

Waist-to-height ratio as index of cardiometabolic risk among the doctors

Miliva Mozaffor, Md. Matiur Rahman, Mariya Tabassum and Forhadul Hoque Mollah

Article Info

Department of Biochemistry and Molecular Biology, Faculty of Basic Science and Paraclinical Science, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

For Correspondence:

Md. Matiur Rahman
dr.matiur57@yahoo.com

Received: 5 November 2017
Accepted: 7 December 2017
Available Online: 9 December 2017

ISSN: 2224-7750 (Online)
2074-2908 (Print)

DOI: 10.3329/bsmmuj.v10i4.34760

Cite this article:

Mozaffor M, Rahman MM, Tabassum M, Mollah FH. Waist-to-height ratio as index of cardiometabolic risk among the doctors. *Bangabandhu Sheikh Mujib Med Univ J.* 2017; 10: 251-54.

Copyright:

The copyright of this article is retained by the author(s) [Attribution CC-BY 4.0]

Available at:

www.banglajol.info

A Journal of Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

Abstract

The aim of this study was to see the cardiometabolic risk among doctors using waist-to-height ratio index as tool. Cardiometabolic risk is an umbrella term that includes all the risk factors of diabetes and cardiovascular disease. The study was conducted among 195 doctors. According to waist-to-height ratio index 167 (85.6%) doctors had cardiometabolic risk. Waist-to-height ratio index was found good (area under the curve >0.5, sensitivity 88.1%, specificity 23.2%, positive predictive value 53.9%, and negative predictive value 66.7%) for their predictive value of cardiometabolic risk. Age grouping was done and found that no age group was free from cardiometabolic risk.

Introduction

Cardiometabolic risk includes all the risk factors for diabetes and cardiovascular disease.¹ Risk factors for type 2 diabetes, cardiovascular disease, obesity, insulin resistance, hyperglycemia, dyslipidemia and hypertension may occur in cluster or individually. They exaggerated by smoking and physical inactivity. As these conditions increase the risk of cardiovascular disease, so these are called cardiometabolic risk.²

Cardiometabolic risk has the values like a) waist circumference (indicates abdominal obesity): >90 cm in male and >80 cm in female,³ b) hyperglycemia: fasting blood glucose >6.9 mmol/L (or previously diagnosed type 2 diabetes),⁴ c) hypertension: blood pressure \geq 140/85 mm Hg,⁵ d) serum triglyceride level \geq 200 mg / dL,⁶ e) serum HDL-cholesterol level <40 mg/dL in male and female.⁶

Dyslipidemia, hypertension, insulin resistance, chronic low-grade inflammation, metabolic syndrome, type 2 diabetes and cardiovascular complications are associated with excess body fat.⁷ The location of excess adiposity is a strong determinant of cardiometabolic risk.⁸ Central deposition of excess fat has been proven to be a stronger predictor of risk of morbidity⁹ and mortality¹⁰ compared to overall obesity defined by body mass index alone.

Individual of South Asian ancestry tend to be insulin resistant with high triglyceride and low concentrations of high density lipoprotein cholesterol.¹¹ Reviews from India, Bangladesh and Pakistan have reported all the major risk factors especially cardiometabolic risk factors-obesity, abdominal obesity, hypertension, dysli-

pidemia and diabetes are increasing.¹²

Waist circumference has limitations which is overcome by waist to height ratio (cut off value is \geq 0.5 for both genders).¹³ Inclusion of height into the index helped to avoid any potential confounding of cardiometabolic risk by height. In Cauca-sian¹⁴ and Asian¹⁵ populations, similar waist-to-height ratio cutoffs for increased cardiometabolic risk have found by studies. The waist-to-height ratio cutoff value of 0.5 is an indicator of cardiometabolic risk.¹⁴ It also denotes cardio-metabolic risk among individuals who are not obese according to other anthropometric indices.

