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A targeted screening for diabetes mellitus in the companions of the diabetic patients attending outpatient department

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Abstract--Background: The world prevalence of diabetes in 2010 among adults aged 20-79 years is estimated to 6.4%. Epidemiological studies showed increasing prevalence of diabetes mellitus over the past few decades, and around 50% of cases of type 2 are asymptomatic. We have conducted a targeted screening to study the prevalence of Type 2 diabetes mellitus in the companions of diabetic patients and screen for asymptomatic cases and to identify risk factors associated with their diabetes in outpatient clinic. **METHODS:** A cross sectional descriptive study investigating 347 adults aged 18-60 years determined the diabetes status in a random sample of companions of diabetic patients. A standard questionnaire, a simple clinical examination and laboratory tests assessed blood sugar, blood pressure, body mass index (BMI) and other risk factors for diabetes. **RESULTS:** The prevalence of Type 2 diabetes in the companions of diabetic patients was 9.5%. Around half (45.45%) of cases were new and asymptomatic, the rest (54.54%) were already diabetics on treatment. The mean age of diabetics was 44.25 ±4 years while that of non-diabetics was 27.8 ±8.31 years. The prevalence of overweight was 44%, it was higher in diabetics than in non-diabetics. The presence of positive family history of diabetes was significantly very high in diabetics and in non-diabetics. **CONCLUSIONS:** The high prevalence of Type 2 diabetes mellitus and its potential increase as a result of the ageing of this population constitutes a major public health problem. Age, positive family history, and high BMI were significantly associated with Type 2 diabetes. Of the factors associated with diabetes, BMI is potentially modifiable, and should be addressed by preventive health activities. As a recommendation an opportunistic screening can be applied to the companion of outpatient visitor for communicable and non-communicable prevalent diseases.

Keyword--targeted screening, diabetes mellitus, family medicine clinic.

Introduction

The prevalence of type 2 diabetes rates continues to increase with increasing number of patients at risk of serious diabetes-related complications.^(1,2) The world prevalence of diabetes in 2010 among adults aged 20-79 years is estimated to 6.4%. Between 2010 and 2030, there is an expected 70% increase in numbers of adults with diabetes in developing countries and a 20% increase in developed countries.⁽³⁾ Four out of every five people with diabetes now live in developing countries, with most affected men and women being of working age.⁽⁴⁾ Globally, the prevalence of diabetes is increasing. The number of people with type 2 diabetes is expected to be doubled in the next 2 decades, and diabetes will be more prevalent in younger populations than in the past.⁽⁵⁾ In Japanese type 2 diabetes, it is an increasingly important problem as a life-style related disease. The total diabetic population is estimated as approximately 7 million with a prevalence of approximately 6%.⁽⁶⁾

Many studies have elaborated the associations between several risk factors and the risk of type 2 diabetes. Body mass index (BMI), lipids, hypertension, smoking; physical inactivity, low education, dietary patterns, family history, and recently also specific genes are the most frequently documented risk factors for type 2 diabetes⁽⁷⁾. The term diagnosis refers to confirmation of diabetes in people who have symptoms, or who have had a positive screening test. In diabetes, the screening test may be the diagnostic test (e.g. a fasting plasma glucose => 7.0 mmol l-1 in someone who has symptoms) or the first part of the diagnostic test if a second test (usually the OGTT) is used to confirm the diagnosis in asymptomatic individuals.

Screening the entire population (never actually suggested since all proposals have been, in some way, selective). Selective or targeted screening performed in a subgroup of subjects who have already been identified as being at relatively high risk in relation to age, body weight, ethnic origin etc. Opportunistic screening carried out at a time when people are seen, by health care professionals, for a reason other than the disorder in question. Screening for undiagnosed DM has its considerable difficulties; it is advisable in people who are known to be at increased risk for DM. The increased risk can be ascertained in a number of ways, including demographic characteristics (older age, minority race-ethnic status, family history of DM), clinical characteristics (hypertension, dyslipidemia), and prior evidence of abnormal glucose values.⁽⁸⁾ We have conducted Targeted screening for the prevalence of type 2 diabetes mellitus in the companions of diabetic patients, study the possible risk factors that contribute to or associate with type 2 diabetes mellitus, screen for asymptomatic cases of diabetes mellitus in the companions.

