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SCREENING MARKERS;

Comparison of BMI, WHpR and lap for identifying hypercholesterolemia, hyperglycemia, hypertension and enhanced atherosclerosis

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ABSTRACT: The screening measures to identify various cardiovascular risks related to hyperglycemia, hypertension and hypercholesterolemia are involves both anatomic assessments like anthropometric measures or body's physiological evaluation by performing biochemical parameters. In this regard "lipid accumulation product" (LAP) has surfaced as a marker to incorporate both these anatomic and physiological considerations. **Objectives:** 1. To measure the LAP differences between subjects having normal and higher levels of glucose, total cholesterol, age, carotid intima media thickness and subjects with and without hypertension. 2. To compare BMI and LAP in terms of effectiveness as a screening marker for diagnosis of diabetes mellitus and hypertension through ROC curve calculation. **Design:** Cross-sectional analysis. **Place and duration of study:** This study was carried out at the departments of pathology, PNS RAHAT hospital from Jan-2011 to Oct-2011. **Subjects and methods:** After several exclusions including know diabetics a total of 202 subjects were enrolled to undergo sampling for Fasting blood glucose, and lipids in exact medical fasting status. These subjects were later evaluated for their various anthropometric measurements including BMI and WHpR (Wait to hip ratio) as per the WHO protocol. Then the individuals went to radiology department where carotid intima media thickness measurements were made by experienced radiologist. LAP (Lipid accumulation products) score was calculated as: LAP score (Male) = [WC (cm) - 65] x triglycerides (mmol/L) LAP score (Female) = [WC (cm) – 58] x triglycerides (mmol/L). LAP scores, BMI. WHpR and mean CIMT readings were grouped as per their high or low results. **Results:** Out of BMI, WHpR and LAP score, only groups based upon LAP score were observed to be significantly different for fasting blood glucose, total cholesterol and mean CIMT levels. Hypertensive subjects had higher LAP scores and WHpR than non-hypertensive subjects; however, BMI differences were not considered significant. One way ANOVA shows the LAP scores progressively rising form normoglycemic subjects {58.38 (95% CI: 51.08-65.67)} to subjects having IFG {70.94(95%CI: 60.88-81.00)} to newly diagnosed diabetes mellitus {101.59(95%CI: 78.35-124.83)}.[P=0.001] The AUCs for diagnosing hypertension was higher for LAP scores than for BMI and WHpR [{(LAP score: 0.648 (95% CI: 0.536-0.760), p= 0.027} vs {(WHpR: 0.588 (95% CI: 0.466-0.709), p= 0.191} vs {(BMI: 0.541 (95% CI: 0.412-0.670), p=0.545}]. Similarly, the AUCs for BMI and WHpR were lower than that of LAP score for predicting a diagnosis of diabetes mellitus [{(LAP score: 0.584 (95% CI: 0.502-0.665), p= 0.047} vs {(BMI: 0.531 (95% CI: 0.448-0.613), p=0.468} vs {WHpR: 0.518 (95% CI: 0.435-0.601), p=0.668}]. **Conclusion:** LAP scores were higher in subjects with established cardiovascular risks like hyperglycemia, hypercholesterolemia, accelerated atherosclerosis and hypertension that simple anthropometric indices like BMI and WHpR.

Key words: Lipid accumulation products (LAP), hypercholesteromia, BMI, Waist to hip ratio (WHpR), CIMT.

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INTRODUCTION

The surge in the cardiovascular diseases have peaked a mammoth rise over the last century, with this mode of human mortality crossing previously mentioned reasons to death.[1] Apart from the non-modifiable risks the common ailments predisposing humans to enhanced cardiovascular risks include diabetes mellitus, hypertension and hyper or dyslipidemia.[2] The usual screening tools ubiquitously available tools

for screening humans for such possible risks are mostly based upon anatomic measurements, like waist circumference, weight, body mass index and others. Apart from these measures the technology has allowed the biochemical estimation of various biochemical parameters which provides a snap shot about the physiological alterations in various metabolic pathways. In this regard certain authorities have suggested "lipid accumulation products" (LAP) as a valuable to identify various cardiovascular risks.[3]

