

Research Article

Determination of Armspan and Foot Length between the Ijaw and Ikwerre Ethnic Group in Nigeria

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Abstract: This study was conducted to determine the average armspan and foot length of the Ijaw and the Ikwerre Ethnic group; to determine if there are ethnic and racial differences in these two parameters. Also, to examine if the arm span is a reliable substitute for human height in an anthropological study for these two Ethnic groups. One thousand subjects (500 Ijaws and 500 Ikwerre people) were used for this study. The places where this research was conducted are: University of Port Harcourt, Rivers State; Niger Delta University, Bayelsa State; Choba community; Yenagoa; Amasoma community, Bayelsa State. The morphological measurements are armspan and foot length. The mean Armspan length of Ijaw male subject was 188.4 ± 9.48 cm, while for Ikwerre male subjects was 174.8 ± 10.1 cm, the armspan length of Ijaw male was significantly higher than that of the Ikwerre males ($p < 0.05$). The mean armspan for Ijaw females was 171.7 ± 11.3 cm. While the mean armspan value of Ikwerre female subjects was 166.4 ± 8.34 cm. The Ijaw females armspan was significantly higher than that of the Ikwerre females ($p < 0.05$). The mean footlength of Ijaw males was 27.9 ± 1.59 cm and the mean value of Ikwerre male foot length was 24.8 ± 2.1 cm. The mean foot length of the Ijaw males was significantly higher than that of the Ikwerre males foot length ($p < 0.05$). The foot length of the Ijaw females was 25.9 ± 1.92 cm. While it was 24.1 ± 1.85 cm for Ikwerre Females. The foot length of the Ijaw females was significantly higher than that of the the Ikwerre females ($p < 0.05$). When these results were compared with other races from previous studies, there were racial differences. This data is recommended to forensic and physical anthropologist.

Keywords: Anthropologists, Armspan, foot length, Ijaw, Ikwerre

INTRODUCTION

Anthropometry is the external measurement and description of human body and its parts for the purpose of comparison and establishing norms for sex, age and race (Fawehinmi and Paul, 2008). Arm span or reach (also known as wingspan) is the physical measurement of the length from one end of an individual's arms (measured at the fingertips) to the other when raised parallel to the ground at shoulder height at a one-hundred and eighty degree angle. In the Philippines, Socrates *et al.* (2000) used arm span (half-span \times 2) to derive height for children with cerebral palsy. The substitution of arm span for height introduces statistically significant changes in spirometry results (Aggarwal *et al.*, 1999). In a cohort of 494 women aged between 55 and 84 years (mean age 67.6 ± 8.2 years) who were randomly selected from a large general practice in Netherlands. Height and arms pan were measured and vertebral morphometry of lateral radiographs of the spine was performed (Versluis *et al.*, 1999). When standing height required to calculate Forced Vital Capacity (FVC) cannot be measured, it

can be derived from arm span using different methods (Chhabra, 2008). Uzunca *et al.* (2008), studied ninety postmenopausal women who were suspected of having osteoporosis and aimed to investigate if 'arm span-height difference' value can help to estimate osteoporosis or related vertebral fractures. Height is a significant parameter in assessment of growth, development and nutritional status (Yabancı *et al.*, 2010). Current practice is to substitute arm span to height, once corrected either by a fixed factor or by an age and sex dependent regression equation (Capderou *et al.*, 2010). Height is used to determine many important clinical measurements, but height may be difficult or impossible to measure accurately in some patients (Jean *et al.*, 2008).

Foot length is the length of the foot as seen on the ground (foot step). It is the distance from the tip of the halux (great toe) to the heel with the subject sitting or standing. The human foot, the foundation for bipedal locomotion, is a complex adaptation that evolved through extensive remodelling of the hind appendage of our arboreal primate forebears (Susman, 1983). Although varying in degree across populations,

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proportionate to stature, female foot length is consistently smaller than male foot length. Daniel *et al.* (2005) carried out a research on the sexual dimorphism in foot length. Ashizawa *et al.* (1997) documented that, among urban Japanese, proportionate to stature, women have smaller feet than men. This result contrasts with the earlier findings of Baba (1975) who, examining employees of a Japanese shoe manufacturer concluded that, proportionate to stature, women have larger feet than men. As part of a large anthropometric study of Czech children, Klementa *et al.* (1973) examined approximately 60 individuals age 17-18 years (the authors note that subjects exhibiting Sexual dimorphism in foot length 45 pathology were dropped, but do not indicate how many individuals fit this description). Stature is sexually dimorphic to some degree in all populations (Holden and Mace, 1999).

