WAIST TO HIP RATIO AS A RISK FACTOR FOR CORONARY ARTERY DISEASE

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SUMMARY

OBJECTIVE: Waist to hip ratio as a risk factor for coronary artery disease.
MATERIAL AND METHODS: It was a prospectively designed observational study involving 300 patients, attending cardiology out patient clinic of liaquat National hospital Karachi .The main outcome measure was diagnosis of CAD in the presence of specific risk factor.

RESULTS: The mean age of our male patients was 57.35±6.8 and that of our female patients was 51.2±8.2.The mean W-H ratio of our male subjects was 0.98±0.19, where as in females it was 0.85±0.14.The W-H ratio was increased in 81%(134) of our male subjects and36%(50) of our female subjects (p- 0.001). The W-H ratio was abnormally increased in 65 % of patients with CAD, whereas only 34% of our patients with normal W-H ratio were diagnosed to have CAD. Using Pearson's chi-square test, the p-value is 0.015 that is significant. It indicates the association between W-H ratio and CAD. The relative risk of CAD is approximately twice in the group with increased W-H ratio than among normal W-H ratio group. Only 18% of males and 63% of females had normal W-H ratio.

CONCLUSION: Abdominal obesity assessed clinically by waist to hip ratio is appearing as risk factor for CAD. The recognition of abdominal obesity is important, as lifestyle intervention is likely to provide significant health benefits.

INTRODUCTION

Obesity is rising in both developed and under-developed countries1 . It has become an epidemic in western societies and our society is also not spared. Obesity is considered a risk factor for premature mortality. Obesity has an association with all cause mortality, cardiovascular disease, diabetes and is an important component of metabolic syndrome. Metabolic syndrome is characterized by impaired glucose tolerance, insulin resistance, abdominal fat distribution, dyslipidemia and hypertension. We don't have epidemiological data in Pakistan regarding the prevalence of obesity but worldwide the prevalence of obesity has doubled approximately 15% to 30%.Obesity is associated with conventional risk factors and novel risk factors (inflammatory markers such as CRP, interleukin-6 and coronary artery endothelial dysfunction).This finding may explain the epidemiological observation that obesity is associated with increased risk of both fatal and non-fatal cardiovascular events. The increase in obesity prevalence is due to two major factors, plentiful supplies of inexpensive food and sedentary jobs. Thanks to technology, production of large quantities of cheap food is possible and manual work is rapidly disappearing. Multiple substances released from adiposites especially abdominal adipose tissue have been identified. These are non-esterified free fatty acids (NEFA's), inflammatory cytokines, PAI-1, adiponectin and leptin.Excessive influx of NEFA's into muscles and liver, released by lipolysis of triglycerides, are believed to be responsible for insulin resistance seen in obese persons 6. Increased fat in liver promotes atherogenic dyslipidemia.PAI-1 synthesized by adipocytes in high levels in obese, is believed to contribute to a pro-thrombotic state 7.Adiponectin is believed to have anti-inflammatory and anti-atherogenic properties. Obese peoples have generally low levels of adiponectin and hence may be deprived of its protective effects 8. It is particularly of interest that obese persons and people with metabolic syndrome have elevated levels of CRP, which is connected with the development of unstable plaques.

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The association between obesity and hypertension is well docuomented.Hypertension is three times more common in obese than in non-obese 9. Left ventricular hypertrophy is common in obese and to some extent is related to hypertension .However; abnormalities in left ventricular mass and function also occur in the absence of hypertension and may be related to severity of hypertension 10.Increased sagittal abdominal diameter was associated with a particularly increased risk of sudden death in asymptomatic men, irrespective of the risk factors11. Traditionally obesity is measured by body mass index BMI (weight in Kg divided by the square height in meters) as proposed by WHO. It is nevertheless a crude estimation that doesn't take into account the distribution of body fat, resulting in variability in different individuals and populations. Substantial evidence now indicates that waist to hip ratio waist or circumference, better predicts co-morbidities and mortality from obesity 13. Multiple studies have shown that Asian populations, especially in the region of south east Asia have a higher percentage of body fat at a low BMI.A waist-hip ratio of more than0.90 in men and 0.80 in women is considered abnormal. A waist circumference of 102cm in men and 88cm in women is defined as abdominal obesity. This study is carried out determine waist-hip ratio as a risk factor for coronary heart disease.

MATERIAL AND METHODS

This is an observational prospective study done on patients presented to out cardiology patient clinic of Liaquat National Hospital Karachi. This is a pilot study on300 patients both males and females. All data were recorded on Performa. Patients who have problems in measurement of anthropometric parameters were excluded from the study. All patients underwent measurement of their BP, fasting blood sugar, and fasting lipid profile. CAD was diagnosed on the basis of typical history of ischemic heart disease, abnormal ECG, ETT and angiography. The nominal data was tested statistically by student's t test whereas chi-square was used for categorical data. The p value was considered statistically significant if it is < 0.05.

