

Anthropometric Assessment of the Nutritional Status of Hypertensive Patients in Imo State

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Abstract

The nutritional status of eighty hypertensive patients was determined using anthropometry. They were divided into two age groups (adult and elderly). The mean body weight and height of female elders (60-80) were 54.1 ± 14.6 kg and 157.0 ± 7.0 cm. They also had 21.7 ± 4.4 , $28.0 \pm 6\%$ 38.6 ± 8.3 kg, 54.7 ± 15.2 kg and 28.1 ± 6.1 kg for BMI, body fat, lean body mass, optimum weight, and body water respectively. Among the male elders, the body weight and height were 61.8 ± 13.5 kg and 9.0 cm. Similarly they had 22.1 ± 4.3 , $20.8 \pm 5.2\%$, 48.4 ± 7.8 kg, 63.5 ± 8.11 kg and 34.4 ± 15.1 kg for BMI, body fat, lean body mass, optimum body weight and body water respectively. Other parameters include arm circumference, arm muscle diameter and skinfold thicknesses. The male adult group (30-50 years) they had 63.7 ± 0.4 kg and 170.4 ± 10.1 cm for their mean body weight and height respectively. They were taller and heavier than the male elders. Similarly, the female adults (30-59 years) were heavier (70.2 ± 19.0 kg) and taller (160.8 ± 8.4 cm) than the female elders. When compared to WHO standards, 72.2 % of the male adults fell within the desirable BMI values. Among the female adults there was high positive correlation between body fat and weight ($r = 0.927$). Lean body mass (LBM) also positively correlated with total skinfold thickness ($r = 0.786$). Similar results were observed for the male adults between body fat and body weight ($r = 0.590$) but between LBM and total skinfold thicknesses correlation was weakly positive ($r = 0.230$). Among the male and female elders the correlation coefficient were significant when body fat were related to body weight. In all the subjects, BMI was positively and significantly correlated with high blood pressure.

Original Research Article

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INTRODUCTION

Anthropometry is a common method of assessing the nutritional status of individual. It is referred to as a measurement of the human body and its parts for the purpose of comparison and establishing norms for sex, age weight, race and so on. It could also be defined as the measurement of man. In clinical situations, anthropometry is used to estimate body energy, stores and protein mass. Anthropometric data usually consist of height, weight, skinfold measurements and measurements of circumference of various body parts (Davidson, 1975).

Anthropometry is a crucial method for assessing body composition and nutritional status because it helps in systematically interpreting physical measurements and evaluating nutritional changes over time. Traditional anthropometric methods are based on a two-compartment

model of body composition, separating fat mass from fat-free mass. Fat-free compartment is made up of skeletal muscle, body cells, extracellular water, bone, and connective tissues. These components are not directly measured with conventional anthropometric measures but body dimensions and tissue thickness can be used to estimate body composition (Roche, 1984) and used as indicators of nutrition status.

The anthropometric procedures are generally used because they are relatively easy, quick, portable, non-invasive, and inexpensive. Typical basic tools needed include skinfold caliper, measuring tape, and weighing scale. These methods are frequently used in nutritional evaluations and for "long-term" monitoring of nutritional and body-composition variations over time in many clinical situations for their practical advantages.

Compartment	Anthropometric techniques used
Fat mass	Body mass index, waist/hip ratio skinfold thickness.
Fat-free mass	Mid arm circumference, mid-arm muscle circumference, mid-arm muscle area.

GENERAL USE OF ANTHROPOMETRIC MEASUREMENTS.

- Used to identify those people whose growth is outside normal values suggesting under nutrition.
- Screening tool to identify individuals at high risk of malnutrition.
- Used to monitor effects of nutritional intervention for treatment of diseases, surgery or malnutrition.

ADVANTAGES OF ANTHROPOMETRY:

Anthropometric measurements are inexpensive and easy to do. (NATIONAL CENTRE FOR HEALTH STATISTICS, 2001)

LIMITATIONS:

Anthropometric measurements do not detect changes over a short period of time or distinguish between specific (NCHS).

