

Relationship of skin fold measurements and cardio vascular disease risk in adult population of Rajasthan

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ABSTRACT

Background: Cardio-vascular disease is a major contributor to the global burden of disease among the non-communicable diseases. Obesity- the condition of excess of body fat has been known to be associated with increase in cardio vascular disease. To obtain a reasonable estimation of body-fat distribution, several anthropometric parameters have been proposed, such as subcutaneous skinfolds and body circumferences. Therefore, the aim of the present study was to examine the relationship of skin fold measurements and CVD and thus to predict and facilitate screening of the disease risk in study population. **Methods:** A total of 100 male patients, with recently diagnosed cardio vascular disease, in age group of 35-55 years were included as subjects for the study. Four skin fold measurements (over Biceps, Triceps, Subscapular and Supra-iliacal) were taken using skin fold measuring calipers. **Results:** Values of central skin folds i.e. Subscapular and Supra-iliacal were found to be higher than the peripheral skin folds i.e. Biceps and Triceps in each group, thus showing Subscapular and Supra-iliacal are positively linked to cardiovascular disease whereas Biceps and Triceps have negative relation with cardiovascular disease. **Conclusion:** Central fat mass can be recognized as an independent risk factor for cardiovascular disease and metabolic disease as well as overall mortality. Skinfold measurement is sensitive marker of cardiovascular risk. Measurement of these parameters may help to identify individuals with adverse concentrations of lipids and other risk factors. These persons could then targeted for weight reduction and risk-factor surveillance.

Key words: Cardiovascular disease, Fat distribution, obesity, Skinfold measurement.

INTRODUCTION

Major health transitions occurred during last century globally, due to various socio-economic and technological changes that profoundly affected life expectancy and ways of living. The most globally pervasive change has been the rising burden of non-communicable diseases (NCDs). Cardiovascular diseases (CVDs), diabetes, cancers, neuropsychiatric illness and other chronic diseases are becoming major contributors to the burden of disease globally.^[1]

CVD is a major contributor to the global burden of disease among the NCDs. Coronary heart disease (CHD) is likely to be the most common cause of disability adjusted life years (DALY) loss in 2020 as compared with its fifth position in 1990. With increasing affluence and a rapidly aging population CVD has become the most serious and immediate health problem in industrialized and developing countries like India.

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The risk factors of cardio vascular disease are obesity, hyperlipidemic state, diabetes mellitus,

hypertension, alcohol and dietary intake, smoking, physical activity and many more.

These factors are known to be associated with each other and significantly increased risk of developing CVD. Predisposing factors of CVD have profound effect in causation of disease.

Obesity- the condition of excess of body fat is one of the most common health problems and it has been known to be associated with increase in cardio vascular disease. Body fat distribution and lipid profile are the important predicting parameters for various metabolic disturbances like diabetes, hypertension and dyslipidaemia.^[2] In the case of obesity, most important consideration relates to its measurement problem. Obesity may be defined as an excess of body fat. But body fat as such is never directly measured in epidemiologic studies. Instead, it is indirectly assessed by either weight-for height indices or skin-fold measurements, or both. The former confounds body fat with other body compartments including muscle and skeletal mass, and the latter considers only subcutaneous fat at specified locations on the body. Thus, skin folds do not even provide a global measure of adiposity. Moreover, the relationship between one or a combination of skin fold measurements and total body fat could vary from individual to individual, depending on the distribution of body fat.

Accurate methods used to assess total body fat and Magnetic resonance imaging) in humans are not suitable for use in large population studies because of cost, irradiation exposure (i.e., computed tomography), and limited availability outside the research setting.^[3] To obtain a reasonable estimation of body-fat distribution, several anthropometric parameters have been proposed, such as subcutaneous skinfolds and body circumferences, which are easy to perform and have a sufficient degree of accuracy.

