

Skin Fold Thickness in Diabetes Mellitus: A Simple Anthropometric Measurement May Bare the Different Aspects of Adipose Tissue.

Chandra Selvi.E¹, Pavithra.N², Saikumar.P³

Department Of Physiology, SreeBalajiMedical College&Hospital, Bharath University, Chennai.

Abstract:

Introduction: Skin fold thickness measurement provides an estimated size of the subcutaneous fat, which is the layer of subcutaneous tissue and composed of adipocytes. Subcutaneous fat is the major determinant of insulin sensitivity and has a strong association with insulin resistance. However, evidence to predict, the effect of duration of diabetes on skin fold thickness remains unclear.

Aim & Objectives: To assess the relation between progression of diabetes and skin fold thickness.

Methods: Three consecutive skin fold thickness of biceps, triceps, infra scapular and iliac crest were measured in eighty three Diabetic patients irrespective of disease duration. History related to our study was obtained from the questionnaire. Average of three values was considered for the analysis of data.

Results: Patients with the disease duration of <5years and 5-10years had increased skin fold thickness in Infra scapular and iliac crest as compared to biceps and triceps. Skin fold thickness of biceps, triceps, iliac crest and infra scapular were significantly reduced in patients with the disease duration of >10years.

Conclusion: Measurement of skin fold thickness is mandatory to identify diabetic patients at risk early to prevent the development of cardiovascular disease and protect them against added complications.

Keywords: Diabetes Mellitus, Skin fold thickness, Biceps, Triceps, Infra scapular, Iliac Crest

I. Introduction

Adipose tissue is a loose connective tissue composed mainly of adipocytes. Stored energy in the form of lipids, act as cushion and insulate body. Adipose tissue has an unlimited growth potential at any stage of life, excess of adipose tissue predisposes to many diseases-development of insulin resistance. Though it plays an important role in insulin resistance, recently only limited studies are available to relate subcutaneous layer of fat and diabetes mellitus hence this study was designed to relate subcutaneous layer of fat and diabetes. Subcutaneous layer of fat cannot be measured directly hence SKIN FOLD THICKNESS an anthropometric measurement was used to evaluate the nutritional status by estimating the amount of subcutaneous fat. Skin fold thickness measurement provides a good estimate of the quantity of fat in body, enabling us to compare the proportion of body fat in different individuals or different region in the same individual. This experiment was done to assess the relation between progression of diabetes and skinfold thickness and association between skin fold thickness and cardiovascular disease.

II. Materials and methods

The study population consists of 83 diabetic patients of different age groups ranging from 35-75 years of age, recruited from the out patients of SreeBalaji Medical College And Hospital. The study protocol was completely explained to the subjects, questionnaire was set to ask the history of subjects. The parameters included in the study were their height, weight, blood pressure and duration of disease. BMI was calculated using the height and weight measured using standard techniques. The population was studied in the Department of physiology of SreeBalaji Medical College And Hospital.

Skin Fold Thickness was measured in subjects in the Department of physiology, using a UNA caliper. SFT was measured in four different sites biceps, triceps, infrascapular and iliac crest three times and their average was taken as the final reading. The subject was divided into three groups with duration of disease as < 5 years, between 5 to 10 years and >10 years.

III. Statistical Analysis

The data collected was analysed by using ANOVA, to assess the significant value(<0.05) for comparing the skin fold thickness of four sites with blood pressure variation. Pearson correlation was done to observe the relation between skin fold thickness and duration of disease.

IV. Result

Table 1: characteristic features of the diabetic subjects:

FEATURES	MEAN	STD
AGE (yrs)	54.93	±9.34
HEIGHT(cm)	157.7	±9.81
WEIGHT(kg)	65.95	±12.91
BMI(kg/m ²)	26.63	±5.23
BP(mm hg)		
SYSTOLE	126.27	±12.07
DIASYTOLE	80.6	±10.16

The study was conducted on 83 diabetic patients,

- The relation between duration of disease and skin fold thickness.
- Association between skin fold thickness and blood pressure were studied.

Relation between duration of disease and skin fold thickness:

The patients were divided into three groups based on the duration of disease as <5 years, between 5 to 10 years and > 10 years.