1.2 NUTRITIONAL STATUS:

An individual is said to have attained a good nutritional when the food supply is adequate and the individuals must be able to select, obtain and consume foods that will meet their nutrient needs. It is therefore said that nutritional status of an individual is the health of an individual as conditioned by the quantity and quality of nutrients consumed and the body's ability to utilize these nutrients to meet its metabolic needs (Davidson, 1975).

Nutritional status simply describes the condition of the body as it relates to the consumption and utilization of food. There are four common methods used in evaluating nutritional status namely clinical examination, biochemical analysis, physical measurement and dietary assessment. The nutritional care specialist must be skilled in clinical, biochemical, anthropometric and dietary methods of evaluating nutritional status (Davidson, 1975). The nutritional status of an individual such as an infant or in patient in hospital is assessed from information which are elicited along with other clinical data from a careful history and a systematic clinical examination. The history may suggest a deficiency in the total amount of the diet or in one or more nutrients. Anthropometry may reveal that the person is underweight, overly thin, or, in the case of a child, not growing at the typical rate. Clinical evaluation may then show symptoms of one of the qualitative types of malnutrition. Biochemical testing may reveal low levels of one or more nutrients in blood or urine.

MATERIALS AND METHODS

SUBJECT.

The history may suggest a deficiency in the total amount of the diet or in one or more nutrients. Anthropometry may reveal that the person is underweight, overly thin, or, in the case of a child, not growing at the typical rate. Clinical evaluation may then show symptoms of one of the qualitative types of malnutrition. Biochemical testing may reveal low levels of one or more nutrients in blood or urine.

SURVEY AREA:

The study covered a government hospital and a missionary hospital namely Holy Rosary Hospital and Federal Medical Centre.

Before I started the practicals, I visited these Hospital and met their managing director. I explained my purpose to him. He encouraged me to go ahead.

I presented a letter of permission to the hospital which in their replies, they gave me an official acceptance to carry out the practicals in their hospitals. I was given opportunity on one of the consultancy days to talk to the hypertensive patients in both hospitals. I made them to really understand the aims and objectives of this study which will be beneficial to them. I told them that I need their maximum co-operate with me.

INSTRUMENTS FOR DATA COLLECTION:

Validated plot tested structured questionnaire was used for the study. The questionnaire was divided into the following sections:

SECTION A:

This section dealt with the personal data of the respondent which included information on the Name, Age, Sex, Marital status and Number of children.

SECTION B:

This section dealt with the anthropometric measurement. They include the Arm circumference, waist, Hip Blood pressure, height, skin fold thickness, which included the biceps, triceps, Abdomen and back subscapular and dietaries studies that is diet recall.

VALIDATION OF INSTRUMENT:

The structure questionnaire was validated by my supervisor Dr I.A. ONIMAW. In the Home Economics Department of Micheal Okpara University of Agricultuere Umudike, Abia-state.

The patients were interviewed using open-ended questions and the information obtained was recorded by me. All the anthropometric and skin fold measurements were measured and recorded by me.

INSTRUMENT:

The instrument used for the study were Hanson model of bathroom weight scale, metre rule (2m), tape rule and skin fold caliper.

The sensitivity of the weight scale was however tested by placing a body of known weight of 200kg on it and the response was satisfactory.

ANTHROPOMETRIC MEASUREMENT:

WEIGHT DETERMINATION:

A portable weight scale (model weight scale Hanson) was used. The scale was a new pre-tested scale that was periodically checked for accuracy with known weight. Weight was recorded to the nearest 0.5 kg. The scale was zeroed before each reading. Weighed each subject at the start of each day. They were weighed without shoes and with minimum clothing. This was repeated three times for each patient and obviously wrong ones were excluded and average of the weight was taken in kilogram (kg).

