

Research Article

Correlation of BMI and WAIST to HIP Ratio with Blood Sugar Random

Sumayya Shabbir, Idrees Shabbir,

Ayesha Sikandar and Zahid Hussain Shah

Mayo hospital, Lahore

[Received: 15/01/2019; Accepted: 31/05/2019; Published: 01/06/2019]

ABSTRACT:

Background: The urban populations are greatly effected with diabetes or high blood sugar range or ratio (BSR) than the rural populations. This elevated prevalence of DM, insulin sensitivity and glucose intolerance among under developed countries has been well explained by the central obesity and insulin resistance syndrome which occur due to the genetic disposition. The primary objective of the study was to calculate the correlation of BMI and waist to hip ratio with BSR.

Material and Methods: Study design: Cross sectional study. **Duration:** Six months (from 01-11-2016 to 30-04-2017) **Setting:** OPD of Mayo hospital, Lahore. **Data collection:** Total 110 Diabetic patients were included. The blood sugar was measured after the 6-8 hour fast. BMI was noted by using weight in kg and height in meters. With the help of flexible tape meter we measured the hip and waist sizes and their ratio was calculated electronically.

Results: The average age of participants 40 ± 14.9 years. There were 81 (73.63%) females and 29 (26.37%) males. 46 (41.8%) had normal BMI. The correlation coefficients were 0.34 and 0.22 respectively for earlier mentioned factors with BSR. The BSR was significantly correlated with BMI and Waist-hip ratio (P value < 0.05).

Conclusion: There is positive significant correlation between BMI and waist to hips ratio with BSR in our population. The earlier mentioned risk factors are known to be the obesity predictors as well.

Keywords: diabetes mellitus (DM), lifestyle, body mass index (BMI), and waist to hips ratio, insulin resistance syndrome.

INTRODUCTION:

The diabetes mellitus (DM) and cardiovascular disease are more common in over weight and obese populations in developing countries. The probable reason maybe the less physical activity. The prevalence has rapidly increased in sub content and is closely linked with lifestyle of people and change in diet. The urban populations are greatly effected with diabetes or high blood sugar range or ratio (BSR) than the rural populations. Although in recent decades the diabetes has increased two to three times in many areas in Pakistan.¹⁻⁴ This elevated prevalence of DM, insulin sensitivity and glucose intolerance among under developed countries has been well explained by the central

obesity and insulin resistance syndrome which occur due to the genetic disposition.³⁻¹⁰ A good measure to the general adiposity is body mass index (BMI).¹ BMI classified as underweight if the value is less than 18.5, 18.5 to 22.9 classified as normal, an over weight range is 25-29.9 and above than equal to 30 named as obese.² Elevated BMI is an established risk factor for majority of fetal diseases. Another important indicator to the obesity diagnosis is Waist Hip ratio (WHR) because of the inclusion of abdominal fat deposition in the Syndrome X.² The primary objective of the study was to calculate the correlation of BMI and waist to hip ratio with BSR.

MATERIAL AND METHODS:

This observational cross sectional was done on 110 subjects enlisted for the study; from OPD of the Mayo hospital, Lahore. The study duration was of six months starting from January 2018. Diabetic patients were included in the study. The exclusion criteria include all patients with cardiac disease history or those on long-term antibiotic or steroid therapy and all the pregnant women whereas all persons that are not taking any anti diabetic drugs were included in this study.

The demographic information with necessary diagnostic history was collected for all the subjects after the attendant or person signed the consent form. For all diagnostic values, the standard operating procedures were strictly followed in hospital laboratory. The blood sugar was measured after the 6-8 hour fast. A sugar level above 130 mg/dl labeled as pre-diabetic and above 200 mg/dl were considered as diabetic.

The height was observed in standing position of the person with a tape meter by removing his/her shoes and with normal shoulders. 0.5 cm was measured as nearest for height. Similarly the weight was measured with weight scale and later the BMI was calculated. With the help of flexible tape meter we measured the hip and waist sizes and their ratio was calculated electronically. The persons with BMI of 18-22.9 kg/m² were named normal weight, 23-24.9 kg/m² were categorized as over weight and above and equal to 25 kg/m² was named obese. An informed consent was taken into account and ethical approval was taken from the hospital ethical Committee.