RESULTS

Out of 300 subjects 164 (55%) were males and 136 (45%) were females. The mean age of our male patients were 51.22±8.2 and that of females was 57.35 ± 6.8 years. The mean W:H ratio of our male subjects was 0.98±0.19.Where as in females it was 0.85±0.14 (Table1).The demographic data is depicted in Table 2.

Table 1

W:H Ratio Male	0.98±0.19	0.0001
W:H Ratio Female	0.85±0.14	0.0001

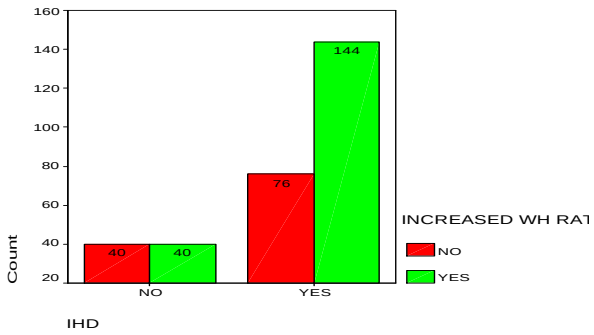
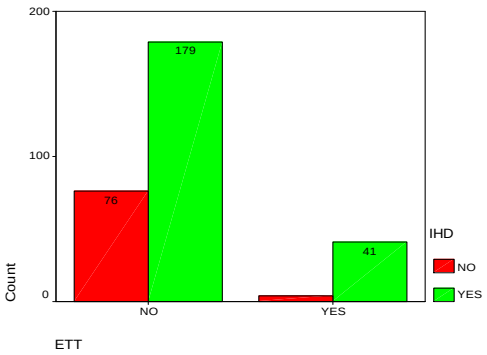


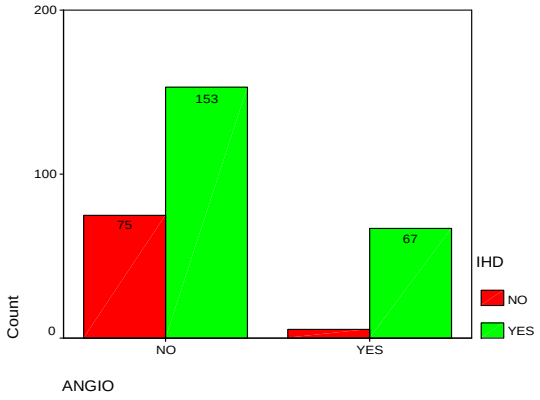
Table 2

		p-value
Male Age	57.35±6.8	
Female Age	51.2±8.2	
Hypertension	155(70%)	0.048
DM	(80)36 %	0.001
Dyslipidemia	102(46%)	0.032

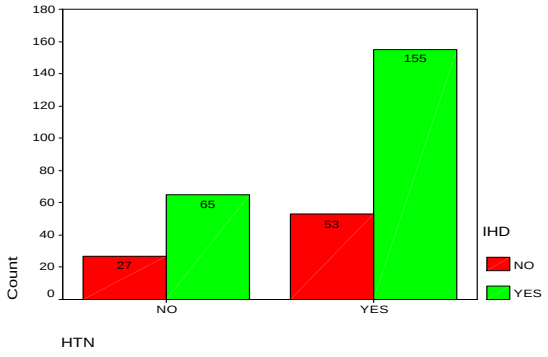
81%(134) of our male subjects and36%(50) of our female subjects had abnormal W:H ratio , with a p-value of 0.001and a CI(0.65,0.98).Only 18% of males and 63% of females had normal W:H ratio. The W: H ratio was abnormally increased in 65 %(186) of patients with CAD, whereas only 34 %(114) of our patients with normal W: H ratios were diagnosed to have CAD. Using Pearson's chi-square test, the p-value is 0.015 that is very significant; it indicates the association between W: H ratio and CAD. The relative risk of CAD is approximately twice in the group with increased W: H ratio than among normal W-H ratio group.