HEIGHT MEASUREMENT:

Height of each subject was measured after they have met with the medical doctor and it was confirmed that he/she was hypertensive. For the purpose of this measurement, a vertical wooden rod was constructed by the Carpentry market in Owerri. It was graduated carefully and made for height measurement.

The height measurement was obtained with the person standing erect on base feet i.e. removing the shoes. Heels together, feet parallel; heels, buttocks, shoulders and back of head against the upright. The head was held comfortably erect facing straight ahead with the lower boundary of orbit in the same horizontal plane as the external auditory meatus. The arms were dangling naturally at the sides and the head piece which is a wooden block softly lowered crushing the hair and touching the top of the skull (Jelliffe, 1966). The length of the measuring rod was 2 metres.

ARM CIRCUMFERENCE:

This was measured to the nearest centimetre on the left arm of each subject as reported by (Jelliffe, 1966). The tape was placed round the arm without hanging freely by a side and the tape was placed round the arm without causing compression or indentation to the skin at the mid-point between the tip of the acromion process of the scapular and the olecranon process of the ulna. Hands were left hanging freely by the side during the measurement.

MEASUREMENT OF SKINFOLD THICKNESS (S F T MM):

Skin folds were measured at the following places viz. Triceps, biceps, subscapular, belly and breast with calliper. These

were the usual sort of callipers. All measures were obtained on the left side of the body as recommended by WHO (Falkner, 1960).

The S F T were determined using the methods of Fletcher (1962). In the act of measurement a lengthwise skinfold is firmly grabbed and lifted slightly upwards between the finger and thumb of the left hand, care being taken not to involve the underlying muscle. The callipers are placed about 1cm below the operator's fingertips at a depth about equivalent to the skinfold, with the skinfold being held gently during the measurement (Jelliffe 1966). In each case three measurements were obtained and recorded.

TRICEPS SKINFOLD:-

Triceps skinfold is often referred to as upper-arm, dorsal arm or arm skinfold. The site was selected with caution halfway down the arm, between the point of the acromion ulna, because the fat in this area is not homogeneous in thickness. The measurement was taken with the hands hanging loosely at the sides. Measurements were made according to the method of (Jelliffe, 1966).

BICEPS SKINFOLD:

Biceps skinfold was measured on the same spot as the triceps skinfold measurement, but on the opposite side. Same process as for triceps skinfold.

SUBSCAPULAR SKINFOLD:

It is sometimes called the rear, or intrascapular, skinfold. It was measured immediately below and lateral to the left scapular angle. The fold was in line running about 45° to the spine, in the normal line of skin cleavage.

ABDOMINAL SKINFOLD:

This was measured at about half way between the umbilicus and the pubis on the mid-abdominal line, about 5cm from the umbilicus and its adhering subcutaneous fat and the measurement is made with the caliper.

AGE:

The patients were asked to honestly supply their ages.

WEIGHED FOOD INTAKE:

In this method, the patients were asked to recall what they ate on the previous day and the present day. They were asked to be specific. This method is called 24 hours recall. The respondent/patient was first asked to recall their dinner, lunch and breakfast of the previous day and the present day's breakfast. These were all asked without forgetting snacks.

The amount consumed were estimated in house-hold measures such as glasses, cup, slices, spoons, a full plate etc. The twenty four hours recall method is used in the food consumption data of families and individual. This is done by weighing a plate of food on a food scale. The weighted number was taken down. It was multiplied with the numbers in the food composition table for use in Africa which were

all in one gram. For instance if a patient's breakfast was two slice of bread and a cup of tea.

They would be weighed on the food scale, the measured number would be multiplied with that on the food composition table like-wise the cup of tea. After this, you would be able to know the amount dried matter, moisture content, fat, carbohydrate, fibre, Ash, Calcium, Iron, Phosphorus, Vitamin-c, energy per day that is contained in that meal. The advantages of this method is that it is less expensive. It allows for a larger samples especially when the diet is relatively monotonous about the same from one day to another.

