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Review

A Community-based Picture of Type 2 Diabetes Mellitus in Vietnam

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There has been a significant increase in the prevalence of type 2 diabetes mellitus (T2DM) in Vietnam. We found that Vietnamese with T2DM had a normal body mass index (BMI), but high levels of total body fat and abdominal fat. Based on published reports together with our own findings, we believe that a sedentary lifestyle and an abundance of starchy foods and also Western style energy-rich foods are factors associated with disease. The staple food of the Vietnamese is still polished-rice which has high glycemic index values. In addition, a Westernized diet, and the chronic consumption of high-glycemic index foods together with a sedentary lifestyle result in insulin resistance and diabetes. The average BMI of T2DM patients is ≤ 23 kg/m², greater than that 20 years ago. In addition,these patients have high levels of body fat, especially abdominal fat, measured as the waist to hip ratio (WHR ≥ 0.90). We therefore, tentatively suggest a BMI of 23 kg/m² together with a WHR of 0.90 for males and 0.85 for females as new cutoff values for the risk of T2DM in Vietnamese. These findings have important implications for primary prevention because they indicate that screening and intervention should focus on high-risk populations. *J Atheroscler Thromb, 2006; 13: 16–20.*

Key words: Type 2 diabetes, Prevalence, BMI cut-off, Percent body fat, Vietnamese

Introduction

Type 2 diabetes mellitus (T2DM) is one of the major non-communicable diseases in the world. The incidence and prevalence of diabetes are increasing not only in industrialized countries but also in developing and newly industrialized countries. According to the World Health Organization (WHO), the number of cases of diabetes will rise to 366 million by the year 2030, more than 270 million of which will occur in developing countries (1). The increase is primarily the result of lifestyle changes known as the "Nutrition Transition," characterized by over-consumption of food, increased consumption of total fat, animal fat, and protein, and decreased physical activity (2). The relationship between T2DM and dietary intake and physical activity has been examined in several recent studies (3, 4). However, the features of diabetes were characterized in each country (5). The purpose of this review was to highlight some of the characteristics of T2DM in Vietnam.

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The increase in prevalence of diabetes: a significant health problem

During the two last decades, socioeconomic conditions and lifestyle have changed profoundly in Vietnam. These changes have had marked effects on disease patterns in the population. The prevalence of non-communicable chronic diseases such as obesity, hypertension and cardiovascular diseases has been increasing (6, 7). The prevalence of diabetes has also been significantly increasing. In 2001, the results of a study conducted in adults in Ho Chi Minh City, southern Vietnam, indicated that the prevalence of diabetes was approximately 2.5

times higher (6.9%) than that recorded 8 years ago (2.5%) (8). Recently, Binh TV *et al.* published a report showing that the prevalence of diabetes in adults in Hanoi City, northern Vietnam, has increased remarkably from 1.2% to 5.8% (9). In addition, a study on middle age Vietnamese indicated that the proportion with high blood glucose levels had increased from 1.6% in 1997 to 6.1% in 2003 (10, 11). Although the prevalence of diabetes in Vietnam is still not very high, the rate of increase is higher than in countries such as China (12), Singapore (13) and the United States (14). These trends suggest that diabetes will be a major health problem in Vietnam.

Anthropometric characteristics and dietary habits of Vietnamese in relation to diabetes

Obesity is so far the most important risk factor for T2DM. Furthermore, its relationship with the disease was confirmed by intervention studies (15, 16). The degree of obesity and the distribution of body fat are very important in the development of diabetes. The distribution of body fat can be evaluated from anthropometric measurements such as height and weight for body mass index (BMI); waist, hip circumference or using bioelectrical impedance (BIA), dual-energy X-ray absorptiometry (DEXA), computerized tomography (CT), etc.

In the early 1990's, studies on diabetes in Vietnam indicated that most diabetic patients had a normal or low BMI (17, 18). The same findings were found in studies conducted from 1995 to 1999. According to a study on 241 hospitalized diabetic patients, the mean BMI of type 2 diabetic patients was 22.3 ± 5.0 kg/m^2 (males) and 21.1 ± 4.5 kg/m^2 (females) (19). Another study on 504 type 2 diabetic patients found that their BMI was in the normal range (22.6 ± 3.5 kg/m^2 for males and 22.7 ± 3.9 kg/m^2 for females) but waist-hip ratio (WHR) was high (0.96 ± 0.07 for males and 0.94 ± 0.08 for females) (20). A low BMI (20.5 ± 0.3) but high WHR (0.88 ± 0.05) in insulin-resistant individuals was also reported in study of Minh HV (21).

