Original Article

Diabetes and Central Obesity

Relationship between Type 2 Diabetes Mellitus and Central Obesity

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ABSTRACT

Objectives: To determine the relationship between type 2 diabetes and central obesity, we investigated the incidence of type 2 diabetes in people visiting the opd of hamdard medical hospital.We also investigated the independent effects of central obesity compared with those of overall obesity
Study Design: Comparative study
Place and Duration of Study: This study was conducted at Hamdard University Hospital between October 2012 to September 2013
Material and Methods: The subjects were 174 men and 261 women selected from 469 people who had undergone medical examinations at OPD of hamdard medical college between 2012 till 2013.Participants with central obesity were determined according to the new criteria announced by the IDF[9]. Central obesity in south east population is defined by the IDF as waist circumference ≥90 cm for men and ≥90 cm for women. Participants with overall obesity were defined as those with BMI ≥25.0 kg/m^2
Results: The results of logistic regression analysis showed that both central obesity and overall obesity were closely related to type 2 diabetes and that the relative risks of occurrence of type 2 diabetes adjusted for age, sex, systolic blood pressure, total cholesterol, and smoking were 2.59 for central obesity and 2.06 for overall obesity. Central obesity maintained its significance when additionally adjusted for overall obesity, but overall obesity lost its significance when additionally adjusted for central obesity
Conclusion: In conclusion, our study suggested that the current cutoff points of waist circumference in the IDF definition for Asian population is useful for assessing the risk of type 2 diabetes and that central obesity may be more useful than overall obesity for evaluating the risk of type 2 diabetes.
Key Word: Type 2 Diabetes Mellitus, Central Obesity, Cholesterol, Smoking

INTRODUCTION

The development of obesity, particularly abdominal obesity, promotes insulin resistance and a cluster of risk factors for CV disease, including hypertension, atherogenic dyslipidaemia, inflammation, and altered haemostasis.[1-2] Abdominal obesity and type 2 diabetes often coexist,[3-4]and patients with type 2 diabetes are well known to be at elevated risk of first or repeat CV events, compared with their non-diabetic counterparts.[5] However, the elevated CV risk associated with insulin-resistant states begins long before patients present for a clinical diagnosis of type 2 diabetes.[6] The purpose of this review is to explore the relationships between abdominal obesity and insulin resistance.
The prevalence of abdominal obesity, according to IDF criteria (waist circumference >90 cm for men and >80 cm for women[9]) is also high and growing and so as incidence of diabetes mellitus type 2. In an NHANES cohort recruited between 1998 and 1994, 30.1% of men had abdominal obesity; by 1999–2000, the prevalence of this cardiometabolic risk factor had increased to 36.0% (an increase in prevalence of 20%).[7] A comparable increase in the prevalence of abdominal obesity was observed in women during this period, from 45.7 to 51.9% (increase in prevalence of 14%). These overall figures conceal potentially important differences between ethnic groups.[8]. Most cases of the metabolic syndrome and diabetes mellitus type 2 that physicians will encounter in their daily practice are likely to be associated with abdominal obesity. A prospective study in a consecutive series of 756 men or women undergoing coronary angiography evaluated the prognostic significance of abdominal obesity (waist circumference or waist-hip ratio) and BMI, with regard to clinical outcomes.[10]

MATERIALS AND METHODS

The subjects were 174 men and 261 women selected from 469 citizens who had undergone medical examinations at OPD of hamdard medical college between 2012 till 2013.The following participants in medical examinations were excluded: those with missing data on blood pressure or waist circumference and those with type 2 diabetes (fasting plasma glucose level ≥126 mg/dl and/or those who were on medication for diabetes).Participants with central obesity were determined according to the new criteria announced by the IDF[9] for south asian . Central obesity is defined by the IDF as waist circumference ≥90 cm for men and ≥80 cm for women. Participants with overall obesity were defined as those with BMI ≥25.0 kg/m^2 [11]The participants were divided into two groups, a normal

group and a central obesity group, and the measured items in the two groups were compared. We also compared the incidences of type 2 diabetes in normal and central obesity groups of subjects who were newly determined as having type 2 diabetes on the basis of data obtained from medical examinations conducted in 2003 or 2004. Moreover, we estimated the relative risk of type 2 diabetes in people with central obesity compared with those who did not have central obesity.As another analysis, the participants were divided into two groups, a normal group and an overall obesity group, and the same assessments as those described above were made for these two groups.