Patients and Methods

It is a cross sectional study including 347 adults (>18y) as a targeted screening of the companions of diabetic patients in four outpatient clinics in Baghdad. The visitors were screened for diabetes status. They were labeled as diabetics if they are already diagnosed. Random blood sample was collected from all visitors and checked by dipstick for sugar. Visitors with positive reading were screened for

diabetes by testing random blood sugar or fasting blood sugar according to the situation. For those who are not diabetic with positive readings, a second fasting blood sugar was done in the next visit (if they appear in the next visit). For all visitors, the following risk factors were studied: Age and sex, relation to the patient, body mass index, blood pressure, family history of diabetes and cigarette smoking status. A simple questionnaire was recorded. Diabetes mellitus was defined according to American diabetes association definition: A fasting blood sugar ≥ 126 mg/ dl in patients with positive urine sugar, or they were already diabetics on treatment.⁽⁸⁾ Hypertension was defined according to Joint committee 8: The diastolic blood pressure measurement on at least two occasions was 90 mm Hg or higher, or the systolic blood pressure on two or more occasions was consistently greater than 140 mm Hg, or they were already on anti hypertensive drugs.⁽⁹⁾ Body mass index (BMI) was defined according to World Health Organization and calculated as (BMI = weight kg / height square meter). Obesity was defined as BMI of 30 or greater. Over weight was defined as BMI of 25 or greater.⁽¹⁰⁾

Statistical methods

It is a descriptive cross-sectional study. Descriptive statistics: Statistical tables, arithmetic mean, standard deviation, and graphic presentation. Differential statistics: fisher exact test. Chi – square test and student-t test when appropriate. P value < 0.05 considered the level of significance.

Results

Total number of the sample was 347 with a mean age of 32.89y. Females were 125 (36%) with mean age of 33.32y, males were 222 (64%) with mean age of 28.58y, female: male ratio was 1:2.5. In this study 43 visitors showed positive result (12.39 %). Eighteen visitors were already diabetic, the rest 25 were considered as hyperglycemia. Only 19 visitors attended the second visit. four visitors attending second visit showed negative result for confirmed diabetes status. As a final result 33 visitor were considered as diabetic companions (9.51 %). Eighteen patients (54.54 %) were already diabetics on treatment. The rest 15 patients (45.45. %) were considered as new cases of diabetes. The prevalence of family history of diabetes mellitus in the total sample was 62.24%. It was 87.87% in diabetic visitors Vs. 59.55% in non-diabetics. (P value<0.05). The prevalence of obesity and overweight was 44.09% in the total sample; it was 78.78% in diabetics vs. 40.44.83% in non-diabetics. (P value<0.05). The prevalence of hypertension in the total sample was 14.85%; it was higher in diabetics than in non-diabetics (48.48%Vs.11.14%) (P value< 0.01).The prevalence of cigarette smoking in the total sample was 20.74%. It was 30.33% in diabetics while it was 18.73% in non-diabetics (P value > 0.05).

	Diabetic		Non diabetic		All	
	No	Age	No	Age	No	Age
Male	13 (10.4)%	44.37	112 (89.6)%	29.43	125 (36)%	33.32
Female	20 (9)%	44.19	202 (91)%	27.04	222 (64)%	28.58
Total	33 (9.51)%	44.25 ±4.21	314 (90.48)%	27.8 ±8.31	347	32.89 ±8.1

Table II
Distribution of patients according to risk factors

<i>Risk Factor for diabetes</i>	All visitors	Diabetic visitors	Non diabetic visitors	Statistical significance
Family history of diabetes	216 (62.24)%	29 (87.87)%	187 (59.55)%	<0.05
B.M.I	153 (44.09)%	26 (78.78)%	127 (40.44)%	<0.05
Hypertension	51 (14.69)%	16 (48.48)%	35 (11.14)%	<0.01
Cigarette Smoking	20.74%	10(30.30)%	65(18.73)%	> 0.05