Some anthropometric measures or indexes, such as body mass index (BMI) and waist circumference, have been used in a large number of studies on adults to analyze the association between adiposity and cardiovascular risk factors.^[4] Zhu et al has found strong relationship between waist circumference and CVD. On the other hand, Seidell JC et al showed skin folds as a reliable alternative for measurement of body fat mass.^[5,6] Traditionally, skin fold measurements have been used for the assessment of body composition and they correlate well with several factors of cardio vascular disease.

Therefore, the aim of the present study was to examine the relationship of skin fold measurements and CVD and thus to predict and facilitate screening of the disease risk in study population.

MATERIALS AND METHODS

The present study was undertaken in the department of Medicine, Dr. S.N. Medical College and its associated group of hospitals, Jodhpur. A total of 100 male patients, with recently diagnosed cardio vascular disease, in age group of 35-55 years were included as subjects for the study. The subjects were divided into four age groups of 35-40, 41-45, 46-50 and 51-55 years. [Table 1] Patients having any other diseases like diabetes, thyroid diseases, any skeletal deformity, renal failure etc. were excluded. Ethical approval was taken from institutional ethics committee and informed consent was taken from each participant prior to study. Then skin fold measurements were taken at the following sites by using skin fold measuring calipers:

Biceps (BI) – front of arm. [Figure 1]

Triceps (TRI) – back of arm. [Figure 2]

Subscapular (SS) – below inferior angle of scapula. [Figure 3]

Suprailiacal (SI) – above iliac crest, at the level of umbilicus. [Figure 4]

Arithmetic mean and standard deviation were calculated for all the measurements and on the basis of mean values, charts were drawn to compare between the measurements.

body-fat distribution (computed tomography and

RESULTS AND DISCUSSION

Table 1: Age wise distribution of subjects.

S.NO.	GROUPS	NO. OF PATIENTS
1	35-40 Years	12
2	41-45 years	15
3	46-50 years	29
4	51-55 years	44
	Total	100

Table 2: Mean skin fold measurements (mm)

S.no.	Group	BI*	TRI**	SS***	SI****
1	35-40	16.8	17.73	24.13	25.13
2	41-45	16.46	16.96	24.67	23.66
3	46-50	15.66	17.84	22.5	23.75
4	51-55	14.62	16.17	20.9	21.31

*Biceps, **Triceps, *** Subscapular, **** Suprailiacal

In present study, the values of central skin folds i.e. SS and SI were found to be higher than the peripheral skin folds i.e. BI and TRI in each group [Table No 2], thus showing SS and SI are positively linked to cardiovascular disease whereas BI and TRI have negative relation with cardiovascular disease.



Figure 1: Measurement of Biceps skinfold.



Figure 2: Measurement of Triceps skinfold

whereas peripheral skin folds were related slightly less with cardiovascular disease.^[10]



Figure 3: Measurement of Subscapular skinfold

Central skin folds, mainly the sub scapular (SS) were observed to be positively linked with CVD risk factors in the studies done on British adults by Donahue RP and Abbott RD (1987), in contrast to peripheral skin folds which were found negatively related to CVD in the studies performed on men and women aged 18-65 years in Yarnell and Patterson et al.^[7,8] Mesa JL et al^[9] measured skin fold thickness and other anthropometric indices and cardio respiratory fitness in 524 adolescents. They emphasized the usefulness of suprailiac skin fold thickness in males as simple anthropometric measurements associated to an overall lipid related metabolic risk.^[9] Ketel IJG et al also stated that central skin fold measurements were moderately related with cardiovascular disease risk factors

Thus we can conclude that central fat mass can be recognized as an independent risk factor for cardiovascular disease and metabolic disease as well as overall mortality. In contrast, peripheral fat mass may independently contribute to a lower risk for cardiovascular disease. Despite the important effect of body fat location on the development of metabolic disturbances, we confirmed that skinfold measurement is sensitive marker of cardiovascular risk. This finding highlights the potential uses of skinfold measurement in identifying individuals at higher metabolic risk of CVDs.