Available literature on screening measures for cardiovascular diseases has shown the significance of both the anatomic measurements and physiological parameters.[4,5] In this regard the concept of incorporating the anatomic measurements like waist circumference and physiological parameters like triglycerides under one heading have come to limelight. These concepts have been termed as "lipid accumulation product (LAP)", "hypertriglyceridemic waist" and "Enlarged Waist, Elevated Triacylglycerols (EWET)".[3,6,7] This concept in theory seems quite appealing, minimally expensive and possibly suitable for routine clinical application. However, following needs to be evaluated before its routine clinical application: Firstly, the concept of anatomic and physiological merger may appear more relevant, not all available evidence points out in favor of the extra-utility of this marker.[8] anthropometric indices are available with even minimum cost implications, and even non-medics can adopt its clinical effectiveness. These indices do not vary overtime a short span of time, while sending a blood sample for estimation of a biochemical parameter would imply an underlying a certain degree of inter and intra individual variability alongside the lab associated error. So Not all available evidence support the idea of additional superiority of add a biochemical parameter like triglycerides to waist circumferences over the traditional anthropometric indices like waist to hip ratios.[9] Secondly, various patterns of obesity have been defined. Not all overweight and obese individuals have been found to have higher cardiovascular mortality;moreover, a regional study has highlighted that isolated hypertriglyceridemia not to be related with coronary heart disease.[10,11] Lastly, racial and ethical variations in prevalence of cardiovascular diseases have been highlighted. In this regard sub-continental populace have been observed to have lesser waists than their Caucasian relatives, but still face a higher burden of such diseases. The effects of race and ethical aspects are also required to be evaluated.[12]

Based upon these observations, along with recent literature review on LAP and related parameters following has been planned to measure the LAP differences between subjects having normal and higher levels of glucose, total cholesterol, age and carotid intima media thickness, and then to compare BMI and waist to hip ration (WHpR) with LAP in terms of effectiveness as a screening marker for diagnosis of diabetes mellitus and hypertension.

MATERIALS AND METHODS

This cross-sectional analysis was carried out between Jan-2011 to Aug-2011 at the department of pathology and radiology PNS RAHAT. Subjects requiring evaluation of their fasting blood glucose evaluations to rule out a diagnosis of diabetes mellitus were considered for inclusion in this study. After several exclusions including non-satisfying medical fasting status, known diabetes, pregnant, indoor subjects and non-volunteers a total of 202 adults subjects (> 18 years) were finally selected for inclusion into the study. The selected individuals were explained the study and formally consented by signing in the study Performa.

After a brief history subjects had their various anthropometric measurements including weight, height, waist circumference, and hip circumference. This was followed by 10 ml of blood sampling for biochemical measurements. The tests included fasting blood glucose, triglycerides and total cholesterol.

Anthropometric measurements

The various parameters included the waist and hip circumference, height and weight measurement.

These measurements were taken in line with the recommendations of WHO.[13]

Biochemical tests

Glucose was measured by hexokinase method, while cholesterol and triglycerides were analyzed using CHOD-PAP and GPO-PAP method. All analysis were carried out on Hitachi-902 clinical chemistry analyzers.

Carotid intima media thickness measurements (CIMT)

CIMT is considered as a surrogate of atherosclerosis. CIMT were measured by B-Mode high frequency (7.5 Hz) ultrasound probe of ultrasound machine (Sonoline ADARA, Simens). After explaining the patients mean CIMT were measured in prone position with neck semi-extended and shoulders resting on soft pillow.[14]

LAP score- LAP (Lipid accumulation products) score was calculated as:

LAP score (Male) = [WC (cm) - 65] x triglycerides (mmol/L)
LAP score (Female) = [WC (cm) – 58] x triglycerides (mmol/L)[3]

Subjects who did not report for CIMT measurements, anthropometric station, with hemolysed samples or lost to further follow up were excluded from the study.

Outcome measures-Following were key outcome measures of our study: LAP score, waist to hip ratio (WHrR), Body mass index (BMI), fasting blood glucose, triglycerides, total cholesterol, carotid intima media thickness (CIMT)

OPERATIONAL DEFINITIONS

1-Groups based upon LAP score- LAP scores from the study subjects were grouped as: Group-1(LAP score < 50), and Group-2(LAP score >49)
2-Groups based upon BMI-Based upon BMI, following groups were made: Group-1 (BMI < 25.00), and group-2 (BMI > 24.99)

3-Groups based upon WHpR-Based upon WHpR the formulated groups were as: Group-1(WHpR< 0.90), and Group-2 (WHpR > 0.89)
3-Groups based upon CIMT- Subjects were divided into 2 groups based upon their mean CIMT readings: Group-1 (Mean CIMT < 7.5 cm), and Group-2 (Mean CIMT > 7.4 cm)