There is a paucity of data on lifestyle-associated disorders among the doctors. In Iran, a study on physicians shows prevalence of obesity and overweight among men and women were 54.5% and 13.3% respectively. High prevalence of metabolic disorders among Indian doctors showing that they had not taken good care of their health. Doctors need to be motivated to practice good health care habits.¹⁶ Doctors are sedentary workers. They also do not have enough time for physical exercise. A large clinical experimental and epidemiological literature clearly points that regular physical activity results in favorable physiological changes and overall health benefits.^{17,18} There is no particular data about the cardiometabolic risk among doctors. So, early identification of individual with cardiometabolic risk is important to start lifestyle modifications and treatment to prevent the development of diabetes and cardiovascular diseases. With these in mind, this study has been designed to find out the prevalence of cardiometabolic risk among the doctors using waist-to-height ratio as index.



Materials and Methods

This study was conducted on 195 doctors (122 males and 73 females) from March 2016 to February 2017. The age range was 30-60 years. Subjects who had pregnancy, known endocrine disorders like polycystic ovary, Cushing syndrome, thyroid disorders, chronic renal failure and hepatic failure were excluded. Antidepressant, anticonvulsant and steroids users were excluded.

Overnight fasting (at least 8-12 hours) blood samples were collected from the study subjects to estimate the serum glucose and lipid profiles. With all aseptic precaution, 5 mL of the venous blood was drawn from the antecubital vein of each study subject in a disposable plastic syringe and was delivered immediately into a clean dry test tube, which was kept in standing position till the clot formation. Then the serum was separated after centrifuging at 3,000 rpm for 5 min and was collected in eppendorf tube, labeled properly and stored in the ultra-freezer at -20°C.

Data were analyzed by computer with the help of the software SPSS version 22.0. Comparison between the male and female doctors of the study subjects was made using unpaired t tests (continuous data) and Chi-square test (categorical data). Receiver operating characteristic curve was created to evaluate the weightage of waist-to-height ratio and TG/HDL-C ratio indices in detection of cardiometabolic risk.

Results

The cardiometabolic risk was identified in 103 male and 64 female doctors (Table I). In total, 85.6% doctors had cardiometabolic risk on the basis of waist-to-height ratio index. The mean value of the waist-to-height ratio index was 0.6 ± 0.1 .

Table I		
Prevalence of cardiometabolic risk based on waist-to-height ratio (n=195)		
	Cardiometabolic risk	
	Present	Absent
Male	103	19
Female	64	9

The receiver operating characteristic curve showed the calculated sensitivity, specificity, positive predicted value and negative predictive value of the waist-to-height ratio as predictors of cardiometabolic risk.

The area under the curve (AUC) was 0.625 (p value =0.002) (Figure 1). The sensitivity was 88.1% and the specificity was 23.2%. The positive predicted values was 53.9%. The negative predicted value was 66.7%

indicates that waist-to-height ratio was a good predictor for cardiometabolic risk.

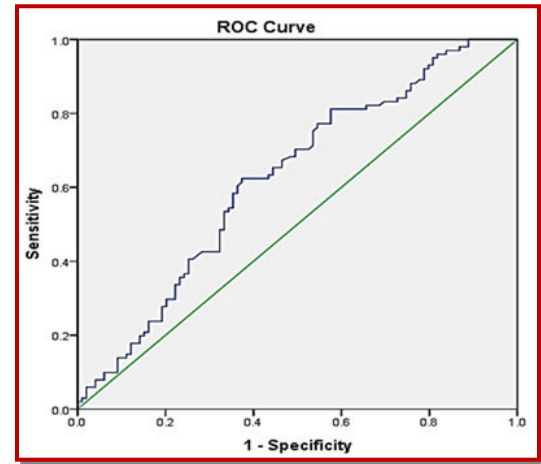


Figure 1: Receiver operating characteristic curve for waist-to-height ratio as index of cardiometabolic risk in total study subjects

Discussion

Cardiometabolic risk denotes lifetime risk for cardiovascular disease. Obesity, hyperglycemia, hypertension, insulin resistance and dyslipidemia are the specific factors that can cause this risk.¹⁹ South Asian nation are facing an epidemic of cardiovascular disease. According to World Health Organization this region has one of the highest cardiovascular mortality rates in the world.²⁰ Age adjusted cardiovascular mortality in Bangladesh is 179/100,000 in men and 108/100,000 in women.

