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# Thigh Length: Stature Ratio of the Yoruba Ethnic Group in Nigeria

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## ABSTRACT

This study was carried out to determine the average value for the stature, thigh length and thigh length to stature ratio of the Yoruba ethnic group. It was also carried out to determine the correlation between the stature and thigh length, and to establish a formulae for estimation of height using thigh length of the adult Yoruba ethnic group, as well as to determine if there are sexual dimorphism in these parameters. Seven hundred and twenty subjects (720 Yoruba's) 360 Yoruba males and 360 Yoruba females were used for this study, between the age range of 18 to 50 years.The location where this study was carried out were: University of Lagos Yaba, Lagos State College of Education Isolo, Ikotun Community and Ijegun Community Ambrose Alli University Ekpoma and university of Port Harcourt.The morphological measurements were stature (height) and thigh length. The mean and standard deviation of the stature, thigh Length and Thigh length: Stature Ratio for males were 172.78±7.01cm, 43.82±2.68cm and 25.35±0.955cm and while for the females, it was 167.22±6.19cm, 43.62±2.75cm and 26.07±1.11cm .It was observed that the Yoruba males had a significantly higher height than the Yoruba females ($p<0.05$). There was no significant difference between the Yoruba males thigh length and the females thigh length ($p>0.05$).There was a significant difference between the thigh length to stature ratio of the Yoruba males and female subjects. The Yoruba females had a significantly higher thigh length to stature ratio than the Yoruba males ($p<0.05$) .A regression formula for estimation of stature was established from the thigh length of the Yoruba subjects. When comparing the result in this study and works of previous authors, there were ethnic and racial differences in these parameters. This study has provided reference data for the Yoruba ethnic group. It will be useful to the anthropologist and the forensic scientist.

**Key words:** Anthropologist, Stature, thigh length, Yoruba.

## INTRODUCTION

For the purpose comparison and establishing norms for sex, age and race , external measurement and description of human body and its parts are neccessary[1] .There are biologically and statistically significant variations between human populations in body shape [2]. Thigh length bears a nearly constant relationship with stature in humans regardless of ethnicity or gender. Earlier study by [3] revealed that, the femur/stature ratio average 26.75% in adult human and the ratio was used to predict stature from femur length and it yielded a remarkably accurate estimate. Human body size and body proportion are interpreted as markers of ethnicity, race, adaptation to temperature, nutritional history and socioeconomic status. In a study carried out by[4], it was observed that the Blacks femur/stature ratio was significantly different from those of the Whites and the Asians. The femur length of shia muslims in India has been studied [5] . The Sitting height, standing height, arm span and leg lengths of 505 healthy women has also been studied by [6]. It was observed that the correlation of arm span and leg length with standing height were good. It was suggested by[7] that stature estimation methods are not universally applicable and that environmental differences within a population or differing levels of modernization and social and economic development between nations are an important source of variation in stature and body proportions of children. From the long limbs of Nigerians, stature has been estimated by [8] and in their study, they established a formulae specific to Nigerians. The height and weight of Nigerians resident in Calabar Metropolis in Cross River State of Nigeria has been studied[9]. Fawehinmi et al.[10] compared the femur to stature ratio between the Ijaw and the Ikwerre ethnic group of Nigeria and the Ijaw's had a higher femur length than that of the Ikwerre's. 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[11]. The thigh length and leg length of 500 adult males (250 from each state) were measured. They concluded that there was no significant difference in

mean thigh length to leg length ratio for adult males in Bayelsa and rivers states of Nigeria. Despite the anthropological and forensic relevance of knowledge of stature and thigh length, there is scarcity of literature on these parameters for the Yoruba ethnic group. This is the driving force behind this research. The aim of this study is to determine the average value for the stature and thigh length of the Yoruba Ethnic group of Nigeria. This study also seek to determine the correlation between the stature and thigh length, and to establish a formulae for estimation of height using thigh length. Finally, this study was carried out to examine if there are Sexual dimorphism, ethnic differences when comparing our result to works of other authors.

## MATERIALS AND METHODS

Seven hundred and twenty subjects (720 Yoruba's) 360 Yoruba males and 360 Yoruba females were used for this study, between the age range of 18 to 50 years. The location where this study was carried out were: University of Lagos Yaba, Lagos State College of Education Isolo, Ikotun Community and Ijegun Community Ambrose Alli University Ekpoma and university of Port Harcourt.

