Obesity and Abdominal Adiposity in Diabetic Dyslipidemia

Manisha Sankhla · Keerti Mathur ·
Jai Singh Rathor · Sushila Gahlot · R. P. Agrawal

Received: 25 January 2011 / Accepted: 31 July 2011 / Published online: 13 September 2011
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Sir,

The prevalence of obesity is increasing in the developed industrialized world and even in the developing countries, at such a rapid pace that the WHO consultation on obesity designated it as the major unmet public health problem worldwide. The medical hazards of obesity are great and adverse effect of obesity do not spare any of the body systems and has been associated with increased risk of a large number of disorders including but not limited to diabetes and dyslipidemia [1].

Asian Indians are more susceptible to develop obesity, abdominal adiposity and insulin resistance which might account for the excessive morbidity and mortality from diabetes in this population [2]. However, the data in this field are scanty and this study was therefore designed to evaluate the association of obesity and abdominal adiposity with diabetes and diabetic dyslipidemia.

A total 171 confirmed patients of diabetes mellitus were recruited from the outpatients and diabetic clinic of PBM Hospital, Bikaner. Body mass index (BMI) and Waist-hip ratio (WHR) were taken as a measure of generalized obesity and abdominal adiposity. Out of 171 patients, when

assessed for generalized obesity as per the National Institutes of Health (NIH) classification, 6 were found to be underweight, 68 normal-weight, 58 overweight, 30 obese class-I and 09 obese class-II. However, abdominal adiposity assessed by using WHR as recommended by WHO 1998, 38 were found to be normal WHR and 133 had abdominal adiposity. Clinical examination and a detail history of each patient regarding the age, sex, year of diagnosis of diabetes, age of onset and duration of diabetes, family history was recorded. Subjects with history of respiratory disorders, renal disease, hypertension, coronary artery disease, smokers and alcoholics were excluded from the study. Blood sample of each patient was analysed for Fasting blood sugar (FBS) and lipid profile parameters using standard commercially available enzymatic kits. Glycosylated hemoglobin (HbA_{1c}) was estimated using “Ion exchange resin method.” Diabetes was diagnosed based on revised ADA criteria and for lipid profile, NCEP (National Cholesterol Education Program) was used.

Results of the study are presented in Tables 1 and 2. Data were analysed using Student’s *t*-test for comparison of means. Pearson correlation coefficients and multiple logistic regression analysis were carried out using SPSS software (Version 10.0.1).

As evident from the table the risk of diabetes is greater in overweight/obese and patients having abdominal adiposity, but on multiple logistic regression analysis BMI turned out to be a stronger predictor of FBS and HbA_{1c} as compared to WHR.

Further, overweight subjects had significantly higher mean value of fasting blood sugar and glycosylated hemoglobin which indicate that the risk of diabetes starts at lower BMI. Previous studies [3–6] have also reported that Indians had a high prevalence of type-2 diabetes even at a low BMI. It appears that besides environmental and life

M. Sankhla · K. Mathur (✉)
Department of Physiology, S.M.S Medical College, Jaipur,
Rajasthan, India
e-mail: keertimathur@yahoo.com

J. S. Rathor
Fortis Escorts Hospital, Jaipur, India

S. Gahlot
Retired Sardar Patel Medical College, Bikaner, India

R. P. Agrawal
Sardar Patel Medical College, Bikaner, India

Table 1 BMI and its relation with putative risk factors of diabetes mellitus

Parameter	Odd's ratio (OR)	Confidence interval (CI)
Glycosylated Hb (%)	6.40 ^{††}	2.52–16.25
Fasting blood sugar (mg/dl)	8.30 ^{††}	2.97–23.15
Total cholesterol (mg/dl)	1.46	0.78–2.74
LDL-cholesterol (mg/dl)	1.61	0.87–2.97
HDL-cholesterol (mg/dl)	1.47	0.38–5.67
Triglyceride (mg/dl)	1.45	0.79–2.66

Multiple logistic regression analysis

^{††} $P \leq 0.001$

habit risk factors, a higher genetic susceptibility in Indian population leads to low thresholds for the acquired diabetogenic factor.

Further, multiple logistic regression analysis revealed that BMI is a stronger predictor of FBS and HbA_{1c} as compared to WHR. The relevance of BMI versus abdominal adiposity to the development of diabetes in Indian population is a matter of scrutiny and debate. Certain studies have observed that central obesity as measured by WHR is associated with hyperglycemia [2]. Still there are studies [7] which could not associate hyperglycemia with either BMI or WHR. Thus, with such compelling evidences in the literature, it becomes imperative to reexamine the relevance of BMI versus abdominal adiposity in predisposition to diabetes in Indian population.

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Table 2 WHR and its relation with putative risk factors of diabetes mellitus

Parameter	Odd's ratio (OR)	Confidence interval (CI)
Glycosylated Hb (%)	2.45	0.89–6.76
Fasting blood sugar (mg/dl)	3.38 [†]	1.43–7.99
Total cholesterol (mg/dl)	1.33	0.64–2.78
LDL-cholesterol (mg/dl)	1.00	0.48–2.01
HDL-cholesterol (mg/dl)	1.81	0.43–7.62
Triglyceride (mg/dl)	2.29 [†]	1.09–4.81

Multiple logistic regression analysis

[†] $P < 0.05$

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