FREQUENCY OF INCREASED WAIST TO HIP RATIO IN PATIENTS OF ACUTE MYOCARDIAL INFARCTION

Muhammad Saleem[a], Rizwan Bilal[a], Huma Aslam[a]

ABSTRACT:

OBJECTIVE: The objective of the study is to observe frequency of increased waist to hip ratio in patients of acute myocardial infarction.

MATERIALS AND METHODS: This cross sectional study was conducted at department of Cardiology, Punjab Institute of Cardiology, Lahore from 08-07-2009 to 08-01-2010 (Six months). One hundred and ninety consecutive patients presenting with acute MI admitted to emergency department were studied.

RESULTS: Out of 190 patients 77.9% patients had normal waist to hip ratio and 22.1% had abnormal waist to hip ratio. Majority of the patients (75.3%) were males. Fifty one percent of total females presented in older age. Other risk factors noted in descending order were smoking (63.7%), hypertension (37.9%), DM (37.4%), previous history of IHD (37.3%) and family history of IHD (17.9%).

CONCLUSION: Abnormal waist to hip ratio is a contributing risk factor of acute myocardial infarction. Approximately 25% patients had abnormal waist to hip ratio. WHR can be used in epidemiological studies of acute myocardial infarction.

INTRODUCTION

Coronary artery disease (CAD) is the most common cause of cardiovascular death all over the world, most commonly due to atherosclerosis.[1] Cardiovascular diseases are leading causes for morbidity and mortality in the Indian subcontinent causing more than 25% of deaths.[2,3,4] Atherosclerotic disease is projected to become the leading cause of global morbidity and mortality by 2020.[5]

Hypertension (HTN), diabetes mellitus (DM) and smoking are considered as major risk factors of acute myocardial infarction.[6] It was studied in Argentinian population that hypertension is a strong and independent risk factor for acute MI.[7] Tobacco use including smoking and chewing is one of the most important cause of acute MI.[8]

Body mass index (BMI), waist circumference (WC) waist hip ratio (WHR) have been used as simple anthropometric indices for assessing the amount and distribution of body fat and are useful indices in predicting the risk of type II DM, HTN and atherosclerotic ischemic heart disease (IHD) like MI in adults.[9,10]

The relation between fat distribution indices and coronary heart disease (CHD) has been documented. The risk of developing subsequent CHD increased continuously across the range of waist to hip ratio.[11]

WHR is positively related to total cholesterol (T-C) and low density lipoprotein cholesterol (LDL-C) and negatively related to high density lipoprotein cholesterol (HDL-C) in both men and women independent of BMI. The regional fat distribution is related to lipid profile independent of the body fat.[12]

This study is designed to find out the frequency of increased WHR with acute MI in our setup. A higher frequency will help us to identify at risk population and to take preventive measure to them.

MATERIALS AND METHODS:

This cross sectional study was conducted at department of Cardiology, Punjab Institute of Cardiology, Lahore from 08-07-2009 to 08-01-2010 (Six months). One hundred and ninety consecutive patients presenting with acute MI admitted to emergency department were studied. All patients of both gender male and female between 20-60 years of age suffering from first myocardial infarction were included in the study.

Patients with history of previous MI, heart failure or valvular heart disease. Patients taking lipid lowering drugs and patients of chronic renal failure or chronic liver disease were excluded from

[a]Punjab Institute of Cardiology,
Lahore Pakistan.

* Corresponding author:
Email:drsaleem187@yahoo.com

the study.

OPERATIONAL DEFINITIONS:

ACUTE MYOCARDIAL INFARCTION: Acute myocardial infarction was diagnosed if two of three following criteria are present:

- Chest pain consistent with acute myocardial infarction.
- Electrocardiographic changes i.e. ST-Segment elevation >0.2 mv in at least two contiguous chest leads or >0.1 mv in at least two contiguous limb leads.
- Raised levels of cardiac enzymes CK-MB and troponins, more than double the reference value.

WAIST TO HIP RATIO:

It is the ratio between the waist and hip circumference. Waist was measured at narrowest part below rib cage and hip was measured at widest part of buttocks. Waist and hip of every patient was measured and waist hip ratio was calculated from those readings.