### Stature (Height)

This was measured using a steel meter rule with the subjects standing in upright position with both hands by the sides. The ruler was placed on top of the subjects (the person's) vertex to indicate the upper margin, the distance between the vertex and the floor is the height recorded in centimeter (cm).

### Thigh Length

The distance between the proximal end of the greater trochanter and the distal lateral femoral condyle was taken as the thigh length[2] (Barry and Maria,2010).

**Figure 1:** Measurement of thigh Length

### Thigh length: Stature Ratio

Thigh length: Stature Ratio was calculated by using the length of the thigh divided by the stature (height) multiplied by one hundred i.e. 100 x length of thigh /stature (height).

All linear measurements were in centimeters for each parameter. The data on the measured parameters were analyzed using the z-test to determine the sex differences and ($P < 0.05$) was taken as being statistically significant.

A correlation study was also carried out between the stature of subjects and thigh length. A regression analysis was also carried out to predict the stature (height) from the thigh length.

Verbal informed consent was sort from subjects before measurements were taken.

### PRECAUTIONS

The following precautions were taken during the measurement:

1. Measurements were taken on bare foot.
2. Each participant's measurements were taken twice to obtain accurate results.
3. Individuals with recognized deformities of either thigh or stature were exempted from the study.
4. Subjects used were from 18 to 50 years.
5. The subjects were indigenes of Yoruba ethnic group
6. Also Their parents and grandparents where from Yoruba.

**RESULTS**

The result of the mean and standard deviation of stature, thigh length and thigh length:stature ratio of the Yoruba ethnic group are shown in table1. The mean and standard deviation of the stature, thigh Length and Thigh length: Stature Ratio for males were 172.78±7.01cm, 43.82±2.68cm and 25.35±0.955cm and while for the females, it was 167.22±6.19cm, 43.62±2.75cm and 26.07±1.11cm .It was observed that the Yoruba males had a significantly higher height than the Yoruba females ($p<0.05$). There was no significant difference between the Yoruba males thigh length and the females thigh length($p>0.05$).There was a significant difference between the thigh length stature ratio of the Yoruba males and female subjects. The Yoruba females had a significantly higher thigh length to stature ratio than the Yoruba males($p<0.05$). Table2 shows Linear Regression Equation for Stature (Height) estimation from thigh length. Table3 Shows the Stature, thigh Length and thigh length stature ratio of Present Study and that of previous studies. It was observed that there were ethnic variations in these parameters. Table4 : Shows Mean thigh/Stature Ratio of Present and Past studies. It was observed that there were ethnic variations in these parameters. Figure 2 and 3 Shows the Pearson correlation between the Height and thigh length for the Yoruba males and females. It was observed that, there was a strong positive correlation between their height and the thigh length ($p<0.05$).

**Table 1:** Mean values of measured and calculated parameter for the Yoruba ethnic group.

| **Parameters** | **Sample Size (N)** | **Male Yoruba** | **Female Yoruba** |
|---|---|---|---|
| **Stature (cm)** | 360 | 172.78±7.01 | 167.22±6.19 |
| **thigh Length(cm)** | 360 | 43.825±2.688 | 43.625±2.757 |
| **Thigh length :Stature Ratio** | 360 | 25.355±0.955 | 26.077±1.106 |

$P<0.05$

**Table 2:** Linear Regression Equation for Stature (Height) from thigh Length

| Variable | Regression Equation |
|---|---|
| Yoruba Males thigh Length (cm) | Yoruba Males Height (Stature) = 92.2+1.72 Yoruba Males thigh Length |
| Yoruba Females thigh Length(cm) | Yoruba Females Height (Stature) = 81.2 + 2.09 Yoruba Females thigh Length |

**Table 3:** Stature, thigh length and thigh length stature ratio of present study and that of previous studies.

| Ethnic Group | Mean Stature (Height)cm (SD) | Mean thigh Length (cm) (SD) | Thigh: Stature Ratio |
|---|---|---|---|
| Male shia muslims in India (Bhavna, 2009)[5] | 167.66 ± 5.69 | 41.71 ± 1.96 | |
| Female shia muslims in India (Bhavna, 2009)[5] | 154.40 ± 4.91 | 38.93 ± 1.62 | |
| Ijaw males (Fawehinmi et al., 2013)[10] | 175.12 ± 7.76 | 46.72 ± 2.82 | 25.5 ± 0.72 |
| Ijaw females (Fawehinmi et al., 2013)[10] | 166.30 ± 8.29 | 40.90 ± 2.34 | 24.6 ± 0.77 |
| Ikwerre males (Fawehinmi et al., 2013)[10] | 164.50 ± 8.13 | 39.50 ± 2.20 | 23.6 ± 0.99 |
| Ikwerre females[10] | 156.40 ± 7.20 | 37.80 ± 2.81 | 23.2 ± 0.92 |
| Yoruba males (Present Study) | 172.78 ± 7.01 | 43.825±2.68 | 25.355 ± 0.95 |
| Yoruba females (Present Study) | 167.22 ± 6.19 | 43.625±2.75 | 26.077 ± 1.11 |

