurements is well known<sup>6</sup>, as is the size difference between left and right upper canines<sup>7</sup>. Stewart<sup>8</sup> has referred to a deformation of the skull having fatal implications, i. e., plagiocephaly, the asymmetry of the vault produced mostly by premature occlusion of the coronal or lambdoidal suture on one side.

Baillet et al.<sup>9</sup>, working on dental asymmetry in Tristan and a few other po-

pulations, suggested that asymmetry was greater in the populations living under the least favourable environmental conditions, and that it can be used as a measure of a population's degree of adaptation to environment.

In view of such general observations concerning bilateral asymmetry, the possibility of asymmetry in skinfold thickness measurements has been investigated by several workers. Skinfold thickness measurements are a set of anthropometric measurements of physiological importance which came into general use rather recently<sup>10, 11, 12, 13, 14</sup>. The observations made so far yield contradictory results. Parizkova and Roth<sup>15</sup> found significant difference between the left and right sides with respect to measurements taken at triceps and biceps in both boys and girls. They also found significant difference between the measurements taken on the left and right sides at supra-iliac in boys but not between those taken at the subscapular and calf site. Womersley and Durnin<sup>16</sup> however, found no significant difference, except at triceps. In view of

Received for publication October 15, 1979

such contradictory findings, we examined the possibility of bilateral asymmetry in triceps and subscapular skinfold thickness measurements, using our data from a rural Indian population.

#### Material and method

Data on skinfold thickness measurements, collected as part of an ongoing bio-anthropological survey of Mirpur village, Midnapore district, West Bengal, have been analysed. The sample consists of 56 male adults and 49 male children. Some of the adult subjects work in Calcutta and visit home during weekends to cultivate their land while others live permanently in the village. The children engage in household chores and work in the field when necessary.

The community under study professes Christianity and, incidentally, claims descent from Portuguese gunners who were brought by Rani Janki of Mahisadal around 1770 to protect her estate from raiders and pirates.

Skinfold thickness measurements were made, using Lange Skinfold Caliper (with a face area of 30 mm and a constant pressure of 10 gm/mm<sup>2</sup>), over triceps and subscapular regions. The landmarks were defined following Weiner and Lourie<sup>14</sup>. The measurements were made on the left and right sides of the body with the subjects standing in a relaxed condition. The skinfold (skin and subcutaneous tissue but not muscle or fascia) was grasped between the thumb and index finger, the caliper was applied about 1 cm above the fingers holding the skinfold, and the reading was made to the nearest mm two seconds after the full pressure of the caliper was applied.

#### Results and discussion

The t-tests served to assess the significance of difference of means between the left and right sides. Table 1 shows that the mean values of the skinfold thickness at triceps and subscapular sites on the left and right sides do not differ significantly in adult males.

TABLE 1  
TRICEPS AND SUBSCAPULAR SKINFOLD MEASUREMENTS (in mm) OF THE LEFT AND RIGHT SIDES (ADULT MALES)

Site	Triceps		Subscapular	
	Mean ± S. E.	Variance	Mean ± S. E.	Variance
Left	5.18 ± 0.33	2.22	7.50 ± 0.39	2.93
Right	5.16 ± 0.29	2.17	7.77 ± 0.42	3.11
$t = 0$		$t = 0.47$		
$F_{55,55} = 1.04$		$F_{55,55} = 0.89$		

TABLE 2  
TRICEPS AND SUBSCAPULAR SKINFOLD MEASUREMENT (in mm) ON THE LEFT AND RIGHT SIDES (MALE CHILDREN)

Site	Triceps		Subscapular	
	Mean ± S. E.	Variance	Mean ± S. E.	Variance
Left	5.13 ± 0.34	2.72	4.41 ± 0.17	1.34
Right	4.79 ± 0.22	2.37	4.21 ± 0.18	1.19
$t = 1.08$		$t = 0.87$		
$F_{48,48} = 1.16$		$F_{48,48} = 1.13$		

In order to assess the statistical significance of the differences between the left and right sides of the body with regard to variability, variance ratios (F-statistics) were calculated (Table 1). The F-values show that in adult males the left and right sides of the body do not differ significantly with respect to variability. Similar results were obtained in male children (Table 2).

