Prevalence of Obesity Among Diabetic Patients in Sabahia Area in Kuwait

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Abstract

Background and Objective: There is well known strong association between type 2 diabetes and obesity. Also obesity represent a major health problem worldwide and specially in Kuwait and gained a great interest in recent years from the different health authorities. The aim of this study was to find out the prevalence of obesity among patients with Diabetes Mellitus attending the primary health care center in El-Sabahia area.

Patients and Methods: Five hundred adult patient known to be diabetic either on oral hypoglycemic drugs or on Insulin therapy or both were included in the study. They were subjected to the following: Full history taking, full general and local examination of the heart, chest and abdomen, anthropometric measurements: Height, weight and waist and hip circumferences and Laboratory investigations including: Fasting and 2 hours post-prandial blood glucose (FBS) measurement, an oral glucose tolerance test (OGTT), blood pressure measurement, blood lipids tests and completing a questionnaire on socio-demographic and smoking information. Patients were classified according to the BMI as (underweight when BMI <18.5kg/m², normal weight when BMI ≥18.5 to 24.9kg/m², overweight when BMI ≥25.0 to 29.9kg/m², class I obesity when BMI = 30.0 to 34.9kg/m², class II obesity when BMI =35.0 to 39.9 kg/m², class III or morbid obesity when BMI ≥40kg/m². Waist circumference and Waist hip ratio were calculated.

Results: Results of the current study regarding the degree of obesity as determined by the body mass index was; 18 patients (3.6%) have normal weight, 54 patients (10.8%) were overweight, 137 patients (27.4%) had class I obesity, 169 patients (33.8%) had class II obesity and 122 patients (24.4%) had morbid obesity. The overall prevalence of obesity in our study population was 85.6%. The mean WHR was significantly higher among males than females (p<0.05) and the prevalence of central obesity among males was more than that in females. Also the mean WHR increased with advanced age but it showed non-significant decrease in the age group >65 years.

Conclusion: The prevalence of obesity among patients with Diabetes Mellitus in Sabahia Kuwait is very high and even higher than most studies. The Waist Hip ratio was found to be also significantly high among diabetic patients. Both sexes had a very high prevalence of obesity and males tended to be more obese than females. These alarming results necessitate rapid intervention for control of obesity especially among Kuwaiti diabetic patients in order to decrease the risk of cardiovascular disease and toward better control of diabetes.

Key Words: Obesity – Diabetic patients.

Introduction

GLOBALLY, the prevalence of chronic, noncommunicable diseases is increasing at an alarming rate. About 18 million people die every year from cardiovascular disease, for which diabetes and hypertension are major predisposing factors. Propelling the upsurge in cases of diabetes and hypertension is the growing prevalence of overweight and obesity-which have, during the past decade, joined underweight, malnutrition and infectious diseases as major health problems threatening the developing world. 2 Today, more than 1.1 billion adults worldwide are overweight and 312 million of them are obese. In addition, at least 155 million children worldwide are overweight or obese, according to the International Obesity Task Force. This task force and the World Health Organization (WHO) have revised the definition of obesity to adjust for ethnic differences and this broader definition may reflect an even higher prevalence with 1.7 billion people classified as overweight worldwide [1].

In the past 20 years, the rates of obesity have tripled in developing countries that have been adopting a Western lifestyle involving decreased physical activity and overconsumption of cheap, energy-dense food. Such lifestyle changes are also affecting children in these countries; the prevalence of overweight among them ranges from 10 to 25% and the prevalence of obesity ranges from 2 to 10%. The Middle East, Pacific Islands, Southeast Asia, and China face the greatest threat. The relationship between obesity and poverty is complex: Being poor in one of the world’s poorest countries (i.e., in countries with a per capita gross national
product [GNP] of less than $800 per year) is associated with underweight and malnutrition, whereas being poor in a middle-income country (with a per capita GNP of about $3,000 per year) is associated with an increased risk of obesity. Some developing countries face the paradox of families in which the children are underweight and the adults are overweight. This combination has been attributed by some people to intrauterine growth retardation and resulting low birth weight, which apparently confer a predisposition to obesity later in life through the acquisition of a "thrifty" phenotype that, when accompanied by rapid childhood weight gain, is conducive to the development of insulin resistance and the metabolic syndrome [2].