**Table 4 :** Mean thigh/stature ratio of present and past studies.

| Researchers | Ethnic Group | Male | Female |
|---|---|---|---|
| Fawehinmi et al. (2013)[10] | Ijaw | 25.50 ± 0.72 | 24.60 ± 0.77 |
| | Ikwerre | 23.60 ± 0.99 | 23.20 ± 0.92 |
| Present Study | Yoruba | 25.355 ± 0.955 | 26.077 ± 1.106 |

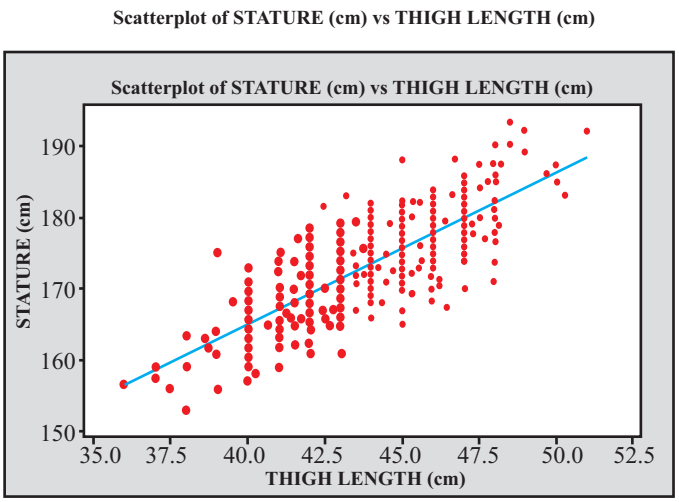


**Figure 2:** Pearson correlation of stature(cm) and thigh length(cm) of Yoruba males R = 0.802

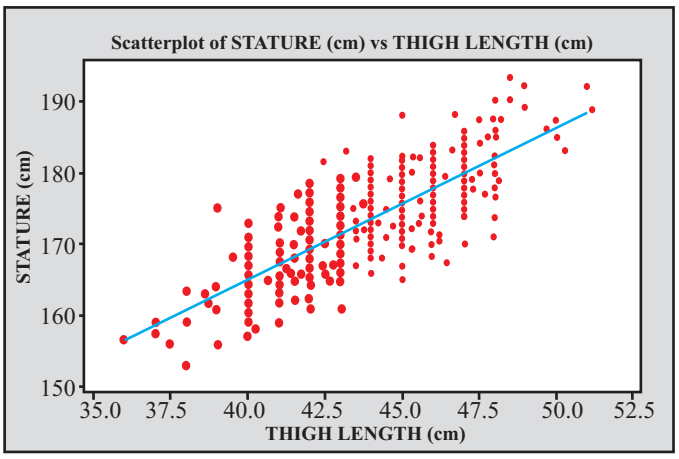


**Figure 3:** Pearson correlation of stature(cm) and thigh length(cm) of Yoruba females R = 0.767

## DISCUSSION

There are diversity of body sizes and shapes with respect to ethnic variations. This could be as a result of differences in our nutrition and genetic variations. Ethnicity also comes into play when one considers height or thigh measurement. The height and thigh length for the Ijaws and the Ikwerre's has been studied [10]. In their study, they observed that the males had a higher height than the females. Ours is in line with their study, as the Yoruba males had a higher height than the females. When comparing our work with the research carried out by Fawehinmi et al.[10] on the Ikwerre and the Ijaw ethnic group, it was observed that the Yoruba males had a higher height than that of the Ikwerre males , but, a lower height, than, that of the Ijaw males. It was also observed the Yoruba females also had a higher height than that of the Ijaw and Ikwerre females. In the study of [10] , it was observed that the Ijaw males had a higher thigh length to stature ratio than their females. Our study is not in line with this, as the Yoruba females had a higher Thigh to stature ratio than their males. The thigh length to stature ratio of the Yoruba's was also higher than that of the Ikwerre Ethnic group of Nigeria. The female Yoruba's also had a higher

