Prevalence Of Type Two Diabetes Mellitus And Its Relation To Obesity And Socioeconomic state

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Abstract:
Background: Type two diabetes mellitus is a common disease with high consequences on morbidity and mortality.
Objective: To have an estimate of the distribution of the disease among adult people and to study its relation to obesity and socioeconomic state.
Setting: Al- Hussein General Hospital
Patients and Methods: A population-based, random sample study, taking adult companions of patients attending the out-patient clinic at Al- Hussein General Hospital from November 2005 to October 2007. Patients who were already diabetics on treatment were included, others were investigated for diagnosis of diabetes according to WHO definition.
Results: The total number of patients studied was 1545 adult, males were 844 (54.6%), and females were 701 (45.4%). Their ages ranged from 25-85 years, the total number of diabetics was 162 (82 females and 80 males). The prevalence adjusted for age and sex was 10.5%. The prevalence of overweight diabetics was (37.7%) and for obese diabetics (40.7%). The majority of diabetics (74.7%) were of low socioeconomic status.
Conclusion: Type two diabetes mellitus showed prevalence of (10.5%) among adult population. It was also concluded that majority of them (78.4%) are either overweight or obese, and most of them (74.7%) were having low socioeconomic status.

Introduction:
Diabetes is a disease that is characterized by high blood sugar, and uneven metabolism, caused by either a low insulin in the blood or a resistance to the effect of insulin (1).
Diabetes is worldwide in distribution and the incidence of both type one and two is rising. It is
estimated that in the year 2000, 150 million people worldwide had diabetes and this is expected to double by 2010. This global pandemic principally involves type two diabetes and is associated with several contributing factors including increased longevity, obesity, unsatisfactory diet, sedentary lifestyle and increasing urbanization (2).

About 90% of patients with diabetes are of type 2 DM (3, 4).

The risk factors to develop diabetes are: obesity, the chance to develop diabetes double for every 20% increase over desirable body weight, poor eating habits, lack of exercise (5), smoking (6), age and family history (7). Although diabetes mellitus type two is primarily a disease of adults over 40, it is now increasingly seen in children and adolescents, an increase thought to be linked to rising rate of obesity in this age group (8). The relation of type two D. M and Obesity is well known (9, 10, 11).

Center for disease control (CDC) has characterized the increase in type two D. M. as an epidemic (12).

The prevalence of diabetes mellitus type two increases with age (5, 7, 13), and 10% of people of Northern European stock (13) will develop diabetes by the age of 70. This promotion rises towards 30% in those with family history of diabetes and in those from some ethnic groups (13). Large differences in prevalence of diabetes mellitus type two exist.

In the U.K. type two diabetes is 3-4 times as prevalent in people of south Asian, African and Caribbean ancestry. High rates have also been found in people of middle eastern or Hispanic American origin living western lifestyle (13).

**Patients and methods**:

The study depended on randomly selected, population based sample. It was conducted in the medical out-patient clinic of AL-Hussein General Hospital, on adult companions for a period of 2 years (from November 2005 to October 2007).

The data were collected according to a data sheet designed for this purpose. History was taken included, name, age, sex, family history of diabetes mellitus and socioeconomic state which entailed level of education, level of living and salary or income, concerning the socioeconomic status. 100,000 Iraqi diners per week is considered middle and less than 40% is considered low and more than 100% is considered high status according to the criteria of ministry of planning and development cooperation in Iraq (14).

Patients who were already diabetics on treatment (oral hypoglycemic drugs) were recorded, the rest of people were investigated for diabetes according to the W.H.O definition of diabetes which is based on a single raised glucose reading with symptoms, otherwise raised values on two occasions of either fasting plasma glucose ≥ 7.0 mmol/l (126 mg/dl) or with a glucose tolerance test two hours after the oral dose, a plasma glucose ≥ 11.1 mmol/l (200 mg/dl) (15). Examinations mainly included the weight of patients in Kgs and heights in Cms. The scale used was a unicef physician balance beem scale. Body Mass Index (BMI) was calculated by dividing body weight in Kgs on squared height in meters. The normal BMI ranged from 18.5-24.9, overweight from 25-29.9 and obesity when BMI is 30 and over (16).

**Statistical analysis**:

All data were analyzed using statistical package for social sciences (SPSS) program and they were expressed as means, standard deviations, and percentage. The t test was used to test the difference between two mean and P value was considered significant if it < 0.05.
During this study 115 of people who selected for study were lost during follow up and were excluded.