One report on middle-aged women in northern Vietnam found that subjects with high plasma glucose levels had a normal to low BMI but high WHR (10). Since 2000, the socio-economy has undergone rapid changes. The quality of life has improved. The mean BMI of Vietnamese which was constant from1985 to 1997 (22, 23), increased from 18.6 kg/m^2 to 20.3 kg/m^2 for males and from 20 kg/m^2 to 20.5 kg/m^2 for females (24). However, the BMI of diabetic patients was normal range based on WHO criteria. Our study (8) indicated that the mean BMI of patients with diabetes was 22.7 ± 3.8 kg/m^2 for males and 23.3 ± 4.1 kg/m^2 for females and WHR was 0.90 ± 0.07 in both genders; it also described an association between obesity, a high WHR and an increase in the prevalence of diabetes. The same findings of a normal BMI and high WHR in Vietnamese diabetics were confirmed in two articles (9, 11). In addition, percent body fat (BF%) was mentioned as a factor associated with diabetes. Tomisaka *et al.*, found that BF% was associated with the development of diabetes and Vietnamese had a higher percent age of body fat than Japanese (25). In 2001, a case-control study on newly diagnosed cases of diabetes using BIA to determine percent body fat, indicated that Vietnamese with type 2 diabetes had a normal BMI but high percent body fat (26). Additional studies indicated that abdominal fat and percent body fat are increasing in Vietnamese, especially in females (10, 11, 27). It is widely accepted that abdominal fat and total body fat are closely associated with insulin resistance. In addition, a role for insulin resistance in the pathogenesis of T2DM was well illustrated. Thereby, it might contribute to the increase in the prevalence of diabetes in Vietnam.

Furthermore, a lack of adaptation to dietary and lifestyle changes may be another possible explanation. In previous decades, the Vietnamese have spent long periods of time without enough food, and their bodies had to adjust to difficult conditions (especially from 1975 to 1985). As mentioned above, with the increase in development and industrialization in Vietnam from the 1990's, socio-economic conditions have improved. As a consequence, a shift from a traditional lifestyle (high levels of occupational and leisure time, lower fat meals) to a more Westernized one is taking place. According to a national general nutrition survey (23), protein and fat intake in Vietnamese increased remarkably (52.4 g vs. 62.0 g and 12.8 v.s 24.9 g, respectively) from 1985 to 2000. Increases in protein and fat intake and consumption of red meat were also observed in a case-control study (28). Interestingly, the traditional meal of Vietnamese, characterized by consumption of huge amounts of rice, coexists with a westernized diet. Although the consumption of rice is decreasing due to westernization (457 g/capita/day in 1985 vs. 452 g/capita/day in 1990 vs. 397 g/capita/day in 2000) (24), rice is still the staple food and provides more than 50% of daily energy intake. However, Vietnamese rice has high glycemic index values (GI: 86–109) (29). It is well recognized that the chronic consumption of high-GI foods which result in recurring, large postprandial fluctuations in blood glucose and insulin levels, can worsen insulin resistance in susceptible populations (30).

What is the cut-off value of BMI for observe risk in Vietnamese?

Body mass index cut-off values have been used internationally to classify overweight and obesity. The relationship between BMI and risk of comorbidities was well demonstrated (31). Recently, there is more and more evidence of a high prevalence of diabetes and coronary artery diseases emerging in Asian populations where the average BMI is lower than the WHO BMI cut-off for being overweight (32–34). In addition, the association be-

tween BMI, BF% and body fat distribution differ across populations. According to previous studies, Asians have a lower BMI but higher BF% than age-matched Caucasians (35–38). This strongly corroborates the need for specific cutoffs of BMI and abdominal fat for Asian populations. According to WHO, the BMI cut-off point for observed risk in different Asian populations varies from 22 kg/m^2 to 25 kg/m^2; for high risk it varies from 26 kg/m^2 to 31 kg/m^2. Lowering cut-off values (by three units) seems appropriate for Hong Kong Chinese, Indonesians and Singaporeans (39). Snehalatha *et al.* (40) gave a cutoff value for a normal BMI for Indian men and women of 23 kg/m^2. Wildman RP *et al.* also suggested that a BMI value of 24 and a waist circumference value of 80 in both genders were appropriate for use in the identification of high-risk Chinese patients (41). In addition, a BMI cut-off of 22–24 and waist circumference cutoff of 75–80 cm for women and 80–85 cm for men were suggested for being overweight and having central adiposity in Asian populations (32–34, 42–44).

Regarding the data on Vietnamese, the same phenomenon was observed: the mean BMI of Vietnamese type 2 diabetic patients was normal (22–23 kg/m^2), but percent body fat and abdominal fat, measured as WHR was high (19, 20, 26). The mean WHR of diabetic patients in those studies ranged 0.90–0.96. Furthermore, according to findings, newly diagnosed cases of diabetes had normal BMI (23.5 kg/m^2 for males and 21.9 kg/m^2 for females) but high WHR (0.93 for males and 0.90 for females) (28). Similar values were seen in the impaired fasting glucose (high risk group) (8). In addition, a normal BMI but high percent body fat and abdominal fat were also found in Vietnamese who suffered from metabolic syndrome (45).Using findings on Vietnamese and the WHO definition of central obesity (31), we tentatively suggest a BMI of 23 for both genders together with a WHR of 0.90 for males and 0.85 for females as the appropriate cutoffs for the risk of T2DM in Vietnamese. These cutoffs need to be re-evaluated based on the relative risk of other obesity-related diseases and their sensitivity and specificity.

Conclusion

The remarkable increase in the prevalence of diabetes has become a priority health problem in Vietnam. Understanding the characteristics and suggesting new cutoffs for BMI (23 kg/m^2 for both genders) together with WHR (0.90 for males and 0.85 for females) for T2DM will help in establishing a screening and intervention program in Vietnam.

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