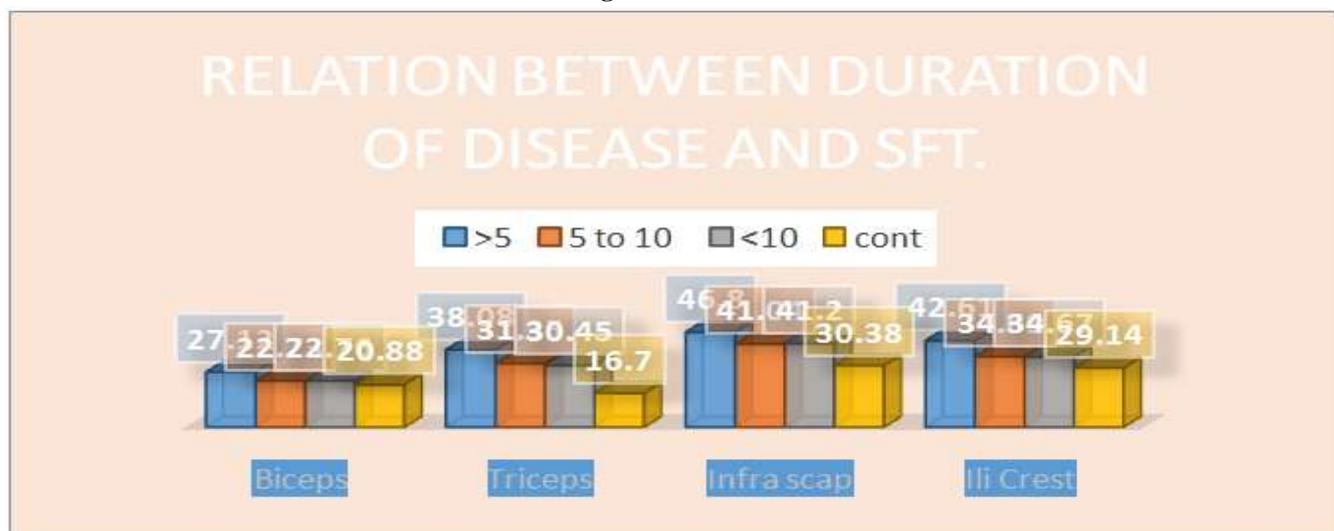
Skin fold thickness was found to be gradually decreasing as the duration of disease increased when compared to non-diabetic patients taken as control.

From the study, it is clear that skin fold thickness gradually decreased in diabetic patients as the duration of disease increased.

FIG 1 explain the above result:

The bar diagram shows Skin fold thickness measurement at four different sites along with control values shown with colour variation.

Fig 1:



Relation between skin fold thickness and blood pressure

Fig 1 a:Correlation between biceps SFT and systolic BP.

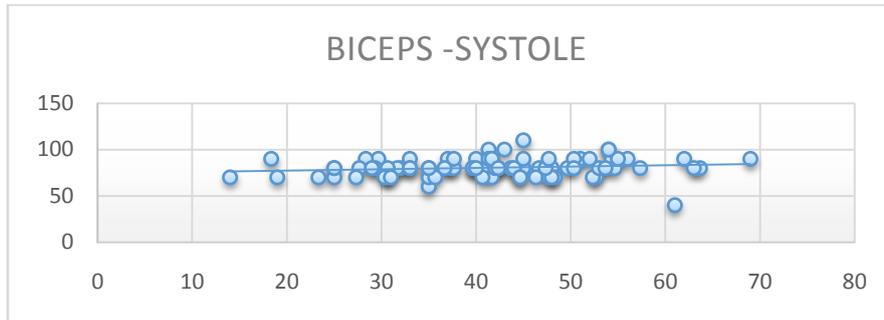


Fig 1 b:Correlation between biceps SFT and diastolic BP.

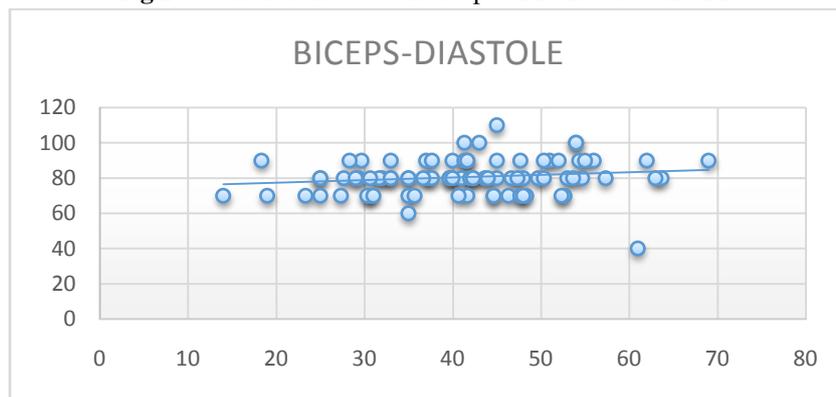


Fig 2 a:Correlation between triceps SFT and systolic BP.

