(International Print/Online Journal)

SJIF IMPACT FACTOR: 5.565
PUBMED-National Library of Medicine ID-101739732

ISSN (Print): 2209-2870
ISSN (Online): 2209-2862

International Journal of Medical Science and Current Research (IJMSCR)
Available online at: www.ijmscr.com
Volume 5, Issue 3, Page No: 81-89
May-June 2022

IJMSCR

Anthropometric Indices In Relation To Overweight And Obesity Among Medical Students At Tertiary Care Hospital, Chengalpattu District

[1]S. Suganya*, [2]Dr.V.Santhosh, [3]Dr. A. Khadeja Bi
[1] Assistant Professor, [2]Professor and Head of the Department, [3]Associate Professor,
Department of Biochemistry, KIMS&RC

***Corresponding Author:**
S. Suganya
Assistant Professor, Department of Biochemistry, KIMS&RC

Type of Publication: Original Research Paper
Conflicts of Interest: Nil

Abstract

Introduction: Obesity is becoming a global epidemic irrespective of age-group. According to WHO, the worldwide prevalence of obesity has nearly doubled since 1980. In 2014, 11% of men and 15% of women aged 18 years and older were obese.

Materials &Method: A cross - sectional descriptive study with group of 302 participants for a period of 4 months from December 2018 to March 2019. The general details of students like name, age, sex and anthropometric measurements of Height, Weight, Hip circumferences, neck Circumference, mid-arm circumference were taken and BMI was calculated. Statistical analysis was done using IBM SPSS Version 25 was used for all kind of data analysis and graphical representations.

Results: In a total of 302 students with the age of 18 & 19 years. Among them 148 (49%) were males and 154 (51%) were females. The mean age of the male medical students who participated in the study was 20.32 ± 2.38 years and the mean age of the females was 19.26 ± 1.43 years. Average BMI of female is 24.46 ± 5.2 and male is 23.47 ± 3.8 which clearly shows female average is around the overweight category and male average around in normal range with slight difference in standard deviation. Average of waist circumference for female is 86.59 ± 16.5 and male is 76.53 ± 16.6.

Conclusion: This study can be concluded that obesity and overweight are quite prevalent in the medical students. Measures to increase physical exercise could be undertaken using the behavior change communication strategy.

Keywords: Body mass index,Mid-arm circumference, Neck circumference, Thigh circumference, Waist circumference.

Introduction

Obesity is growing at a striking rate around the world. Regardless of whether the country is low, middle, or high-income, the rates have reached similarly high rates. For example, the Spain, Canada, and Germany have prevalence rates at around 35% with the United States leading the high-income countries at an alarming 56% [28]. In low-to-middle income countries, China and Brazil resemble rates of the three high-income countries, with Mexico leading at a shocking 74%. Abdominal obesity is associated with an increased risk of multiple chronic diseases like diabetes, hypertension, coronary heart disease, stroke and certain types of cancer [12]. It has been reported that there are approximately 937 million obese adults and 396 million overweight adults worldwide. Abdominal obesity is becoming a global epidemic in children as well. According to WHO, the worldwide prevalence of obesity has nearly doubled since 1980[14]. In 2014, 11% of men and 15% of women aged 18 years and older were obese.

Among south Asian populations due to several reasons, such as increasing urbanization, rural-to-urban migration, increased 'westernized lifestyle' (high carbohydrate, high-fat, low-fiber diet and decreasing trends in physical activity in nutrition and lifestyle transitions) and life expectancy ('epidemiological transition') is observed.

Asian Indians have a greater predisposition to abdominal obesity and accumulation of visceral fat and this has been termed as Asian Indian phenotype [16]. In a study conducted in urban north India (New Delhi), the overall prevalence of generalized obesity was 50.1%, while that of abdominal obesity was 68.9%. Comparatively it was interesting to note that a high prevalence has been reported in economically disadvantaged adults residing in urban slums [18].