190 patients of first acute myocardial infarction fulfilling the inclusion criteria were selected from emergency department, Punjab Institute of Cardiology, Lahore. The details of study were explained to the patients and informed consent was obtained from all the patients. . A full history was taken particularly age, sex, history of smoking, diabetes mellitus, hypertension, ischemic heart disease and family history of ischemic heart disease. The patients' waist and hip circumferences were measured in centimeters. Then a ratio of waist to hip was calculated from these two measurements for each patient. Waist hip ratio was measured for estimation of fat distribution and >1 was considered abnormal.

All the collected information was entered and analyzed using Statistical Package for Social Sciences (SPSS) version 10. Categorical variables were expressed as frequencies and percentages while continuous variables were expressed as Mean ± Standard Deviation (SD). Waist to hip ratio was expressed as frequency and percentage. Data was stratified for Risk Factors like gender, diabetes mellitus, hypertension, smoking, history of IHD and family history of IHD.

RESULTS:

190 patients presenting with acute myocardial infarction were studied.

Table 1 summarizes baseline characteristics of the study population. It was noted that most of the study population (75.3%) comprised of male patients. Regarding distribution of normal and

Table 1.Baseline characteristics of patients presenting with acute MI.

Characteristics	Number (percentages)
Age mean(Years)	48.7± 7.8
Male	143 (75.3%)
Female	47(24.7%)
Smoking	121(63.7%)
Hypertension	72(37.9%)
Diabetes mellitus	71(37.4%)
Ischemic heart disease	69(36.3%)
Family history of ischemic heart disease	34(17.9%)

Table 2:Distribution of waist to hip ratio with age and gender in patients with acute MI.

Waist to hip ratio			Gender	
			Male	Female
Normal	Age (years)	30-40	18(15.5%)	01(3.1%)
		41-50	62(53.4%)	15(46.9%)
		51-60	36(31.0%)	16(50.0%)
Abnormal	Age (years)	30-40	10(37.0%)	03(20.0%)
		41-50	09(33.3%)	04(26.7%)
		51-60	08(29.6%)	08(53.3%)

Table 3:Distribution of waist to hip ratio with major risk factors with acute MI.

Risk factors	Normal waist to hip ratio n=148	Abnormal waist to hip ratio n=42
Smoking	97(65.5%)	24 (57.1%)
Hypertension	58(39.2%)	14(33.3%)
Diabetes mellitus	56(37.8%)	15(35.7%)
History of IHD	60(40.5%)	9(21.4%)
Family history of IHD	25(16.9%)	9(21.4%)

abnormal waist to hip ratio in patients presenting with acute myocardial infarction. It was noted that 148(77.9%) patients had normal waist to hip ratio while remaining 42 (22.1%) patients had abnormal waist to hip ratio. The study population was also evaluated for other risk factors. Smoking was found to be the commonest risk factor as 63.7% patients were smokers. Hypertension was second most common risk factor. There were 37.9% of the patients who had history of hypertension. Other risk factors like diabetes mellitus was seen in 37.4% of the patients, history of ischemic heart disease in 36.3% of the patients and family history of ischemic heart disease in 17.9% of the patients.

Table 2 shows that most of the patients (47.4%) presented between 41-50 years. Thirty two patients (16.8%) presented between 30-40 years. It was noted that approximately half (40.2%) of them had abnormal waist to hip ratio.

Twenty four female patients (51%) presented between 51-60 years and only four female patients presented at young age between 30-40 years. It was observed that three out of four these four

young female patients had abnormal waist to hip ratio.

Table 3 shows distribution of waist to hip ratio with major risk factors. It was observed that smoking was the commonest risk factor in the study population.

DISCUSSION:

Coronary artery disease is the leading cause of cardiovascular mortality, responsible for more than 4.5 million deaths occurring in developing world.[13] One in four middle aged adults in Pakistan has coronary artery disease.[14]

In our study one hundred and ninety patients who presented with first myocardial infarction were included. The results of this study are consistent with other studies and shows abdominal adiposity measured by waist to hip ratio is one of the risk factors of acute myocardial infarction. The association of abnormal waist to hip ratio was observed in both men and women. About one fourth (22.1%) of the patients who presented with acute myocardial infarction had abnormal waist to hip ratio.

