

A Comparative Study on Thigh Length to Leg Length Ratio in Adult Males of Two Southern States in Nigeria

W.N. Dare, A.Z. Erefah and P.D. Ogbe

Department of Anatomy, College of Health Sciences,
Niger Delta University, Wilberforce Island, Nigeria

Abstract: A comparative study of the thigh length and leg length in adult males of Bayelsa and Rivers States was embarked upon in order to compare and establish a difference between the two states. The thigh length and leg length of 500 adult males (250 from each state) were measured. The thigh length to leg length ratio was determined by thigh length divided by leg length. The results showed that the mean thigh length to leg length ratio of Bayelsa and Rivers study population were 0.95 ± 0.87 and 0.96 ± 0.83 respectively. The magnitude of difference between the two ratios is 0.01. There was no significant difference in thigh length and leg length ratio in adults in Bayelsa state and Rivers state ($p > 0.05$). However, the mean leg length was greater than mean thigh length amongst adult males in both study populations. The mean thigh length and the mean leg length for Bayelsa and Rivers states were 42.86 ± 0.47 cm, 45.12 ± 0.54 cm and 43 ± 0.59 cm, 45 ± 0.71 cm respectively. On the basis of anthropometric measurement, we conclude that there was no significant difference in mean thigh length to leg length ratio for adult males in Bayelsa and rivers states of Nigeria.

Key words: Thigh length • Leg length • Adult male • Bayelsa and Rivers states

INTRODUCTION

Variation is one of the most important phenomena occurring in humans and is attributed to many factors such as mutation and natural selection [1, 2], aging [3], height changes [4] nutrition [5]. Anthropometry is a series of systematized measuring techniques that express quantitatively the dimensions of the human body and skeleton. Many studies have emphasized the importance of anthropometric measurements as a means of studying variations in human populations [1]. Anthropometry, often viewed as a traditional and perhaps the basic tool of biological anthropology, has a long tradition of use in forensic sciences and it is finding increase use in medical sciences especially in the discipline of forensic medicine. It is highly objective and reliable in the hands of trained anthropometrist [6].

The thigh is the region of the lower limb between the hip and the knee; it can be delineated anatomically by the greater trochanter at the hip superiorly and the lower border of the condyles inferiorly [7]. The two bones in the leg are; medially, the tibia and laterally, the fibula.

In the early days anthropometrists were interested in measurement of the cranium and face because the investigations were concerned with establishing ancestral relationship between different racial groups. It was believed that the shape of the skull remained constant in each race and that different races showed different indices [8]. Thigh length and leg length are relevant anthropometric parameters. Measurement of thigh and leg lengths for body building males was found to be 17.88inches and 21.00 inches with a ratio of 0.851 [9] and 48.50cm and 47.20cm with a ratio of 1.03 for trained adolescent females [10].

Bayelsa and Rivers states are situated in the extreme south of Nigeria. They are located in the Niger Delta area and shared common boundary. This study was aimed at establishing a difference in body proportion of individuals in the two states, using the age brackets of thigh length to leg length as parameters. It is also aim at providing reference data for Bayelsa and Rivers states which could be of relevance in clinical practice in forensic medicine and anthropological studies.

MATERIALS AND METHODS

The study population consisted of 500 adult males from Bayelsa and Rivers states (250 from each state) with age range of 20-60years. Participants were of different socioeconomic back ground which were representative of reference population and were selected by simple random sampling from various communities in the two states. All participants were healthy and without symptoms of lower limb abnormalities. Consent of participants were sought and obtained for the study.

Thigh length was measured with a flexible tape from the greater trochanter above to the lower border of the condyles below. The leg length was measured from the lateral condyle above to the level of the lateral malleolus below. All the measurements were taken with the subject in the erect position and to the nearest centimeter.

Statistical analysis was done using a two tail paired student t-test.

RESULTS

The results are summarized in the table below. The study revealed that there was significant difference in lower limb length between adult males in Bayelsa and Rivers states in Nigeria. It was discovered that mean leg length was greater than the mean thigh length in adult males in Rivers and Bayelsa states. Mean thigh length to leg length ratio for Rivers and Bayelsa were 0.96 ± 0.83 and 0.95 ± 0.87 respectively. There was no significant difference ($p < 0.05$) between the two states which agrees with that of a previous study [11]. The study also revealed that the mean thigh length to leg length ratio was almost the same for the various age ranges, except a slight difference in adult males in the age groups 38-43, as shown in the Table 1.

DISCUSSION

This study was conducted to establish a difference in body proportions of adult male individuals in Bayelsa and Rivers States using the thigh length and leg length as parameters. Human biologists generally use anthropometric measurements of the body proportion to study variations in body composition and relate them to hereditary, environmental and developmental factors. Thus, the use of the anthropometric measurements of the body has recently been incorporated in different fields of science such as nutrition, paediatrics and endocrinology.