Nearly 70% of India's population resides in rural areas. Even a small increase in prevalence of obesity in rural areas could lead to a huge increase in the number of obese individuals in India. Many studies in India have reported higher prevalence of obesity among women compared to men [19]. In Tamil Nadu, the age standardized prevalence of generalized obesity was 45.9%, while the of abdominal obesity was 46.6%.

In General, Obesity the excess visceral fat is associated with an increased risk factor of not only cardiovascular disease and many other emerging non-communicable diseases [22]. BMI has become the most widely accepted index of obesity and a proxy for total body fatness, but it does not differentiate between the over-muscled and the over-fat or distinguish between individuals with different types of fat distribution . Few evidences pointed out in the mid 20th century that people with a 'central' type of fat distribution (android shape) were at greater health risk than those whose fat was deposited 'peripherally' (gynoid shape)[12]. Only in the last 2 decades has there been a consensus view that health risks (non-communicable diseases like predominantly cardiovascular disease (CVD) and diabetes can be determined as much by the relative distribution of the excess fat as by its total amount. The use of imaging techniques such as computed tomography (CT) and magnetic resonance Imaging (MRI) has subsequently indicated that central obesity is associated with a preferential deposition of fat in the internal, visceral fat depots rather than the external, subcutaneous fat depots [18].

Relative fat distribution, as measured by the ratio of waist circumference to hip circumference (WHR), was popular for many years and is a good predictor of health risk. However, although very useful for risk assessment, WHR is not always helpful in a risk management because both waist and hip can decrease with weight reduction and so the ratio of WHR can sometimes change very little. Another problem is that WHR requires measurements of 2 circumferences. Although our dataset allowed calculation of WHR, this index was not considered further in our study, since we do not believe that WHR is useful in a public health context as its use does not always motivate risk reduction.

Much attention has subsequently been given to the use of waist circumference for risk assessment and management, as this is more strongly correlated with visceral fat than WHR. The widely used cut-points namely 102 cm for men and 88 cm for women, were originally intended as a simpler alternative to BMI cut-offs indicating a need for weight reduction.

There are various measurements to be used to measure the excess fat with different parameters at Different thresholds may however be needed for men and women, for different ages, and for ethnic group.

The objective of this study is to describe the various anthropometric indices used to measure the obesity with its standard cut-off between male and female among the medical students.

Materials & Methods:

The present study was a cross - sectional descriptive study done on medical Students of Karpaga Vinayaga institute of medical sciences and research centre, Chengalpet District. In a group of 310 students, 302 students participated in the study. 8 students were not included in the study due to certain administrative problems and who were absent due to some or the other reasons. The study was done for a period of 4 months from December 2018 to March 2019. A brief introduction on obesity and overweight and its implications were explained and a written consent was obtained for the participation in the study. The general details of the students like name, age, sex, type of diet (Veg/non-veg) and anthropometric measurements of Height, Weight, Hip

Volume 5, Issue 3; May-June 2022; Page No 81-89

circumferences, neck Circumference, mid-arm circumference were taken. Body Mass Index (BMI) was calculated using the formula weight in kg / height in meters. Waist to hip ratio was also calculated using the formula waist / hip in centimeters. The WHO BMI classifications was followed, i.e.

Under weight <18.50, normal range 18.50-24.99, over weight >=25 which is further subdivided as pre obese 25-29.99, obese class 1 30-34.99, obese class 2 35 – 39.99. Obese 3 >=40.

The weight was taken by bathroom scale weighing machine (accurate upto 0.5 kg), the marking of the height in cm was made on the wall up to an accuracy of 0.5 cm. The height was measured by asking them to stand barefoot and facing the back in approximation to the wall and keeping a scale straight on the head. A point was marked by the pencil on the wall. The reading was taken and then communicated to the participants to write on the questionnaire and then to calculate its BMI and to classify their own self so as to make them aware that in which category they lie. The weighing machine was checked and corrected, if required, for zero error before the start of the study. They were also checked and corrected, if required, after every 10th reading during the study period.

