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Celebrating the 80th birthday of
Professor Dr. Habil Josef Glinka, SVD

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Department of Anthropology
Faculty of Social and Political Sciences
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The Relationship Between Waist Circumference and Diabetes Mellitus Type 2 In The Installation Outpatient A.Wahab.Sjahran Hospital Samarinda

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Abstract

Waist circumference can be used as an indicator of abdominal obesity, whereas abdominal obesity will be followed by an increase of body mass index (BMI). Both of these can cause disruption of insulin sensitivity which can lead to diabetes mellitus type 2. This research aims to know the influence of waist circumference to diabetes mellitus type 2. The sampling was carried out in clinical interna of A.Wahab.Sjahranie hospital. The method used was analytic crossectional study by comparing patients with diabetes mellitus type 2 and without diabetes mellitus type 2. The data analysis used bivariat analysis, and tested by chi-square test. The result of this research showed a significant relationship between waist circumference which is more than 80 cm in female and more than 90 cm in male with incidence of diabetes mellitus type 2. Conclusion : waist circumference can affect the incidence of diabetes mellitus type 2.

Keywords : waist circumference, diabetes mellitus, abdominal obesity

Introduction

Obesity has become a major worldwide epidemic affecting more than 300 million people. It is an important risk factor for diabetes mellitus, type 2, a chronic disorder of carbohydrate, fat, and protein metabolism. From the clinical perspective, visceral adipose tissue is known to generate diabetogenic substances (De Fronzo, 2004) and, as such, may be Clinical evidence suggests that the association of diabetes with central obesity is stronger than the association with general fat. Studies using computed tomodraphy and magnetic resonance imaging have provided further evidence to support that central obesity, visceral adipose tissue, and upper-body nonvisceral fat are the major contributors to the metabolic complications (Despres JP, Moorjani S, Lupien PJ, 1998). Central obesity has been associated with decreased glucose tolerance, alterations in muscle insulin homeostasis, reduced metabolic clearance of insulin, and decreased insulin-stimulated glucose disposal. In addition, studies that have analyzed the association of anthropometric measures and abdominal visceral fat have found waist circumference to be a better measure of central obesity because it is a better predictor of abdominal visceral fat obtained with computed tomography than the waist/hip ratio, so that it can be easily measured and interpreted (Molarius A, Seidell JC., 1998; Rankinen T, Kim SY, Perusse L, et al., 1999; Hill JO, Sidney S, Lewis CE, et al., 1999). However, waist circumference cannot distinguish abdominal subcutaneous fat, total abdominal fat, and total body fat, and it is strongly correlated with body mass index. Body mass index has been shown to be a good indicator of general fat (fat areas in the arm, thigh, and waist using computed tomodraphy scans), muscularity (muscle area
in the thigh), and frame size (bone area in thighs) (Seidell JC, Bjorntorp P, Sjostrom L, et al., 1989).

As expected, epidemiologic studies have demonstrated that these three obesity indicators are strong and consistent predictors of diabetes mellitus, type 2. However, despite the clear, clinical difference between visceral and other forms of fat, little epidemiologic difference would be expected in the relations of diabetes with body mass index versus waist circumference (Ford ES, Mokdad AH, Giles WH., 2003). Several studies have shown that waist circumference is a better predictor of diabetes mellitus, type 2, than body mass index, but these findings are inconclusive (Wei M, Gaskill SP, Haffner SM, et al., 1997; Stevens J, Couper D, Pankow J, et al., 2001). While other studies provide evidence that waist/hip ratio has less influence towards body mass index (Ohlson LO, Larsson B, Bjorntorp P, et al., 1988; Cassano PA, Rosner B, Vokonas PS, et al., 1992). In addition, the ability of these obesity indicators to predict diabetes may differ by ethnicity, age, and sex (Resnick HE, Halter JB, Valsania P, et al., 1998; Haffner SM, Mitchell BD, Hazuda HP, et al., 1991). For example, among Asian populations, central obesity has become a more consistent predictor of diabetes than total obesity (Cassano PA, Rosner B, Vokonas PS, et al., 1992; Boyko EJ, Fujimoto WY, Leonetti DL, et al., Visceral adiposity and risk of type 2 diabetes: a prospective study among Japanese Americans. Diabetes Care 2000), while general obesity has become a better predictor among White US populations and Europeans (Chan JM, Rimm EB, Colditz CA, et al., 1994; Spiegelman D, Israel RG, Bouchard C, et al., 1992).

To study the magnitude of the association among different obesity indicators in multiethnic populations comprising studies worldwide, we performed a analysis of published studies that reported the association between obesity and incident diabetes in certain area. This study aims to know the relationship of waist circumference of male and female diabetes and the non diabetes ones in a certain area (A.Wahab.Sjahranie hospital).

