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Research Article

DIFFERENCES IN DEMOGRAPHICS, LIPID PROFILE AND OTHER CLINICAL CHARACTERISTICS AMONG TYPE 2 DIABETIC PATIENTS IN THE STATE OF PENANG, MALAYSIA ACCORDING TO GENDER AND RACES

ALI QAIS BLEBIL[1*], YAHAYA HASSAN[1], JUMAN ABDULELAH DUJAILI[1]

[1] **Discipline of Clinical Pharmacy, School of Pharmaceutical Sciences, UniversitiSains Malaysia, Mendin 11800 Penang, Malaysia ,**
Email: aliblebil@yahoo.com

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ABSTRACT

Objectives: The present study aimed to compare between Malaysian diabetic patients who have dyslipidemia in terms of genders and races with regards to demographic, anthropometric, lipid profile and other clinical characteristics.
Methods: A cross-sectional study among type 2 diabetic patients who have dyslipidemia was conducted. Demographic and Clinical characteristics were collected from medical records of type 2 diabetic patients who attended Endocrine Clinic of a tertiary referral hospital in the state of Penang, Malaysia and who satisfy the eligibility criteria of the study.
Results and Conclusions:In the present study, there were significant differences between female and male in terms of body mass index (BMI) (28.5 ± 5.6 and 26.6 ± 4.9, respectively). Furthermore, female gender was significantly had a higher mean level of high density lipoprotein (HDL) cholesterol ($P < 0.001$). Malay type 2 diabetic patients had higher waist circumference (WC) and BMI. In contrast, Chinese had lowest WC and BMI. Additionally, Chinese significantly had the highest HDL cholesterol compared to Malay and Indian. They also had the lowest low density lipoprotein (LDL) cholesterol and triglycerides (TG) levels.
Male gender, Malay and Indian races had the worst diabetic control, anthropometric and lipid profile comparing to female gender and Chinese race. Further attention should be provided to these groups. Intensive counselling regarding lifestyle changes or even treatment modifications should be considered to achieve normal blood-glucose levels and also improve dyslipidemia.

Keywords: Dyslipidemia, diabetes mellitus, ethnicity, gender, Malaysia.

INTRODUCTION

Studies gathered over the years have demonstrated that diabetes mellitus (DM) is an independent risk factor for CVD and it further increases the effects of other common risk factors, such as hypertension, smoking and hypercholesterolemia. [1, 2] In addition, mortality related to cardiovascular events in diabetic patients is significantly higher than in non-diabetic individuals. [3]

Malaysian population is developing rapidly and becoming more urbanized and adopting a more western lifestyle which is probably resulting in an increase in the prevalence of DM in Malaysia from about 1±2% in the 1960s to 10% in the 1990s. [4, 5]Malaysia demographics are represented by multiple ethnic groups. In Penang, the eighth most populous state in Malaysia, there is three main ethnic groups. These are represented by Malays, Chinese and Indians which comprising 44.7%, 43.9% and 10.3% of the Malaysian population in the state of Penang, respectively. Female's percentage is more than the male's (49.3% vs. 50.7%) in the state Penang. [6]

Studies have shown that the main ethnic groups (Malay, Chinese and Indian) differ in the prevalence of DM as well as other cardiovascular risk factors such as dyslipidemia. [7, 8] This study aimed to determine the differences in demographics, anthropometric data and lipid profile among type 2 diabetic patients in the state of Penang, Malaysia according to their gender and race.

MATERIALS AND METHODS

A cross-sectional study was conducted inEndocrine Clinic at Penang General Hospital. The data were collected by reviewing patients' medical reports. Type two diabetic patients who attended the Endocrine Clinic between February and April 2009, who aged more than or equal 40 years and diagnosed with dyslipidemia were included in the study. Whereby, pregnant women, cancer; acquired immune deficiency syndrome (AIDS) and human immunodeficiency virus-co infected patients were excluded. A convenient sampling method was used for the subjects who satisfied the eligibility criteria of the study. The data collected include demographic, anthropometric characteristics and laboratory readings. Two hundred and forty six patients were included in the study.

In the current study dyslipidemia defined as one or more from the following criteria: as it diagnosed previously by physician, elevated total (TC), LDL cholesterol, or TG; low HDL cholesterol; or a combination of these abnormalities and for patients who reported being prescribed for lipid lowering drugs. BMI was classified to Obese (BMI > 27 kg/m2), Overweight (BMI ≥ 23 kg/m2) and normal weight (BMI < 23 kg/m2). [9] The optimal lipid levels for LDL-C, TC and TG were ≤ 2.6 mmol/L; < 5.2 mmol/L and ≤ 1.7 mmol/L , respectively), while for HDL-C is > 1.0 mmol/l for male and > 1.3 mmol/l for female. According to the Malaysian clinical practice guideline in Management of type 2 DM and Third Report of the National Cholesterol Education Program (NCEP), the optimal target for glycated haemoglobin (HbA1c) is < 6.5 %. [10, 11]

Descriptive analyses were applied for numerical variables by calculating the mean ± SD. Percentage and frequency were determined for categorical variables. Independent *t*-test was applied for continuous and normally distributed variables; otherwise Mann-Whitney U test was applied as a substitute. One-way Anova test was used to show the differences among the race with regard to socio-demographic and clinical variables; otherwise Kruskul Wallis test was applied as a substitute. For all analysis, two-tailed statistical tests were used with p value ≤ 0.05 for statistically significant level at 95% confidence interval (CI).