Statistical analysis: was done after collection of the data and it was analyzed and interpreted using Mean (standard Deviation) and appropriate graphs.

MS-Excel was used for data entry and cleaning and IBM SPSS Version 25 was used for all kind of data analysis and graphical representations.

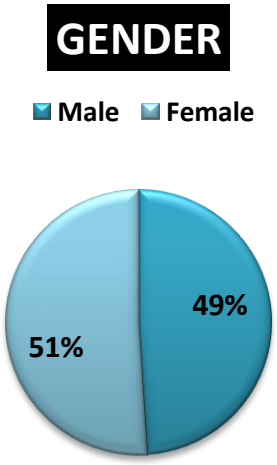
The study was approved by the Institutional Ethics committee (IEC) of Karpaga Vinayaga Institute of Medical Science and Research Centre.

Results:

In a total of 302 students with the age of 18 and 19 years. Among them 148 (49%) were males and 154 (51%) were females. The mean age of the male medical students who participated in the study was 20.32 ± 2.38 years and the mean age of the females was 19.26 ± 1.43 years as shown in Table1

Table: 1 Gender and Age Distribution of this study

Gender (n= 302)	N	%
Male	148	49
Female	154	51
Age	**Mean**	**SD**
Male	20.32	2.38
Female	19.26	1.43



Volume 5, Issue 3; May-June 2022; Page No 81-89

Table: 2 Gender- wise descriptive for anthropometric indices

Variables	Gender	Mean	Standard Deviation	Minimum	Maximum
HT	Female	165.83	14.1	132	193
	Male	166.14	14.4	103	193
WT	Female	56.34	18.4	32.0	130.0
	Male	66.32	16.7	40.0	130.0
BMI	Female	24.46	5.2	16	45
	Male	23.47	3.8	16	36
HC	Female	84.57	17.5	34.0	110.0
	Male	87.85	19.0	33.0	147.0
WC	Female	86.59	16.5	27.0	120.0
	Male	76.53	16.6	24.5	134.0
W/H ratio	Female	0.91	0.1	0.55	1.25
	Male	0.88	0.1	0.57	1.50
NC	Female	32.15	8.4	10.0	53.0
	Male	31.76	6.8	10.0	53.0
MC	Female	27.43	11.7	8.0	120.0
	Male	25.68	5.9	8.0	37.0
TC	Female	45.66	11.9	10.5	80.0
	Male	46.57	10.8	10.0	80.0
CC	Female	33.03	7.6	12.0	57.0
	Male	32.65	6.6	12.0	52.0

The Descriptive on anthropometric indices for male and female was given in the above table. The mean height of male was 166.14 ± 14.1 and female was 165.83 ± 14.1.In heights; both male and female are almost similar without any significant standard deviation.

Mean weight was 66.32 ± 18.4 and 66.32 ± 16.7 for female and male respectively. The calculated BMI from the height and weight record. In weight, Male are slightly higher than female without any significant standard deviation.

In regarding to average BMI of female is 24.46 ± 5.2 and male is 23.47 ± 3.8 which clearly shows female average is around the overweight category and male average around in normal range with slight difference in standard deviation.

The average of Hip circumference for female is 84.57 ± 17.5 and male is 87.85 ± 19. In Hip Circumference of male is higher than female with slight standard deviation.

The average of waist circumference for female is 86.59 ± 16.5 and male is 76.53 ± 16.6.comparatively waist circumference of female is higher than male waist circumference with precise standard deviation.

