Vietnamese may develop type 2 diabetes with smaller increases in body mass index and waist circumference than Taiwanese

Abstract

Background: Obesity is associated with development of diabetes. However, it seems that the level of obesity in association with diabetes may differ from country to country.

Aim: To compare BMI and waist circumference in diabetic patients between Vietnamese and Taiwanese.

Methods: Subjects were found to be diabetes mellitus by the health examination and had not treatment before. They were 163 Vietnamese and 298 Taiwanese. Body weight, height and waist circumference were measured.

Results: Compared with Taiwanese, the Vietnamese diabetes had significantly lower in BMI (23.1±4.1 vs. 25.9±3.4 kg/m², p< 0.001), and waist circumference (82.2±10.2 vs. 86.8±9.4 cm, p<0.001; respectively).

Conclusion: Vietnamese people may develop diabetes at smaller increase of BMI and waist circumference than the increase in these indices to induce diabetes in Taiwanese, thus indicating that the factors of Type 2 DM in Vietnam such as BMI, genetic, dietary and lifestyle which have inter-correlate complexity. It requires further investigations.

Introduction

The incidence and prevalence of type 2 diabetes have been increasing in both countries [4,5]. Generally, the increase is primarily the result of lifestyle changes known as the “Nutri-tion Transition,” characterized by over-consumption of food, increased consumption of total fat (lipids), protein, and lack of physical activity [6]. The association of overweight (defined by body mass index, BMI) and type 2 diabetes has been well-documented [7,8,6]. In addition, accumulation of abdominal fat (measured by bioimpedance analyzer (BIA) or CT scan, DEXA scan) and abdominal fat (measured by waist-circumference, waist-to-hip ratio (WHR), MRI, CT scan) are also considered as risk factors for insulin resistance, [9], pathophysiological factors for chronic lifestyle related diseases [10]. According to previous studies, with the same BMI level, the Asias have higher BF% compared to age and gender matched Caucasians [11].

It strongly corroborates the need for specific cutoffs of BMI and abdominal fat for Asian population. The lower cut point values for BMI to define overweight and obesity and lower waist circumference value to define abdominal obesity have been proposed for Asian population [12]. Studies in Indians suggested that BMI of 23 (for both genders) and waist circumference of 87 cm (for men) and 82 cm (for women) were optimal cut point for identifying cardiometabolic risks (includes diabetes, pre-diabetes) [13]. Wildman RP et al. also suggested that 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 [14]. In addition, the BMI cut-off of 22-24 and waist circumference cutoff near 75-80 cm for women and 80-85 cm for men were suggested for overweight and central adiposity in Asian population [15,16,17]. In Vietnam, the BMI of both undiagnosed and diagnosed diabetes were 23kg/m² or lower [18]. Both the genetic and dietary factors which affect on these values of diabetes, are differ-
The prevalence of diabetes has been increasing rap-idly and con-
stitutes a significant public health problem and priority. Under-
standing the characteristics of dia-betes is essential for developing
programs to prevent and control this disease. In the current study,
we found that although in the same Asian population, the BMI of
untreated dia-betic pa-tients (including both diagnosed and undiagnosed) be-
tween Taiwanese and Vietnamese.

Materials and Methods

Subjects

In both countries, subjects were found to be diabetes mellitus by
the health examination and had not treat-ment before. Totally, 163 Vietnamese and 298 Taiwan-ese were invited to participate
in this study.

This study was approved by the Research and Ethnical Review
Board of the Health Service of Ho Chi Minh City and also by the
MJ Research Foundation Review Committee in Taiwan. A written
informed consent was obtained from all participants. The diabetic
patients will be referred to family physicians or endocrinolo-gists
for receiving appropriate treatment after being enrolled into this
study.

