Some anthropometric attributes of a rural community in Nigeria

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Summary

Some attributes of anthropometric indices of the Kainji Lake population are presented. All adults except pregnant women were measured for height, weight and mid-upper arm circumference. The height of the males was generally found to be significantly higher (P < 0.05) than the females. No significant differences were obtained between the sexes for weight and midupper arm circumference in the total population. Differences in nutrient intake of the sexes and the predominant ethnic groups were ascribed to be responsible for the sex differences and the variability in the standard deviation of the means in different age groups. The Kainji Lake values were found to be generally lower than the Lagos values but compared well with the reference values.

Résumé

On analyse certaines caractéristiques anthropométriques de la population du lac Kainji. Tous les adultes sauf les femmes enceintes ont pris part à l'exercice qui a consisté à les peser, à les mesurer et à prendre la taille de leur biceps — on a trouvé que la taille des hommes était nettement supérieure (P < 0.05) à celle des femmes. On n'a pas trouvé de différence nette entre les sexes concernant le poids et la taille des biceps dans l'ensemble de la population. Les différences dans l'alimentation des deux sexes et la différence entre les groupes ethniques dominants ont été jugées responsables de la différence entre les sexes et de la variabilité des écarts normales des moyens dans les différentes tranches d'âge. De façon générale on a trouvé que les caractéristiques du lac Kainji étaient inférieures à celles de Lagos mais ne le cédaient en rien aux caractéristiques de référence.

Introduction

Most studies on anthropometric measures in Nigeria to date were concentrated on children [1,2]. The only study on adult population was by Johnson [3] and was conducted among the urban population of Lagos, Nigeria. There has been no parallel study of the rural population in Nigeria. Since 1974, a community health project on baseline studies has been ongoing in the Kainji Lake area by Kainji Lake Research Institute, New Bussa. The present study is part of the baseline study and was intended to provide anthropometric data that has been lacking on the adult population in rural Nigeria.

Materials and methods

The location of Kainji Lake area and the villages randomly selected for the community health project have been well described by Adekolu-John [4]. In the villages 4652 people were counted: 2284 males and 2368 females. Excluding pregnant women, 3160 people aged above 10 years were selected for this study. All subjects were weighed and measured for height and mid-upper arm circumference following the methods already described by Jelliffe [5]. The survey was conducted from compound to compound and nearly 100% success was achieved. All measurements, coding and analysis of data were conducted by the author.

Results

Table 1 shows how the average heights vary for age and sex in the population. In the males there was a general increase in height with age from 10 to <30 years. There was no further increase until 45–49 years. In the females the

Age group (years)	Male			Female			Total		
	n	Mean	s.d.	n	Mean	s.d.	n	Mean	s.d.
10-14	195	138.1	16.3	149	139.4	22.4	344	138.8	19.5
15-19	122	148.2	27.0	160	154.2	15.9	282	152.1	19.7
20-24	99	158.0	17.0	279	156.9	4.8	378	157.0	12.5
25-29	155	169.0	7.0	297	158.8	9.0	452	160.1	9.3
30-34	194	168.9	5.9	249	160.0	3.8	443	162.4	5.9
35-39	201	159.3	18.8	127	160.1	5.8	328	160.0	11.6
40-44	148	169.2	4.9	103	159.7	7.4	251	167.1	8.7
45-49	102	172.7	4.4	52	156.1	8.3	154	165.6	10.4
50-54	79	167.8	6.1	49	164.0	6.9	128	167.1	6.2
≥55	248	169.7	8.4	152	157.9	5.9	400	165.3	9.4
Total	1543	160.3	11.6	1617	154.9	9.0	3160	157.4	11.3

Table 1. Average heights (cm) by age and sex

major increase occurred at 15–19 years. Increases in height in other age groups were relatively small. The mean height of males (160.3 cm) was significantly higher than the mean height of females (154.9 cm) in the total population (P < 0.05). Differences in heights between sexes were particularly marked in the 30–34, 40–44 and 45–49 years age groups. The mean heights of males and females for the 15–41 years age group are 162.9 and 155.2 cm, espectively.

Table 2 shows the distribution of weights by are and sex. The weight of males generally increased between 10 and 35 years with the peak occurring in the 30–34 years age group. In the remaining age groups the increase was low. Among the females there was rapid gain in weight from 10 to <25 years. The increase in weight was slow thereafter until 50–54 years with a value of 67.3 kg. The males were generally heavier than the females but for most of the age groups the differences were not significant (P > 0.05). However, among the 30–34, 40–44, and \geq 55 years age groups the differences were significant (P < 0.05). The weight of the females was significantly higher than the males at 15–19 years (P < 0.05). The mean weights of males and females for the 15–44 years age group were 46.2 and 53.8 kg, respectively.

Age group (years)	Male			Female			Total		
	n	Mean	s.d.	n	Mean	s.d.	n	Mean	s.d.
10-14	195	32.0	9.8	149	34.7	8.6	344	33.3	9.2
15-19	122	36.8	16.1	160	47.1	15.0	282	43.4	15.6
20-24	99	47.0	12.0	279	53.8	7.5	378	48.1	139
25-29	155	58.3	6.7	297	56.0	8.1	452	56.3	78
30-34	194	64.3	7.5	249	54.9	8.3	443	57.8	9.1
35-39	201	58.6	12.8	127	56.7	12.3	328	57.1	12.1
40-44	148	59.9	5.5	103	51.8	6.0	251	58.1	6.1
45-49	102	70.3	14.0	52	60.4	18.8	154	65.9	16.7
50-54	79	63.2	7.1	49	67.3	15.3	128	63.9	8.5
≥55	248	58.5	11.1	152	50.6	7.3	400	55.5	10.4
Total	1543	53.5	10.3	1617	51.0	10.7	3160	52.2	11.0

Table 2. The mean weights (kg) by age and sex

Table 3 shows the average mid-upper arm circumference by age and sex. In the males the arm circumference increased rapidly from 10 to 30 years but with little or no increase in other age groups. In the females there was a rapid increase from 10 to 25 years and another rise from 45 to 55 years with a peak at 50–54 years. There was no significant difference in mid-upper arm circumference of the male and female subjects except at 10–14 years (P > 0.05).