The doctors are from affluent society. They usually live sedentary lifestyle but they experience different type of physical and mental stress throughout their professional life.

In this study, of total 195 study subjects 100 (50.0%) according to waist circumference, 40 (20.0%) according to systolic blood pressure and 42 (21.0%) according to diastolic blood pressure had cardiometabolic risk in term of fasting blood glucose, 25 (12.5%); triglyceride, 95 (47.5%) and HDL-C, 128 (64.0%) study subjects had cardiometabolic risk. A study on young Indian doctors showed higher prevalence of metabolic syndrome in doctors.¹⁶ Another study on Madurai area physicians identified that 49% of doctors had the metabolic syndrome.¹⁸

In this study, the prevalence of cardiometabolic risk was 85.6% on the basis of waist-to-height ratio index. This study is supported by Ramachandra et al. (2008).¹⁶ They conducted a study among Indian doctors and found the prevalence of metabolic syndrome 29.0%. They concluded that in India,

doctors had high prevalence of cardiometabolic risk factors. Another study conducted at King Abdulaziz Medical City in Riyadh showed that the prevalence of cardiometabolic risk factors among the physicians and non-physicians was almost similar. High awareness of cardiometabolic risk factors alone is not enough to prevent their occurrence was the findings of their study.²²

In this study, a specific segment of people in our society was selected who are doctors and there was quiet high prevalence of obesity and dyslipidemia among them. A study in Iran carried out on random sample of 272 doctors aged 26-40 years, the prevalence of obesity among the male and female doctors were 54.5 and 13.3% respectively.

ROC curves of waist-to-height ratio was produced to see the area under the curve for cardiometabolic risk. AUC of waist-to-height ratio were 0.625 (both sex), 0.552 (male) and 0.746 (female). A study among Italian population showed AUC of waist-to-height ratio was 0.713 in male and 0.701 in female.²³

In this study, the waist-to-height ratio showed sensitivity 86.4% and specificity 18.6% for male, sensitivity 97.2% and specificity 27.5% for female, sensitivity 88.1% and specificity 23.2% for total study subjects. In their study Mombelli, et al. (2009)²³ found sensitivity 92.0%, specificity 28.1% in male and sensitivity 87.4%, specificity 37.6% in female for waist-to-height ratio.

This study documented high prevalence of cardiometabolic risk among doctors. In our study waist-to-height ratio index was found good (AUC >0.5) for their predictive value of cardiometabolic risk. It was also revealed that waist-to-height ratio was a good index for cardiometabolic risk in female which is in agreement with other previous studies.²³

High awareness of cardiovascular disease and associated risk factors alone is not enough to prevent their occurrence among doctor society. Routine screening of these risk factors and improvement of the lifestyle of doctors are highly needed.

Conclusion

The prevalence of cardiometabolic risk is high (85.6%) among the doctors based on waist-to-height ratio index.