Material and Methods

Methods
We studied male and female aged 30–80 years, who participated in the Data from an Epidemiological Study in clinical interna of A.Wahab.Sjahranie hospital. All participants signed an informed consent, and the protocol was approved by an ethics committee. The samples were taken from the patients who came to the clinical interna of A.Wahab.Sjahranie hospital from January to July 2011. Every patient was measured the waist circumference and weight, so the total samples were 207 male and 178 female. The categories of obesity in this study are: both male diabetes and non diabetes have waist circumference more than 90 cm. Both female diabetes and non diabetes have waist circumference more than 80 cm.

Measurement technique
Waist Circumference (WC) is actually a perimeter, which provides an estimate of body girth at the level of the abdomen. Different anatomic landmarks have been used to determine the exact location for measuring WC in different clinical studies, including 1) midpoint between the lowest rib and the iliac crest; 2) the umbilicus; 3) narrowest (minimum) or widest (maximum) WC; 4) just below the lowest rib; and 5) just above the iliac crest. The specific site used to measure WC influences the absolute WC value that is obtained (Goodman-Gruen D, Barrett-Connor E, 1996).

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Discussion

The relationship of waist circumference with incident diabetes was confirmed in our study by a significant value p = 0.000. There is a relationship between waist circumference with incident of diabetes mellitus type 2. This research showed a significant result for men whose waist circumference more than 90 cm and women whose waist circumference more than 80 cm with an incident of diabetes mellitus type 2.

Ford et al. (2003), support the use of waist circumference as a measure of obesity to predict health risk. Among their arguments are that waist circumference has been shown to be a good or better predictor than body mass index of the metabolic syndrome, diabetes, cardiovascular disease, and all-cause of mortality due to the metabolic syndrome; it provides information about health risk as well as body mass index; and it is conceptually easy to measure, although it does require some training and standardization. However, based on the result of the study, it is reasonable that waist circumference it used as an indicator of risk for cardiovascular disease and diabetes mellitus type 2 (Molarius A, Seidell JC, 1998; Seidell JC, Bjornorp P, Sjostrom L, et al., 1989; Janssen I, Heymsfield SB, Allison DB, et al., 2002). Some counterarguments states that waist circumference is strongly correlated to body mass index (Ford et al., 2003; Wei M, Gaskill SP, Haffner SM, et al., 1997; CODA Study group, 2004); waist circumference can not differentiate between subcutaneous fat and visceral fat; it has not shown a consistent relationship between waist circumference with visceral fat based on age and body mass index; and body fat distribution which may be different across racial, sex, and age (Molarius A, Seidell JC, 1998; Hill JO, Sidney S, Lewis CE, et al. 1999; Janssen I, Heymsfield SB, Allison DB, et al., 2002; Molarius A, Seidell JC, Sans S, et al., 1993; Duncan BB, Chambless LE, Schmidt MI, et al., 1995) strata.

Other indicators have been suggested to describe fat distribution associated with abdominal obesity (Molarius A, Seidell JC., 1998). For example, the subscapular/triceps skinfold ratio has been used to describe central versus peripheral obesity. The waist/hip ratio and the waist/thigh ratio have been used to identify upper versus lower body obesity. In addition, other indicator, such as waist/height ratio, conicity index, and abdominal to mid-thigh girth, have been developed on the basis of a variety of criteria. However, ratios are more difficult to interpret biologically, are less sensitive to weight gain, and have statistical limitations (Allison DB, Paultre F, Goran MI, et al., 1995). Because relatively few studies have considered these indicators, we did not include them in our meta-analysis. However, some have argued against the use of waist/hip ratio as a measure of obesity because of its ambiguous biologic interpretation, its lesser sensitivity to weight gain, its greater variability across age, sex, and ethnic groups, and its greater computational complexity and interpretation in a public health context (Molarius A, Seidell JC., 1998).

Stevens et al. (2001), found that waist circumference had better discriminatory performance for diabetes than did body mass index or waist/hip ratio.

When comparing differences between obesity indicators across study-level characteristics, we found that the present analysis had several limitations included comparisons of waist circumference. Sparseness of studies in each category did not allow us to further analyze the heterogeneity with a multivariable approach. Additional heterogeneity may be derived from diversity of design features, clinical characteristics, and model assumptions.

Conclusions

In conclusion, there is a relationship between waist circumference with incident of diabetes mellitus type 2. This research showed a significant result for men whose waist circumference more than 90 cm and women whose waist circumference more than 80 cm with an incident of diabetes mellitus type 2. Although the clinical use of the waist circumference measurement of visceral fat is undeniable, the statistical reality is that waist circumference and body mass index are very highly correlated and likely to happen similarly in diabetes prediction. Waist circumference, appears to have the same ability to predict diabetes as well as body mass index.

References


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