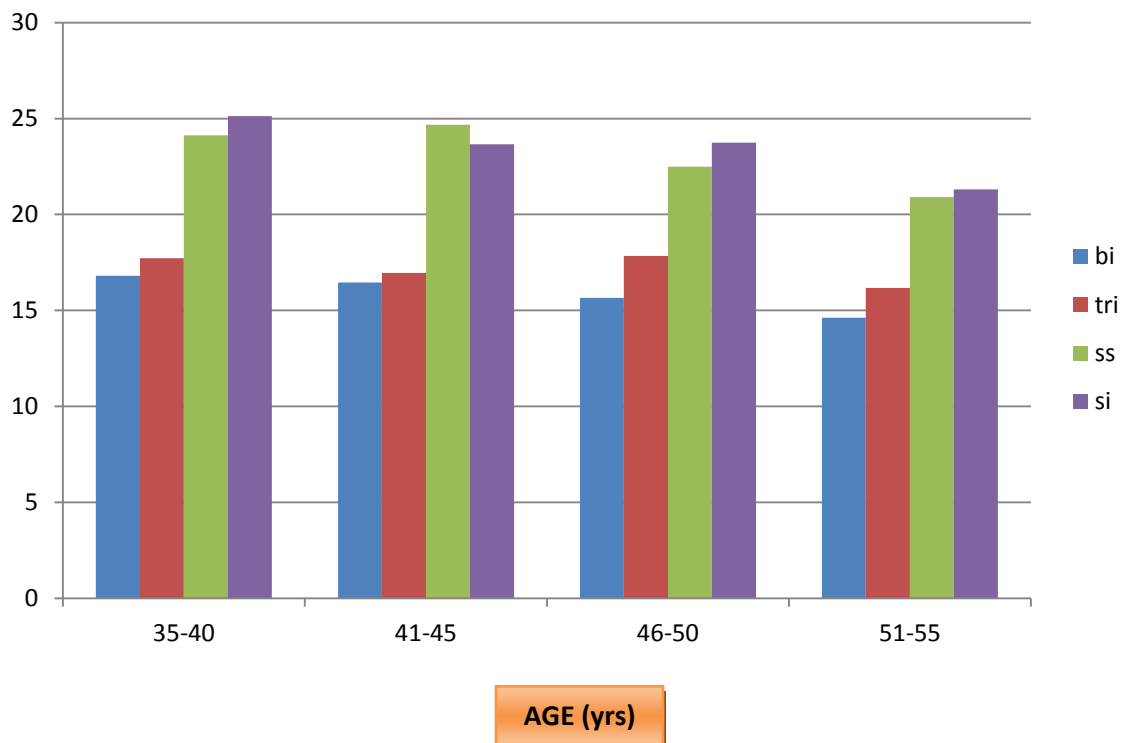




Figure 4: Measurement of Suprailiacal skinfold

Our results indicate that a relative excess of adipose tissue in the abdominal or central region of individuals is associated with adverse lipid profile. Limitations of the current study should be considered for further research in this area. Only 4 skinfold thickness was obtained and it is possible that measurements at other site (such as at the chest or thigh) may provide additional information. Despite these limitations, our findings may have important implications for the choice of skinfold-thickness in clinical and epidemiologic studies. Skinfold-thickness, which is relatively easy to measure, appears to be an important correlate of body fat distribution. These findings suggest that the measurement of these parameters may help to identify individuals with adverse concentrations of lipids and other risk factors. These persons could then targeted for weight reduction and risk-factor surveillance.

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How to cite this article: Agarwal C, Srivastava I, Bhati M, Sharma P, Swami N. Relationship of skin fold measurements and cardio vascular disease risk in adult population of Rajasthan. Ann. of Int. Med. & Den. Res. 2015;1(2):61-5.

Source of Support: Nil, **Conflict of Interest:** None declared