Statistical analysis:

The information collected from patients were entered electronically, stored and analyzed later by using SPSS version 20. Descriptive statistics were applied by calculating mean and standard deviation. Frequency distribution and percentages were performed for all qualitative variables like gender, BMI etc. P-value ≤ 0.05 was considered statistically significant in all inferential statistics.

RESULTS:

We enrolled a total of 110 individuals for this study. The average age of all the participants was 40 ± 14.9 with range 17-80. 39 (35.45%) of the patient were in the age category of 17 to 30. 33 (30%) belong to 31-45 and 41(37.27%) were above 45 years of age. 81 (73.63%) of the patients were female whereas 29(26.37%) were males. 46(41.8%) were with normal BMI more on the person's characteristics were given in table 1.

Table 1: Baseline characteristic for all the participants.

Characteristics	n(%)
Number of patients	110
Age (mean \pm SD)	40 ± 14.9
Average weight	66 ± 12.5 kg
Average height	159 ± 13.5 cm
BMI	
Under weight	5(4.5%)
Normal	46(41.8%)
Over weight	35(31.8%)
Obese	24(21.8%)
Average Waist - hip ratio	0.90 ± 0.85
Average blood sugar level	175 ± 109.4

The average waist circumference was 91.8 ± 15 cm and hip circumference was 101 ± 13.4 cm respectively.

The BSR was significantly correlated with BMI and Waist-hip ratio (P value < 0.05). The correlation coefficients were 0.34 and 0.22 respectively for earlier mentioned factors with BSR.

Discussion:

This study was planned to estimate the correlation of BSR with BMI and hip to waist ratio, moreover we aim was draw an attention to the increasing diabetes disease in the population. Many epidemiological studies has proved that the people in developing countries like Pakistan and India were more susceptible to diabetic and cardiac disease risks as of the unhealthy lifestyle and less physical activities.¹¹⁻¹⁷ Comparatively, majority of the participants in our study population were at high weight as compared to other developing countries published populations.^{2,18,19}

We observed in our study that BMI is significantly correlated to the SBR, recent published report by world health organization revealed that more the Asian has high association among BMI and BSR as compared to the Western or European populations.¹⁷ The diabetes risk has rapidly increased in last decade.² More the diabetes found in urban areas than the rural, some of the similar populations like in India have shown the prevalence of diabetes above 8 percent whereas it was above 2% in rural areas.⁴

We reported in our study the higher BMI has positive significant association to BSR. Similar findings were observed in published studies.^{20,12-14} With the present study results, it is more likely to observe very less margin of safety among abnormal and normal BMI values. This is very much comparable to population in developed countries. On another aspect the body weight is said to be closely linked with the diabetes prevention. The less or reduced weight is also associated with low BMI and waist to hip ratio.¹⁶

Another fact of this is the genetic predisposition to the obesity, which may occur due to the abnormal fat distributions in body caused by the resistance of insulin.^{5,7,15} We reported in our study the waist to hip ratio is significantly associated with BSR. This finding is supported by other published studies.^{12,13} Moreover evidences available, that shows the waist to hip ratio is more in males than females and is associated to the diabetes risk.¹⁴

CONCLUSIONS:

We may conclude from our study that there is positive significant correlation between BMI and waist to hips ratio with BSR in our population. The earlier mentioned risk factors are known to be the obesity predictors as well.

REFERENCES:

1. Ramachandran A, Snehalatha C, Dharmaraj D, Vishwanathan M. Prevalence of glucose intolerance in Asian Indians: Urban-Rural Difference and significance of upper body adiposity. *Diab Care* 1992;15:1348-55.