thigh length to staure ratio than the Ijaws. A research among shia muslims in India was carried out by[5] . When comparing our result with that of the shia muslims in India, it was observed that the Yoruba males and females had a higher stature than that of the shia muslims in india. The average thigh length of the Yoruba's were higher than that of the Shia muslims in India. It is also higher than that of the Ikwerre Ethnic group. These results suggests that stature estimation methods are not universally applicable and that environmental differences within a population (e.g., socioeconomic status differences) or differing levels of modernization and social and economic development between nations are an important source of variation in stature and body proportions. A comparative study of the thigh length and leg length in adult males of Bayelsa and Rivers States has been embarked upon in order to compare and establish a difference between the Rivers and Bayelsa state of Nigeria[11]. In their study, they concluded that there was no significant difference in mean thigh length to leg length ratio for adult males in Bayelsa and Rivers states of Nigeria. When comparing the thigh length of the study carried out by [11] and our present study, it was observed that the Yoruba's had a higher thigh length than that of the bayelsans and Rivers.Igiri et al.[9] observed that the males had a larger height than the females in their research. This is in line with their study as the heights of the Yoruba males was higher than their female counterparts. The height of the Yoruba's are lower than that of the Dutch of European males and females, but, it is higher than that of the Efe pygmies of Africa[2].

Mohanty *et al.*[6] carried out a correlation between sitting height, arm span and leg length and observed a positive correlation between these parameters. Our study is in line with it, as there was a positive correlation between the height and the thigh length..The result from Ibegbu et al.[12] on Nigerians show that there was a positive correlation between height and the parameters used against it. Our study is also in line with this as there was a positive correlation between the height and the measured parameters. In the study carried out by Didia et al.[8], regression models were used to establish formulae specific to Nigerians. General formulae for males and females were established. In this study, formula's for estimation of height, using thigh length were established. Our result compares favorably with that of Didia et al.[8] and can be relied upon.

## CONCLUSION

Knowledge of thigh length to stature ratio is very important to the anatomist and anthropologist in human identification. This work has produced a reference data for the Yoruba ethnic group. When working on an anthropometric data that has to do with height estimation using thigh length of the Yoruba ethnic group, the formula given in this research work should be given cognizance.

## REFERENCES


1. Fawehinmi, H.B. and C.W. Paul. Comparison of Anthropometric characteristics (heigh, armspan, knee height and foot length, between Ibo and Hausa adults).Biomec.Afri. 2008;6(1): 2.
2. Barry Bogin and Maria I V. Leg length, body proportion and health: Review with a note on beauty. Int. J. Environ. Res. Public health.2010; 7: 1047-1075.
3. Feldesman M.R. Femur/stature ratio and estimation of stature in children, Am.J.Phys Anthropol. 1992; 87(4):47-59
4. Feldesman .M.R and Fountain R.L. Race specificity and the femur/stature ratio. *Am.J.of Phys. Anthropol.* 1996;100: 207–224.
5. Bhavna, S N. Use of lower limb measurements in Reconstructing stature among shia muslims. The internet journal of Biological Anthropology. 2009;2 (2).
6. Mohanty S.P., Suresh B. S. and Sreekumaran N.N. The use of arm span as a predictor o f height: A study of South Indian women. Journal of Orthopaedic Surgery. 2001;9(1): 19–23.
7. Cardoso H.F. A test of three methods for estimating stature from immature skeletal remains using long bone lengths.J Forensic Sci. 2009;54(1):13-9.
8. Blessing C. Didia, Ethelbert C. Nduka and Okechukwu Adele. Stature Estimation Formulae for Nigerians. journal of Forensic Sciences.2009;54 (1):20–21.
9. Igiri A, Ekong M, Ogan C and Odey P. *Body Mass Index Measure Of Young Adult Nigerians Residents In The Calabar Metropolis*. The Internet Journal of Biological Anthropology.2008; 2(2).
10. Fawehinmi H B, Ogoun T R, and Okoseimiema S.C. Determination of femur stature ratio of the Ijaw and ikwerre ethnic groups in Nigeria.Scientia Africana. 2013;12(2) 28-39.
11. *Dare W.N, A.Z. Erefah and P.D. Ogbe.*A Comparative Study on Thigh Length to Leg Length Ratio in Adult Males of Two Southern States in Nigeria. European Journal of Applied Sciences.2013; 5 (4): 115-117.
12. Ibegbu A. O., David E. T. , Hamman W.O. ,Umana U.E. , Musa S. A. Association of Hand Length with Height in Nigerian School Children. Journal of Biology and Life Science.2013; 4 (2): 83-94