STATISTICAL ANALYSIS

All data were entered into SPSS version-15. Mean and SD were calculated for age, and frequencies were calculated for gender. Pearson's correlations were measured for various outcome measures and LAP and BMI scores. The differences for fasting blood glucose, total cholesterol, age, CIMT were calculated between groups based upon LAP scores and BMI by independent sample t-test. The LAP and BMI results were also compared between groups between hypertensive's and non-hypertensive by Independent Mann Witney U-test, as there were only 21 hypertensive subjects. One way ANOVA was used to compare the increasing order of patient's glycemic status i.e., from normoglycemia to impaired fasting glucose (IFG) and finally diabetes mellitus. Later Area under the curve (AUC) were calculated for BMI and LAP score were calculated for predicitn a diagnosis of diabetes mellitus and hypertension.

RESULTS

The mean age among our data set was 42 $\pm$ 10.49 years. Out of the initially enrolled subjects, 41% were females and 59% were males. Gender differences were not found to be significantly different for age, fasting blood glucose, total cholesterol, CIMT; however the fasting triglyceride levels were higher in male subjects (2.29 $\pm$ 1.16 mmol/L) in comparison to females(1.77 $\pm$ 0.76 mmol/L) [P=0.001]. The data comparing WHpR, BMI and LAP score groups among study subjects is shown for age, glycemic status, cholesterolemia status and group based upon CIMT is shown in Table-I. Hypertensive subjects had higher LAP scores and WHpR than non-hypertensive subjects; however, BMI differences were not considered significant. Table-II One way ANOVA shows the LAP scores progressively rising form normoglycemic subjects [58.38 (95% CI: 51.08-65.67) to subjects having IFG [70.94(95%CI: 60.88-81.00)] to newly diagnosed diabetes mellitus [101.59(95%CI: 78.35-124.83)] as depicted in Figure-1. [P=0.001] The AUCs

for diagnosing hypertension was higher for LAP scores than for BMI and WHpR [{(LAP score: 0.648 (95% CI: 0.536-0.760), p= 0.027} vs {(WHpR: 0.588 (95% CI: 0.466-0.709), p= 0.191} vs {(BMI: 0.541 (95% CI: 0.412-0.670), p=0.545}].

Figure-2 Similarly, the AUCs for BMI and WHpR were lower than that of LAP score for predicting a diagnosis of diabetes mellitus [{(LAP score: 0.584 (95% CI: 0.502-0.665), p= 0.047} vs {(BMI: 0.531 (95% CI: 0.448-0.613), p=0.468} vs {WHpR: 0.518 (95% CI: 0.435-0.601), p=0.668}]. Figure-3

S.No	Parameter	Groups based upon LAP scores			Groups based upon BMI			Groups based upon WHpR		
		LAP score < 50	LAP score > 49	Sig*	BMI < 25.00	BMI > 24.99	Sig*	WHpR < 0.90	WHpR > 0.89	Sig*
1	Age in years	39.64 (± 11.63)	43.81 (± 9.85)	0.010	40.09 (± 10.90)	43.33 (± 10.14)	0.033	37.77 (± 9.94)	44.36 (± 10.17)	0.000
2	Fasting blood glucose (mmol/L)	5.35 (± 0.50)	6.04 (± 1.89)	0.000	5.85 (± 1.91)	5.76 (± 1.34)	0.733	5.59 (± 1.09)	5.91 (± 1.80)	0.156
3	Total cholesterol (mmol/L)	4.43 (± 0.70)	5.01 (± 0.83)	0.000	4.57 (± 0.74)	4.92 (± 0.86)	0.004	4.64 (± 0.85)	4.86 (± 0.82)	0.090
4	CIMT (cm)	0.64 (± 0.15)	0.72 (± 0.13)	0.001	0.67 (± 0.15)	0.69 (± 0.14)	0.220	0.65 (± 0.13)	O.71 (± 0.14)	0.032

Table-I. Differences in age, fasting blood glucose, total cholesterol and mean CIMT among groups based upon LAP score, BMI and WHpR

**Significance measured by Independent sample t-test*

S.No	Parameter	Hypertensive		Non-hypertensives		Sig
		Mean	SD	Mean	SD	
1	Lipid accumulation product (LAP) score	93.04	40.26	61.45	36.45	0.002
2	Body mass index (BMI)	28.94	5.13	26.36	4.54	0.30
3	Waist to hip ratio (WHpR)	0.95	0.58	0.91	0.56	0.007

