THE STUDY OF ANTHROPOMETRIC PARAMETERS TO PREDICT CARDIOVASCULAR DISEASE RISK FACTORS IN ADULT POPULATION OF WESTERN RAJASTHAN

Sushma K. Kataria, Isha Srivastava, Abhilasha Dadhich
Department of Anatomy, Dr. Sampurnanand Medical College, Jodhpur Rajasthan.

ABSTRACT

Cardiovascular disease is the most serious and immediate health problem in many countries nowadays. Thus, the present study was performed on 100 male patients wtih cardiovascular disease to determine the values of simple anthropometric parameters in each. BMI, waist circumference, hip circumference, waist to hip ratio, waist to height ratio and skin folds were measured. Observations showed that all parameters are positively linked with cardiovascular disease risk factors but peripheral skin folds were negatively linked.

KEYWORDS: -Cardiovascular Disease, Hip Circumference, Waist Circumference and Body Mass Index (BMI)

INTRODUCTION

Coronary arterial disease results in dysfunction of the heart. It is the most serious and immediate health problem in many countries and has absorbed large share of time and wealth on research all over the world. In India, rates of cardiovascular disease among urban populations have risen from 4% to 11% in the past 5 decades.

The risk factors have theoretical and practical implications with respect to the aetio-pathogenesis, pathophysiology, recognition, prevention and management of the dreadful complications of cardiovascular disease. These are also known to be associated with significantly increased risk of developing the disease in subsequent years. These factors are hyperlipidemic states, hypertension, smoking, sedentary life style, diabetes mellitus, alcohol intake, thrombotic tendency and obesity.

Obesity is one of the major risk factors of cardiovascular disease and is defined as a condition where there is an excess of body fat. It has been known to be associated with hypertension, diabetes, dyslipidemia and increase in cardiovascular disease. In addition, cardiovascular disease mortality is about 3 fold higher among obese men and women.

Although there are several instruments to measure total body fat and its distribution, anthropometric measurements play an important role in clinical practice

Correspondence
Dr. Sushma K. Kataria
Warden Bungalow, Medical Girls Hostel, M.D.M. Hospital Campus, Shastri Nagar, Jodhpur (Raj.) 342003

E-mail : drkushal11@yahoo.co.in
Phone 09414134813,

The study done by Zhu et al has found waist circumference to be the best screening measure for cardiovascular disease[1]. On the other hand, study done by Seidell JC et al showed skin folds as a reliable alternative for measurement of body fat mass2. Gupta R et all evaluated cardiovascular disease risk factor, anthropometrically in 600 subjects of Punjabi bhatia community.[3] Kaur P et all observed that age, body mass index and smoking were very strongly associated with hypertension.[4] Thus, it is seen that predictive power of anthropometric indices is population dependent and varies from race to race. Therefore, it is essential to determine what values of simple anthropometric measurements are associated with the presence of adverse cardiovascular disease risk factors in each population to facilitate enhanced screening for disease risk.

Thus, the aim of the present study is to examine the predictive ability of anthropometric indices for development of cardiovascular disease risk factors such as obesity, diabetes or hypertension.

MATERIAL AND METHODS: - The present study was undertaken in the department of Medicine, Dr. S.N. Medical College and its associated group of hospitals.

A total of 100 male patients, with recently diagnosed cardiovascular disease, in age group of 35-55 years were included for the study. The patients were further subdivided into following four groups:

Group 1 Having hypertension as the major risk factor of cardiovascular disease.

Group 2 Having diabetes as the major risk factor of cardiovascular disease.

Group 3 Having both hypertension and diabetes as

the risk factors of cardiovascular disease.
Group 4 Having some risk factor of cardiovascular disease other than diabetes and hypertension.
Various anthropometric parameters were measured :
1. Body Mass Index (BMI) Weight calculated by weighing machine and height by measuring tape. BMI calculated by following formula given by Garrow JS and Websler 1985
BMI (Kg/m2) = Weight(Kg)/Height(m)2
2. Waist Circumference (WC) (cm) was measured at the most lateral contour of the abdomen by a measuring tape.
3. Hip Circumference (HC) (cm) measured at the widest portion of hips by measuring tape.
4. Skin Fold Measurments they were taken at the following sites by using skin fold measuring calipers :
a. Biceps Front of arm
b. Triceps On the back of arm
c. Suprailiacal Above iliac crest, at the level of umbilicus
d. Subscapular Below inferior angle of scapula
5. Waist To Hip Ratio (W/H) - was calculated by dividing WC by HC
6. Waist To Height Ratio (W/HT) was calculated by dividing WC by height.
Arithmetic mean and standard deviation were calculated for all parameters studied.