References

- Eckel RH, Kahn R, Robertson RM, Rizza RA. Preventing cardiovascular disease and diabetes: A call to action from the American Diabetes Association and the American Heart Association. *Circulation* 2006; 113: 2943-46.
- Brunzell JD, Davidson M, Furberg CD. Lipoprotein management in patients with cardiometabolic risk: Consensus conference report from the American Diabetes Association and the American College of Cardiology Foundation. *Diabetes Care*. 2008; 31: 811-22.
- International Diabetes Federation. The IDF consensus worldwide definition of metabolic syndrome. Brussels, 2006.
- Expert Committee on the Diagnosis and Classification of Diabetes Mellitus: Report of the expert committee on the diagnosis and classification of diabetes mellitus. *Diabetes Care*. 2003; 26: 5-20.
- Chobanian AV, Bakris GL, Black HR. Seventh report of the joint national committee on prevention, detection, evaluation and treatment of high blood pressure. *Hypertension* 2003; 42: 1206-52.
- Expert panel on detection, evaluation, and treatment of high blood cholesterol in adults. Executive summary of the third report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (adult treatment panel III). *JAMA*. 2001; 285: 2486-97.
- Connor JM, Millar SR, Buckley CM, Kearney PM, Perry IJ. The prevalence and determinants of undiagnosed and diagnosed type 2 diabetes in middle-aged Irish adults. *PLOS ONE*. 2013; 8: 80504.
- Després JP. Abdominal obesity: The most prevalent cause of the metabolic syndrome and related cardiometabolic risk. *Eur Heart J*. 2006; 8: 4-12.
- Yusuf S, Hawken S, Ounpuu S, Bautista L, Franzosi MG, Commerford P. Obesity and the risk of myocardial infarction in 27,000 participants from 52 countries: A case-control study. *Lancet* 2005; 366: 1640-49.
- Pouliot MC, Despres JP, Lemieux S, Moorjan S, Bouchard C, Tremblay A. Waist circumference and abdominal sagittal diameter: best simple anthropometric indexes of abdominal visceral adipose tissue accumulation and related cardiovascular risk in men and women. *Am J Cardiol*. 1994; 73: 460-68.
- Laws A, Reaven GM. Evidence for an independent relationship between insulin resistance and fasting plasma HDL-cholesterol, triglyceride and insulin concentrations. *J Intern Med*. 1992; 231: 25-30.
- Gupta R, Guptha S, Sharma K, Gupta A, Deedwania PC. Regional variations in cardiovascular risk factors in India: India Heart Watch. *World J Cardiol*. 2012; 4: 112-20.
- Ashwel M, Hsieh SD. Six reasons why the waist-to-height ratio is a rapid and effective global indicator for health risks of obesity and how its use could simplify the international public health message on obesity. *Int J Food Sci Nutr*. 2005; 56: 303-07.
- Ashwell M, Lejeune S, McPherson K. Ratio of waist circumference to height may be better indicator of

- need for weight management. *Br Med J.* 1996; 312: 377.
15. Hsieh SD, Yoshinaga H. Abdominal fat distribution and coronary heart disease risk factors in men: waist/height ratio as a simple and useful predictor. *Int J Obes Relat Metab Disord.* 1995; 19: 585-89.
 16. Ramachandra A, Snehalata C, Yamuna A, Murugesan N. High prevalence of cardiometabolic risk factors among young physicians in India. *JAPI.* 2008; 56: 17-20.
 17. U.S. Department of Health and Human Services, Physical activity and health: A report of the Surgeon General. National Center for Chronic Disease Prevention and Health Promotion. Atlanta, Georgia, USA. 1996.
 18. Mathavan A, Chockalingam S, Bilchik B, Saini V. Madurai Area Physicians Cardiovascular Health Evaluation Survey (MAPCHES): An alarming status. *Can J Cardiol.* 2009; 25: 303-08.
 19. Brunzell JD, Davidson M, Furberg CD. Lipoprotein management in patients with cardiometabolic risk: Consensus conference report from the American Diabetes Association and the American College of Cardiology Foundation. *Diabetes Care.* 2008; 31: 811-22.
 20. World Health Organization. Global status report on non-communicable disease. Geneva, World Health Organization, 2014.
 21. Salazar MR, Carbajal HA, Espeche WG, Sisniegues CEL, Balbin E, Dulbecco CA, Aizpurua M, Marillet AG, Raven GM. Relation among the plasma triglyceride/high-density lipoprotein cholesterol concentration ratio, insulin resistance and associated cardiometabolic risk factors in men and women. *Am J Cardiol.* 2012; 109: 1749-53.
 22. Alwan IA, Badri M, Al-Ghamdi M, Aljarbou A, Alotaibi H, Tamim H. Prevalence of self-reported cardiovascular risk factors among Saudi physicians: A comparative study. *Int J Health Sci (Qassim).* 2013; 7: 3-12.
 23. Mombelli G, Zanaboni AM, Gaito S, Sirtori CR. Waist-to-height ratio is a highly sensitive index for the metabolic syndrome in a Mediterranean population. *Metab Syndr Relat Disord.* 2009; 7: 477-84.
-