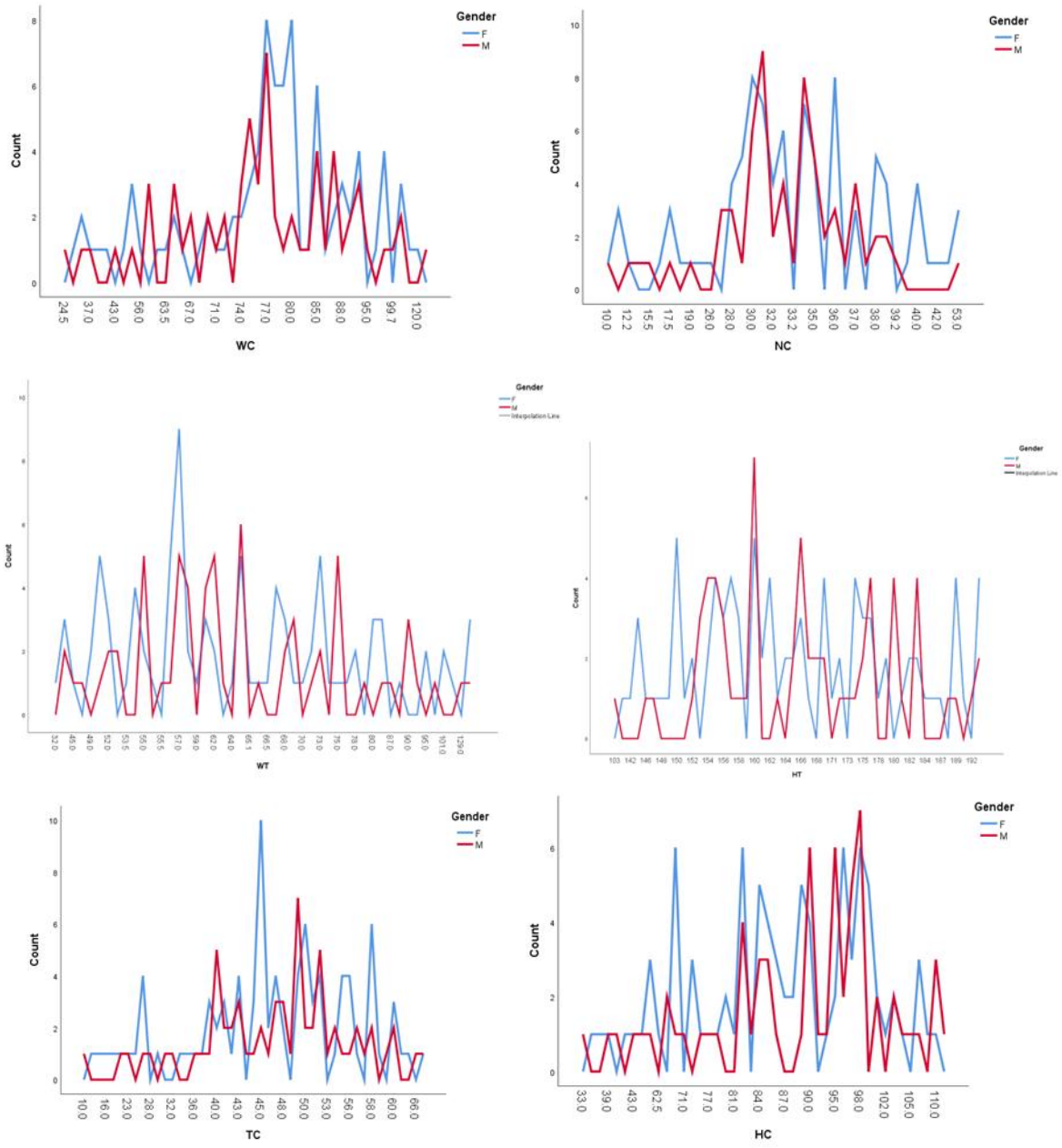
The average of W/H ratio of male and female are 0.88±0.1 and 0.91± 0.1 respectively. The proportion of W/H has slight different average along with precise standard deviation.