Anthropometric measurements

Body weight, height, waist and hip circumferences, and percent
body fat were measured with the participant in the standing posi-
tion wearing light clothing and no shoes. Body weight was deter-
mined using a digital scale Tanita 1609 (Tanita, Tokyo, Japan) to
the nearest 0.1 kg. Height was measured with a portable Seca sta-
diometer 208 (Vogel & Halke, Hamburg, Germany) to the near-
est 0.1 cm. Body mass index (BMI) was computed as the ratio
of weight (kg) per height squared (m2). Waist circumference was
measured at the minimum circum-ference between the umbilicus
and iliac crest.

The classification of diabetes and was carried out ac-cording to
WHO criteria [19].

Statistical analysis

Data were presented as mean and standard deviation. The inde-
pendent sample unpaired t-test was used to compare means and
test for significant differences in anthropometric. General linear
model adjusted for family age and gender was used to compare
the differ-ence in anthropometric parameters in diabetic subjects
between the Vietnamese and Taiwanese. A p-value < 0.05 was
considered as statistical significance. Statisti-cal analyses were per-
formed using SPSS for windows 10.0 (SPSS, Chicago, IL).

Results

The anthropometric parameters are shown in Table 1. As com-
pared with Taiwanese, the Vietnamese dia-betes are shorter (159.8
± 7.8 vs. 152.6 ± 6.5 cm, p< 0.001),lower in BMI (23.1±4.1 vs.
25.9 ± 3.4 kg/m2, p< 0.001), and waist circumference (82.2 ±
10.2 vs. 86.8± 9.4 cm, p< 0.001; respectively). These differ-ences
are still significant after adjustment for age and gender (Table 1).

Discussion

The prevalence of diabetes has been increasing rap-idly and con-
stitutes a significant public health problem and priority. Under-
standing the characteristics of dia-betes is essential for developing
programs to prevent and control this disease. In the current study,
we found that although in the same Asian population, the BMI of
Taiwanese with diabetes are shorter (159.8
± 7.8 vs. 152.6 ± 6.5 cm, p< 0.001), lower in BMI (23.1±4.1 vs.
25.9 ± 3.4 kg/m2, p< 0.001), and waist circumference (82.2 ±
10.2 vs. 86.8± 9.4 cm, p< 0.001; respectively). These differ-ences
are still significant after adjustment for age and gender (Table 1).

Table 1: The anthropometric parameters of study population

| Variables     | Vietnamese | Taiwanese | p1 | p2 | p3 | p4 |
|---------------|------------|-----------|----|----|----|----|
| AGE (yrs)     | Mean | SD  | Mean | SD  | Mean | SD | Mean | SD | Mean | SD | p1 | p2 | p3 | p4 |
|---------------|------|-----|------|-----|------|----|------|----|------|----|----|----|----|----|
|               | 62.1 | 0.1 | 63.1 | 0.7 | 61.7 | 0.7 | 63.8 | 0.1 | 58.1 | 0.7 | 7.9 | < 0.01 | < 0.001 | < 0.001 |
| HEIGHT (cm)   | 152.6 | 5.5 | 160.1 | 5.3 | 150.9 | 5.4 | 159.8 | 7.8 | 165.5 | 5.6 | 5.6 | < 0.01 | < 0.001 | < 0.001 |
| WEIGHT (kg)   | 53.9 | 10.7 | 57.9 | 9.6 | 53.1 | 10.7 | 66.2 | 10.4 | 70.4 | 9.6 | 62.1 | 0.6 | < 0.001 | < 0.001 | < 0.001 |
| WAIST (cm)    | 23.1 | 4.1 | 22.5 | 3.5 | 23.2 | 4.1 | 25.9 | 3.4 | 25.6 | 3.2 | 26.1 | 3.6 | < 0.001 | < 0.001 | < 0.001 |
|               | 82.2 | 10.2 | 82.8 | 10.8 | 82.1 | 10.1 | 86.8 | 9.4 | 89.8 | 8.8 | 83.8 | 7.1 | < 0.001 | NS | < 0.001 | < 0.001 |

P1: comparison performed between male subjects only P2: comparison performed between female subjects only
p3: comparison performed on total population between 2 nations without any adjustment
p4: comparison performed on total population between 2 nations after adjustment for age, gender