Results:
The total number of patients studied were 1545 adult. The number of males was 844 (54.6%), the number of females was 701 (45.4%). Their ages ranged from 25-85 years, the total number of diabetics in the sample was 162, included 82 females and 80 males. The distribution of diabetics in the different age groups is shown in table one (mean age of diabetic patients 50.3±11.5).
The Table 1 shows significant correlation between DM type II and the mean age. The number of diabetic patients with normal weight and their percentage, patients with overweight and obesity and their percentage in both sexes is shown in table two and figure 1. About (37.7%) of diabetic patients of both sexes were overweight and (40.7%) of them were obese. Table 2 and figure 1 shows significant correlation between DM type II and mean BMI. The prevalence of normal and underweight diabetics was calculated as (21.6%) compared with (42.2%) in the general population. The prevalence of overweight diabetic people was (37.7%) compared with (30.1%) for the general population. The prevalence of obese diabetics was (40.7%) compared with (27.8%) for the general population—table 3 and figure 2 shows the compares.
Table 4 and figure 3: shows the relation of diabetes mellitus with the socioeconomic status. The number of diabetic people with low socioeconomic state in the sample was 121 (66 female and 55 males), while the number of diabetic people with middle socioeconomic state was 40 (16 females and 24 males), while the number of diabetic people with high socioeconomic state was 1 (male).

Table 5 shows the prevalence of type two diabetes mellitus. The prevalence for females is (11.7%) compared with (9.5%) for males. The prevalence adjusted for age and sex is (10.5%).

Table 1
Distribution of diabetes in the different age groups

<table>
<thead>
<tr>
<th>Age group</th>
<th>No. of ♀</th>
<th>No. of ♂</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-34</td>
<td>3</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>35-44</td>
<td>14</td>
<td>17</td>
<td>31</td>
</tr>
<tr>
<td>45-54</td>
<td>27</td>
<td>23</td>
<td>50</td>
</tr>
<tr>
<td>55-64</td>
<td>32</td>
<td>19</td>
<td>51</td>
</tr>
<tr>
<td>65-74</td>
<td>6</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>75-84</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>80</td>
<td>162</td>
</tr>
</tbody>
</table>

*P<0.005
### Table 2
The relation between type II DM & BMI

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number of normal weight (%)</th>
<th>Number of overweight (%)</th>
<th>Number of obese (%)</th>
<th>Total</th>
<th>BMI (Kg/m²) (mean±SD)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>♂</td>
<td>15 (18.8%)</td>
<td>38 (47.5%)</td>
<td>27 (33.8%)</td>
<td>80</td>
<td>28.7±6.3*</td>
</tr>
<tr>
<td>♀</td>
<td>20 (24.4%)</td>
<td>23 (28%)</td>
<td>39 (47.6%)</td>
<td>82</td>
<td>30±6.1*</td>
</tr>
<tr>
<td>Total</td>
<td>35 (21.6%)</td>
<td>61 (37.7%)</td>
<td>66 (40.7%)</td>
<td>162</td>
<td>29.2±5.6*</td>
</tr>
</tbody>
</table>

*P<0.005

### Figure 1
The relation between type II DM & BMI

![Graph showing the relation between type II DM and BMI](image)

### Table 3
Comparison between diabetic people and non diabetic (number & prevalence of normal weight, overweight and obese)

<table>
<thead>
<tr>
<th>Type of people</th>
<th>Number of normal weight and under weight (%)</th>
<th>Number of overweight (%)</th>
<th>Number of obese (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non diabetic people</td>
<td>583 (42.2%)</td>
<td>416 (30.1%)</td>
<td>384 (27.8%)</td>
</tr>
<tr>
<td>Diabetic people</td>
<td>35 (21.6%)</td>
<td>61 (37.7%)</td>
<td>66 (40.7%)</td>
</tr>
</tbody>
</table>
Figure (2)
Comparison between diabetic people and non diabetic (number & prevalence of normal weight, over weight and obese)

![Graph showing comparison between diabetic and non-diabetic people in normal weight, overweight, and obese categories.]