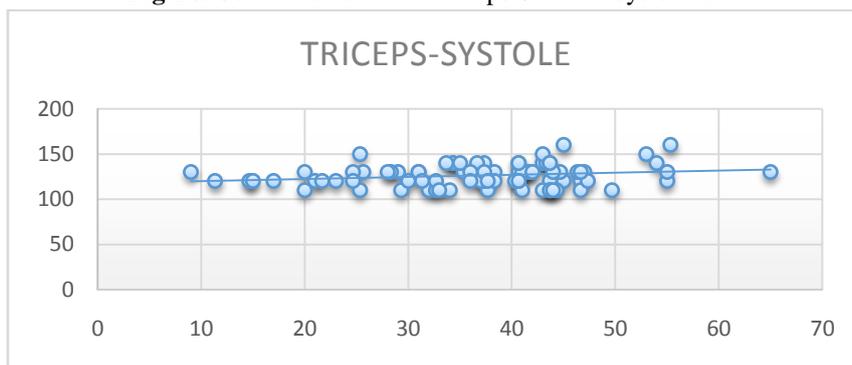


Fig 2 b:Correlation between triceps SFT diastolic BP.

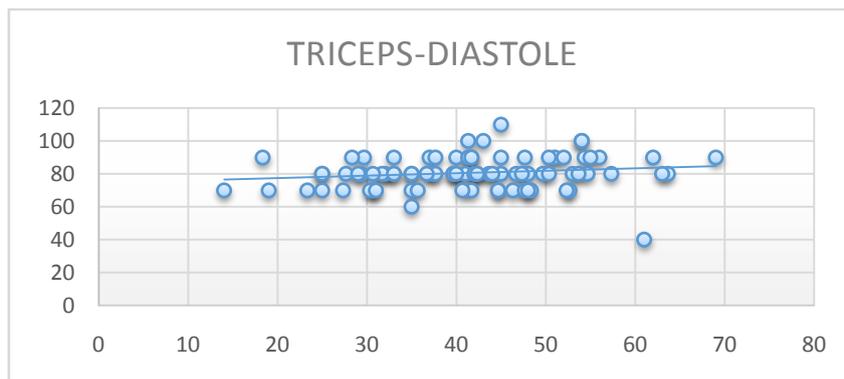


Fig 3 a: Correlation between infra scapular SFT and systolic BP.

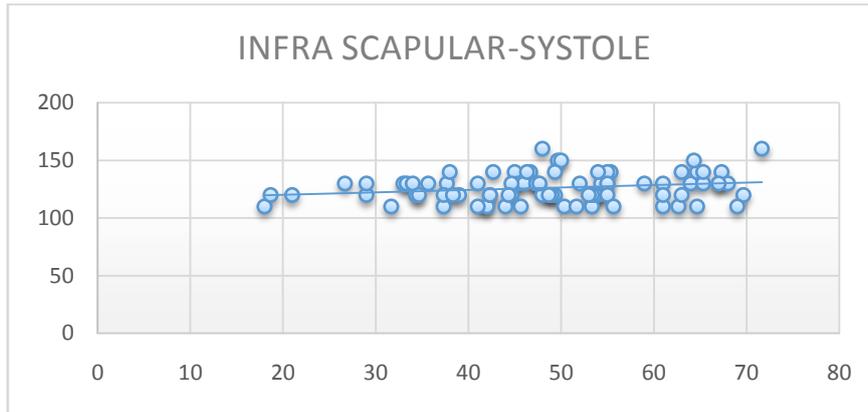


Fig 3 b:Correlation between infra scapular SFT and diastolic BP.

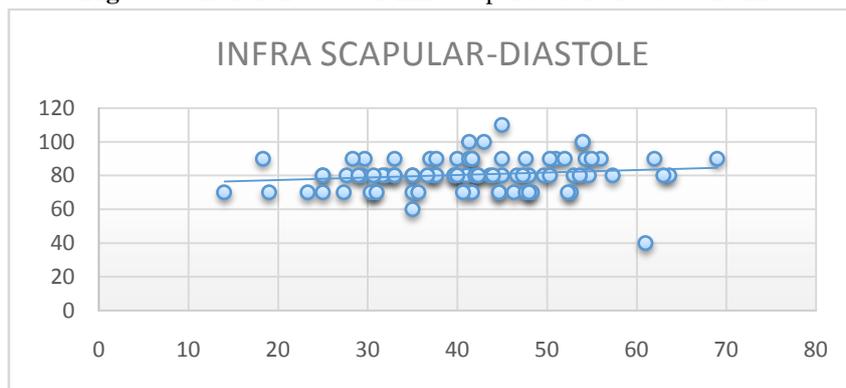


Fig 4 a:Correlation between iliac crest SFT and systolic BP.