CALCULATION OF BODY COMPOSITION PARAMETERS:

The parameters determined are height, weight, lean body mass (LBM), Total body Fat (TBF) both in kilograms and percentage, optimum weight, density, Quetelet's index or BMI, body water, Arm muscle circumference, Arm muscle diameter.

HEIGHTS AND BODY WEIGHTS:

Were read off directly from scale. Quetelet's or BMI was calculated from height and weight measurements using the following formula:

Body mass Index: (Quetelet's Index)

$$BMI = \frac{\text{Body Weight (in kg)}}{(\text{Height in metre})^2}$$

BODY DENSITY:

This was calculated using the following equations by Durnin and Rahaman (1967):

$$Y = 1.1610 - D.0.0632 \times \text{for men}$$

HEIGHT RANGE (CM)	VALUES TO BE SUBTRACTED
140 – 149	100
150 – 155	102
156 – 159	102.5
160 – 165	103
166 – 169	103.5
170 – 175	104
176 – 179	104.5
>180	106

ARM MUSCLE DIAMETER:

$$AMD = \frac{\text{arm circumference (mm)} - \text{triceps (mm)}}{\pi}$$

BODY WATER

This was estimated from the following formula:

$$FFM \text{ or LBM} = \frac{TBW}{0.73}$$

Where FFM or LBM is free fat mass which was anthropometrically derived. (Wrong et al 1989)

Where $x = \log$ (sum of Triceps, biceps, subscapular and abdomen).

While for women, equation of Durnin and Womersley (1974) was used:

$$Y = 1.1605 - 0.0777 \times \text{for women}$$

Where $x = \log$ (sum of triceps, biceps and subscapular skinfold thickness)

$$Y = \text{density}$$

PERCENT BODY FAT:

This was estimated from Siri's (1956) equation:

$$\% \text{ Body fat} = \frac{((4.95) - 4.5)}{\text{Density}} \times \frac{100}{1}$$

BODY FAT IN KILOGRAM:

Total Body Fat (kg) =

$$\frac{\text{Total body fat \%} \times \text{Body weight (kg)}}{100}$$

LEAN BODY MASS (LBM):

$$LBM = \text{Body weight (kg)} - \text{Body fat kg}$$

RAPID METHOD FOR OPTIMUM WEIGHT (WEIGHT-FOR-HEIGHT)

During this research it was discovered that the weight-for-height of adults and the elderly may be quickly calculated in the field if the height is known. After examining and considering alternative formulae used for weight-for-height, it was discovered that this parameter could be simply calculated by subtracting some set values from a particular height range.

STATISTICAL ANALYSIS.

Here, two populations were compared in this case Adults and the elderly. Two test statistics were used. One for when we have equal variance.

1. Test statistic for difference of means of two populations with $\sigma_1^2 = \sigma_2^2$

$$t_{cal} = \frac{(\bar{X}_1 - \bar{X}_2) - (U_1 - U_2)}{S^2}$$

$$S^2 = \frac{(n_1 - 1) \cdot S_1^2 + (n_2 - 1) \cdot S_2^2}{n_1 + n_2 - 2}$$

$$n_1 + n_2 - 2$$

$$t_{\text{tab}} = t_{\frac{\alpha}{2}} \quad (\text{d.f.})$$

2. Test Statistic for when $d_1^2 = d_2^2$

$$t_{\text{cal}} = (X_1 - X_2) - (U_1 - U_2)$$

$$S_1^2 \quad S_2^2$$

$$n_1 \quad n_2$$

$$\left(\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2} \right)^2$$

$$d.f. = (S_1^2)^2 + (S_2^2)^2$$

$$n_1 \quad n_2$$

$$n_1 - 1 \quad n_2 - 1$$

$$H_0 : U_1 = U_2$$

$$H_1 : U_1 \neq U_2$$

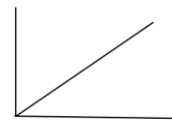
Decision Reject H_0 if $(t_{\text{cal}}) > t_{\text{tab}}$