Thus the present data fail to show any significant bilateral asymmetry with regard to the two measurements under consideration, whether we look at the mean or the variability. Our general observation stands in contrast to that of Pařízková and Roth<sup>4</sup>, for which we do not offer an explanation.

#### Acknowledgements

I am indebted to the authorities of the Geonkhali High School for providing us accommodation, to The Venerable The Archdeacon of Calcutta and the Parish priest of the Roman Catholic church in Mirpur for their generous help and cooperation, to the district authorities, Midnapore district, Government of West Bengal for introducing us in Mirpur, to the authorities of Indian Statistical Institute for financial and logistic support, to Shri P. Adhikary for typing the manuscript, to the people of Mirpur for their unhesitating help and cooperation since the very inception of the project and to Dr. A. Basu for guiding this work.

#### REFERENCES

1. TORGERSEN, J. *Acta Radiol.* 36 (1951) 521.  
 — 2. WATSON, E. H., G. H. LOWREY: *Growth and Development* (Year Book Pub. Inc. Chicago 1954). — 3. BAER, M. J., J. DURKATZ, *Am. J. Phys. Anthrop.* 15 (1957) 181. — 4. PAŘÍZKOVÁ, J., Z. ROTH, *Hum. Biol.* 44 (1972) 613.  
 — 5. CUMMINS, H., C. MIDLO: *Finger Prints. Palms and Soles; An Introduction to Dermatoglyphics* (Dover Publications, New York 1961). — 6. HOLT, S. B.: *The Genetics of Dermal Ridges* (Charles C. Thomas Illinois 1968).  
 — 7. BAILIT, H. L., P. L. WORKMAN, J. D. NISWANDER, C. J. MACLEAN, *Hum. Biol.* 42 (1970) 626. — 8. STEWART, T. D. (Ed.): *Hrdlicka's Practical Anthropology* (The Wistar Institute of Anatomy, Philadelphia 1952). — 9. BROZEK, J. (Ed.): *Body Measurements and*

*Human Nutrition* (Wayne State Univ. Press, Michigan 1956). — 10. BROZEK, J.: *The measurements of body compositions in: A Handbook of Anthropometry* (Ed. Ashley Montagu, M. F.; Charles C. Thomas, Illinois 1960). — 11. BROZEK, J., A. HENSCHEL (Eds.): *Techniques for Measuring Body Composition* (National Academy of Sciences — National Research Council, Washington D. C., 1961). — 12. DAMON, A., R. F. GOLDMAN, *Hum. Biol.* 38 (1966) 32. — 13. PAŘÍZKOVÁ, J. *Metabolism*, 10 (1961) 794. — 14. PAŘÍZKOVÁ, J., P. BUZKOVÁ, *Hum. Biol.* 41 (1971) 436. — 15. WOMERSLEY, J., J. V. G. A. DURRIN, *Hum. Biol.* 45 (1973) 281. — 16. WEINER J. S., J. A. LOURIE: *Human Biology; A Guide to Field Methods* (Blackwell, Oxford 1969).

R. Gupta

*Anthropometry and Human Genetics Unit, Indian Statistical Institute, 203 B. T. Road, Calcutta — 700035, India*

#### PROUČAVANJE BILATERALNE ASIMETRIJE KOD MJERENJA DEBLJINE KOŽNIH NABORA

#### SAŽETAK

Na osnovu podataka iz sela Mirpur, pokrajina Midnapore, Zapadni Bengal, ispitivana je moguća bilateralna asimetrija kod mjerenja debljine kožnih nabora tricepsa i subskapularne regije. Uzorak obuhvaća 56 odraslih muškaraca i 49 muške djece. Mjerenja su vršena pomoću »Lange Skinfold Caliper«, prema standardnoj metodi, na lijevoj i desnoj strani tijela, a ispitanici su bili u opuštenom položaju. Analiza pokazuje da razlike između lijeve i desne strane i u subskapularnoj regiji nisu značajne s obzirom na srednje vrijednosti i varijable.