

HYPERLIPIDEMIA AND OBESITY AMONG DIABETICS AT JUBAIL MILITARY HOSPITAL

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هدف الدراسة: تقييم توزيع اعتلال نسبة الدهون والسمن بين مرضى السكر المراجعين لعيادة الرعاية الصحية الأولية.

طريقة الدراسة: شملت الدراسة جميع مرضى السكر المسجلين في عيادة الرعاية الصحية الأولية في مستشفى القوات المسلحة بقاعدة الملك عبد العزيز البحرية بالجبيل، شرقي المملكة العربية السعودية، وعددهم 282 مريض سكر سجلوا وأجريت لهم المقابلة الشخصية بواسطة أطباء الرعاية الصحية الأولية. ثم سجلت أوزانهم وأطوالهم وكذلك تم تسجيل نسبة السكر والكوليسترول في الدم بعد صيام 12 ساعة.

نتائج الدراسة: أظهرت الدراسة وجود السكر من النوع الأول بين 10.3% من عينة الدراسة بينما شكلت الغالبية (89.7%) النوع الثاني. كان مؤشر كتلة الجسم طبيعيًا في 22.7% من عينة الدراسة. بينما كان 40.8% من العينة زائدين في الوزن و 36.5% منهم بدينين (نوى سمنة). مؤشر كتلة الجسم كان أعلى في النساء من الرجال (بدلالة إحصائية أقل من 0.001). نسبة الكوليسترول في الدم كانت أعلى من الحد الطبيعي في 26% من عينة الدراسة، والبروتين الدهني القليل الكثافة في 27% من العينة والترايغليسيريدات في 11%. أما البروتين الدهني الكثيف فقد كان أقل من المستوى الطبيعي في 38% من عينة الدراسة. وشكل اعتلال الدهون المختلطة 5% من مرضى السكر المشاركين بالدراسة.

الاستنتاجات: زيادة الدهون والسمن كانت عالية بين مرضى السكر. وهذا يتطلب عناية خاصة في مجال الوقاية والعلاج.

الكلمات المرجعية: مرض السكر، الدهون، زيادة الكوليسترول، مؤشر كتلة الجسم، السمن.

Objective: Evaluate the pattern of dyslipidemia and obesity among diabetics, attending the Primary Care Clinic.

Subjects and Methods: All diabetics (282) registered in the Primary Care Clinic of the Armed Forces Hospital at King Abdulaziz Naval Base, Jubail, Eastern Saudi Arabia, were interviewed by primary care doctors. Weight and height were recorded; fasting blood glucose and cholesterol levels were measured after 12-hour fasting.

Results: The study revealed that among 89.7% type 2 and 10.3% type 1 diabetes mellitus, 22.7% had a normal Body Mass Index (BMI) 40.8% were overweight, and 36.5%, obese. Females had a significantly higher BMI than males ($P < 0.001$). Total cholesterol was more than normal in 26%, LDL in 27% and Triglycerides in 11% but HDL lower than normal in 38%. However, mixed hyperlipidemia was seen in 5% of the study population.

Conclusion: Obesity and dyslipidemia were high among diabetic patients and special attention is required in prevention and treatment.

Key Words: Diabetes mellitus, lipids, hypercholesterolemia, BMI, obesity.

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INTRODUCTION

Diabetes mellitus is one of the secondary causes of hypercholesterolemia.¹ Hypercholesterolemia in diabetics is an additional risk factor for coronary heart disease (CHD),^{2,3} therefore, mortality and morbidity due to CHD are higher among those patients.⁴ It was documented that abnormal plasma lipid level is frequently seen in diabetics especially triglycerides.⁵

Hyperlipidemia has been investigated in the Kingdom among healthy adults⁶ and patients.⁷ However, hyperlipidemia among diabetics has only recently been studied.^{8,9}

These and other factors have urged the authors to evaluate the pattern of dyslipidemia and obesity among diabetics attending the Primary Health Care (PHC) Center in the Military Hospital, Jubail, in the Eastern Province of Saudi Arabia.