Volume 5, Issue 3; May-June 2022; Page No 81-89

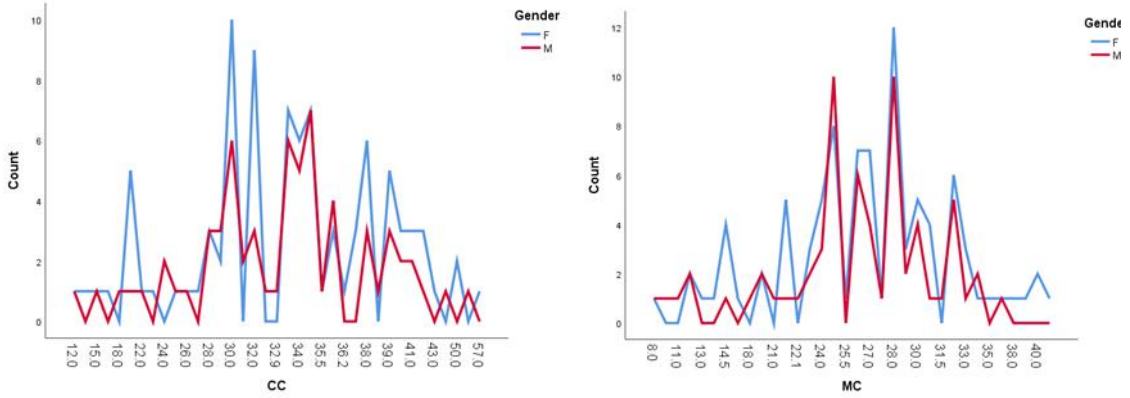
Average Neck circumference of female and male are 27.43 ± 8.4 and 31.76 ± 6.8 respectively. Neck circumference of male is higher than females along with precise and valid standard deviation

Average Mid-arm circumference for male is 25.68 ± 5.9 and for female is 27.43 ± 11.7. The average Thigh Circumference for female is 45.66 ± 11.9 and male is 46.57 ± 10.8. The average calf circumference for female is 33.03 ± 7.6 and for male is 32.65 ± 6.6. This additional index of Mid-arm circumference and Thigh circumference has slight differences in averages along with précised standard deviation. In figure1 Shown the patterns of anthropometric indices among medical students.

Figure :1 Difference in pattern of anthropometric indices among the medical students



Volume 5, Issue 3; May-June 2022; Page No 81-89



Discussion:

Importance of Using WHtR factors from our study, it is clear from the correlation coefficients that the proxy indicators of central fat distribution, namely waist circumference and especially WHtR, are better at predicting metabolic risk factors than BMI. In the last few years, there has been an exponential increase in evidence from investigators around the world showing the superiority of WHtR over other anthropometric indices in their association with metabolic risks, hypertension, and stroke and chronic kidney disease. Supporting evidence has come from cross-sectional studies in adults from, among others, Taiwan [14–24], Greece [25], Jamaica [18], Hong Kong [19], Korea [20], Bangladesh [21], Singapore [22], China [23], Iran [24], Japan [25], Germany [26, 27], Thailand [28, 29], Pakistan [30], Australia [31], USA [40], Iraq [33], Korea [34], Brazil [35], and India [36]. Shown that WHtR is better than BMI, waist circumference, and WHR and authors lend support as well.

Some authors have argued that waist circumference is a more convenient measure than WHtR because of its simplicity. To a some extent this is true, but concerns have been expressed that one set of boundary values for waist circumference (developed on Caucasian subjects) does not suit all ethnic groups [37] and that risk can differ for people with the same waist circumference, but different heights [13]

In concern with medical students, the results were quite similar to Tiwari R et al; that obesity and overweight are quite prevalent irrespective of gender and their progression and complications can be prevented by screening at least BMI timely [12].

With respect to our study and its population, the prevalence of overweight and obesity pattern has high deviation in female than male among the medical students. It can be decreased by encouraging healthy lifestyle, healthy food habits and a physically active every day, among the adolescents and youth in upcoming generation [11].

