Short Communication

The High Prevalence of Overweight and Obesity in Patients with Diabetes Mellitus in Yazd

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Abstract

The prevalence of obesity and overweight in most population is increasing alarmingly. This rise is associated with economic development, increasing urbanization, change in dietary and other lifestyle patterns and also reduced physical activity. Last studies showed that type 2 diabetes incidence rise with increasing body mass index (BMI). This paper evaluated the prevalence of overweight and obesity among diabetic patients. A total of 518 consecutive central-based patients (198 males and 320 females) with type 2 diabetes (T2DM) were investigated in this prospective cross-sectional study. The overall prevalence of overweight and obesity (BMI>25 kg/m2) was 76%. The mean of BMI in women was 26.66 ± 3.98 and in men was 28.70 ± 4.36. The prevalence of overweight and obesity were 48% and 28%, respectively. This paper indicated a high prevalence of overweight and obesity in diabetic patients in Yazd (central province of Iran).

Introduction

There are well-defined biological and behavioral risk factors for type 2 diabetes mellitus (T2DM) , most of which are thought to operate through increasing insulin resistance. The most important of these are overweight and obesity, particularly abdominal obesity, and physical inactivity[1-3]. There are several highly successful studies that showing that prevention, or at least delaying the onset, of T2DM is possible. A combination of change in dietary and increased physical activity reduces 60% of incidence of T2DM in individuals at high risk[4]. Obesity has become a major cause of morbidity and mortality in the world and being overweight is the main modifiable risk factor for most important disease such as T2DM, hypertension, cardiovascular diseases, musculoskeletal and psychological disorders as well as several types of cancer[5]. Developing countries are increasingly vulnerable to the worldwide epidemic of obesity, which affects all segments of the population, including men, women and children[6,7] and its prevalence among Iranian children and adults increased in previous decade[8]. The purpose of this paper was to assess the prevalence of overweight and obesity among patients with diabetes mellitus.

Methods

This cross-sectional study was performed in the Yazd Diabetes research center. The local institutional research ethics committee approved the study protocol, and all the patients included in the study received both written and oral information concerning the study and signed a written informed consent. A total of 518 consecutive central-based patients with type 2 diabetes (T2DM) were investigated in this prospective cross-sectional study. Inclusion criteria were patients older than 30 years of age, with T2DM on oral antiglycemic or insulin therapy. Exclusion criteria were pregnancy or lactation, type 1 diabetes, gestational diabetes, newly discovered uncontrolled diabetes mellitus. Based on HbA1c levels, poor glycemic control was defined as HbA1c 7% (53 mmol/mol)[9]. There were about 25000 diabetic patients who were registered in the Yazd Diabetes research center. The systematic randomiza-

tion method was used. According with (estimating prevalence in a population) about 500 diabetic patients were selected. Statistical significance was accepted at the p<0.05 level and the accepted difference was 10%. Information concerning the age, gender, duration of diabetes, Glycosylated hemoglobin (HbA1c), previous history of stroke or myocardial infarction (MI) and cigarette smoking status was obtained from the patients 'medical records'. Blood pressure (BP) was measured by standard methods using a sphygmomanometer with the patient in a sitting position. Three measurements were made in all subjects at 5-minute intervals, and the average of the second and third measurements was used in the analysis. Hypertension was defined as a systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg or taking antihypertensive medications. Anthropometric measurements including weight and height measurements were obtained using standardized techniques. Height was measured in centimeters using a wall-mounted measuring tape to the nearest centimeter[10]. Subjects were requested to stand upright without shoes with their back against the wall, heels together and eyes directed forward. Weight was measured in kilograms using a digital scale that was kept on a firm horizontal surface[11]. Subjects were asked to wear light clothing and weight was recorded to the nearest 0.5 kg. Body mass index was calculated as weight in kilograms divided by height in meters squared (Kg/m^2). The guideline of the United States National Institute of Health (NIH) use the following BMI classification: BMI<18.5 kg/m^2, underweight; BMI 18.5 to 24.9 kg/m^2, normal weight; BMI 25.0-29.9 kg/m^2, overweight; BMI 30-34.9 kg/m^2, obesity class I; BMI 35-39.9 kg/m^2, obesity class II; and BMI ≥40.0 kg/m^2, obesity class III[12]. Data were analyzed using the SPSS version 20.0 for windows computer software package (SPSS Inc., Chicago, IL, USA). T-test and analysis of variance (ANOVA) were used in comparing the means. The chi square was used comparing the prevalence in different groups. Frequency, percent, mean and standard deviation were used for descriptive analysis. Statistical significance was accepted at the p < 0.05 level. Data are expressed as mean ± SD values when referred to in the text.

Results

Totally 518 patients with type 2 diabetes were included, 198 male (38%) and 320 female (62%). The age average was 59.82 ± 10.27 years. The mean age at onset was 36.12 + 15.41 years and the mean duration of diabetes was 12.22 ± 7.71 years. 45.3% of the patients were treated with insulin and 54.7% of them without insulin. In addition 9.7% of patients have macular edema and 66.1% of patients are hypertensive. According to the NIH recommendation, they were divided into six groups: group 1 (underweight; $n = 0$), group 2 (normal; $n = 124$), group 3 (overweight; $n = 249$), group 4 (obesity class I; $n = 108$), group 5 (obesity class II; n = 28) and group 6 (obesity class II; $n = 9$). The overall prevalence of overweight and obesity was present in 76%. The prevalence of normal weight was 24%, the prevalence of overweight and obesity was 48% and 28%, respectively. The prevalence of class I, class II, and class III obesity was 21%, 5.3%, and 1.7%, respectively as shown in Table 1.