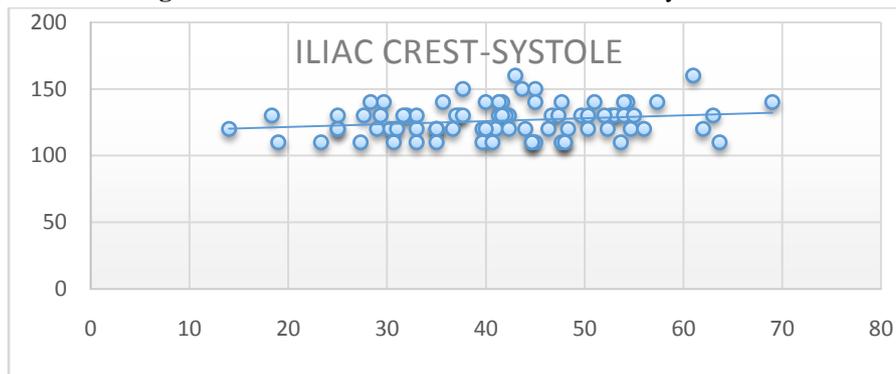
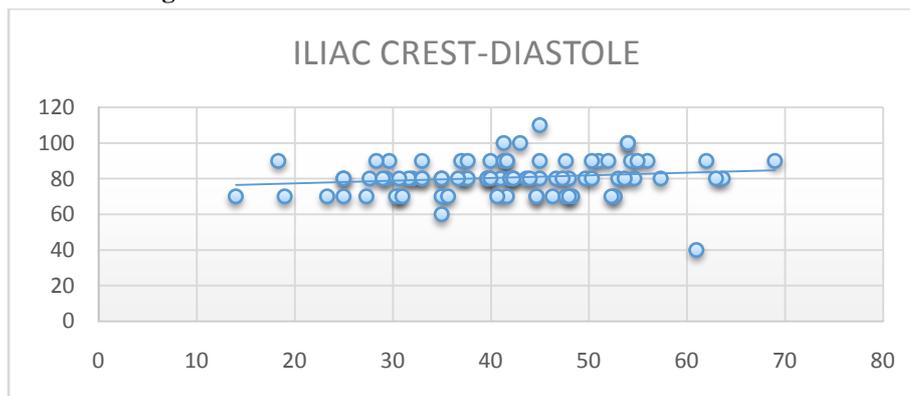


Fig 4 b:Correlation between iliac crest SFT and diastolic BP.



Body fat also has an impact on blood pressure . From the data collected it was found that skin fold thickness was found to be in positive correlation with blood pressure in all four sites of measurement. Hence from the study , we conclude that body fat has great impact on blood pressure.

V. Discussion

In this study , Skin fold thickness was found to be decreased gradually as the duration of disease increased in diabetic subjects. Insulin plays a main role in carbohydrate metabolism and the available excess of glucose is stored as glycogen in liver and as fat in adipose tissue by influx of free fatty acids. In diabetic patients , condition of absence of insulin, there is efflux of free fatty acids from the adipose tissue. Hence in diabetic patients there is decrease of skin fold thickness as the duration of disease increases, this is shown clearly in the FIG 1 which describes the variation of skin fold thickness in different sites as the duration of the disease increases.

Previous study has been stated that there is positive correlation between body mass index and blood pressure but there is no correlation between skin fold thickness and blood pressure⁽⁵⁾ .In contrast to their study ,in our study we conclude that there is strong correlation between skin fold thickness and blood pressure from the data collected , FIG 1 a,1b , 2a,2b,3a,3b,4a,4b. From these tables it shown that there is a correlation between blood pressure and skin fold thickness.

Previous study revealed that other anthropometric measurement BMI, waist hip ratio have association with blood pressure⁽⁸⁾.Since insulin has direct effect on subcutaneous layer of fat this study proves that there is strong and positive correlation between skin fold thickness with blood pressure .

VI. Conclusion

This study concluded that progression of diabetes alters skin fold thickness which has positive correlation with blood pressure . In spite of having many anthropometric parameters to associate cardiovascular risk in diabetes , skin fold thickness may be used as routine parameter in clinical practise to manage cardiovascular disease in diabetic patients .Because skin fold thickness method is a non invasive method , a direct measurement of subcutaneous layer of fat, which may provide direct effect of insulin on lipid metabolism .

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