Table-II. Differences in LAP score, BMI and WHpR among hypertensive and non-hypertensive subjects

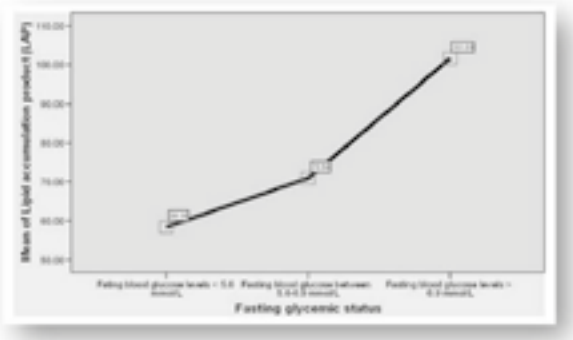

Figure-1. Differences in LAP score among subjects with normoglycemia (n=85), impaired fasting glucose [IFG] (N=77) and newly diagnosed diabetes mellitus [NDDM] (n=14) [p=0.001]

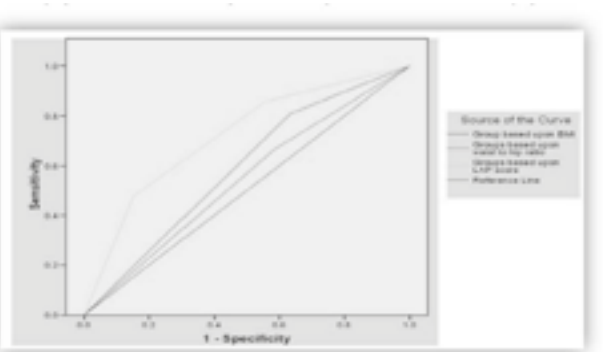

Figure-2. Comparing LAP score, WHpR and BMI for predicting hypertension through ROC curve analysis.

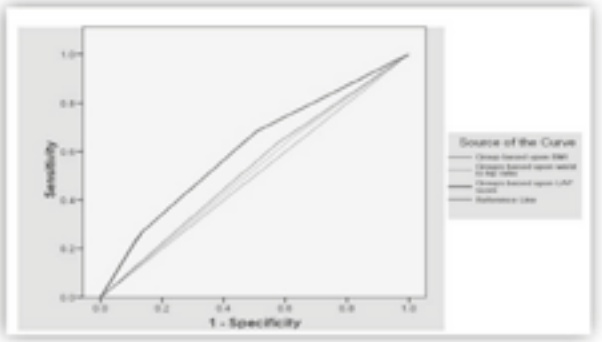

Figure-3. ROC curve analysis demonstrating comparison between BMI, WHpR and LAP score for predicting a diagnosis of diabetes mellitus

DISCUSSION

Our study has demonstrated that fasting blood glucose, total cholesterol and carotid intima media thickness measurements levels were significantly different among groups based upon LAP score. In comparison the BMI groups did not show significant differences among groups based upon glycemia and CIMT levels, and formulated high and low WHpR groups were only able to prove better in differentiating for CIMT levels. Literature search do augment our observations, as Montalcini et al and Irace et al have not found BMI to be a better marker to depict underneath metabolic disorders and enhanced atherosclerosis.[15,16] In comparison to BMI, WHpR did show some ability to predict increasing atherosclerosis, without being predictive of underlying glycemic or cholesterol status. Augmenting our results Łopatyński et al have shown WHpR to have a only weaker correlation with glycemic levels.[17] The plausible interpretation of these finding could be the fact that LAP being a combination marker of both anatomic and physiological status incorporates a 2-diamensional evaluation status, while BMI or WHpR only provides information about the anatomic aspects.[6,7] Secondly, body's anatomy may vary between individuals and may again be related to ethnicity.[18] May it be a possibility that our local ethnic status defines obesity in a less predictive by employing traditional cut-offs than the Caucasians to imply an underlying metabolic risk clustering?[19] Considering the Asian ethnicity as a separate sub set, in which anatomic aspects could be either different i.e., lower or possibly deceptive in terms of depicting underlying metabolic derangements due to diabetes and other complications.[20] Locally, Hafeez et al have demonstrated BMI as a less representative marker for cardiovascular diseases.[21] Similarly, Deurenberg-Yap et al and Vikram et al from regional states have also experienced similar shortcomings after evaluating BMI in particular and parameters included with waist in identifying cardiovascular risks.[22,23] In contrast Tehran Lipid study does not identify LAP scoring as a superior marker than WHpR.[8] Probable reason could be the much larger sample size which was able to obviate the type-2 statistical error and thus provided a level of equivalence for these markers. Moreover, the same study has recommended better or for LAP score in comparison to BMI. Finally the calculated AUC for these parameters in our study did show the enhanced yield of LAP scores than BMI and WHpR, which do suggest the extra edge which LAP can provide.

