Relation between anthropometric measurements and serum lipid profile among cardio-metabolically healthy subjects: A pilot study

Sir,

Excess body fatness is a risk factor associated with premature mortality, type 2 diabetes and cardiovascular disease. Serum lipid levels as cardio-metabolic risk factor has been well known.[1] This study was done to correlate and understand the association between measures of adiposity like waist circumference (WC), waist/hip ratio (WHR), skinfold thickness (SFT) and body mass index (BMI) with serum lipid levels and to determine the best predictor of serum lipid profile among them.

One-hundred subjects between 20 and 60 years of age attending the outpatient department of RL Jalappa Hospital, Kolar, were enrolled after obtaining clearance from Institutional Ethical committee and informed consent from them. Detailed history was taken and subjects with H/O diabetes mellitus, cardiovascular disease, carcinoma, liver disease and on lipid-lowering agents suggestive of cardio-metabolic abnormality were excluded from the study.

Body weight was measured in kg by a mechanical scale to the nearest kg. Height was measured to the nearest one cm. BMI (kg/m^2) was calculated using Quitelet's index.

WC was measured midway between the lowest rib and the iliac crest and hip circumference at the level of the greater trochanters with legs close together, using a non-stretchable measuring tape by average of three measurements nearest to 0.5 cm. The WHR equals WC divided by hip circumference.

SFT in mm was assessed at seven sites: biceps, triceps, abdomen, subscapular, suprailiac, thigh and calf, using digital skin caliper whereby a pinch of skin is precisely measured by caliper at these sites to determine the subcutaneous fat layer thickness. General guidelines for using total sum (in millimeters) of the seven main skin fold sites [Table 1]:[2]

Lipid profile of the subjects was done in biochemistry laboratory of RL Jalappa Hospital, Kolar, using Vitrow's 250 Autoanalyser (Johnson & Johnson, Rochester, New York, USA).

WC, BMI, WHR and SFT were correlated individually with lipid profile using Pearson's correlation analysis using SPSS version 14.

The mean age in the study group was 39.3 ± 10.5 years and the proportion of males and females was 67% and 37%, respectively.

All parameters of lipid profile namely serum cholesterol, low density lipoprotein (LDL), triglyceride and LDL/HDL ratio except high density lipoprotein (HDL) had significant positive correlation with all parameters of anthropometric measures as shown in Table 2. HDL had negative correlation with all anthropometric measures, which was statistically significant only with WC and WHR and not with SFT and BMI. Correlations were stronger for WC compared with other anthropometric measurements.

Pearson's Correlations (r values) between lipid profile and anthropometric measurements [Table 2].

All the anthropometric variables had significant positive correlation with each other. According to the present study, WC best correlates with all the parameters of lipid profile. An increased WHR may reflect both a relative abundance of abdominal fat (increased WC) or a relative lack of gluteal muscle (decreased hip circumference), questioning its reliability.[3]

SFT has limitations like skin fold calipers cannot open wide enough to measure total fat thickness, thus grossly under

Table 1: General guidelines for using total sum (in millimeters) of the seven main skinfold sites

	Excellent	Good	Average	Below average	Poor
Normal					
Male	60-80	81-90	91-110	111-150	150+
Female	70-90	91-100	101-120	121-150	150+

Table 2: Pearson's Correlations (r values) between lipid profile and anthropometric measurements.

Lipid Profile	WC#	SFT	WHR	BMI
Cholesterol	0.747 (**)	0.671 (**)	0.610 (**)	0.593 (**)
LDL	0.614 (**)	0.583 (**)	0.537 (**)	0.510 (**)
TGL	0.526 (**)	0.503 (**)	0.506 (**)	0.338 (**)
HDL	-0.283 (**)	-0.172	-0.212 (*)	-0.187
LDL/HDL	0.593 (**)	0.524 (**)	0.484 (**)	0.481 (**)

**Correlation significant at 0.01 level, *Correlation significant at 0.05 level,
#WC - Highest correlation coefficient (r values)

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estimates body fat percentage in the obese population, and has wide observer bias, requiring proper skills in skin fold measurements.[4]

BMI does not account for factors such as body fat distribution, specifically abdominal obesity, and cannot distinguish between lean and fat body mass.[1]

WC reflects abdominal fat, which contains higher amounts of visceral fat. Visceral fat is made by liver, turned into cholesterol, and released into the bloodstream where it forms plaque on the artery walls, resulting in high blood pressure and cardiovascular disease.[5]

The results of this study are consistent with previous studies that report a stronger association between anthropometric measures accounting for abdominal adiposity like WC and cardiovascular disease risk factors.[1,3,5]

This study revealed that all the anthropometric measures were significantly correlated with lipid profile. However, WC was the best predictor of lipid profile and hence the most important risk factor for cardio-metabolic diseases. It is a very simple, economic and less time-consuming procedure, which can be used as a screening test to predict the cardio-metabolic risk of an individual. Further studies with larger population are needed to quantify the results for application to community health lifestyle modifications.

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It is short-but so what!

Sir,

A 34-year-old male presented with gradually worsening right upper-quadrant pain. There was no history of any significant past illness or abdominal surgery. His laboratory test results revealed hemoglobin 12.9 g/dl; total leukocyte count 13 200 cells/mm^3 (neutrophils-63%); normal liver and kidney function tests. Ultrasound of the abdomen revealed features suggesting acute-on-chronic cholecystitis following which the patient was subjected to contrast-enhanced CT. Apart from calculus cholecystitis, an important incidental finding was detected. CT sections through the pancreas revealed normal size head, neck and the uncinate process of the pancreas with absent pancreatic body and tail. The distal pancreatic bed was seen filled by stomach and intestine [Figure 1]. The patient was subsequently evaluated and was found to have mildly elevated serum glucose (fasting blood glucose – 105 mg/dl).

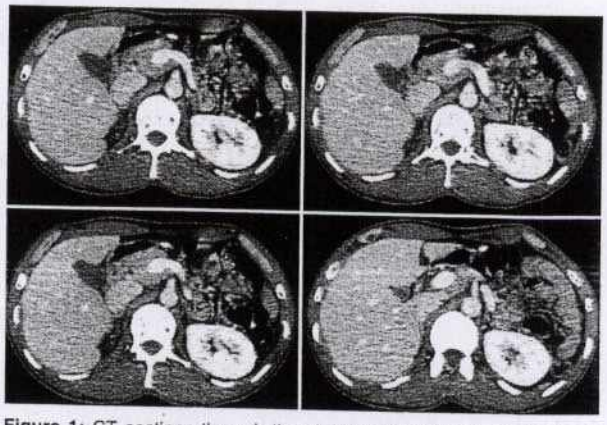

Figure 1: CT sections through the abdomen reveal normal size head, neck and the uncinate process of the pancreas with absent pancreatic body and tail