Kabagambe et al estimated the population-attributable risk for acute myocardial infarction among Costa Ricans. They noted that abdominal adiposity is one of the risk factors of acute myocardial infarction. Abdominal adiposity was seen in 29.3% of the patients presenting with acute myocardial infarction.[15]

Their result is consistent with our study. It was observed that 22% of our patients who presented with acute myocardial infarction had abnormal waist to hip ratio.

Similarly Noeman et al studied 459 young Pakistani patients who presented with symptoms of acute myocardial infarction. The patients were evaluated for risk factors of acute myocardial infarction; obesity as measured by waist to hip ratio, diabetes mellitus, hypertension and smoking. It was noted that 35% patients with premature coronary artery disease had central obesity as measured by waist to hip ratio.[16]

In our study 31% patients who presented with acute myocardial infarction at young age (30-40 years) had abnormal waist to hip ratio. These studies suggest that increased waist to hip ratio is one of the risk factors of the acute myocardial infarction at younger age.

Total number of female patients who presented with myocardial infarction were small (43 out of 190 patients) as compared to males. However Females who presented with acute myocardial infarction were older than males at the time of presentation and those who were younger at the time of presentation had abnormal waist to hip ratio, however their absolute number is small(4) to draw any meaningful conclusion.

Canoy et al examined relationship between fat distribution indices and coronary heart disease among 24,508 men and women. Among these, 892 women developed coronary heart disease. After adjustment for BMI and other coronary heart disease risk factors waist to hip ratio was more significantly associated with female gender than with male. They concluded that indices of abdominal obesity were consistent and strong predictive for coronary heart disease. These simple and inexpensive measurements could be used to asses obesity related coronary heart disease risk.[11]

de Koning et al demonstrated that the risk of incident coronary vascular disease increases in men and women with elevation in waist circumference and waist to hip ratio. They noted that WHR has been suggested to be a superior predictor of CVD risk because it includes a measurement of hip circumference, which is inversely associated with dysglycemia, dyslipidemia, diabetes, hypertension, CVD, and death.[17]

In our study we also studied the distribution of waist to hip ratio with other risk factors. It was noted that among smokers, diabetics, hypertensive and in patients with previous history of ischemic heart disease one fourth of patients had abnormal waist to hip ratio. More over it was seen that one third of the patients had abnormal waist to hip ratio who had family history of ischemic heart disease. This relationship is consistent with clustering of risk factors that is present in our population. Presence of classical risk factors in our study is consistent with other studies and abroad.

Yusuf et all conducted a large case control study in 52 countries. In that study they identified different risk factors of acute myocardial infarction. Abnormal lipids, smoking, hypertension, diabetes mellitus, a high waist to hip ratio, psychosocial factors, low fruit and vegetable consumption, account for 90% cases of acute myocardial infarction worldwide.[18]

Tobacco smoking is associated with acute myocardial infarction. They noted that 58.4% young males and only 6.2% older women were smokers.[8] A study conducted in Argentine population showed that hypertension is an important risk factor of acute myocardial infarction.[6]

In our study smoking was commonest risk factor. It was noted that 63.7% patients were smoker. Hypertension was the second most common risk factor of acute myocardial infarction. There were 37.9% patients who had history of hypertension.

LIMITATIONS:

It was a single centre study with small sample size. We were also hampered by lack of significance tests between different groups. More meaningful results could be obtained by large sample size and with more sophisticated statistical tests.

CONCLUSION:

This study indicates that increased waist to hip ratio is a contributing risk factor of acute myocardial infarction. Approximately one fourth of the patients were found to have abnormal waist to hip ratio.

WHR is a non-invasive and inexpensive method of estimation of regional fat distribution and hence can be included in epidemiological studies of coronary artery disease.