The differences for LAP score and WHpR were found to be significantly different among subjects with and without hypertension, while BMI were not different between the aforementioned groups. Literature reveals a stronger relationship between WHpR and hypertension than BMI, indicating the fact that fat deposition indices like WHpR have more influence in the development of hypertension.[24] Once the anatomic fat indices are combined with physiological fat indices like serum triglycerides the logical sequence should be an enhancement in prediction of hypertension. In this regard not much data is available to augment our findings, while Kahn et al have has observed more significant effect of LAP than BMI in predicting underlying hypertensive disorders.[3] In this regard a new controlled trial is recommended to evaluate the effect of mean to multiple readings of systolic and diastolic blood pressures on LAP score after adjusting the influence of medication.

First limitation which is being acknowledged is the cross-sectional nature of the study, which was being carried out in a clinical set up. In order to approve our observations it is suggested

that community based study must be planned with a larger sample size. Secondly, the study results must only be interpreted with regards to associated ethnicity and should not be interpolated for a different regional zone.

This study is clinically important because it highlights our observations that routinely used clinical anthropometric indices like BMI and WHpR did not show significant differences to predict various cardiovascular risk factors. It also provides an insight into the concept of different meanings of fat deposition and physiological circulation of triglycerides, indicating that their combination in the form of LAP may be more useful in representing associated cardiovascular risks.

CONCLUSION

LAP scores were higher in subjects with established cardiovascular risks like hyperglycemia, hypercholesterolemia, and hypertension than simple anthropometric indices like BMI and WHpR. Moreover, LAP scores were also depictive of associated atherosclerosis.

REFERENCES

1. Shen J, Goyal A, Sperling L. **The emerging epidemic of obesity, diabetes, and the metabolic syndrome in china.** Cardiol Res Pract. 2012; 2012:178675.

2. Kozan O; RiskMan Study Group. **An observational study to evaluate the clinical practice of cardiovascular risk management among hypertensive patients in Turkey.** Turk Kardiyol Dern Ars. 2011 Sep; 39(6):445-55. doi: 10.5543/tkda.2011.01592.

3. Kahn HS. **The "lipid accumulation product" performs better than the body mass index for recognizing cardiovascular risk: a population-based comparison.** BMC Cardiovasc Disord. 2005 Sep 8;5:26.

4. Schneider HJ, Glaesmer H, Klotsche J, Böhler S, Lehnert H, Zeiher AM, et al; **DETECT Study Group. Accuracy of anthropometric indicators of obesity to predict cardiovascular risk.** J Clin Endocrinol Metab. 2007 Feb;92(2):589-94. Epub 2006 Nov 14.

5. Pfeuffer M, Auinger A, Bley U, Kraus-Stojanowic I, Laue C, Winkler P, et al. **Effect of quercetin on traits of the metabolic syndrome, endothelial function and inflammatory parameters in men with different APOE isoforms.** Nutr Metab Cardiovasc Dis. 2011 Nov 23.

6. Lemieux I, Pascot A, Couillard C, Lamarche B, Tchernof A, Alméras N, et al. **Hypertriglyceridemic waist: A marker of the atherogenic metabolic triad (hyperinsulinemia; hyperapolipoprotein B; small, dense LDL) in men?** Circulation. 2000 Jul 11;102(2):179-84.

7. Kahn HS, Valdez R. **Metabolic risks identified by the combination of enlarged waist and elevated triacylglycerol concentration.** Am J Clin Nutr. 2003 Nov;78(5):928-34.

8. Bozorgmanesh M, Hadaegh F, Azizi F. **Predictive performances of lipid accumulation product vs. adiposity measures for cardiovascular diseases and all-cause mortality, 8.6-year follow-up: Tehran lipid and glucose study.** Lipids Health Dis. 2010 Sep 16;9:100.

9. Bozorgmanesh M, Hadaegh F, Azizi F. **Diabetes prediction, lipid accumulation product, and adiposity measures; 6-year follow-up: Tehran lipid and glucose study.** Lipids Health Dis. 2010 May 10;9:45.