OBSERVATIONS

The following observations were performed:

TABLE NO. 1 shows mean, BMI, waist circumference [WC (cm)] and hip circumference [HC (cm)] in the four groups

S. No.	*Groups*	*BMI(Kg/ m^2)*	*WC (cm)*	*HC (cm)*
1.	*Hypertension*	*24.62*	*104.4*	*99.6*
2.	*Diabetes*	*24.73*	*100.39*	*98.75*
3.	*Hypertension + Diabetes*	*24.42*	*101.42*	*97.41*
4.	*Other*	*24.04*	*99.33*	*95.76*

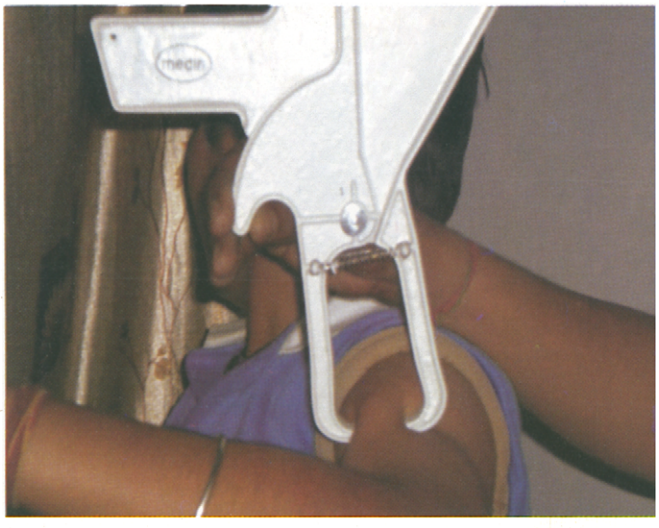
TABLE NO. 1 shows mean, BMI, waist circumference [WC (cm)] and hip circumference [HC (cm)] in the four groups.

S. No.	*Groups*	*W/Ht*	*W/H*
1.	*Hypertension*	*0.595*	*1.05*
2.	*Diabetes*	*0.589*	*1.02*
3.	*Hypertension + Diabetes*	*0.590*	*1.04*
4.	*Other*	*0.581*	*1.04*

TABLE NO. 2 shows mean waist to height ratio [W/Ht] and waist to hip ratio [W/H] in the four groups.

S. No.	Groups	BI	TRI	SS	SI
1.	Hypertension	16.8	17.73	24.13	25.13
2.	Diabetes	16.46	16.96	24.67	23.66
3.	Hypertension + Diabetes	15.66	17.84	22.5	23.75
4.	Other	14.62	16.17	20.9	21.31

TABLE NO. 3 shows mean skin fold measurements (mm) at biceps (BI), triceps (TRI), sub scapular (SS) and supra iliac (SI) region in the four groups.



a) Biceps

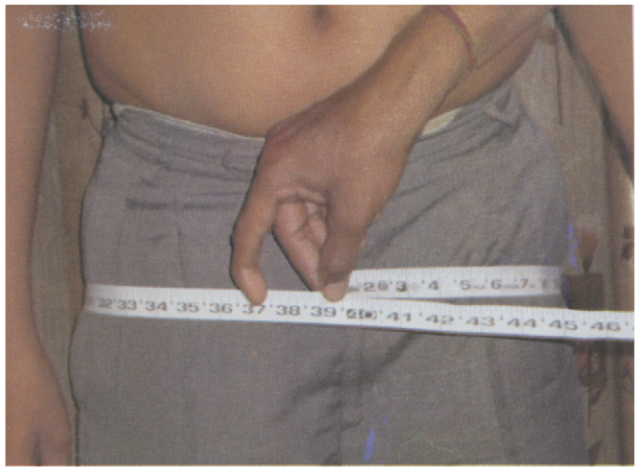
b) Triceps

c) Suprailiac

d) Subscapular

SKIN FOLD MEASUREMENTS

Waist Circumference



Hip Circumference

DISCUSSION

In the ageing population of industrialized nations, increasing burden of chronic cardiovascular disease has an enormous impact on population health, the health care system and the economy. The need for a better understanding of how to achieve "healthy ageing", how to slow down the process of cardiovascular disease generation and progression, and how to improve preventive and therapeutic strategies is obvious in societies with a steadily rising life expectancy. Therefore, the present study was performed on 100 patients of cardiovascular disease in age group of 35-55 years of western Rajasthan population.

In Asians, the increased risks associated with obesity have been shown to occur at lower BMIs and these populations are predisposed to visceral or abdominal obesity. Therefore, the WHO proposes a lower BMI value to define overweight and obesity in Asia-Pacific region and the cut off points for overweight and obesity given are 23 kg/m^2 and 25 kg/m^2.[5]

In the present study, the values of BMI were calculated as >23 kg/m^2 thus showing a positive relation between cardiovascular disease and body fat. Similarly, Gupta R et al calculated the values of BMI >23 kg/m^2 In Punjabi Bhatia community in Jaipur[3]. Also Sargeant LA et al observed the cut off points for BMI lower than the criteria of WHO in Jamaica[6].