RESULTS

Two hundred and forty six diabetic patients were included in the study. Of these, 95 (39%) patients were Chinese, 80 (32%) were Malay, 67 (27%) were Indian and 4 (2%) patients were of other races. In addition, genders in this study were almost equal (125 females and 121 males).

In this analysis, there were significant differences between male and female in terms of BMI. Women had higher BMI compared to their counterpart (28.5 ± 5.6 vs. 26.6 ± 4.9). In contrast, there were no significance differences in age, waist circumference (WC), duration of diabetes mellitus diagnosis, fasting blood glucose (FBG) and HbA1c between women and men. Data are shown in table 1.

Table 1: The Demographic and Anthropometric Data of Patients with Type 2 Diabetes Mellitus According To Gender.

	Male	Female	*P* value
Age (years)	56.2 ± 8.9	57.2 ± 8.8	0.425*
Waist circumference (cm)	97.3 ± 14.1	95.6 ± 11.7	0.320*
Body Mass Index (Kg/m^2)	26.6 ± 4.9	28.5 ± 5.6	0.005*
Duration of diabetes (years)	10.9 ± 7.5	11.4 ± 6.9	0.437**
FBG (mmol/l)	8.1 ± 3.9	7.9 ± 3.5	0.813**
HbA1c (%)	8.4 ± 1.9	8.3 ± 1.9	0.602**
Systolic blood pressure (mmHg)	139.8 ± 20.9	140.8 ± 18.7	0.506**
Diastolic blood pressure (mmHg)	80.79 ± 9.96	78.33 ± 8.63	0.012**

WC, Waist circumference; BMI, body mass index; FBG, fasting blood glucose; HbA1c, glycated hemoglobin.
***Independent t-Test** ** Mann-Whitney Test**

Table 2 displays the differences between female and male in terms of lipid profile. Interestingly, females had higher HDL cholesterol (1.24 ± 0.3 and 1.12 ± 0.33, respectively). Men had higher mean LDL cholesterol and TG levels, although it did not reach statistical significance.

Table 2: Differences in Gender in Term of Lipid Profile.

	Male	Female	*P* value *
TC (mmol/l)	4.60 ± 1.24	4.74 ± 1.02	0.063
LDL cholesterol (mmol/l)	2.71 ± 1.05	2.70 ± 0.87	0.680
HDL cholesterol (mmol/l)	1.12 ± 0.33	1.24 ± 0.32	<0.001
TG (mmol/l)	1.72 ± 1.03	1.69 ± 0.84	0.917

TC, total cholesterol; LDL, low density lipoprotein; HDL, high density lipoprotein; TG, triglycerides.
***Mann-Whitney Test**

In this cohort, there were significant differences in age among races (*P* = 0.016). Chinese diabetic patients were significantly older than Malay and Indian (58.9±8.8, 54.7±8.0 and 56.1±9.4, respectively). Furthermore, there were significant differences between the ethnic groups in terms of WC and BMI. Malay had the highest WC. They were also having the highest BMI compared to Chinese and Indian (30.1 ± 6.3, 26.1 ± 4.6 and 26.8 ± 3.9, respectively). However, there were no significant differences among these ethnic groups regarding duration of DM; FBG; HbA1c; systolic and diastolic blood pressure. Data are shown in table 3.

Table 3: The Demographic and Anthropometric Of Patients with Type 2 Diabetic Patients According To Race.

	Malay	Chinese	Indian	Other	*P* value
Age (years)	54.7 ± 8.0	58.9 ± 8.8	56.1 ± 9.4	54.5 ± 8.7	0.016*
WC (cm)	100.1 ± 15.2	92.3 ± 11.3	97.8 ± 10.5	95.3 ± 12.8	0.001*
BMI (Kg/m^2)	30.1 ± 6.3	26.1 ± 4.6	26.8 ± 3.9	26.0 ± 5.5	< 0.001*
Duration of diabetes (years)	10.9 ± 7.1	10.9 ± 7.5	11.9 ± 7.0	4.9 ± 2.9	0.269**
FBG (mmol/L)	8.3 ± 3.6	7.6 ±3.4	8.6 ± 4.2	5.5 ± 0.6	0.177**
HbA1c (%)	8.4 ± 1.9	8.1 ± 1.8	8.8 ± 2.0	7.9 ± 1.8	0.106**
Systolic blood pressure (mmHg)	141.0±118.6	143.3 ± 20.9	136.2 ± 19.4	125.0 ± 5.8	0.040**
Diastolic blood pressure (mmHg)	81.2 ± 11.2	78.5 ± 8.4	79.2 ± 8.3	77.5 ± 5.0	0.397**