Despite the anthropological importance of arm span and height, there is no research carried out on it between the Ijaw ethnic group and Ikwerre ethnic group in Nigeria. There is also no documentation of the foot length of the Ijaw people and the Ikwerre Ethnic group. This research is therefore embarked upon to give a report on the arm span and height of these two ethnic groups; and to examine if the arm span is a reliable substitute for human height in an anthropological study for these two Ethnic groups. It is also aimed at determining a baseline data for foot length and armspan for Ijaw and Ikwerre ethnic group; and see if there are Ethnic and racial differences when compared to other Ethnic groups or Races.

MATERIALS AND METHODS

The study was carried out between March 2011 to November 2011. One thousand subjects (500 Ijaws and 500 Ikwerre people), 250 males and 250 females for Ijaw and 250 male and 250 female Ikwerre's, between the ages of 18-40 years. The subjects were either Ijaw or Ikwerre ethnic origin by both parents and grand parents. The places where this research was conducted are: University of Port Harcourt, Rivers State; Niger Delta University, Bayelsa State; Choba community; Yenagoa; Amasoma community, Bayelsa State.

Methodology: Arm span or reach (also known as wingspan) was measured using a metric tape and pencil as the length from one end of an individual's arms (measured at the middle fingertips) to the other when raised parallel to the ground at shoulder height of both hands (at 90°). The subjects were asked to standing up against the wall with their arms extended sideways at a ninety degree angle. A person with a length measuring tool (usually a tape measure) will measure from one end of the tip of the finger to the other.

Facing away from the wall, with back and buttocks touching the arms are stretched out horizontally. Measurement was taken from the tip of the middle

finger of the right hand to the tip of the middle finger of the left hand across the chest at the clavicle.

Foot length: The footlength was measured using a meter rule as the distance from the tip of the hallux (great toe) to the back of the Achilles, taken with subjects either sitting or standing and result recorded in centimeter.

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.

RESULTS AND ANALYSIS

The result of the mean and standard deviation of armspan length of Ijaw male subjects are shown in Table 1 and the mean armspan length of Ikwerre male subjects are shown in Table 2. The mean Armspan length of Ijaw male subject Was 188.4 SD±9.48 cm, while for Ikwerre male subject in Table 2, was 174.8±10.1 cm. There was Ethnic differences in the armspan which was described in Fig. 1. The armspan length of Ijaw male was significantly higher than that of the Ikwerre males ($p < 0.05$). Table 3, showed the mean and standard deviation value of armspan of Ijaw females. It was 171.7±11.3 cm for Ijaw females. While the mean armspan value of Ikwerre female subjects was 166.4±8.34 cm as shown in Table 4. There was also an Ethnic differences in the armspan which was described in Fig. 1. The Ijaw females have a significantly higher armspan than the Ikwerre females ($p < 0.05$).

The result of the mean and standard deviation of the foot length of Ijaw male subjects are shown in Table 1. The mean footlength of Ijaw males was 27.9±1.59 cm and the mean value of Ikwerre male foot length as shown in Table 2 was 24.8±2.30 cm. The

Table 1: Showing the mean and standard deviation of armspan and foot length of male ijaw subjects

Parameter	Mean value	Standard deviation
Armspan	188.4	±9.48
Foot length	27.9	±1.59

Table 2: Showing the mean and standard deviation of armspan and foot length of male ikwerre subjects

Parameter	Mean value	Standard deviation
Armspan	174.8	±10.10
Foot length	24.8	±2.30

Table 3: Showing the mean and standard deviation of arm span and foot length of female ijaw subjects

Parameter	Mean value	Standard deviation
Armspan	171.7	±11.30
Foot length	25.9	±1.92

Table 4: Showing the mean and standard deviation of armspan and foot length of female ikwerre subjects

Parameter	Mean value	Standard deviation
Armspan	166.4	±8.34
Foot length	24.1	±1.85



Fig. 1: Showing armspan length measurement

Table 5: Showing a comparison of mean armspan result of present study to previous studies

Researchers	Male	Female
Fawehinmi and Paul (2008)	Igbo : 185.95±9.16 Hausa: 202.37±6.56	172.95±7.64 191.15±10.43
Samira <i>et al.</i> (2011)		Bangladeshi female 154.74±5.69
Present study	Ijaw = 188.4±0.48 Ikwerre = 174.8±10.1	171.7±11.3 166.4±8.34

Table 6: Showing a comparison of mean foot length values of present study to past studies