The human and financial costs of obesity are also mounting: A higher body-mass index (the weight in kilograms divided by the square of height in meters) has been shown to account for up to 16% of the global burden of disease, expressed as a percentage of disability-adjusted life-years. In the developed world, 2 to 7% of total health care costs are attributable to obesity. In the United States alone, the combined direct and indirect costs of obesity were estimated to be $123 billion in 2001. In 2004 in the Pacific Islands, the economic consequences of noncommunicable diseases, mainly obesity and diabetes, amounted to $1.95 million almost 60% of the health care budget of Tonga [2].

The growing prevalence of type 2 diabetes, cardiovascular disease and some cancers is tied to excess weight. The burden of these diseases is particularly high in the middle-income countries of Eastern Europe, Latin America and Asia, where obesity is the fifth-most-common cause of the disease burden-ranking just below underweight. The high risk of both diabetes and cardiovascular disease associated with obesity in Asians may be due to a predisposition to abdominal obesity, which can lead to the metabolic syndrome and impaired glucose tolerance [3].

The increase in the prevalence of type 2 diabetes is closely linked to the upsurge in obesity. About 90% of type 2 diabetes is attributable to excess weight. Furthermore, approximately 197 million people worldwide have impaired glucose tolerance, most commonly because of obesity and the associated metabolic syndrome. This number is expected to increase to 420 million by 2025 [2].

Population-based surveys of 75 communities in 32 countries show that diabetes is rare in communities in developing countries where a traditional lifestyle has been preserved. By contrast, some Arab, migrant Asian Indian, Chinese and U.S. Hispanic communities that have undergone westernization and urbanization are at higher risk; in these populations, the prevalence of diabetes ranges from 14 to 20%. In addition, most of the population growth in the developing world is taking place in urban areas [4,5].

Kuwait with a population of 2.5 million has the highest level of obesity in the world. 75% of the population is obese and childhood obesity is rising. Estimated cost of obesity to Kuwait is a minimum of $2.8 billion annually in direct and indirect costs [6].

A study by the Kuwait University concluded that the country has one of the highest rates of diabetics and obese people in the world. A survey of 383 residents aged 20-65 years revealed that 70% were obese. Doctors attribute a change in lifestyle and eating habits of Kuwaitis as the cause [6].

**Objective of the study:**

To determine the prevalence of obesity among patients with diabetes mellitus and some of the co-morbid conditions in Sabahia region in Kuwait.

**Patients and Methods**

This study is a cross sectional analytic study that was conducted in the period from June 2008 to August 2008 in the Diabetes Clinic in El-Sabahia Western primary health care Center. Five hundred adult patients known to be diabetic either on oral hypoglycemic drugs or on Insulin therapy or both were included in the study.

**All patients included in the study were subjected to the following:**

1. Full history taking with special emphasis on history of diabetes mellitus, drug therapy, complications of diabetes and cardiac history.
2. Full general and local examination of the heart, chest and abdomen.
3. 12 leads resting ECG.
4. Anthropometric measurements: Height, weight and waist and hip circumferences.
5. Laboratory investigations including: Fasting and 2 hours post-prandial blood glucose (FBS) measurement, blood lipids tests and completing a questionnaire on socio-demographic and smoking information.

**Calculating BMI:** The distinction between overweight and obesity is made on the basis of the
body mass index (BMI). The BMI is the most practical way to evaluate the degree of excess weight. It is calculated from the weight and square of the height as follows [7]:

\[
\text{BMI} = \frac{\text{Body weight (in kg)}}{\text{Height (in meters)}^2}
\]

**Classification of BMI:** The recommended classifications for BMI adopted by the National Institute of Health (NIH) and World Health Organization (WHO) [6,7] and endorsed by most expert groups are:

- Underweight–BMI <18.5 kg/m²
- Normal weight–BMI ≥ 18.5 to 24.9 kg/m²
- Overweight–BMI ≥ 25.0 to 29.9 kg/m²
- Class I obesity–BMI = 30.0 to 34.9 kg/m²
- Class II obesity–BMI = 35.0 to 39.9 kg/m²
- Class III obesity–BMI ≥ 40 kg/m²

This type of obesity is also referred to as severe, extreme, or morbid obesity.