The SPSS package (version 11.5J) was used for statistical analysis. The χ^2 test was used for frequency comparison. Multiple logistic regression analysis was used to estimate the relative risk for type 2 diabetes. The significance level of all analyses was set at $P < 0.05$.

RESULTS

Ninteen of the 327 individuals in the normal group and 14 of the 87 individuals in the central obesity group were newly defined as having type 2 diabetes. The incidence of type 2 diabetes was significantly higher in the central obesity group than in the normal group (15.6 vs. 5.8%; $P < 0.0001$). Eighteen of the 296 individuals in the normal group and 15 of the 118 individuals in the overall group were newly defined as having type 2 diabetes . The incidence of type 2 diabetes was significantly higher in the overall obesity group than in the normal group (12.7 vs. 5.9%; $P < 0.0001$).

The results of logistic regression analysis showed that both central obesity and overall obesity were closely related to type 2 diabetes and that the relative risks of occurrence of type 2 diabetes adjusted for age, sex, systolic blood pressure, total cholesterol, and smoking were 2.59 for central obesity and 2.06 for overall obesity (Table 2). Central obesity maintained its significance when additionally adjusted for overall obesity, but overall obesity lost its significance when additionally adjusted for central obesity (Table 3).

Table No.1: (Adjusted for age and sex)

Central obesity	2.84 (1.54–5.25)†
Overall obesity	2.30 (1.37–3.85)†

Table No.2: (Adjusted for age and sex + total cholesterol, systolic blood pressure, and smoking)

Central obesity	2.59 (1.39–4.81)†
Overall obesity	2.06 (1.20–3.54)†

Table No.3: (Adjusted for age and sex + total cholesterol, systolic blood pressure, and smoking + overall obesity or central obesity)

Central obesity	2.07 (1.03–4.16)‡
Overall obesity	1.53 (0.83–2.83)

* Relative risk of central obesity was adjusted for overall obesity (yes/no) and that of overall obesity was adjusted for central obesity (yes/no). The results of logistic regression analysis showed that both central obesity and overall obesity were closely related to type 2 diabetes (Table 1 and 2). Central obesity maintained its significance when additionally adjusted for overall obesity, but overall obesity lost its significance when additionally adjusted for central obesity (Table 3)

† $P < 0.01$; ‡ $P < 0.05$.

DISCUSSION

Waist circumference is a better predictor of visceral fat (assessed using advanced techniques such as dual-energy X-ray absorptiometry and computed tomography) than BMI and waist-to-hip ratio[12 13 14]. There is a strong association between waist circumference and risk of developing health conditions such as cardiovascular disease and type 2 diabetes[15 16 17 18 19]. In our study, only central obesity remained a significant predictor of risk of type 2 diabetes when central obesity and overall obesity were included in the model simultaneously.The IDF also announced a new definition of metabolic syndrome in 2005, and according to the new definition, for a person to be defined as having metabolic syndrome he or she must have central obesity assessed by waist circumference[17]. Since there are some ethnic or country-specific differences in cutoff points of waist circumference, ethnic and country-specific cutoff points have been separately established in the IDF definition on the basis of results of various epidemiological studies.South asian cutoff points have also been independently established in the IDF definition (waist circumference ≥90 cm for men and ≥80 cm for women)..Controversy remains regarding the cutoff points for waist circumference that should be used in clinical practice. The influence of abdominal fatness on health risks such as risk of type 2 diabetes is a continuous one, and any cutoff point is therefore arbitrary[20]. Further epidemiological data must be obtained in each country to determine the appropriate country-specific cutoff points for assessing the risk of type 2 diabetes.

CONCLUSION

The study suggested that the current cutoff points of waist circumference in the IDF definition are useful for assessing the risk of type 2 diabetes and that central obesity may be more useful than overall obesity for evaluating the risk of type 2 diabetes.