The possibility that differences could occur in the thigh length and leg length of adult males of Bayelsa and Rivers states were investigated. The study showed that the mean thigh length to leg length ratio among the study population were 0.95 ± 0.87 and 0.96 ± 0.83 for Bayelsa and Rivers states respectively. This is consistent with previous study which showed that the thigh length to leg length ratio in a particular population was 0.85 [9] which is less than 1. This disagrees with the results of another study that the thigh length to leg length ratio was 1.03 [10].

Even though there has been little or no work done to compare this anthropometric parameters between the two states, the present study was consistent with some other studies. This had shown that body proportions are the dimensions of the different body parts, in relation to each order and that it is a function of age and sex in a particular race. Variations in this body proportions depend on variations in the dimensions of the skeleton, development of muscles and fat content distribution in the body. These in turn are dependent on the influence of climate, diet and health which are important determinants of development and growth. Although these results represent only adult males in the two states of Nigeria,

Table 1: Showing mean \pm SD of thigh length / leg length ratio between Bayelsa and Rivers states.

Age range	Bayelsa state				Rivers state			
	Number	Mean TL	Mean LL	Ratio	Number	Mean TL	Mean LL	Ratio
20-25	60	45 \pm 0.5	47 \pm 0.54	0.96	70	44 \pm 0.4	46 \pm 1.0	0.96
26-31	63	42 \pm 0.6	44 \pm 0.6	0.95	53	43 \pm 0.6	45 \pm 0.9	0.96
32-37	52	43 \pm 0.3	45 \pm 0.52	0.96	42	45 \pm 0.8	47 \pm 0.6	0.96
38-43	45	41 \pm 0.7	44 \pm 0.42	0.93*	45	40 \pm 0.6	42 \pm 1.5	0.95*
44-49	20	42 \pm 0.6	45 \pm 0.5	0.93*	20	44 \pm 0.5	46 \pm 1.0	0.96*
50-55	5	44 \pm 0.3	46 \pm 0.45	0.96	15	42 \pm 0.7	44 \pm 0.5	0.96
56-60	5	43 \pm 0.3	45 \pm 0.75	0.96	5	43 \pm 0.5	45 \pm 0.5	0.96

A two tail paired student t-test. *Values were not significantly different, $p > 0.05$

the result does not show a direct interpretation on the influence of climate, diet and health on the development and growth of the bones and the various age distributions.

CONCLUSION

The mean thigh length to leg length ratio for Bayelsa and Rivers states study population were 0.95 ± 0.87 and 0.96 ± 0.83 respectively. The magnitude of difference between the two states was 0.01, which is not statistically significant. On the basis of anthropometric measurements, it can be concluded that there was no significant difference in mean thigh length to leg length ratio for adult males of Bayelsa and Rivers states of Nigeria. This may be useful to physical anthropology, forensic investigation and clinical practice. Further studies should be done in other states of Nigeria to form basis for comparison.

REFERENCES

1. Oladipo, G.S., A.I. Udoaka, E.O. Afolabi and I.F. Bob-Manuel, 2009. Nasal Parameters of Itsekiris and Urhobos of Nigeria. *The Internet Journal of Biological Anthropology*, 3(1).
2. Aggarwal, A.N., D. Gupta and S.K. Jindal, 1999. Interpreting Spirometric Data: Impact of substitution of Arm Span for standing height in adults from North India. *Chest Med*, 115: 557-562.
3. Gunby, M.C. and J.E. Morley, 1994. Epidemiology of bone loss with aging Chin Geriator Med., 10: 557-571(181) {Medicine}
4. McPherson, R., D.R. Lancaster and J.C. Carrole, 1978. Height changes with aging in African-Americans, 33: 20-25.
5. Agyekum, S. and Fak Tayie, 1999. Armspan as an Alternative Index for Height in the Adult Ghanian. Department of Nutrition and Food Science, University of Ghana, Legon, pp: 4-42.
6. Krishan, K., 2007. Anthropometry in forensic medicine and forensic science-Forensic Anthropometry. *The Internet Journal of Forensic Science*, 2:(1).
7. Moore, K. and A. Dalley, 1999. Clinically Oriented Anatomy. 4th Edn., Lippincott Williams and Wilkins, pp: 332-331, 506.
7. Abbey, O.E., 1980. Body proportions measurements of length and breadth of foot in relation to body height.
9. Noel's building chart, 2008.
10. David, L., H. May and H. Mike, 1996. Relationship of Structural Dimensions to Leg Strength Trained Adolescent Females. *IAHPERD Journal*, 29(2): spring.
11. Kelly, M.A. and J.O. Onyeka, 1998. *An Introduction to Statistics and Experimental Design for the Life Sciences*; Enugu and Lagos, ABC Publishers.