Clinicians should be aware that BMI may overestimate the degree of obesity in individuals who are overweight but very muscular (for example, professional athletes or bodybuilders).

**Waist circumference:**

Increasing central adiposity is associated with an increased risk of morbidity and mortality [8,15,16]. Therefore, in addition to measuring body mass index, waist circumference should be measured to assess abdominal obesity. Patients with abdominal obesity (also called central adiposity, visceral, android, or male-type obesity) are at increased risk for heart disease, diabetes, hypertension and dyslipidemia.

- The waist circumference is measured with a flexible tape placed on a horizontal plane at the level of the iliac crest as seen from the anterior view.
- In adults with a BMI of 25 to 34.9 kg/m², a waist circumference greater than 102 cm (40 in) for men and 88 cm (35 in) for women is associated with a greater risk of hypertension, type 2 diabetes, and dyslipidemia and CHD [15].
- In patients with a BMI ≥ 35 kg/m², measurement of waist circumference is less helpful since it adds little to the predictive power of the disease risk classification of BMI; almost all individuals with this BMI also have an abnormal waist circumference [6].

**Results**

This cross-sectional study included 500 patients with diabetes Mellitus, their age ranged between 30-72 years with a mean of 52.5±9.4. They were 298 males and 202 females. The general characteristics and level of obesity are presented in Table (1). The mean body mass index was 31.8±4.7 kg/m².

Results of the current study regarding the degree of obesity as determined by the body mass index was; 18 patients (3.6%) have normal weight, 54 patients (10.8%) were overweight, 137 patients (27.4%) had class obesity, 169 patients (33.8%) had class II obesity and 122 patients (24.4%) had morbid obesity. The overall prevalence of obesity in our study population was 85.6%.

Table (1): Baseline general characteristics of the studied patients and controls.

<table>
<thead>
<tr>
<th>Cases (N=500)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>52.5±9.4</td>
</tr>
<tr>
<td>Sex:</td>
<td></td>
</tr>
<tr>
<td>Males (N, %)</td>
<td>298 (59.6%)</td>
</tr>
<tr>
<td>Females (N, %)</td>
<td>202 (40.4%)</td>
</tr>
<tr>
<td>Pulse (B/min.)</td>
<td>87.9±15.6</td>
</tr>
<tr>
<td>SBP (mm Hg)</td>
<td>125±10.5</td>
</tr>
<tr>
<td>DBP (mm Hg)</td>
<td>84±7.3</td>
</tr>
<tr>
<td>Body Mass Index (Kg/m²)</td>
<td>31.8±4.7</td>
</tr>
<tr>
<td>Duration of diabetes:</td>
<td></td>
</tr>
<tr>
<td>5 years</td>
<td>145 (37.5%)</td>
</tr>
<tr>
<td>10 years</td>
<td>139 (25%)</td>
</tr>
<tr>
<td>15 years</td>
<td>127 (20%)</td>
</tr>
<tr>
<td>&gt;15 years</td>
<td>89 (17.5%)</td>
</tr>
<tr>
<td>Drugs used for t of DM:</td>
<td></td>
</tr>
<tr>
<td>Oral hypoglycemic</td>
<td>354 (70.8%)</td>
</tr>
<tr>
<td>Insulin</td>
<td>103 (20.6%)</td>
</tr>
<tr>
<td>Adjuvant oral hypoglycemic</td>
<td>43 (8.6%)</td>
</tr>
<tr>
<td>Level of obesity:</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>18 (3.6%)</td>
</tr>
<tr>
<td>Overweight</td>
<td>54 (10.8%)</td>
</tr>
<tr>
<td>Class I obesity</td>
<td>137 (27.4%)</td>
</tr>
<tr>
<td>Class II obesity</td>
<td>169 (33.8%)</td>
</tr>
<tr>
<td>Class III obesity (morbid obesity)</td>
<td>122 (24.4%)</td>
</tr>
<tr>
<td>Control of diabetes:</td>
<td></td>
</tr>
<tr>
<td>Controlled</td>
<td>285 (57%)</td>
</tr>
<tr>
<td>Not-controlled</td>
<td>215 (43%)</td>
</tr>
</tbody>
</table>

Table (2): Results of laboratory investigations among the studied group and controls.