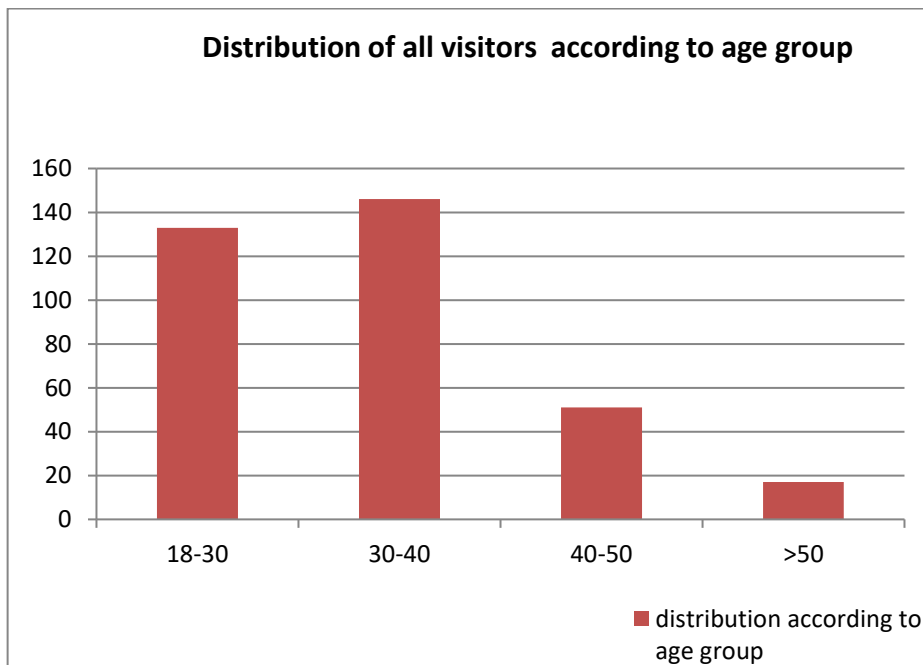


Figure 1. Distribution of all visitors according to age groups

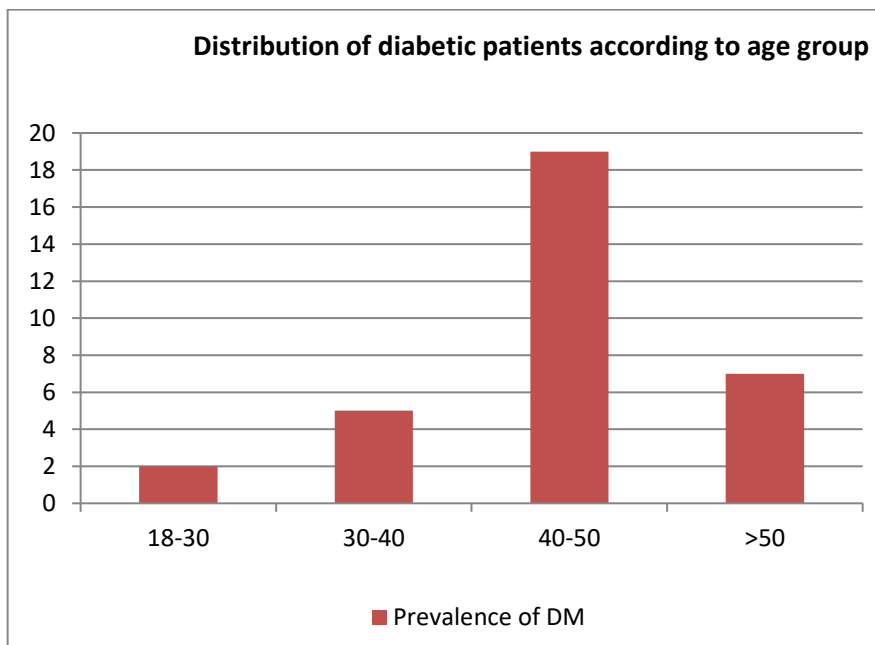


Figure 2. Distributions of diabetics according to age groups

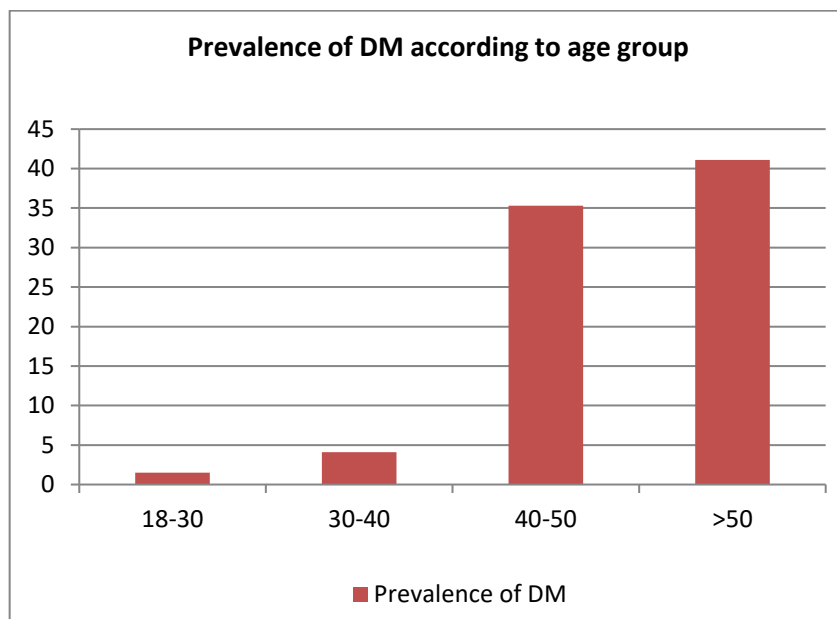


Figure 2. Prevalence of diabetics according to age groups.