CORRELATION COEFFICIENT:

In this research work, some of the parameters are connected which calls for a need to relate them. To achieve this, correlation is used to determine them. According to Inyama et al; 1995, correlation coefficient is used when there is some connection or dependence between two or more variables. He said that it measures the actual amount of relationship that exists between two given variables. It is normally denoted by r and lies between -1 and 1. That is $-1 \leq r \leq 1$

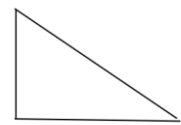
If $0.5 \leq r \leq 1$ or $1 \leq r \leq -0.5$, we say that there is a good correlation. But if $r \leq 0.5$ or $0 \geq r \geq -0.5$, we say that there is a poor or non-existent correlation. When r is +1, we have a perfect or hundred percent correlation, when r is 0, there is no

correlation. A correlation is said to be positive if an increase in one variable is accompanied by an increase in the other. But if an increase in one variable is accompanied by a decrease in the other variable, the correlation is said to be negative.



+r

and



-r

There are two main methods of calculating correlation coefficient, they are the

i) Product-moment method

ii) Spearman's/Pearson's method.

In this research work, Spearman/Pearson's method is to be used. This method only gives an approximate result since it takes into account only the absolute size of the variables. The steps of the Spearman's method by ranks are

1. Rank the values in each set of data by either considering the smallest value first and give it the rank 1 and proceed in that order or consider the largest value as the one with first rank.

2. After ranking both sets of the variables, work out a set of deviations by subtracting each x -rank from the corresponding y -rank or vice versa.

3. Obtain a set of d^2 and sum that is $\sum d^2$

4. Use the Spearman's formula below to calculate $r = 1 - \frac{6 \sum d^2}{n(n^2 - 1)}$ When n is the number of (x,y) pairs.

$n(n^2 - 1)$ When n is the number of (x,y) pairs.

TABLE I: ELDERLY MALE

a.	Body weight	Energy Intake	-0.528
	Body weight	Fat Intake	0.067
	Body weight	Protein	-0.403
b.	Total skinfold thickness	Energy Intake	-0.589
	Total skinfold thickness	Fat intake	-0.049
	Total skinfold thickness	Protein Intake	-0.390
c.	Body fat	Energy Intake	-0.500
	Body fat	Fat Intake	-0.049
	Body fat	Protein Intake	-0.237

TABLE II FEMALE ELDERS

a	Body weight	Energy Intake	-0.528
	Body weight	Fat Intake	0.067
	Body weight	Protein Intake	-0.403
b	Total skinfold thickness	Energy Intake	-0.589
	Total skinfold thickness	Fat Intake	0.321
	Total skinfold thickness	Protein Intake	-0.390
c	Body fat	Energy intake	0.501
	Body fat	Fat Intake	0.321
	Body fat	Protein Intake	-0.542

TABLE III MALE ADULT

a	Body weight	Energy Intake	-0.011
	Body weight	Fat Intake	0.0280
	Body weight	Protein Intake	0.310
b	Total skinfold thickness	Energy Intake	0.041
	Total skinfold thickness	Fat Intake	-0.132
	Total skinfold thickness	Protein Intake	-0.045
c	Body fat	Energy Intake	0.078
	Body fat	Fat Intake	-0.199
	Body fat	Protein Intake	0.0139

TABLE IV FEMALE ADULTS.