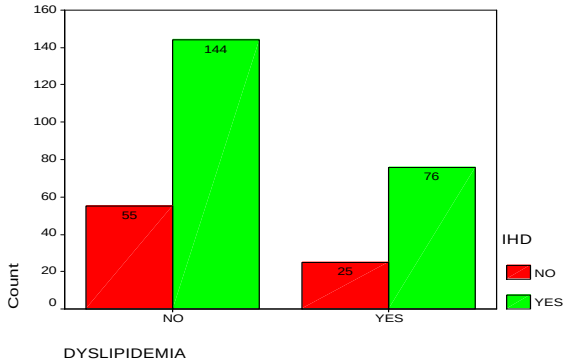


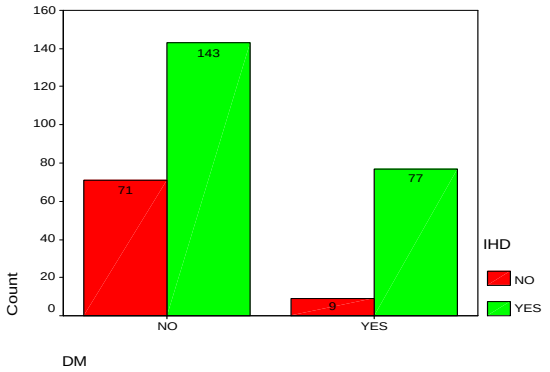
ETT was performed in 45 (15%) of patients and it was positive for reversible myocardial ischemia in 41(90%) of patients with a p-value of 0.03. Angiography was done in 72(24%) of patients with significant CAD seen in 79% with a P-value of 0.001.



46%(102)of our patients were found to have dyslipidemia with a diagnosis of CAD, p-value of 0.032 and CI(1.04-3.07).Hypertension was associated with 70% of our patients with CAD with a p-value of 0.04and a CI(0.70-2.0).36% of our CAD patients had DM with a p-value of 0.001,CI(2.01-3.96).







DISCUSSION

The fact that CAD occurs in younger age in South Asians is well documented and is noted in this study as well 12. This study included relatively higher number of female patients (45%). In a male dominant society where social weightage is given to males, this not only shows a changing trend in health care attitude where females are now getting reasonable share in health care priorities. This change is seen in rural areas and there appears little change in rural areas in this respect. There is also an epidemiologic paradigm shift, that CAD is affecting our female population. ETT was reported abnormal in 41(90%) out of 45(15%). Angiography was done in 24% of our patients and angiography showed significant CAD in (79%) of patients with abnormal W: H ratio. The average W:H ratio in our patients was higher than reported in Europeans caucasions13 .As we don't have any epidemiologic data regarding the average W:H ratio in Pakistani population, we used the internationally accepted W:H ratio. The WHO report on appropriate body-mass index for Asian population has showed that the risk of CAD starts at a lower BMI in Asians than compared to non-asians14.Not only the risk of CAD is increased but the prevalence of

hypertension. The conventional risk factors for CAD were presented in significant numbers in our patients.61% of our study population had an abnormal W-H ratio and out of that 78 %(p-0.015) had CAD. This figure clearly stands out as compared to conventional risk factors. Prospective studies have suggested that abdominal obesity is a risk factor for CAD independent of standard risk factors15,16.Part of this could be explained by the emerging risk factors. These risk factors found commonly in obese persons are atherogenic dyslipidemia, insulin resistance, a pro-inflammatory and pro-thrombotic state17.South Asian population is found to be more susceptible to effects of obesity, especially abdominal obesity, with a striking increase in risk of CAD. Studies involving south Asian expatriates in UK have demonstrated high levels of CRP. High CRP concentrations significantly predict the risk of MI 18.Interestingly CRP concentrations are higher in south Asians than in Europeans and is accounted for by greater central obesity in Asian population13. The reason(s) for this abnormal fat distribution in Asians and perhaps in Pakistanis too are poor diet rich in carbohydrate and lack of physical activity. A third mechanism recently proposed is the early mal-nutrition during childhood and later weight gain seen in many Asian societies19.By the new obesity guidelines as proposed by WHO for Asian population ,a third of this population is now classified as obese and 50% as overweight20,21.

As people with obesity may also have hypertension, DM and dyslipidemia, it is practically difficult to separate the individual risk. This was also the limitation in our study.

An epidemiologic survey in Pakistan is urgently needed to determine the right cut-off measurements for waist circumference and W-H ratio in Pakistani population. Increasing the physical activity would be the most important single most measure for prevention of CAD in obese people. The modification of health related behaviors could be beneficial in south Asian population as poor dietary and life style habits in this population is of recent origin and therefore easier to reverse.

CONCLUSION

CAD is rising in south Asia and is taking a more malignant course in south Asians than in Caucasians. A similar socioeconomic and cultural back ground may be responsible in a genetically predisposed population. .Abdominal obesity by producing a pro-inflammatory and pro-thrombotic state may be greatly responsible. Waist -hip ratio may seem better measure to screen for abnormal fat distribution and making strategies and guidelines to curb this problem.

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