2. Ram BS, Shanti SR, Paturi VR, Sidharth D, Madhu V, Ashok KD, et al. Diet and lifestyle guidelines and desirable levels of risk factors for the prevention of diabetes and its vascular complications in Indians: a scientific statement of The International College of Nutrition. *J Cardiovasc Risk* 1997;4:201-8.
3. McKeigue PM, Adelstein AM, Shipley MJ, Riemersma RA, Marmot MG, Hunt SP, et al. Diet and risk factors for coronary artery disease in Asians in North-West London. *Lancet* 1985;2:1086-90.
4. Singh RB, Niaz MA. Coronary risk factors in Indians. *Lancet* 1995;346: 778-9.
5. Scholfield DJ, Behall KM, Bhathena SJ, Kelsay J, Reiser S, Revett KR. A study on Asian Indian and American vegetarians: Indications of a racial predisposition to glucose intolerance. *Am. J. Hyderabad. Clin Nutr* 1987;46: 955-61.
6. Cruickshank JK, Cooper J, Burnett M, MacDuff J, Drubra U. Ethnic differences in plasma C Peptide and insulin in relation to glucose intolerance and blood pressure *Lancet* 1991;338: 842-7.
7. McKeigue PM, Shah B, Marmot MG. Relation of central obesity and insulin resistance with high diabetes prevalence and cardiovascular risk in South Asians. *Lancet* 1991;337:382-6.
8. Enas E, Garg A, Davidson M, Nair V, Huet B, Yusuf S. Coronary heart disease and its risk factors in the first-generation immigrant Asian Indians to the United States of America. *Indian Heart J* 1996;48:343-53.
9. Hughes K. Trends in mortality from ischemic heart disease in Singapore, 1959 to 1983. *Int J Epidemiol* 1986;15:44-50.
10. Bhatnagar D, Anand IS, Durrington PN, Patel DJ, Wander GS, Mackness ML, et al. Coronary risk factors in people from the Indian subcontinent living in West London and their siblings in India. *Lancet* 1995;345:405-9.
11. Shaukat N, Douglas JT, Bennett JL, de Bono DP. Can physical activity explain the differences in insulin levels and fibrinolytic activity between young Indo-origin and

- European relatives of patients with coronary artery disease? *Fibrinolysis* 1995;9:55-63.
12. Singh RB, Ghosh S, Niaz MA, Gupta S, Bishnoi I, Sharma JP, et al. Epidemiological study of diet and coronary risk factors in relation to central obesity and insulin levels urban population of North India. *Int J Cardiol* 1995;47: 245-55.
 13. Singh RB. Indian consensus for Prevention of Hypertension and Coronary Artery Disease: Indian Consensus Group: Report of a consensus development workshop conducted by the Indian Society of Hypertension and the International College of Nutrition. *J Nutr Environ Med* 1996;6: 309-18.
 14. Gopalan C, Ramasastri BV, Balasubramanian SC. Nutritive value of Indian Foods. National Institute of Nutrition (NIN). 2004.
 15. Mandal S, Sidhartha D, Mohanty BK, Sahu CS. Effects of ethnic origin, dietary and lifestyle habits on plasma lipid profiles -A study of three population groups. *J Nutr Environ Med* 1984;4:141-8.
 16. Singh RB, Rastogi V, Rastogi SS, Niaz MA, Beegom R. Effect of diet and moderate exercise on central obesity and associated disturbances, myocardial infarction and mortality in patients with and without coronary artery diseases. *J Am Coll Nutr* 1996;15(6):592-8.
 17. WHO Expert Consultation. Appropriate body-mass index in Asian populations and its implications for policy and intervention strategies. *Lancet* 2004;363:157-63.
 18. Aziz N, Kallur SD, Nirmalan PK. Implications of the revised consensus body mass indices for Asian Indians on clinical obstetric practice. *J Clin Diagn Res* 2014;8(5):OC01–OC03.
 19. Misra A, Chowbey P, Makkar BM, Vikram NK, Wasir JS, Chadha D, et al. Consensus Statement for Diagnosis of Obesity, Abdominal Obesity and the Metabolic Syndrome for Asian Indians and Recommendations for Physical Activity, Medical and Surgical Management. *JAPI* 2009;57:163-70.
 20. Al-Dahr MSH, Jiffri EH. Increased adipose tissue expression of tumor necrosis factor-alpha and insulin resistance in obese subjects with type II diabetes. *World J Medical Sci* 2010;5(2):30-5.