A	Body weight	Energy Intake	0.122
	Body weight	Fat Intake	-0.257
	Body weight	Protein Intake	0.131
B	Total skinfold thickness	Energy Intake	0.043
	Total skinfold thickness	Fat Intake	0.413
	Total skinfold thickness	Protein	0.060
C	Body fat	Energy Intake	0.082
	Body fat	Fat Intake	-0.227
	Body fat	Protein Intake	0.079

TABLE V: CORRELATION BETWEEN THE BODY PARAMETER (BODY MASS INDEX) SHOWN BELOW IN MALES AND FEMALE (ADULT AND MALE AND FEMALE ELDERLY)

a. BODY MASS INDEX (ELDERS)

BP	M	F	OVERALL
<89	22.4081	21.4441	43.8522
<94	20.7251	23.4861	42.2112
<104	22.4444	22.6409	45.0853
<114	24.2215	21.7010	48.9225
<119	26.5250	20.8111	47.3361
	-0.288	0.558	0.646

b. BODY MASS INDEX (BMI) (ADULTS)

BP	M	F	OVERALL
<89	24.2392	27.5614	51.8006
<94	21.7215	23.7825	45.5040
<104	22.6300	23.8510	46.4810
<114	22.0501	21.9070	43.9571
<119	20.1780	24.1824	44.3604
	0.754	0.858	0.723

TABLE VI: CORRELATION BETWEEN THE HYPERTENSIVE PATIENT'S BODY COMPOSITION AND THEIR NUTRITIONAL STATUS PARAMETERS

TABLE A (FEMALE ADULTS)

Lean body mass	Height	-0.236
Lean body mass	Weight	0.857
Lean body mass	Arm circumference	0.347
Lean body mass	Skinfold thickness	0.786
Total body water	Weight	0.847
Body fat	Weight	0.927

TABLE B MALE ADULT

Lean body mass	Height	0.249
Lean body mass	Weight	0.915
Lean body mass	Arm circumference	-0.195
Lean body mass	Skinfold thickness	0.230
Total body mass	Weight	0.914
Body fat	Weight	0.590
Body fat	Skinfold thickness	0.670

TABLE C MALE ELDERS

Body Composition Parameter	Variable	Correlation Coefficient (r)
Lean body mass	Height	-0.017
Lean body mass	Weight	-0.238
Lean body mass	Arm circumference	0.351
Lean body mass	Skinfold thickness	-0.059
Total body water	Weight	0.972
Body fat	Weight	0.956
Body fat	Skinfold thickness	0.631

TABLE D FEMALE ELDERS

Lean body mass	Height	-0.017
Lean body mass	Weight	0.928
Lean body mass	Arm circumference	0.420
Lean body mass	Skinfold thickness	0.922
Total body water	Weight	0.963
Body fat	Weight	0.928
Body fat	Skinfold thickness	0.901

DISCUSSION

From the result the nutritional status of hypertensive patients was determined. It was found that mean weight in kilogram of male and female adult that averaged 63.7 ± 9.4 and 70.2 ± 19.0 respectively met up with the standard and this implies that they are nutritionally adequate but about 20% and 16.7% of the female and male did not meet up to the WHO standard while the mean weight in kilogram of male and female elders 61.8 ± 5.8 (SD) and 54.1 ± 13.6 (SD) respectively met up with the standard and this also implies that they were nutritionally adequate but about 25% and 46.2% respectively did not meet up to standard of WHO and about 24% of female adult were above the standard. The male and female adult had a mean height in centimeter of 170.4 ± 10.1 and 162.8 ± 8.4 respectively also met up to standard. This means that their height is adequate for the body weight while that if the elderly male and female body height that average 167.0 ± 9.0 (SD) and 157 ± 7.0 respectively met up to standard and about 8.3% and 24% respectively did not meet up to standard while 88.9% of adult male met up to WHO standard.

The male and female adult had a mean body mass index (BMI) of 22.0 ± 3.6 and 26.4 ± 6.7 respectively which meet up to the standard according Robergs et al. The female adult

had a mean BMI that is above this standard. Individually, 32% of them were within that standard while 48% of them were above the desirable BMI and 16% were below it. This means that these female whose BMI are above are at the risk of obesity. BMI according to Smalley et al, should be used with caution as indicators of obesity and that obesity is one of the disorders that leads to hypertension.