Researchers	Male	Female
Present study	Ijaw = 27.9±1.59 cm Ikwerre = 24.8±2.3 cm	25.9±1.92 cm 24.1±1.82 cm
Japan Leather and Leather Goods Industry Association (JLIA) (1987)	Japanese 21.1±28.7 cm Mean average 24.9±1.05	19.4 to 26.3 cm 22.8±0.89 cm
Industrial Product Research Institute (IPRI) (1991, 1992)	25.4±1.10 cm	23.3±0.97 cm
Fawehinmi and Paul (2008)	Igbo : 27.23±1.53 Hausa: 27.2±3.04	25.33±2.37 26.25±1.19

Table 7: Mean femur length and height of ijaw and ikwerre subjects

Measurement	Male		Female	
	Ijaw	Ikwerre	Ijaw	Ikwerre
Height	175.12±7.76 cm	164.50±8.13 cm	166.30±8.29 cm	156.40±7.20 cm

mean foot length of the Ijaw males was significantly higher than that of the Ikwerre males ($p < 0.05$). Table 3, shows the mean and standard deviation of Ijaw females foot length as 25.9±1.92 cm. While it was 24.1±1.85 cm for Ikwerre Females as shown in Table 4. The Ijaw females have a significantly higher foot length than the Ikwerre females ($p < 0.05$). The mean Armspan value for Ikwerre male subjects was 174.8±10.1 cm and the mean Armspan of Ikwerre female subject is 166.4±8.34 cm. The mean armspan of Ikerre males was significantly higher than that of Ikwerre females ($p < 0.05$).

The result of the mean and standard deviation of armspan length of previous studies in Nigeria; Bangladeshi females and present study are shown in Table 5. It was observed that there were sexual and ethnic differences when comparing our result with that of the Hausa and Igbo Ethnic group. There were also racial differences when comparing our result with that of Bangladeshi females.

The result of the mean and standard deviation of foot length of previous studies and that of our present

study are shown in Table 6. It was observed that there were Ethnic and racial differences in foot length. The result of the mean and standard deviation of height (stature) of the Ijaw and Ikwerre ethnic group are shown in Table 7. It was observed that there were Ethnic differences in the height between these ethnic groups.

DISCUSSION

Fawehinmi and Paul (2008) conducted a research using the armspan between the Igbo and the Hausa Ethnic groups in Nigeria. They stated that there were gender and Ethnic differences in their work. Our result is in line with this as there was ethnic and gender differences in armspan between Ikwerre and Ijaws. When comparing our result with the result of (Fawehinmi and Paul, 2008), There were also Ethnic differences.

Tayie *et al.* (2003) concluded that Armspan can be used to predict height with mean armspan value. Samira *et al.* (2011) stated that the mean value of armspan of Bangladeshi female was 154.74±5.69 cm while their stature was 152.79±5.62 cm. Also Chhabra (2008), result showed that armspan was about 5 to 6% greater than stature (standing height). These finding also were in accordance with our result, were the mean armspan values of the Ijaw and Ikwerre ethnic group was greater than their height (stature). Thus, armspan cannot be used as direct substitute for height for people whose height cannot be obtained directly for the Ijaw and Ikwerre ethnic groups.

Fawehinmi and Paul (2008), studied the foot length of Igbo's and Hausa's and gave the mean foot length as 27.23±1.53 cm for Igbo male and 25.33±2.37 cm as Igbo females. This shows that there is sexual dimorphism with respect to the Igbos. The mean foot length for the Hausa males was 27.24±3.04 and 26.25±1.19 cm for Hausa females. This also shows sex difference in foot length. Comparing our result with that of their's shows that there are ethnic differences in foot length in Nigeria.

The Japan Leather and Leather Goods Industry Association (JLIA) (1987) suggested the foot length of male as 21.1 to 28.7 cm and for females 19.4 to 26.3 cm thus the mean average foot length of Japanese male according to The Japan Leather and Leather Goods Industry Association (JLIA) (1987) was given as 24.9±1.05 cm while the mean average female foot length was given as 22.8±0.89 cm. This shows there is mean foot length difference in gender.

Also, The Industrial Product Research Institute (IPRI) (1991, 1992) stated the mean foot length for males as 25.4±1.10 and 23.3±0.97 cm for females. This shows gender differences in foot length. Comparing these results with our result shows that there are racial

differences in foot length. This Ethnic and Racial differences could be as a result of differences in nutrition, climate and genetic factors.

CONCLUSION

The armspan and foot length are very important parameters in an anthropological study. Arm span should not be used as a direct substitute to human height for the Ijaw and Ikwerre Ethnic groups because it is not a reliable parameter. Further study should be carried out in other ethnic groups in Nigeria.

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