REFERENCES

1. DeFronzo RA, Ferrannini E. Insulin resistance: a multifaceted syndrome responsible for NIDDM, obesity, hypertension, dyslipidemia, and

atherosclerotic cardiovascular disease. Diabetes Care 1991; 14: 173–194.
2. Haffner SM. Insulin resistance, inflammation, and the prediabetic state. Am J Cardiol 2003; 92: 18J–26J.
3. Okosun IS, Dever GE. Abdominal obesity and ethnic differences in diabetes awareness, treatment, and glycemic control. Obes Res 2002;10: 1241–1250.
4. Okosun IS, Chandra KM, Choi S, Christman J, Dever GE, Prewitt TE. Hypertension and type 2 diabetes comorbidity in adults in the United States: risk of overall and regional adiposity Obes Res 2001; 9: 1–9.
5. Haffner SM, Lehto S, Ronnemaa T, Pyorala K, Laakso M. Mortality from coronary heart disease in subjects with type 2 diabetes and in nondiabetic subjects with and without prior myocardial infarction. N Engl J Med 1998; 339: 229–234.
6. Unwin N, Shaw J, Zimmet P, Alberti KG. Impaired glucose tolerance and impaired fasting glycaemia: the current status on definition and intervention. Diabet Med 2002; 19: 708–723.
7. Ford ES, Giles WH, Mokdad AH. Increasing prevalence of the metabolic syndrome among US adults. Diabetes Care 2004; 27: 2444–2449.
8. Ford ES, Giles WH, Dietz WH. Prevalence of the metabolic syndrome among US adults: findings from the third National Health and Nutrition Examination Survey. JAMA 2002; 287: 356–359.
9. International Diabetes Federation: The IDF consensus worldwide definition of the metabolic syndrome [article online].. Accessed on 23 January 2006
10. Hoefle G, Saely CH, Aczel S, Benzer W, Marte T, Langer P, Drexel H. Impact of total and central obesity on vascular mortality in patients undergoing coronary angiography. Int J Obes (Lond) 2005; 29: 785–791.
11. Matsuzawa Y, Inoue S, Ikeda Y, Sakata T, Saitoh Y, Satoh Y, et al. The new diagnostic criteria of obesity (in Japanese). Journal of Japan Society for the Study of Obesity 2000;**6**:18–28.
12. Rankinen T, Kim SY, Perusse L, Despres JP, Bouchard C. The prediction of abdominal visceral fat level from body composition and anthropometry: ROC analysis. Int J Obes Relat Metab Disord 1999;23:801–809.
13. Taylor RW, Keil D, Gold EJ, Williams SM, Goulding A. Body mass index, waist girth, and waist-to-hip ratio as indexes of total and regional adiposity in women: evaluation using receiver operating characteristic curves. Am J Clin Nutr 1998;**67**:44 –49.
14. Wang Y, Rimm EB, Stampher MJ, Willet WC, Hu FB. Comparison of abdominal adiposity and overall obesity in predicting risk of type 2 diabetes among men. Am J Clin Nutr 2005;**81**:555 –563.
15. Wei M, Gaskill SP, Haffner SM, Stern MP. Waist circumference as the best predictor of noninsulin dependent diabetes mellitus (NIDDM) compared with body mass index, waist/hip ratio and other anthropometric measurements in Mexican Americans: a 7-year prospective study. Obes Res 1997;**5**:16 –23.
16. Ledoux M, Lambert J, Reeder BA, Despres JP. Correlation between cardiovascular disease risk factors and simple anthropometric measures: Canadian Heart Health Surveys Research Group. Can Med Assoc J 1997;**157(Suppl. 1)** : S46 –S53.
17. Reeder BA, Senthilselvan A, Despres JP, Angel A, Liu L, Wang H, et al. The association of cardiovascular disease risk factors with abdominal obesity in Canada: Canadian Heart Health Surveys Research Group. Can Med Assoc J 1997; **157(Suppl. 1)** : S39 –S45.
18. Mamtani MR, Kulkarni HR: Predictive performance of anthropometric indexes of central obesity for the risk of type 2 diabetes. Arch Med Res 2005;**36** :581 –589.
19. Yusuf S, Hawken S, Ounpuu S, Bautista L, Franzosi MG, Commerford P, et al. The INTERHEART Study Investigators: Obesity and the risk of myocardial infarction in 27000 participants from 52 countries: a case-control study. Lancet 2005;**366** : 1640 –1649.
20. Stevens J, Couper D, Pankow J, Folsom AR, Duncan BB, Nieto FJ, et al. Sensitivity and specificity of anthropometrics for the prediction on diabetes in a biracial cohort. Obes Res 2001; **9**:696 –705.

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