In the elderly male and female, the means of their BMI are 22.1 ± 4.3 and 21.7 ± 4.4 respectively[cite: 17]. It was observed that they all met up to standard but individually, about 33% did not meet up to standard while 41.7% of the individuals met up to standard and 25% were above the standard tending towards over weight.

The male and female adults had a mean arm circumference of 11.2 ± 1.8 and 14.5 ± 8.9 respectively while the elderly male and female had a mean of arm circumference of 12.1 ± 3.9 and 12.7 ± 4.9 respectively[cite: 17]. This indicating that they are nutritionally adequate. But the one of the adult male showed that there was muscle wasting.

The mean result of the male and female adult optimum weight is 66.4 ± 8.8 and 59.9 ± 7.7 respectively[cite: 17]. When compared with the actual body weight, it was observed that the mean of adult male body weight was not up to that of the

optimum weight while the female's actual body weight was above the optimum body weight. The elderly male and female optimum body weight's mean is 63.5 ± 1.0 and 54.7 ± 6.4 respectively. The elderly male's body weight was not up to that of the optimum weight while the female elders met up to their optimum weight.

The mean of adult male body weight is 63.7 ± 9.4 while that of female is 70.2 ± 19.0 and the mean height of adult male is 170.4 ± 10.01 and that of female is 162.8 ± 8.4 . This means that the adult females have a BMI greater than that of the males. This means that they (female) stand at a greater risk of becoming obsessed and this predisposes them to hypertension. This is because the female adult is above the desirable BMI.

The elderly male and female have a body weight mean of 61.8 ± 13.5 and 54.1 ± 13.6 while their mean height is 167.1 ± 9.0 and 157 ± 7.0 respectively. This means that the male and female BMI within the desirable BMI.

They are nutritionally adequate. When compared with standards, they met up to the standard according to FAO/WHO standard.

Correlation has been run to determine some of the objective. The result gotten when their body composition was related with their nutritional status is discussed as follows.

In the female adults, when the lean body mass was correlated with height, it was observed that there is a weak negative correlation. The lean body mass is significantly correlated with their weight ($r = 0.857$). Lean body mass is some what correlated with Arm circumference. Lean body mass is highly correlated with skinfold thickness. The total body water is highly significantly correlated with weight meaning that there is a clear relationship between them. There is a clear relationship between them. The body fat in female is also highly correlated with weight ($r = 0.927$). It is significant at the 0.01 level.

In the male adult, the lean body mass is weakly correlated with height. This means that the relationship between them is very slight. The lean body mass is highly correlated with the weight. This means that there is a relationship between their lean body mass and their body weight. The lean body mass to some what negatively correlated with the arm circumference. There is a clear relationship between total body water and body weight. It is highly significant ($r = 0.914$). There is a significant correlation between the body fat and the body weight. The body fat and skinfold thickness is also highly correlated ($r = 0.670$).

In the male elders, the lean body mass and height is almost not correlated ($r = -0.017$). The lean body mass and body weight is weak negatively correlated. There is a slight relationship between the two parameters the lean body mass is also correlated with arm circumference ($r = 0.351$). The lean body mass and skinfold thickness is almost not correlated ($r = -0.059$). The total body water and body weight

is significantly correlated. The body fat and body weight is significantly correlated. ($r = 0.956$). This is also a relationship between body fat and skinfold thickness. It is also significant at 0.01 level. ($r = 0.631$).

While in the female elders, there is a weak negative correlation between the lean body mass and their body height. ($r = 0.017$). It is almost not correlated. There is a high correlation between the lean body mass and the body weight. This mean that the body weight is affected by their lean body mass. The lean body mass is highly correlated with the skinfold thickness. It is highly significant. ($r = 0.922$). The total body water is highly correlated with the body weight ($r = 0.963$). The body fat is also highly correlated with body weight ($r = 0.928$). It is also significant. The body fat is highly correlated with skinfold thickness. ($r = 0.901$). From these results gotten from correlation, it has now showed that their body composition being the independent variable is related to their nutritional status.

