Relationship Between Mid-Arm Circumference And Height Of Children 5years And Below In A Semi Urban Community In Nigeria

I Bob-Manuel, A Udoaka

Citation

Abstract

Objective: To examine the relationship between Mid-arm circumference and height of children 5 years and below.Methodology and results: Mid-arm circumference (MAC) and height of 200 (106 male and 94 female) subjects were measured and compared statistically. The MAC and height of males were greater than that of females. The difference between male and female MAC and height were not statistically significant (P> 0.05). From correlation analysis, the MAC showed positive correlation with height (r = 0.17 and r = 0.18 for males and females respectively). Conclusion and application of findings: The results demonstrate that the MAC of children 5years and below is positive correlation to their length. This could be used to determine the growth rate and nutritional status of children. However, further studies are needed to confirm the positive correlation between MAC and height in older children and adults.

INTRODUCTION

The use of anthropometric data for assessing the nutritional conditions has been adopted internationally as a standard practice (WHO, 1983). Mid-arm circumference and height are examples of such parameters used. Mid arm circumference (MAC) is the measurement of the circumference of the non-dominant (left) arm, at the mid point between the tip of the shoulder and the tip of the elbow (i. e. between the acromium and the olecranon process). MAC is useful for the assessment of the nutritional status of children (de Onis and Habicht, 1996). Mid arm circumference is an appropriate indicator for the assessment of acute and chronic muscle wasting in children which is used in predicting mortality and death in children than any other anthropometric indicator when the period of follow-up is short (Beaton et al, 1990). The ease with which MAC can be assessed makes it suitable for nutritional screening.

Height is a measure of the rate of growth. Growth rate differ from one community to another as revealed from anthropometric studies (WHO, 1995). Mid arm circumference was first used as a public health index of protein calorie malnutrition in Haiti in 1958 (Jellife and Jellife, 1958). They employed this measurement because thin limbs were clinically obvious in malnutrition, which probably reflected stores of protein (muscle) and fat

(energy). The left mid arm circumference was easily accessible and approximately rounded. Besides, Bennett (1989) showed mid arm circumference as a public health index of malnutrition in early childhood putting together existing data collected from widely separated regions- East and West Africa, Tunisia, Malaysia, Lebanon, the Caribbean e.t.c. From the collected data, Bennett (1989) screened young children in feeding program in Kivu province of Congo following civil disturbance. Jellife, in 1964, suggested the possibility of using 'quipu' for the estimation of the nutritional status of young children using mid arm circumference measurements (Jellife, 1964). The name 'quipu' was taken from knotted cord use by the Incas for recording purposes in Haiti.

Cherian et al (1983) revealed that the mid arm circumference alters little between 1- 4yrs, (Cherian et al, 1983) such that the use of a single standard for the second year of life or even for the whole preschool period was suggested (King et al, 1973).

Since MAC requires little equipment and is easy to perform even on the most debilitated individuals; it is thus potentially suited to screening admissions in feeding centers during emergences for children (WHO, 1995) using MAC cut off points proposed by WHO (Beaton et al, 1990).

MAC cut off point for use in screening acute adult undernutrition have also been proposed. They based hese on extrapolation from more normally nourished populations in developing countries, without reference data from acutely under nourished adults during famine. Although there is some evidence that the under nourished category may be associated with increased mobility in chronically under-nourished population. (WHO, 1995).

Among the many surrogate anthropometric parameters used to identify low birth weight (LBW) babies, mid arm circumference (MAC) was found to be the most useful and simplest to predict whether a baby was low birth weight (LBW) at birth or not. Since most neonates lose 10% of body weight soon after birth and when such babies subsequently come for medical care, MAC is recommended as an alternative measurement. A cut off of 9 cm, with a sensitivity of 92% and a specificity of 90.5% is used to identify LBW. (Nair et al, 2006).

Biological, genetic, socio-economic and environmental factors have shown to affect MAC in several studies (de Onis and Habicht, 1996, Allen and Gillespie, 2001).

However, this study is aimed at correlating the mid arm circumference (MAC) and the height of children below 5years to establish there exist a relation between MAC and height.

MATERIALS AND METHOD

This correlative and cross section research was done on 200 children (106 males and 94 females), five years and below in a semi-urban community – Choba in River State of Nigeria. The following materials were used for this study: calibrated meter rule, tape, pen and exercise book.