Author's Contribution

MS: Data Acquiring, manuscript writing and study design. RB: manuscript writing. HA: Statistics.

REFERENCES

1. Allen KM. Coronary revascularization, general consideration. In: Crawford MH. Current diagnosis & treatment in cardiology.2nd ed. New York McGraw-Hill; 2003; 7:97-107.
2. Gupta R, Joshi P, Mohan V, Reddy KS, Yusuf S. Epidemiology and causation of coronary heart disease and stroke in India. Heart 2008; 94: 16-26.
3. Enas EA, Mohan V, Deepa M, Farooq S, Pazhoor S, chennikkara H. The metabolic syndrom and dyslipidemia among Asian Indians: a population with high rates of diabetes and premature coronary artery disease. J Cardiometab Syndr 2007; 2: 267-75.
4. Enas EA, Chacko V, Pazhoor SG, Chennikkara H, Evarapalli HP. Dyslipidemia in South Asian patients. Curr Atheroscler Rep 2007; 9: 367-74.
5. Nishtar S, Wierzbicki AS, Lumb PJ, Lambert-Hammil M, Turner CN, Crook MA, et al. Waist hip ratio and low HDL predicts the risk of coronary artery disease in Pakistanis. Curr Med Res Opin 2004; 20: 55-62.
6. Cirruzi M, Pramparo P, Rozlosnik J, Zylberstjn H, Delmont H, Haquim M et al. Hypertension and the risk of acute myocardial infarction in Argentina. Prev Cardiolo 2001; 57-64.
7. El-Menyar AA, Albinali HA, Bener A, Mohammed I, Al Suwaidi J. Prevalence and impact of diabetes mellitus in patients with acute myocardial infarction: A 10 year experience .Angiology. 2009;60(6):683-8.
8. Teo KK, Ounpuu S, Hawken S, Pandey MR, Valentin V, Hunt D et. al. Tobacco use and myocardial infarction in 52 countries in the INTERHEART study: a case-control study. Lancet 2006; 647-58.
9. Huang KC, Lee MS, Lee SD, Chang YH, Lin YC, Tu SH, Pan WH. Obesity in the elderly and its relationship with cardiovascular risk factors in Taiwan. Obes Res 2005; 13: 170-8.
10. Elobeid MA, Desmond RA, Thomas O, Keith SW, Allison DB. Waist circumference values are increasing beyond those expected from BMI increases. Obesity 2007; 15: 2380-3.
11. Canoy D, Boekholdt SM, Wareham N, Luben R, Welch A, Bingham S, et al. Body fat distribution and risk of coronary heart disease in men and women in the European Prospective Investigation into Cancer and Nutrition in Norfolk cohort: a population based prospective study. Circulation 2007; 116:2933-43.
12. Canoy D, Wareham N, Welch A, Bingham S, Day N, et al. Serum lipid concenteration in relation to anthropometric indices of central and peripheral fat distribution in 20021 British men and women: results from the EPIC/Norfolk population based cohort study. Atherosclerosis 2006; 420-7.
13. Okrainec K, Benerjee DK, Eisenberg MJ. Coronary artery disease in the developing world. Am Heart J. 2004 Jul;148(1):7-15.
14. Jafar TH, Jafary FH, Jessani S, Chaturvedi N. Heart disease epidemic in Pakistan: women and men at equal risk. Am Heart J. 2005 Aug;150(2):221-6.
15. Kabagambe EK, Baylin A, Campos H. Non fatal acute myocardial infarction in Costa Rica. Modifiable risk factors, population attributable risks and adherence to dietary guidelines. Circulation. 2007 Mar 6;115(9):1075-81.
16. Noeman A, Ahmad N, Azhar M. Coronary artery disease in young: faulty lifestyle, heredofamilial or both. Annals 2007;13: 162-4.
17. de Koning L, Merchant AT, Pogue J, Anand SS. Waist circumference and waist-to-hip ratio as predictors of cardiovascular events: meta-regression analysis of prospective studies. Eur Heart J. 2007 Apr;28:850-6.
18. Yusuf S, Hawken S, Ounpuu S et al and investigators. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet 2004;364:937-52.