In achieving the objective that says to find out any relationship between food intake and the disease body weight, total skin fold thickness and body fat were used as indices to ascertain this. Since the diseases cannot be measured, these indices mention above is used to correlate the food intakes of these patients.

In the elderly male, the body weight was correlated with their food intake (Energy intake, fat intake and protein intake), it was observed that with the energy and protein intake there was negative correlation. This means that as the body weight is decreasing, the energy and protein intake will be increasing. While body weight and fat intake is almost not correlated. The total skin fold thickness is negatively correlated with energy and protein intake. While in that of fat intake, there is almost correlation.

In the female elders, there is also a negative correlation between, the body weight and energy and protein intake. Then there is also almost no correlation between body weight and fat intake. There is a negative correlation between total skinfold thickness and the food intake. The body fat and energy and fat intake is correlated. But there is a negative correlation between body fat and protein intake.

In the male adult, the body weight is negatively correlated with energy intake. There is correlation between body weight and fat and protein intake. There is almost no correlation between total skinfold thickness and their food intake. This is also application in the body fat. There is almost no correlation between body fat and the food intake.

In the female adult, there is a weak correlation between their body weight and food intake. Between total skin fold thickness and energy and protein intake, there is almost no correlation between them. But total skin fold and fat intake is correlated. Also, there is a weak correlation between body fat and food intake.

In achieving the objective that said to find out if there is any relationship between the disease and the body parameter (Body mass index), a correlation is used to do this. First of all, the average BMI of the patient that fell in different classification of hypertension was determined. Then for the elderly, their blood pressure was correlated with their BMI, the following result were achieved, when the BP was correlated with male BMI a weak negative correlation was gotten ($r=-0.288$) when the BP was correlated with female BMI, it was observed that they were correlated. There is relationship between the two variable, ($r=0.558$). Then the BP was correlated with the overall BMI, it was observed that they were highly correlated.

In the adult, the BP was connected with the male BMI, it was observed that they are significantly correlated. This suggests that their BMI is tied to their condition. Then BP was connected with female BMI and it was shown that they were highly correlated. Which suggests they are related. Then the BP was also connected with the overall BMI, it was seen that they are likewise substantially correlated.

Therefore from the result obtained, this shows that there is a relationship between the disease and the body mass index which is used to determine some of the chronic diseases which obesity is one of. And from this research we had known that obesity can aggravate this disorder hypertension.

CONCLUSION

From the study, we have found that many factors can aggravate hypertension. This has been by interviewing and by assessments. Some could be as a result of genetic factors, some as a result of obesity, some as a result of psychosocial stress (anxiety) while some as a result of physical inactivity. Having determine their nutritional status and body composition and comparing them with standards, conclusion can be drawn that this disorder is mainly as a result of increased body mass index. This is concerned with the adult. Then among the elderly group as we have learnt from this study that as one advances in age, the blood pressure tends to increase. This is most at times as a result of anxiety. Therefore, most of the elders used in this study, during the interview period, it was observed that they were worrying for one socio-economic problem to another. Most were also stressed.

Also, a test was conducted to check if there was any significant difference between the adult body parameter and that of the elderly patient. It was observed that some of the parameters were significantly different from those of the elderly patients while in some, there was no significant difference.

A t-test was also used to determine if there any significant difference between the adult dietary intake and the elderly dietary intake, it was observed that there was significant difference between the two.

RECOMMENDATION

I recommend to as many that are affected by hypertension to eat more of proteinous food. Those who cannot afford meat and milk should go for the substitute like ice fish, beans, etc.

They should reduce the intake of high cholesterol diet especially red meat, egg, palm oil, fat etc.

I also recommend that they should avoid staying idle, they should involve themselves in one physical activity or the other, but they also should avoid any deep breathing exercise. This is to avoid acceleration of blood pressure.

Finally, I recommend that the public health sector of the government to embark on enlightenment program on the usefulness of the various kinds of food and their combination in the right proportion necessary for health and growth.

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