For evaluating the body composition and fat distribution anthropometric data using reference values on anthropometric values to predict cardiovascular risks and metabolic disorders in healthy young Turkish people. The conclusion of this study can be referred for our study population. [10] However, only the habit of regular exercise and taking care of stress triggering factors was found to have a significant influence on body weight of the subjects. Health food habit could improve the health of the medical students [9].

Obesity and stress remain a common problem among medical undergraduates. The causality can be established with more robust study designs. Encouraging proper eating habits combined with daily physical activity, yoga and body weight management programs might help curbing the problem [8].

Standardization of Terminology and Measurement

As the importance of WHtR for health screening becomes more popular, we believe it would be useful to standardize terminology. Thus, waist to stature ratio (WSR), waist/height (W/Ht), waist: height ratio, waist circumference to height ratio (WC/Ht), and waist-to-height ratio (WHTR) could all be rephrased as waist to height ratio and abbreviated to WHtR. Standardization of the measurement of waist circumference will become even more important, and

Volume 5, Issue 3; May-June 2022; Page No 81-89

several studies have already addressed this issue. It is particularly important that this standardization includes population groups such as the elderly and very obese.

Conclusion:

Despite of various studies in recent time recognize WHtR as best measure for obesity than other anthropometric indices, Waist circumference is a simple and effective way to screen abdominal obesity as preliminary level. So that timely measures could be taken to prevent their progression and complications on general obesity.

This study can be concluded that obesity and overweight are quite prevalent in the medical students. In respect to gender stratified analysis, the pattern of various anthropometric indices shows a more deviation in female than male medical students.

Measures to increase physical exercise could be undertaken using the behavior change communication strategy. Awareness regarding dietary habits should also be perceived by them. Persons with above standard cut-off on abdominal obesity should be motivated for regular physical activity to overcome this health condition among young adults.

Limitations:

As a preliminary investigation on the validity of using WHtR instead of waist circumference, BMI and other anthropometric indices, we acknowledge that this study has some limitations in scope and depth of analysis. The modest sample size in the medical students limits the power to demonstrate statistical significance when the data are stratified by sex. All standardized anthropometric measurement were not used in this study since there were no much associated variables collected other than anthropometric indices and related socio-demographic details.

References:

1. World Health Organisation (ed): Obesity. Preventing and managing the global epidemic. Report of a WHO Consultation on Obesity, Geneva 3–5 June 1997. World Health Organ Tech Rep 2000;894: i–xii, 1–253.
2. Margaret Ashwella Sigrid Gibsonb, Waist to Height Ratio Is a Simple and Effective Obesity Screening Tool for Cardiovascular Risk Factors: Analysis of Data from the British National Diet and Nutrition Survey of Adults Aged 19–64 Years. Obes Facts 2009;2:97–103.
3. PInar Karakaş, Memduha Gülhal BozkIr, Anthropometric indices in relation to overweight and obesity among Turkish medical students. Arch Med Sci 2012; 8, 2: 209-213.
4. Lucy M. Browning, Shiun Dong Hsieh and Margaret Ashwell, A systematic review of waist-to-weight ratio as a screening tool for the prediction of cardiovascular disease and diabetes: 0·5 could be a suitable global boundary value. Nutrition Research Reviews (2010), 23, 247–269
5. Adrian Kostulski , Tomasz Pawełczyk, Jolanta Rabe-Jabłońska, The risk of significant body weight gain and abdominal obesity during short-term treatment with olanzapine. Arch Med Sci 2009; 5, 2: 259-266.
6. Ranjana Tiwari, Vikas Jain, Ajit Singh Rajput, A. K. Bhagwat, Manish Goyal, Sakshi Tiwari, A study to assess prevalence of obesity among medical students of G.R. medical college, Gwalior, M. P., India. Int J Res Med Sci. 2014 Nov;2(4):1412-1416.
7. Dong-Hyun Choi , Yang-Im Hur , Jae-Heon Kang , Kyoungwoo Kim , Young Gyu Cho, Soo-Min Hong and Eun Byul Cho, Usefulness of the Waist Circumference-to-Height Ratio in Screening for Obesity and Metabolic Syndrome among Korean Children and Adolescents: Korea National Health and Nutrition Examination Survey, 2010–2014. Nutrients 2017, 9, 256; doi:10.3390/nu9030256.
8. Krishna T S, Devi C S, Harini M, Rao E V, Viswakumar R, Prevalence of obesity and its association with stress levels among undergraduate medical students. ***Int J Clin Biochem Res*** 2021;8(3):222-225
9. Gupta S, Ray TG, Saha I. Overweight, obesity and influence of stress on body weight among undergraduate medical students. Indian J Community Med 2009; 34:255-7.
10. PInarKarakaş, MemduhaGülhalBozkIr Anthropometric indices in relation to overweight and obesity among Turkish medical students Department of Anatomy, School of Medicine,Çukurova University, Adana, Turkey

