

## To test the accuracy of a new anthropometric parameter, Waist to BSA ratio in predicting myocardial infarction

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### Abstract

**Background & Method:** Present study was carried out with an aim to test the accuracy of a new anthropometric parameter, Waist to BSA ratio in predicting myocardial infarction. Patients with acute coronary syndrome having ST segment elevation or non-ST segment elevation myocardial infarction diagnosed by ECG and Troponin I levels, admitted in ICCU of GMC, BHOPAL. **Result:** Waist to hip ratio, waist to height ratio, waist to BSA ratio and waist circumference, all were better anthropometric parameters than BMI to predict myocardial infarction in Indian population. **Conclusion:** Waist to hip ratio, waist to height ratio, waist to BSA ratio and waist circumference, all were better anthropometric parameters than BMI to predict myocardial infarction in Indian population. Waist to BSA was a good anthropometric parameter to predict myocardial infarction in Indian population. Studies involving larger population are required to prove the accuracy of this parameter in predicting coronary artery diseases.

**Keywords:** anthropometric parameter, Waist, BSA ratio, Myocardial Infarction.

**Study Designed:** Case Control Study.

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### Introduction

The WHR is the most generally utilized list of provincial fat tissue dispersion and is estimated in a standing position. Remove esteems for WHR were 0.88 and 0.81 in people separately. WHR anticipated resulting diabetes in men and coronary illness in all kinds of people and was more prescient of these end focuses than BMI[1].

In Inter heart Study, done on patients of intense myocardial localized necrosis, expanding midriff to-hip proportion was related with expanding hazard of myocardial dead tissue. This connection stayed huge after change for BMI and other danger factors and even among those viewed as being exceptionally lean or of ordinary weight (BMI < 25 kg/m<sup>2</sup>) [2]. Besides, in contrast to that for BMI, this affiliation was apparent across all world districts. In one more review done in patients of ischemic coronary illness, weight evaluated by abdomen hip proportion is a superior indicator of CVD and CHD mortality than midriff outline, which, thus, is a preferable indicator over BMI[3].

The body peripheries, the estimation at the midsection or "midriff" is the most factor in term of its area or position, particularly among large and old people. In numerous fat people, the umbilicus might be coordinated descending due to the extreme arches of the stomach divider and subsequently it turns into somewhat hard to quantify the specific abdomen circumference[4].

### Material & Method

Patients with acute coronary syndrome having ST segment elevation or non-ST segment elevation myocardial infarction diagnosed by ECG and Troponin I levels, admitted in ICCU of GMC, BHOPAL from Oct 2018 to Sep 2019 were included in the study.

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Narrowest waist circumference when viewed from the front with the patient in standing position and at least 06 hrs of fasting, at the end of a normal expiration, measured to the nearest half cm.

### Inclusion criteria

Only the patients with the first episode of myocardial infarction were included in the study. All the patients were taken in the study within 7 days of the episode of myocardial infarction.

ST elevation was defined as: New ST segment elevation at J-point in two contiguous leads with cut-off points:  $\geq 0.2$  mm in male;  $\geq 0.15$  mm in females in leads V2, V3 and  $\geq 0.1$  mm in other leads.

(Joint ESC/ACCF/AHA/WHF Task Force for the Redefinition of Myocardial Infarction European Heart Journal 2007 28(20): 2525-2538. Troponin I cut-off for MI in the study was 0.1 ng/ml. Matching controls, matched by age and sex were included in the study. Controls didn't have any history of CAD, or systemic arterial hypertension or diabetes.

Controls were the attendants with patients admitted (for non cardiac complaints) in medicine wards of GMC, BHOPAL.

### Exclusion criteria for cases

- Patients who didn't give consent (verbal expressed consent) for the study.
- Patients having congestive heart failure.
- Recent significant weight loss based upon the history of the patient.
- Ascites or any malignancy.
- Pregnancy.
- Patients on lipid lowering drugs or drugs for reducing weight.
- Patients on long-term use of steroids.