MATERIAL AND METHODS

A total of 282 diabetic patients were registered at the diabetic clinic in the Primary Care Department at this Military Hospital from 1994 (the date when the diabetic clinic first started) through 1996. Complete history, physical examination, and investigations were done on every patient registered in this clinic.

Two nurses were assigned to this clinic after some training. Weight was measured with a previously calibrated weighing machine and height measured by those nurses. Both were recorded to the nearest decimal point.

Among the different investigations done for those patients were the fasting serum lipids. Other investigations, such as fasting plasma glucose and HbA1c were not used in this particular study.

Fasting serum lipids were done on a sample of blood after fasting for 12 hours. The method used for determining the cholesterol and triglycerides levels in the

laboratory was the Enzymatic method (CHILL). The BMI (which is weight divided by the square of the height) was used to assess the degree of obesity. The BMI was considered normal if it was below 25 kg/m², 25-29.9 kg/m² overweight and 30 kg/m² or greater was obese.¹⁰ According to the national cholesterol education program,² the total cholesterol was considered high if it was >6.2 m mol/L and low density lipoprotein (LDL) >4.15 m mol/L. High density lipoprotein (HDL) was regarded low <0.9 m mol/L.

All statistics were done with a personal computer using Epi-Info program. Statistics used in this study were the Chi-Squared and Student "T" test.

RESULTS

There were 282 diabetic patients attending the diabetic clinic at the Primary Care Department. Two hundred and fifty three were type II diabetes mellitus (89.7%) and the rest were type I (10.3%). Their ages ranged from 19 years to 91 years of age with a mean (SD) of 46 years ± 12.98.

Table 1 shows the distribution of the different groups of BMI with their sexes. There were 212 male patients (75.2%) and 70 females (24.8%). Sixty-four of the attending patients had a normal (<25 kg/m²) BMI, 115 patients (40.8%) were over weight and 103 patients (36.5%) obese. The females had a significantly higher BMI than the males (p<0.001).

Table 2 shows that the total cholesterol level was high (>6.2 m mol/L) in 73 patients (26%). There was no significant difference between the two types of diabetes (P=0.65). Low density lipoprotein was high (>4.15 m mol/L) in 76 patients (27%). On the other hand, the HDL was low (<0.9 m mol/L) in 108 patients (38%). The triglycerides were high (>4.5 m mol/L) in 32 patients (11%). Mixed hyperlipidemia (high

cholesterol and triglycerides) was found in 13 diabetic patients (5%).

In table 3, it is shown that diabetic males

Table 1: The body mass index among the genders

| BMI (Kg/m ²) | Male (212) | Female (70) | Total (%) |
|--------------------------|------------|-------------|-------------|
| | No. (%) | No. (%) | |
| < 25 | 55 (25.94) | 9 (12.86) | 64 (22.70) |
| 25-29.9 | 93 (43.87) | 22 (31.43) | 115 (40.80) |
| ≥ 30 | 64 (30.19) | 39 (55.71) | 103 (36.50) |
| TOTAL | 212 (100) | 70 (100) | |

Chi squared = 15.36 p-value=<0.001

Table 2: Distribution of diabetic patients having dyslipidemia

| Type of lipids | Normal | Dyslipidemic |
|-----------------------------|----------|--------------|
| | No (%) | No. (%) |
| Total cholesterol | 209 (74) | 73 (26) |
| Low density lipid | 206 (73) | 76 (27) |
| High density lipid | 174 (62) | 108 (38) |
| Triglycerides | 250 (89) | 32 (11) |
| Cholesterol + triglycerides | 269 (95) | 13 (5) |