<table>
<thead>
<tr>
<th>All patients (n=500)</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting blood sugar (mg/dl)</td>
<td>219±65.7</td>
</tr>
<tr>
<td>Post prandial blood sugar (mg/dl)</td>
<td>254.8±76.6</td>
</tr>
<tr>
<td>HBA1C (mg/dl)</td>
<td>9.6±0.7</td>
</tr>
<tr>
<td>Total cholesterol (mg/dl)</td>
<td>237.9±49.8</td>
</tr>
<tr>
<td>HDL (mg/dl)</td>
<td>33.6±4.1</td>
</tr>
<tr>
<td>LDL (mg/dl)</td>
<td>115.4±41.3</td>
</tr>
<tr>
<td>TG (mg/dl)</td>
<td>174.6±22.4</td>
</tr>
<tr>
<td>Urea (mg/dl)</td>
<td>33.6±7.6</td>
</tr>
<tr>
<td>Creatinine (mg/dl)</td>
<td>0.92±0.02</td>
</tr>
</tbody>
</table>
### Table (3): Mean waist to hip ratio and the prevalence of abdominal obesity (WHR >0.9 in men and >85 in women) by sex and age.

| Age group | Males | | Females | | |  |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|
|           | N     | WHR (mean ± SD) | WHR >0.9 (n and %) | N     | WHR (mean ± SD) | WHR >0.9 (n and %) | p value |
| 30-34     | 19    | 0.93±0.2 | 13 (68.4%) | 10    | 0.89±0.2 | 6 (60%) | <0.05 |
| 35-44     | 46    | 0.95±0.3 | 34 (73.9%) | 31    | 0.91±0.3 | 23 (74.2%) | <0.05 |
| 45-54     | 77    | 0.97±0.4 | 71 (92.2%) | 49    | 0.95±0.4 | 41 (83.7%) | <0.05 |
| 55-65     | 109   | 1.1±0.4   | 101 (92.7%) | 80    | 0.98±0.4 | 71 (88.8%) | <0.05 |
| >65       | 47    | 0.98±0.3 | 39 (82.9%) | 32    | 0.9±0.3   | 26 (81.3%) | <0.05 |

Results of laboratory investigations are presented in Table (2). We found that the blood glucose level was no good as well as the mean lipid profile was not good.

The mean WHR was significantly higher among males than females ($p<0.05$) and the prevalence of central obesity among males was more than that in females (Table 3). Also the mean WHR increased with advanced age but it showed non-significant decrease in the age group >65 years (Table 3).

![Fig. (1): Prevalence of obesity among all the studied patients.](image)

**Discussion**

Obesity and increased central fat are associated with increased morbidity in addition to mortality [20]. In a survey of adults in the United States, overweight people had a higher relative risk of hypertension, hypercholesterolemia and diabetes mellitus [21]. This increase in relative risk appears to be greater in overweight adults aged 20 to 44 years than in those aged 45 to 74 years.

The Swedish Obese Subjects Study was a longitudinal study of obese individuals (mean BMI 41; mean age 48 years) who chose either bariatric surgery or conventional therapy for weight loss [23,24].

Type 2 diabetes mellitus is strongly associated with obesity in all ethnic groups. More than 80 percent of cases of type 2 diabetes can be attributed to obesity, which may also account for many diabetes-related deaths. A curvilinear relationship between BMI and the risk of type 2 diabetes was found in women in the Nurses' Health Study [25,26]. The lowest risk was associated with a BMI below 22kg/m² (slightly lower than in men from the Health Professionals Study); at a BMI greater than 35kg/m² the relative risk for diabetes adjusted for age increased to 61. The risk may be further increased by a sedentary lifestyle or decreased by exercise [27].