10. Uretsky S, Messerli FH, Bangalore S, Champion A, Cooper-Dehoff RM, Zhou Q, et al. **Obesity paradox in patients with hypertension and coronary artery disease.** Am J Med. 2007 Oct;120(10):863-70.

11. Rajmohan L, Deepa R, Mohan A, Mohan V. **Association between isolated hypercholesterolemia, isolated hypertriglyceridemia and coronary artery disease in south Indian type 2 diabetic patients.** Indian Heart J. 2000 Jul-Aug;52(4):400-6.

12. Bathula R, Hughes AD, Panerai RB, Potter JF, McG Thom SA, Tillin T, et al. **South Asians have adverse cerebrovascular haemodynamics, despite equivalent blood pressure, compared with Europeans. This is due to their greater hyperglycaemia.** Int J Epidemiol. 2011 Jun 30.

13. World Health Organization (WHO). **Physical Status: The Use and Interpretation of Anthropometry.** Report of a WHO Expert Committee, No. 854. Geneva: WHO, 1995.

14. Dogan S, Duivenvoorden R, Grobbee DE, Kastelein JJ, Shear CL, Evans GW, et al; **Radiance 1 and Radiance 2 Study Groups. Ultrasound protocols to measure carotid intima-media thickness in trials; comparison of reproducibility, rate of progression, and effect of intervention in subjects with familial hypercholesterolemia and subjects with mixed dyslipidemia.** Ann Med. 2010 Sep;42(6):447-64.

15. Montalcini T, Gorgone G, Gazzaruso C, Sesti G, Perticone F, Pujia A. **Carotid atherosclerosis associated to metabolic syndrome but not BMI in**

healthy menopausal women. Diabetes Res Clin Pract. 2007 Jun;76(3):378-82.

16. Irace C, Scavelli F, Carallo C, Serra R, Cortese C, Gnasso A. **Body mass index, metabolic syndrome and carotid atherosclerosis.** Coron Artery Dis. 2009 Mar;20(2):94-9.

17. Łopatyński J, Mardarowicz G, Szcześniak 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.

18. Désilets MC, Garrel D, Couillard C, Tremblay A, Després JP, Bouchard C, Delisle H. **Ethnic differences in body composition and other markers of cardiovascular disease risk: study in matched Haitian and White subjects from Quebec.** Obesity (Silver Spring). 2006 Jun;14(6):1019-27.

19. Wang TD, Goto S, Bhatt DL, Steg PG, Chan JC, Richard AJ, Liau CS; **REACH Registry Investigators. Ethnic differences in the relationships of anthropometric measures to metabolic risk factors in Asian patients at risk of atherothrombosis: results from the REduction of Atherothrombosis for Continued Health (REACH) Registry.** Metabolism. 2010 Mar;59(3):400-8.

20. Lean ME, Han TS, Bush H, Anderson AS, Bradby H, Williams R. **Ethnic differences in anthropometric and lifestyle measures related to coronary heart disease risk between South Asian, Italian and general-population British women living in the west of Scotland.** Int J Obes Relat Metab Disord. 2001 Dec;25(12):1800-5.

21. Hafeez S, Javed A, Kayani MA. **Clinical profile of patients presenting with acute ST elevation myocardial infarction.** J Pak Med Assoc Mar 2010;62(3):190-3.

22. Deurenberg-Yap M, Chew SK, Lin VF, Tan BY, van Staveren WA, Deurenberg P. **Relationships between indices of obesity and its co-morbidities in multi-ethnic Singapore.** Int J Obes Relat Metab Disord. 2001 Oct;25(10):1554-62.

23. Vikram NK, Pandey RM, Misra A, Sharma R, Devi JR, Khanna N. **Non-obese (body mass index < 25 kg/m2) Asian Indians with normal waist circumference have high cardiovascular risk.** Nutrition. 2003 Jun;19(6):503-9.

24. Feldstein CA, Akopian M, Olivieri AO, Kramer AP, Nasi M, Garrido D. **A comparison of body mass index and waist-to-hip ratio as indicators of hypertension risk in an urban Argentine population: a hospital-based study.** Nutr Metab Cardiovasc Dis. 2005 Aug; 15(4):310-5.

"Only a few people care,
the rest are just curious."

Unknown

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3	Dr. Muhammad Shahzad Hanif	3rd Author	