**Results****Table 1: Sex wise distribution of study population (percentage)**

MALES	70.1
FEMALES	29.9
TOTAL	100

**Table 2: Area under the curve**

Anthropometric Parameters	Males	Females
BMI	0.650	0.616
WAIST CIRCUMFERENCE	0.721	0.713
WAIST-HIP RATIO	0.792	0.764
WAIST-HEIGHT RATIO	0.736	0.729
WAIST-BSA RATIO	0.768	0.718

**Table 3: P values by unpaired T – test for males and females**

ANTHROPOMETRIC PARAMETERS	MALES	FEMALES
BMI	0.0061	0.044
WAIST CIRCUMFERENCE	<0.0011	0.036
WAIST-HIP RATIO	<0.048	<0.016
WAIST-HEIGHT RATIO	<0.0031	0.0008
WAIST-BSA RATIO	<0.041	0.028

**Table 4: Cut-off values where sensitivity approximates specificity**

ANTHROPOMETRIC PARAMETERS	MALES	FEMALES
BMI	22.3	24.7
WAIST CIRCUMFERENCE	77	68
WAIST-HIP RATIO	0.9	0.79
WAIST-HEIGHT RATIO	0.48	0.46
WAIST-BSA RATIO	51.6	49.3

**Discussion**

Prof Yusuf S et al. (Interheart study) observed that waist circumference might be the best single indicator of individual and multiple cardiovascular risk factors. In our study it was observed that waist to hip ratio was a better parameter than waist circumference to predict myocardial infarction in both males and females[5&6].

Waist-to-height ratio, is a simple and practical index for assessing central fat distribution and metabolic risk in Japanese men and women. We, in our study found that the difference between waist to height ratio in cases and controls was significant with p value of <0.0001 for males and 0.008 for females (calculated by unpaired t test). But waist to hip ratio was the better parameter than waist to height ratio in both males and females.

In Canadian Heart Health Surveys it was observed that waist circumference (WC) is probably a better indicator of abdominal fatness and cardiovascular disease than either body mass index (BMI) or waist-to-hip ratio (WHR). We found that waist to hip ratio was probably the best predictor of myocardial infarction in Indian population, better than waist circumference. BMI in our study was a poor parameter to predict myocardial infarction[7].

The optimal cut-off values in the study by W.Y. Lin et al. suggested that BMIs of 23.6 kg/m<sup>2</sup> in men and 22.1 kg/m<sup>2</sup> in women, WCs of

80.5 cm in men and 71.5 cm in women, WHR of 0.85 in men and 0.76 in women, and a WHtR of 0.48 in men and 0.45 in women might be more appropriate for defining adult overweight or obesity in Taiwan[8]. We in our study found nearly the same cut-off values. We also assessed the accuracy of a new parameter waist to BSA ratio in our study. It was interesting to find that the difference between the values of cases and controls was significant (p value of <0.0001 for males and 0.012 for females, calculated by Unpaired t test). It was a better parameter than BMI, waist to height ratio and waist circumference in males when the AUC (derived by ROC curve) were compared. Hence this parameter could be used in future as an indicator of central obesity to predict the risk for coronary artery disease.

The major limitation of our study was the less number of female patients in the study (n=32). Another limitation of the study was that most of the population in the study belonged to the low socio-economic strata and hence were more likely to be undernourished.

**Conclusion**

Among all the anthropometric parameters, waist to hip ratio was the best parameter in both males and females. Waist to BSA was a good anthropometric parameter to predict myocardial infarction in Indian population. Studies involving larger population are required to prove the accuracy of this parameter in predicting coronary artery diseases.

**References**

- Guidelines for the Management of Patients with ST elevation myocardial infarction 2004 by the American College of Cardiology Foundation and the American Heart Association, Inc. ACC/AHA.
- The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure National Institutes of Health National Heart, Lung, and Blood Institute NIH Publication No. 04-5230 August 2004.
- Wolf PA, D'Agostino RB, Kannel WB, Bonita R, Belanger AJ. Cigarette smoking as a risk factor for stroke: the Framingham Study. JAMA.1988; 259:1025–1029.
- Third Report of the National Cholesterol Education Program (NCEP) Expert (Adult Panel Treatment Panel III) Final Report on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults Circulation 2002; 106: 3143.
- World Health Organization. The Asia-Pacific perspective: Redefining obesity and its treatment. Geneva, Switzerland: World Health Organization; ISBN # 0-9577082-1-1 Feb 2000.
- Yusuf S, Hawken S, Ôunpuu S, et al. INTERHEART STUDY Obesity and the risk of myocardial infarction in 27 000 participants from 52 countries: a case-control study. Lancet 2005; 366(9497): 1640-9.
- CJ Dobbeltsteyn, MR Joffres, maclean, G Flowerdew1 and The Canadian Heart Health Surveys Research group: A comparative evaluation of waist circumference, Waist-to-hip ratio and body mass index as indicators Of cardiovascular risk factors. International Journal of Obesity 2001;25, 652-661.
- Lin WY Optimal cut-off values for obesity: using simple anthropometric indices to predict cardiovascular risk factors in Taiwan Int J Obes Relat Metab Disord.. 2002;26(9):1232-8

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