Table 4 shows the mean heights, weights and mid-upper arm circumferences of the Kainji Lake population aged above 25 years and the reference values for both sexes.

The Kainji Lake population compares with 90–94% of the standard weight and the height for males; 100–104% for females and about

100% in both sexes for mid-upper arm circumference. The source of the reference values for heights and weights is an adaptation from the Society of Actuaries [6] while that of mid-upper arm circumference is an adaptation from O'Brien and Shelton [7] and Hertzberg *et al.* [8].

Discussion

Most studies on anthropometric measurements in various centres [9–13] of adult populations in Africa suffered from lack of information on local standards with which to make comparison and detect any departure from normal values for the purposes of objective clinical assessments of individual subjects. In Nigeria, like elsewhere, there is no local standard with which

Table 3. Average mid-upper arm circumference (cm) by age and sex

Age group (years)	Male			Female			Total		
	n	Mean	s.d.	n	Mean	s.d.	n	Mean	s.d.
10-14	195	19.9	3.3	149	22.3	3.0	344	21.1	3.3
15-19	122	21.0	4.4	160	24.4	3.9	282	23.2	4.3
20-24	99	25.2	3.6	279	28.2	3.5	378	26.1	3.4
25-29	155	29.7	2.5	297	28.5	3.0	452	28.6	3.0
30-34	194	30.2	3.1	249	28.2	2.6	443	28.8	2.9
35-39	201	28.2	4.8	127	29.4	5.1	328	28.1	6.8
40-44	148	27.8	2.3	103	26.8	2.5	251	27.6	2.4
45-49	102	30.0	2.8	52	31.9	8.7	154	30.9	4.9
50-54	79	29.5	3.0	49	32.7	5.5	128	30.1	3.5
≥55	248	27.9	3.2	152	26.9	3.4	400	27.5	3.2
Total	1543	26.4	3.3	1617	27.2	4.1	3160	26.8	3.8

Table 4. The mean heights, weights and mid-upper arm circumference of the Kainji population aged 25 years and above and the reference values by sex

		Male	Female		
	Kainji	Reference	Kainji	Reference	
Height (cm)	168.3	168	159.2	159	
Weight (kg)	61.2	59.7-61.9	55.7	55 2-58 2	
Percentage of standard weight		90-94		100-104	
Arm circumference (cm)	28.7	29.3*	28.7	28.5*	

*Standard value at 100%.

to compare the adult population. Nonetheless, the present study provides a unique opportunity to compare anthropometric data of the adult population in rural population with the urban population than hitherto. The present study also helps to identify those factors which might be important in understanding the anthropometric picture of the rural population in particular.

Adekolu-John [14] had reported increases in height and weight with age in children below 10 years. A similar trend was also reported here below 30 years and 20 years for height in males and females, respectively; below 35 years and 25 years for weight in males and females, respectively; and 30 years and 25 years, respectively for mid-upper arm circumference. The study has therefore suggested that growth generally stops earlier in females than in males in the Kainji Lake population.

Johnson [3] reported mean heights of males and females in Lagos as 167.6 and 157.7 cm, respectively, and the mean weights as 58.5 and 56.3 kg, respectively for males and females aged 15-44 years. These values are generally higher than the 162.94 cm for height of males and 46.17 kg and 53.8 kg for the weight of males and females, respectively, calculated for the same age group in this study. The female height of 158.2 cm in this study is close to that of 157.7 cm in Lagos. Unfortunately, statistical analysis to determine the significance of sexual differences between the data of this study and that of Lagos was impossible. The age grouping of the Lagos data was not consistent and has made direct estimate of the means of equivalent age groups difficult.

The means of height and weight of the Kainji Lake population are lower than the Lagos values probably because the Kainji population is essentially rural. Morley *et al.* [1] reported lower values of height and weight for rural children of Imesi–Ile in Oyo State. Nigeria than those reported on the urban children of Ibadan by Janes [2]. It would appear therefore that the factors responsible for the differences in the values of rural and urban children were probably responsible for the differences in the adult population of Lagos and Kainji in this study. These factors could include better sanitation, nutrient intake and accessibility to better health care in the urban areas.

It is important when addressing further the anthropometric data of the adult population in this study to re-examine the nutrient intake of the population. Adekolu-John *et al.* [16] reported that the nutrient intake of males in Kainji Lake population was superior to the females and that it varied with different ethnic groups. The greater means in height and weight of males, with significant differences in the heights in males in the total population and in height and weight in some age groups, could be the result of the higher nutrient intake of the males.

The Kainji Lake population is multi-ethnic and this study has shown variations in the standard deviations of anthropometric indices in the age groups. These variations could be the effect of differences in nutrient intake of the different ethnic groups expressed in their anthropometry or it could be due to secular changes occurring in the age groups.

Despite the sex and ethnic differences in the nutrient intake, Adekolu-John *et al.* [16] reported that the nutrient intake of the Kainji Lake population was generally adequate. This could probably explain the high comparability in this study of the antbropometric data and the reference values.

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