Table 4
The relation of type II D. M. with the socioeconomic status

<table>
<thead>
<tr>
<th>Sex</th>
<th>No. Of Low socioeconomic patients</th>
<th>No. of middle socioeconomic state patients</th>
<th>No. of high socioeconomic state patients</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>♀</td>
<td>66</td>
<td>16</td>
<td>0</td>
<td>82</td>
</tr>
<tr>
<td>♂</td>
<td>55</td>
<td>24</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Total (♀)</td>
<td>Total (♂)</td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>♀</td>
<td>121 (74.7%)</td>
<td>40 (24.7%)</td>
<td>1 (0.6)</td>
<td>162</td>
</tr>
</tbody>
</table>

Figure (3)
The relation between type II DM with Socioeconomic status

![Bar chart showing the number of diabetic patients by sex and socioeconomic class.]
Table 5  
Prevalence rate of type II D. M.

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number of diabetics</th>
<th>Total number. in the sample</th>
<th>Prevalence rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>82</td>
<td>701</td>
<td>11.7%</td>
</tr>
<tr>
<td>Males</td>
<td>80</td>
<td>844</td>
<td>9.5%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>1545</td>
<td>10.5%</td>
</tr>
</tbody>
</table>

Discussion:  
Diabetes mellitus type two increases in its incidence as the age advances (5, 7, 13), this study shows this phenomenon e.g. in the age group 25-34 the number of diabetics were (15), increased to (31) in the age group 35-44, then to (50) in the age group 45-54, then to (51) in the age group 55-64 but dropped to (14) in the age group 65-74 and to (1) in the age group 75-84. this discrepancy is probably due to the fact that the number of people in this age group was low because of low life span in Iraq. This study showed slight female preponderance over males (82) for female versus (80) male with diabetes. This is consistent with CDC analyzed data on 2000 from the Behavioral Risk Factor Surveillance (BRFS); women account for approximately 52% of all persons aged ≥20 years with diabetes (12, 17).

A different survey done by Iraqi Primary Health care department (IPHD) in collaboration with WHO in the year 2006, showed slight male preponderance in prevalence of type two (D. M) e.g. (10.9%) for males versus (9.9%) for females (18). This study shows positive relationship between D.M. type two and obesity e.g. (28%) of diabetic females were overweight and (47.6%) of them were obese. In males the value were (47.5%) and (33.8%) respectively, this is consistent with other study done by Despres Jean-Pierre et al in 2001 (19).

In this study a comparison in the prevalence rate of obesity and overweight between diabetic patients and non diabetic shows a prevalence rate of (37.7%) with overweight diabetics versus (30.1%) of nondiabetic and, (40.7%) for obese diabetics versus (27.8%) of non diabetic. This study showed inverse relationship between the prevalence of D.M. type 2 and socioeconomic state. The number of low socioeconomic state diabetics was (121) compared with (40) having middle socioeconomic state. The number of subjects with high socioeconomic status was one could be attributed to the fact that data collected from persons about their income should be taken guardedly, and also because individuals with high standards prefer to go to consult private clinics rather than general hospital. The (BRFSS) study (20) in 2000, showed that socioeconomic of women with diabetic is lower than that of women without diabetic. Another study done by Evans et al. showed that type two D. M is more prevalent in lower socioeconomic groups in western societies (9). In poor countries diabetic is a disease of the rich, but, in rich countries it is a disease of the poor according to Gale et al. (13).

In our study prevalence rate of D. M type two in females (11.7%) versus (9.5%) in males, when adjusted for sex the prevalence rate is (10.5%). Comparable studies showed that approximately 8% of white population in united states has D. M, an additional 5-6% have diabetes but do not even know its while in African Americans and Asians Americans it is estimated to be 10%, in Hispanics 15%, in Certain Native American Communities 20% to 50% (4, 5).

The prevalence rate of D. M among Bahrainis aged 20 and above in 1996 was (27.6%), Saudi Arabians (4.6%), OMANis (10%) and Egyptians (13.6%) (7).

Conclusions and recommendation:  
The prevalence of type two D.M. is not very high in our country in comparable to near by Arab gulf countries and some other countries. The prevalence of type two D. M increases with age.
Obesity is common among diabetic patients and its treatment will lower the incidence of diabetes. Diabetes is more common among patients with low socioeconomic states. Governmental strategies aimed at improving the socioeconomic state will have an effect to reduce the prevalence of diabetes.

References:
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Iraqi Primary Health Care Department, Risk Factors Survey of non- communicable diseases 2006, available at: Preventiv11@yahoo.com