Waist circumference (WC) is a strong predictor of intra abdominal adiposity.In the present study, the values for WC were observed around 100 cm in relation with the study of Lopatynski J et al who found the cut off points for waist circumference as 99cm in men of Lublin[7].

Fat predominantly deposited around hips and buttocks does not have risk for health complications such as cardiovascular disease as observed by Goh VHH et al, they found the cut off values for hip circumference as 101.5 cm in Singapor men[7]. Ketel IJG found the values of hip circumference as 89.3 cm in Caucasian Dutch adults[9]. In our study, the cut off values of hip circumference were observed as 95.76 cm.

On the other hand, waist to hip ratio (W/H) is a measure that had a strong relationship with diabetes and hypertension and is a robust predictor of disease risk and mortality. In our study, the cut off values of W/H were calculated as 1.02. Kaur P et at concluded that W/H was the best predictor of hypertension and diabetes in male industrial population in Chennai[4].

Another ratio, waist to height (W/Ht.) has also the potential to be globally applicable to different ethnic populations. Schulze MB et al concluded that W/Ht was the strongest anthropometric predictor than any other anthropometrical measure in both men and women of Potsdam, Germany[10]. In the present study, the values of W/Ht were found as >0.58.

Traditionally, skin fold thickness measurements have been used for the assessment of body composition and fat distribution and they correlate well with several factors of cardiovascular disease.

In the present study the values of central skin folds were found to be higher than the peripheral skin folds thus showing a positive relation between central skin folds and was seen, similar to the study of Donahue RP and Abbott RD on British adults[11]. A negative relation was seen between peripheral skin folds and cardiovascular disease.

Hence, the values of BMI calculated as > 23 Kg/m^2 shows a positive relation between cardiovascular

disease and body fat. The cut off values of hip circumference and waist to hip ratio were observed as 95.76 cm and 1.02. The positive relation between central skin folds and negative relation between peripheral skin folds and cardiovascular disease were seen in western Rajsathan population. This is the first study of this kind on this population so it cannot be compared with data of this region.

REFERENCES

1. Zhu S, Wang Z, Heshka S, Heo M, Faith MS and Heymsfield SB.: Waist circumference and obesity associated risk factors among whites in the third NHANES: Clinical action thresholds. *Am J Cli Nutr.* 2002: 76; 743-9.
2. Seidell JC, Ferreina I, Snijder MB and Kemper HCG.: Central fat mass versus peripheral fat and lean mass: Opposite association with arterial stiffening? The Amsterdam Growth and Health Longitudinal Study. *J Clin Endo and Meta.* 2004: 89; 2632-2639.
3. Gupta R, Sarna M, Thanvi J and Rastogi P.: High prevalence of multiple coronary risk factors in Punjabi Bhatia community: Jaipur Heart Watch-3. *Indian Heart* J. 2004: 56; 646-652.
4. Kaur P, Radhakrishnan E, Rao SR, Gupte MD, Rao TV, Chennakesavan S and Sankarasubbaivan S.: A comparison of anthropometric indices for predicting hypertension and diabetes in a male industrial population of Chennai, South India. *Eth Dis;* 2008: 18(1); 31-6.
5. WHO Expert Consultation , Appropriate BMI for Asian populations and its implications for policy and intervention strategies. *Lancet.* 2004: 363; 157-163.
6. Sargeant LA, Bennett FF, Forrester TE, Cooper RS and Wilks RJ.: Predicting incident diabetes in Jamaica: The role of anthropometry. *Obesity Research.* 2002: 10; 792-798.
7. Lopatynski J, Mardowicz G and Szczesniak G.: A comparative evaluation of waist circumference, waist to hip ratio, waist to height ratio and body mass index as indicators of impaired glucose tolerance and as risk factors for type 2-diabetes mellitus. *Ann Univ Mariae Curie Sklodowska* [Med]. 2003: 58(1); 413-9.
8. Goh VHH, Tain CF, Tong TYY, Mok HPP and Wong MT.: Are BMI and other anthropometric measures appropriate as indices for obesity? A study in Asian population. *J of Lipid Research.* 2004: 45; 1892-1898.
9. Ketel IJG, Volman MNM, Seidell JC, Stehouwen CDA, Twisk JW and Lambalk CB.: Superiority of skin fold measurements and waist over waist to hip ratio for determination of body fat distribution in a population based cohort of Caucasian Dutch adults. *European J of Endocrinology.* 2007: 156(6); 655-661.
10. Schulze MB, Heidemann C, Bergmann MM, Hoffmann K and Boeing H.: Comparison of anthropometric characteristics in predicting the incidence of type 2 diabetes in EPIC-Potsdam study. *Diabetes Care.* 2006: 29; 1921-1923.
11. Donahue RP and Abbott RD.: Central obesity and CHD in men. *Lancet.* 1987 :2; 1215.