WC, Waist circumference; BMI, Body Mass Index; FBG, fasting blood glucose; HbA1c, glycated hemoglobin.
***One-Way Anova Test** ** **Kruskal Wallis Test**

Table 4: Differences among Race in Term of Lipid Profile

	Malay	Chinese	Indian	Other	*P* value*
TC (mmol/L)	4.76 ± 1.1	4.69 ± 1.2	4.58 ± 1.1	4.63 ± 0.4	0.758
LDL cholesterol (mmol/L)	2.79 ± 0.9	2.64 ± 0.9	2.71 ± 1.0	2.47 ± 0.1	0.515
HDL cholesterol (mmol/L)	1.16 ± 0.3	1.26 ± 0.3	1.12 ± 0.4	1.09 ± 0.1	0.014
TG (mmol/L)	1.72 ± 0.9	1.68 ± 1.1	1.71 ± 0.8	2.35 ± 1.2	0.578

TC: Total cholesterol, LDL: Low density lipoprotein, HDL: High density lipoprotein, TG: Triglycerides.
***Kruskal Wallis Test**

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Table 4 illustrates the differences between races in the state of Penang in terms of lipid profile. Chinese had the highest HDL cholesterol compared to Malays and Indians (1.3 ± 0.3, 1.2 ± 0.3 and 1.1 ± 0.4, respectively). Unfortunately, Malay had the worst lipid profile with regards to TC, LDL cholesterol and TG, although it did not reach statistical significance.

DISCUSSION

In the current study, there were significant differences between male and female in terms of BMI. This finding reflects the differences in prevalence of obesity among gender in the population of Malaysia. A previous national survey reported that in adult males, 15.1% were overweight and 2.9% obese while in adult females, 17.9% were overweight and 5.7% obese. [12] However, there were no significant differences between male and female diabetic patients with regard to age, WC, duration of DM diagnosis, FBG and HbA1c. In Kuwait, a study found that there were no significant differences between men and women in terms of duration of diabetes and HbA1c. [13] Jacobs et al also found that there was no significant difference between genders in terms of duration of diabetes. [14] A study done in Saudi Arabia showed that FBG was significantly higher in female than male. [15] These differences between male and their female counterpart diabetic patients warrant more investigation.

Female in our cohort had higher mean value of HDL cholesterol. Moreover, there were no significant differences with regards to TC, LDL cholesterol and TG between the two gender groups. Our findings are consistent with the result of a study conducted by Khan H A. and Jacobs et al, which reported significantly higher level of HDL cholesterol among women. [14, 15] In Turkey, a study showed that female had a higher HDL cholesterol level compared to male, while male had higher LDL cholesterol and triglycerides. [16] Souza et al found that men were significantly had higher triglycerides than that of female. [17] In this study male had higher levels of LDL cholesterol and TG, although they were not statistically significant. This consistent with common understanding that males' gender is at greater risk for coronary disease than are women who can be explained by an earlier onset of LDL cholesterol elevation and lowering of HDL cholesterol. [18]

An early study conducted in Malaysia reported that Malay diabetic patients were younger than Chinese and Indian (38.8 ± 9.0, 40.3 ± 10.1 and 40.6 ± 9.8, respectively), but these failed to reach statistical significant. Moreover, the author found that BMI was significantly different between the ethnic groups of Malaysia. Malay had the highest BMI when compared to Indian and Chinese (26.8 ± 4.9, 25.5 ± 4.3 and 25.4 ± 4.5, respectively). [19] These corroborate the results of our study.

Furthermore, we found that Chinese had the highest HDL cholesterol than that of Malay and Indian (1.3 ± 0.3, 1.2 ± 0.3 and 1.1 ± 0.4, respectively). This might due to different lifestyle among these races, including diet and exercise and other social habits. In Singapore a study showed that the differences in lipid profile between Malay, Chinese and Indian were due to differences in insulin sensitivity. The authors found that Chinese subjects had the lowest insulin resistance compared to Malay and Indian. [8] This could be another possible explanation for the differences observed in our study.

The data that resulted from this study are limited because it was a retrospective data from a routine clinic and not a prospective series. However, the strength lies in the fact that it was the usual clinical setting where most clinicians practice and not in the artificial setting of a clinical trial. The results of the current study may not be generalizable to all diabetic patients who have dyslipidemia in Malaysia since the study patients were selected from a single tertiary care referral hospital. Finally, medications that can affect lipid levels (e.g., beta blockers, and diuretics) that patients may have been taking at the time of their visit were not captured in our registry.

The results of the present study demonstrate that male gender, Malay and Indian races had the worst diabetic control, anthropometric and lipid profile comparing to female gender and Chinese race. Further attention should be provided to these groups. In addition, intensive counseling regarding lifestyle changes,including increased physical activity and dietarymodifications or even treatment modifications should be considered to achieve normal blood-glucose levels and also improve dyslipidemia.

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