Table 3: Distribution of the mean value of lipids among the genders

| Type of lipids | Males (212) | Females (70) | p-value |
|--------------------|--------------|--------------|---------|
| | Mean* (SD) | Mean* (SD) | |
| Cholesterol | 5.496 (1.11) | 5.709 (1.08) | 0.245 |
| Low density lipid | 3.566 (1.19) | 3.685 (1.05) | 0.444 |
| High density lipid | 1.104 (0.44) | 1.266 (0.45) | < 0.001 |
| Triglycerides | 2.675 (3.43) | 2.256 (2.50) | 0.190 |

*all values were measured in m mol/L

had a lower level of total cholesterol and LDL than females. However, this difference was not statistically significant (p=0.245 and 0.444, respectively). Whereas the females had slightly higher levels of HDL than males the difference was significant p<0.001. However, the triglycerides levels were slightly lower among diabetic females than males but the difference did not attain statistical significance.

DISCUSSION

Conflicting views have been reported in several studies²⁻⁵ about obesity as an independent risk factor for CHD. However, the studies agree on the association

between obesity and hypercholesterolemia.

In this study, female diabetics had higher BMI than males (p<0.001), which is consistent with the previous finding by Khandekar in 1994 in the Kingdom of Saudi Arabia.⁸ High intake of calories and fats may be attributed to the vast improvement in the economy of the country. This has influenced the change in dietary habits of the people.

It was alarming to see that 55.7% of the female diabetics were found to be obese compared to 30.2% of the males (i.e., BMI ≥ 30 kg/m²). This may be partially explained by the fact that most females in Saudi Arabia lead a sedentary life style indoors with little exercise.

Most males, however, have a more active lifestyle. Most of the males in this study were in the military and performed a variety of activities and exercise.

Atherosclerosis accounts for a considerable percentage of all diabetic mortality, the majority of which is the consequence of coronary artery disease. Hyperlipidemia is an important cause for atherosclerosis. This study shows the distribution of the different types of dyslipidemia among our diabetic patients.

One quarter of the study population had hypercholesterolemia. Al-Nuaim⁹ reported 14% hypercholesterolemia among his diabetics in 1995. This figure is increasing with time, so the problem requires serious intervention in the form of health education, dietary instructions, and physical exercises.

It was reported that hypertriglyceridemia is associated with low HDL among diabetics.^{2,4} Low density lipid is considered as an independent risk factor for CHD with levels > 4.15 mmol/L. Twenty seven percent of the study population had this risk. None of the above mentioned references reported their mean level of LDL.

The serum level of HDL was found to be low in 38% of the study population. This is the highest among the different types of dyslipidemia. A high level of HDL is considered a negative risk factor for CHD. Therefore, it is important to study this high proportion of diabetics in greater detail. Hypertriglyceridemia was seen in 11% of this study population and this is similar to the figure (15%) reported by Al-Nuaim.⁹ Reports from

elsewhere by Stern et al¹¹ showed a higher percentage (23%). The different race, socioeconomic state, and dietary habit may explain this.

In an early study by Bacchus in 1982¹² the cholesterol levels among healthy subjects, in this country, were reported as 4.27 m mol/L among males and 4.23 m mol/L among females. In 1991, Inam⁷ reported a level of 5.25 m mol/L among males and 5.49 m mol/L among females. However, in 1985 the cholesterol level among diabetics in this country was reported as 5.2 m mol/L among non-insulin dependent diabetes mellitus (NIDDM).¹³ In this study, the mean cholesterol level among all the diabetic males was found to be 5.49 m mol/L and 5.71 m mol/L among diabetic females. These figures are very close to the levels reported by Khandekar⁸ (i.e., 5.52 m mol/L for males and 5.97 m mol/L for females). Khandekar used the same method to determine cholesterol and triglycerides levels in a Saudi diabetic population.

The higher level of HDL among females than males is another evidence of the positive effect of estrogen, as previously documented.¹⁴

The study revealed that obesity and dyslipidemia were high among diabetic patients and required special attention. This can be done through health education at the primary care level and the diabetic clinics. More health education on diet is required particularly for females with the help of the primary care physicians and the media.

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