Volume 5, Issue 3; May-June 2022; Page No 81-89

Arch Med Sci 2012; 8, 2: 209-213 DOI: 10.5114/aoms.2012.28546

11. Gopal Krishanan S, Ganesh Kumar P, Prakash MVS, Christopher, Amolraj V. Prevalence of overweight/obesity, among the medical students, Malaysia. Med J Malaysia. 2012 Aug;67(4):442-4.
12. Ranjana Tiwari1 *, Vikas Jain2 ,Ajit Singh Rajput2 , A. K. Bhagwat1 , Manish Goyal2 , Sakshi Tiwari3 A study to assess prevalence of obesity among medical students of G.R. medical college, Gwalior, M. P., India International Journal of Research in Medical Sciences Tiwari R et al. Int J Res Med Sci. 2014 Nov;2(4):1412-1416
13. Hsieh S, Yoshinaga H: Do people with similar waist circumference share similar health risks irrespective of height? Tohoku J Exp Med 199
14. Lin WY, Lee LT, Chen CY, Lo H, Hsia HH, Liu IL, Lin RS, Shau WY, Huang KC: Optimal cut-off values for obesity: using simple anthropometric indices to predict cardiovascular risk factors in Taiwan. Int J Obes Relat Metab Disord 2002;26:1232– 1238.
15. Huang KC, Lin WY, Lee LT, Chen CY, Lo H, Hsia HH, Liu IL, Shau WY, Lin RS: Four anthropometric indices and cardiovascular risk factors in Taiwan. Int J Obes Relat Metab Disord 2002;26:1060– 1068.
16. Huang HW, Tan SQ, Fu X, Peng DX, Liu XQ, Lin RJ, Wu SH, Huang JX: Study on the correlation between hypertension and the indexes of vascular endothelial function among people living in the community (in Chinese). Zhonghua Liu Xing Bing Xue Za Zhi 2007;28:798–801.
17. Bertsias G, Mammas I, Linardakis M, Kafatos A: Overweight and obesity in relation to cardiovascular disease risk factors among medical students in Crete, Greece. BMC Public Health 2003;3:3.
18. Sargeant LA, Bennett FI, Forrester TE, Cooper RS, Wilks RJ: Predicting incident diabetes in Jamaica: the role of anthropometry. Obes Res 2002; 10:792–798
19. Ho SY, Lam TH, Janus ED: Waist to stature ratio is more strongly associated with cardiovascular risk factors than other simple anthropometric indices. Ann Epidemiol 2003;13:683–691.
20. 20 Jeong SK, Seo MW, Kim YH, Kweon SS, Nam HS: Does waist indicate dyslipidemia better than BMI in Korean adult population? J Korean Med Sci 2005;20:7–12.
21. Sayeed MA, Mahtab H, Latif ZA, Khanam PA, Ahsan KA, Banu A, Azad Khan AK: Waist-toheight ratio is a better obesity index than body mass index and waist-to-hip ratio for predicting diabetes, hypertension and lipidemia. Bangladesh Med Res Counc Bull 2003;29:1–10.
22. Pua YH, Ong PH: Anthropometric indices as screening tools for cardiovascular risk factors in Singaporean women. Asia Pac J Clin Nutr 2005;14: 74–79.
23. Wu AH, Yu MC, Tseng CC, Pike MC: Body size, hormone therapy and risk of breast cancer in Asian American women. Int J Cancer 2007;120:844–852.
24. Hadaegh F, Zabetian A, Harati H, Azizi F: Waist/ height ratio as a better predictor of type 2 diabetes compared to body mass index in Tehranian adult men – a 3.6-year prospective study. Exp Clin Endocrinol Diabetes 2006;114:310–315.
25. Hsieh SD, Muto T: The superiority of waist-toheight ratio as an anthropometric index to evaluate clustering of coronary risk factors among non-obese men and women. Prev Med 2005;40:216–220.
26. Bosy-Westphal A, Geisler C, Onur S, Korth O, Selberg O, Schrezenmeir J, Muller MJ: Value of body fat mass vs anthropometric obesity indices in the assessment of metabolic risk factors. Int J Obes (Lond) 2006;30:475–483.
27. Schneider HJ, Glaesmer H, Klotsche J, Bohler S, Lehnert H, Zeiher AM, Marz W, Pittrow D, Stalla GK, Wittchen HU: Accuracy of anthropometric indicators of obesity to predict cardiovascular risk. J Clin Endocrinol Metab 2007;92:589–594.
28. Aekplakorn W, Kosulwat V, Suriyawongpaisal P: Obesity indices and cardiovascular risk factors in Thai adults. Int J Obes (Lond) 2006;30:1782–1790.
29. Aekplakorn W, Pakpeankitwatana V, Lee CM, Woodward M, Barzi F, Yamwong S,