In Taiwan, according to Tu YK et, al., the BMI and waist cir-
cumference of healthy subjects have been con-stant for ten years
(1996 – 2006) and the average BMI and waist circumference are
24kg/m2 for male and 22kg/m2 for female. While, the waist cir-
cumference in female subject has been constant (70.2 vs. 70.4cm).
this index has increased by 2cm (from 80 to 82cm) in male sub-
jects [23]. The results of this study show that the BMI and waist circumference of Taiwanese with type 2 diabetes were greater ap-
proximately 1.5kg/m2 (25.6 vs. 24.1 kg/m2) in male and 4.5 kg/
m2 (26.1 vs. 21.5 kg/m2) in female subjects (for BMI); and 7cm
(89.8 vs. 82.4cm) in male and 14cm in (83.8 vs. 70.4cm) fe-male
subjects (for waist circumference) than those of healthy subjects.

Taking together, it is suggested that the Vietnamese people may
develop diabetes at small increase of BMI and waist circumference, while it requires more in-crease in these indices to induce diabetes in Taiwanese. Since the prevalence of diabetes in Vietnamese has rapidly increased in the last three decades, this finding is important point that needs to be paid more attention in the screening program for diabetes in Vietnam.

In order to early detection of diabetic patients, the screening program should include subjects with small increase in BMI and waist circumference even though their indices are in normal range. It suggests that there are other important factors other than BMI (obesity) and further investigation should conduct in the future.

The difference in genetic features between Taiwanese and Vietnamese may be contributed factors for development of diabetes with small increase of BMI and waist circumference in Vietnamese. Furthermore the lack of adaptation of dietary and lifestyle changes may be another explanation. During previous decades, the Vietnamese had spent a long period of time in lack of food, their body had to adjust with the difficult condition (especially from 1975-1985). As mentioned above, with the increasing development and industrialization in Vietnam from 1990’s, the socio-economy had ameliorated. As consequence, a shift of traditional lifestyle (high levels of occupational and leisure time, lower fat meals) to a more Westernized one is taking place. The consumptions of energy, animal protein and lipid have significantly increased [24]. In addition, the change in consumption of brown-rice to well-polished rice has also been observed. The relationship between consumption of well-polished rice (high glycemic index) and increase postprandial blood glucose in general Vietnamese was observed [25].

As mentioned previously, cut point values of BMI to define overweight (>23 kg/m²) and obesity (>25 kg/m²) and waist circumference (WC) to define abdominal obesity (>90 cm in men and >80 cm in women) have been proposed for Asians population [12]. However, the cutoffs for obesity indices for type 2DM risk factors may differ between different Asian ethnicities. A study in Thailand suggested that the optimal cutoffs for diabetes, hypertension and dyslipidemia for men and women, respectively, are 22–23 and 24–25 kg/m² for body mass index (BMI); 80–85 and 81–85 cm for waist circumference (WC); 0.89–0.91 and 0.85–0.88 for waist–hip ratio (WHR); [26]. For Hong Kong Chinese, optimal cutoffs are 23.4 kg/m² for BMI, and 78.2 cm for WC, in men; and 23.4 kg/m² for BMI, and 74.7 cm for WC in women [27]. Li et al. recommended a BMI cutoff at 24 kg/m² for both sexes and WC at 85cm for men and 80cm for women in a study of 13,817 adults living in Shanghai. Meta analysis of data from 13 population-based studies in China and Taiwan showed that a BMI of 24kg/m² had a sensitivity and specificity for identification of cardiovascular risk factors, and if this target is achieved it would prevent approximately 50% clustering of cardiovascular risk factor [28].

The present study indicates that in the same Asian pop-ulation, the influence of dietary intake, lifestyle may differ from one to another country in development of diabetes. For Vietnamese, the cut-off values of BMI and waist circumference should be re-considered (to be lower) in establishment an appropriate screening and control program for the disease including education on their dietary patterns such as healthy food; gradually replacing well-polished white rice to brown rice; and active lifestyle.

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