Table1: Prevalence rate of overweight and obesity

category	BMI	Number of patients	%
Underweight	<18.5	0	0
Normal	18.5 - 24.9	124	24
Overweight	25- 29.9	249	48
Obese class I	30 – 34.9	108	21
Obese class II	35 – 39.9	28	5.3
Obese class III	40<	9	1.7

Abbreviations: BMI, body mass index.

There were no significant interaction between age with BMI (P=0.387) but There was a strong relationship between gender (P=0.000) and systolic blood hypertension (P=0.001) with BMI. However, there were no significant different in HbA1c between the five groups (P=0.58). It should be noted that none of these patients was underweight (BMI lower than 18.5). In addition, the correlation between insulin use and BMI was positive (P=0.049). The characteristics of the study population are shown in Table 2.

Table2: Baseline characteristics of study subjects by BMI category

Variables	Normal/ under- weight 124 (23.9%)	Over- weight 249 (48. 06%)	Obese Class I 08 (20.84)	Obese Class II 28 (5.4)	Ex- treme Obesity 9 (1.73)	P val- ue
Age, years	60.35 ±10.6	60.34 ±10.07	59.12 ±9.76	59.66 ±8.53	50.50 ±14.14	0.09
Gender Male Female	57.10% 42.90%	38.20% 61.80%	25.80% 74.20%	20% 80%	25% 75%	0
Systemic hyperten- sion, % No Yes	36.20% 63.80%	38.20% 61.80%	23.60% 76.40%	29.40% 70.60%	16.70% 83.30%	0.001
HbA1c level	8.11 ±1.61	8.42 ±1.64	8.45 ±1.34	8.55 ±1.26	8.59 ±1.39	0.58
Insulin therapy, % No Yes	62.70% 37.30%	56.20% 43.80%	42.10% 57.95	47.60% 52.40%	83.30% 16.70%	0.049

Data presented are means (SD) or percent (%), as appropriate.

Table 3 shows the mean of BMI in women was 26.66 (± 3.98) and in men was 28.70 (± 4.36). In addition, 9 patients (1.7%) were classified as obese of which seven were females and two were males. There was a significant statistical association between sex and BMI (P < 0.00). It should be noted that none of these patients was underweight (BMI lower than 18.5).

Table 3: Anthropometric characteristics of the respondents

Parameter	Male - mean (SD)	Female - mean (SD)
Weight (kg)	78.26 ± 13.68	70.18 ± 11.68
Height (m)	170.81 ± 6.87	155.90 ± 5.97
BMI (kg/m²)	26.66 ± 3.98	28.70 ± 4.36

Data presented are means (SD) as appropriate.
Abbreviations: BMI, body mass index

Discussion

Obesity and diabetes mellitus are become a major public health challenges all over the world. The link between the two conditions is important because obesity is the main modifiable risk factor for type II diabetes[13]. In this analytic cross sectional study of type 2 diabetic adult, we observed high prevalence of overweight and obesity and it is noticeable that in our study population there was not anyone with body mass index under 18.5. A recent review article report that the range of overweigh and obesity in Iranian adult was 27.0-38.5 and 12.6-25.9, respectively[14]. In further systematic review and meta-analysis found the prevalence of obesity among Iranian adults (≥18 years old) is 21.5 and report higher prevalence of overweight and obesity among women than men (27.3% compared to 13.7%)[15]. In an adult population study (>30 years old) in Yazd, the prevalence overweight and obesity was 29% and 9.5%, respectively. In our study up to Two-thirds (76%) of the total patients have BMI > 25 Kg/m². The overall prevalence of overweight and obesity was 48% and 28%, respectively. To compare with this, Butheinah et al showed that the among the diabetic patients, 58.5% had a BMI ≥ 25 Kg/m² and 28.8% were obese with BMI ≥ 30 Kg/m²[16]. A study by Janghorbani et. al., the prevalence of overweight (BMI > 25 Kg/m²) was 77.1% in female and 59.9% in male[17]. A recent study by Basukala et. al., reported that 37.5% and 14.4% of the diabetic patients are obese and overweight, respectively and showed that obesity was found more prevalent among women than men (25.7%, 5.5% respectively)[18]. Another population base study by Sharma et al in a study showed that 46.65% of the patients with type II diabetes were overweight and obese[19]. In our knowledge only one study present with slightly higher prevalence than our study that was reported 83% males and 86.8% female were obese[20]. As our result most of the study showed the higher frequency of overweight and obesity in diabetic women and also the obesity was more common between Iranian women compare to men[15].

Conclusion

On the basis of the above remarks, it was observed that there is a remarkable difference in the prevalence of overweight and obesity between general populations and diabetic patients in center of Iran that have high rates of DM. In addition, it seems that the correlation of genetics and environmental is cause of this high prevalence of obesity in our city. Furthermore, obesity was more prevalent among female than male.

Acknowledgment

Conflict of interest

The authors declare that they have no conflict of interest.

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