Volume 5, Issue 3; May-June 2022; Page No 81-89

Unkurapinun N, Sritara P: Abdominal obesity and coronary heart disease in Thai men. Obesity (Silver Spring) 2007;15:1036–1042.
30. Khan A, Haq FU, Pervez MB, Saleheen D, Frossard PM, Ishaq M, Hakeem A, Sheikh HT, Ahmad U: Anthropometric correlates of blood pressure in normotensive Pakistani subjects. Int J Cardiol 2008; 124:259–262
31. Neville KA, Cohn RJ, Steinbeck KS, Johnston K, Walker JL: Hyperinsulinemia, impaired glucose tolerance, and diabetes mellitus in survivors of childhood cancer: prevalence and risk factors. J Clin Endocrinol Metab 2006;91:4401–4407.
32. Diaz VA, Mainous AG 3rd, Baker R, Carnemolla M, Majeed A: How does ethnicity affect the association between obesity and diabetes? Diabet Med 2007;24:1199–1204.
33. Mansour AA, Al-Jazairi MI: Cut-off values for anthropometric variables that confer increased risk of type 2 diabetes mellitus and hypertension in Iraq. Arch Med Res 2007;38:253–258.
34. Lee K, Song YM, Sung J: Which obesity indicators are better predictors of metabolic risk?: healthy twin study. Obesity (Silver Spring) 2008;16:834– 840.
35. Pitanga FJ, Lessa I: Waist-to-height ratio as a coronary risk predictor among adults (in Portuguese). Rev Assoc Med Bras 2006;52:157–161.
36. Joshi PP: Is waist to height ratio a better and more practical measure of obesity to assess cardiovascular or diabetes risk in indians? J Assoc Physicians India 2008;56:202–3; author reply 203–204.
37. Ashwell M, Hsieh S: Six reasons why the waist-toheight 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;56:303–307

Volume 5, Issue 3; May-June 2022; Page No 81-89