The mid arm circumference measurements were taken with subjects standing and their left arm straightened, resting proximal to the left thigh. The tape was then wrapped loosely round the arm at the mid point between the acromium and olecranon and measurement taken to the nearest 0.1cm. Also, the height of each subject were measured while they where standing erect against the wall and their shoes removed.

The collected data were then analyzed statistically and correlation test carried out.

RESULTS

A total of two hundred (200) subjects (106males and 94

females) five (5) years and below were used for this study. The parameters measured from each subject are mid arm circumference (MAC) and height.

Depending on the collected data, the MAC was then compared with the data given by WHO (1995) as reference data and used world wide for making age and sex comparisons.

The age group and number of individuals in each for both males and females are represented in Table1.

Figure 1

Table 1: Sample Size

Age group (Months)	No of Males	No of females
< 12	10	9
12 – 23	17	13
24 – 35	20	20
36 – 47	15	15
48 – 59	22	19
60	22	18
TOTAL	106	94

Statistical analysis of collected data shows the following result as presented in table 2, 3 and 5.

Figure 2

Table 2: Mean mid-arm circumference and mean height of male subjects

Age group (months)	Frequency	MAC (cm)	HEIGHT (cm)
< 12	10	13.8	71.4
12-23	17	16.0	89.2
24-35	20	17.3	99.9
36-47	15	17.0	102.9
48-59	22	17.2	109.2
60	22	18.0	114.3
	Mean	17.0	101.4
	SD	1.2	12.6

Figure 3

Table 3: Mid arm circumference and height of female subject

Age group (months)	Frequency	MAC (cm)	Height (cm)
0-11	9	13.4	67.0
12-23	13	15.7	87.0
24-35	20	16.0	93.0
36-47	15	17.0	102.1
48-59	19	17.2	108.0
60	18	18.1	112.4
	Mean	**16.5**	**97.9**
	SD	**1.3**	**16.2**

Figure 4

Table 4: WHO monograph standard for MAC. (WHO, 1995)

Age (months)	Boys (cm)	Girl (cm)
0 -11	10.5 – 15. 8	10.2- 15.5
12 – 23	15.9 -16.3	15.8 – 16.1
24 – 35	16.4 – 16.5	16.1 – 16.4
36 – 47	16.5 – 16.7	16.4 – 16.6
48 – 59	16.7 – 17.0	16.6 – 16.9
60	17.0 - ?	16.9 - ?

Figure 5

Table 5: Mean Mid-arm circumference and height of male and female sample population

Sex	MAC (cm) mean	MAC(cm) SD	HEIGHT (cm) MEAN	HEIGHT (cm) SD
MALE	17.0	1.3	101.4	12.6
FEMALE	16.5	1.3	97.9	16.2

(p < 0.05)

Correlation coefficient test between MAC and height in males:

Correlation coefficient, r = 0.17.

Correlation coefficient test between MAC and height in females:

Female correlation coefficient, r = 0.16

DISCUSSION

This study measured and compared the mid-arm circumference with the height of children 5 year and below in a semi urban settlement – Choba in Rivers State of Nigeria.

From the calculation results the MAC of males and females (Table 2 and 3) conforms to values recommended by WHO as a reference base (WHO, 1995). The mean MAC of males and females 5 years and below are 17.5 ± 1.2cm and 16.5 ± 1.3cm respectively and the mean height of males and females are 101.4 ± 12.6cm and 97.9 ± 16.2cm (Table 4) respectively. The males MAC and Height were greater than that of females for each age group. The difference however is not statistically significant (P> 0.05).

Correlation analysis of the height and MAC of males and females using Pearson product – moment correlation gave the correlation coefficient, r = 0.17 and r = 0.16 respectively. This implies that positive correlation exist between height and MAC from ages 0-5years, as the height of the individual increases the mid-arm circumference increase for both sexes.

CONCLUSION AND RECOMMENDATION

Mid arm circumference is an important clinical anthropometric parameter used to determine the nutritional status of children while height measure of growth in a children. There exist a positive correlation between MAC and Height (r = 0.17 for males and r = 0.16 for females).

However, this positive correlation between Height and MAC need to be confirmed for older children and adults as changing skeletal muscle and redistribution of subcutaneous fat towards central area of the body may affect the MAC.

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Author Information

Ibinabo F. Bob-Manuel, B.Sc.

Department Of Anatomy, Faculty Of Basic Medical Sciences, University Of Port Harcourt

A.I. Udoaka, FWACS

Department Of Anatomy, Faculty Of Basic Medical Sciences, University Of Port Harcourt