This study is a cross-sectional analytic study that was conducted in order to find the prevalence of obesity among diabetic patients in El-Sabahia area in Kuwait. Results of the current study regarding the degree of obesity as determined by the body mass index was; 18 patients (3.6%) have normal weight, 54 patients (10.8%) were overweight, 137 patients (27.4%) had class I obesity, 169 patients (33.8%) had class II obesity and 122 patients (24.4%) had morbid obesity. The overall prevalence of obesity in our study population was 85.6%. In other word, the overall prevalence of
obesity and overweight was 96.4% which is very high and even higher in most of the studies correlating diabetes with obesity and overweight. The study done by Daousi et al. [19] who studied the Prevalence of obesity in type 2 diabetes in secondary care and the prevalence of obesity in their study in UK was found to be 86% and they concluded that Obesity is the rule among patients attending this hospital diabetes clinic, with 86% of those with type 2 diabetes overweight or obese. Obesity is associated with significantly worse cardiovascular risk factors in this patient group, suggesting that more active interventions to control weight gain would be appropriate.

Results of laboratory investigations are presented in Table (2). We found that the blood glucose level was no good as well as the mean lipid profile was not good. These results of the bad laboratory profile in our patients could be attributed to the unhealthy life style and the bad eating habits.

The mean WHR was significantly higher among males than females (p<0.05) and the prevalence of central obesity among males was more than that in females. Also the mean WHR increased with advanced age but it showed non-significant decrease in the age group >65 years.

Both obesity and fat distribution are known to be associated with CVD and its risk factors [1,28]. Because of its cross-sectional design, this study is not able to show causality, as exposure and effect are measured simultaneously. It is possible that subjects who had been diagnosed with diabetes or hypertension prior to the survey had changed their lifestyles, including their body weight, in response to their condition. However, the significant association of obesity and central obesity with diabetes, low HDL-cholesterol and elevated triglycerides after controlling for age, sex and smoking, are consistent with the findings of prospective studies [29]. The effect of age on the association between BMI and morbidity has been debated [30]. In an analysis of cross-sectional data from the Third National Health and Nutrition Examination Survey (NHANES III) in the United States, it was observed that the relationship of obesity with the comorbidities studied (including diabetes) was generally strongest among the younger age groups [30]. The interaction of obesity with age found in this study in relation to diabetes requires further investigation.

Weight gain after age 18 years in women and after age 20 years in men also increases the risk of type 2 diabetes. The Nurses’ Health Study, for example, compared women with stable weight (those who gained or lost <5kg) after the age of 18 years to women who gained weight [31,32]. Those who had gained 5.0 to 7.9kg had a relative risk of diabetes of 1.9; this risk increased to 2.7 for women who gained 8.0 to 10.9kg [31]. Similar findings were noted in men in the Health Professionals Study [31,34]. Thus, the excess risk for diabetes with even modest weight gain is substantial.

Weight gain precedes the onset of diabetes. Among Pima Indians (a group with a particularly high incidence of type 2 diabetes), for example, body weight gradually increased 30kg (from 60kg to 90kg) in the years preceding the diagnosis of diabetes [35,36].

Insulin resistance with hyperinsulinemia is characteristic of obesity and is present before the onset of hyperglycemia. After the onset of obesity, the first demonstrable changes are impairment in glucose removal and increased insulin resistance, which result in hyperinsulinemia. The hyperinsulinemia in turn increases hepatic very-low-density triglyceride synthesis, plasminogen activator inhibitor-1 synthesis, sympathetic nervous system activity, and sodium reabsorption. These changes contribute to hyperlipidemia and hypertension in obese subjects [36,37].

The insulin resistance characteristic of type 2 diabetes probably results from a combination of obesity and genetic factors. In a study of nondiabetic offspring of two parents with type 2 diabetes, for example, insulin sensitivity was similar to that of normal subjects with no first-degree relatives with type 2 diabetes at near ideal body weight; at increasing degrees of obesity, however, the progressive decrease in insulin sensitivity was much more pronounced in those with a family history of type 2 diabetes [38].

It is not entirely clear how obesity induces insulin resistance, but a number of mechanisms may be involved.

Conclusion:

The prevalence of obesity among patients with Diabetes Mellitus in Sabahia Kuwait is very high and even higher than most studies. The Waist Hip ratio was found to be also significantly high among diabetic patients. Both sexes had a very high prevalence of obesity and males tended to be more obese than females. These alarming results necessitates rapid intervention for control of obesity especially among Kuwaiti diabetic patients in order to decrease the risk of cardiovascular disease and toward better control of diabetes.
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References

35. HELMHIC P.R., RAGLAND D.R., LEUNG R.W. and Paffenbarger R.S. Jr: Physical activity and reduced...