Discussion

In family medicine, selective or targeted screening is performed in a subgroup of subjects who have already been identified as being at relatively high risk in relation to age, body weight, ethnic origin etc. Testing the urine for glucose is the usual procedure for detecting diabetes. The greatest disadvantage of using

urinary glucose as a diagnostic or screening test is the individual variation in renal threshold. Estimation of the blood glucose concentration is therefore essential in making the diagnosis. The most common cause of glycosuria is a low renal threshold for glucose (renal glycosuria) which is common during pregnancy. It can be excluded by history and estimation of blood sugar.⁽¹¹⁾ In this study, we have used dipstick for blood sugar, and for positive result we did random or fasting blood sugar at the same time.

Globally in 2013, it is estimated that almost 382 million people suffer from diabetes for a prevalence of 8.3%. North America and the Caribbean is the region with the higher prevalence of 11% having 37 million people with diabetes followed by the Middle East and North Africa with a prevalence of 9.2% having 35 million people with diabetes.⁽¹²⁾ In another study done in Japan; the total diabetic population is estimated as approximately 7 million with a prevalence of approximately 6%.⁽¹³⁾ In this study, the prevalence was (9.51%). It is a relatively high prevalence when compared to international figures. This is a targeted screening study for the companions of diabetic patients, and this may explain the higher prevalence. A lot of studies showed that about 30-50% of type 2 diabetes were asymptomatic. The period in which the patient is asymptomatic has been estimated to be as long as 10 years.⁽¹⁴⁾ In this study (45.45%) was asymptomatic, and considered as new cases of diabetes. This figure of asymptomatic patients is significant. It is very important to discover DM before clinical diagnosis. A number of studies have found that DM has already progressed significantly in its severity before clinical diagnosis, significantly that widespread structural lesions related to DM have developed during the asymptomatic preclinical phase of the disease.⁽¹⁵⁾

The prevalence of type II diabetes is increasing with age (15). Figure II showed that the prevalence was higher at ages > 40 years in the whole sample, at the same time the prevalence still higher in the older age groups. Figure III. The mean age of diabetic patients is higher than that of non-diabetics. (44.25 vs. 27.8 years) with statistically significant difference.⁽²⁾ Age, positive family history, high triglycerides level, and high BMI were significantly associated with Type 2 diabetes⁽¹⁵⁾. The association between obesity and DM was shown in several studies^(16, 2, 17). Obesity contributes to both hypertension and diabetes mellitus. In this study, overweight and obesity was prevalent in 44.09 % of all patients. Diabetics showed higher prevalence of overweight than non-diabetics (78.78% vs.40.44%) with statistically significant difference ($P < 0.05$). The level of obesity among the general population has increased, due partly to increased calorie intake and is a significant factor in the increased rate of diabetes.² It is also more common among the elderly⁽²⁾.

The prevalence of diabetes increased in a dose-response relationship with increasing BMI. Crude prevalence in individuals without a family history and BMI of 22.5-24.9 kg/m² was 2.2% compared to 33.3% in those with a family history and BMI over 35 kg/m². Thirty-eight percent of the excess risk of diabetes in people with a family history could be avoided if their BMI did not exceed 30 kg/m².⁽¹⁸⁾ Abdominal obesity was associated with an increased risk of type 2 diabetes when adjusting for body mass index, age, smoking and alcohol consumption.⁽¹⁹⁾ The prevalence of diabetes continues to increase rapidly in the

U.S. Because the prevalence of obesity is also rising, diabetes will become even more common. Major efforts are needed to alter these trends. ⁽²⁰⁾Hypertension affects approximately 70% of patients with diabetes and is approximately twice as common in persons with diabetes as in those without. Sympathetic nerve over activity is crucial in the pathogenesis of hypertension in diabetes ⁽²¹⁾. In our study the prevalence of hypertension in diabetics was higher than in non-diabetics (48.48% vs. 11.14%) ($P < 0.01$) which was statistically significant. Hypertension is twice as frequent in diabetic patients as in the general population ⁽²²⁾. Its prevalence is higher in Type 2 than in Type 1 diabetes. The onset of hypertension often precedes the diagnosis of type 2 diabetes, whereas, in the latter it is strictly related to the presence of nephropathy ⁽²³⁾.

Several studies showed an association between DM and family history of diabetes in first degree relatives (15,18,24). In our study the prevalence of FH of DM was very high in diabetics and in non-diabetics (87.87% Vs 59.55%) there is a difference but not reaching the statistical significance ($P > 0.05$). Individuals with a family history of diabetes are at increased risk for the metabolic consequences of obesity and form an easily identifiable group who may benefit from targeted intervention to prevent the development of obesity through increased physical activity ⁽¹⁸⁾. Maternal family history and combined maternal and paternal family history predisposed to future type 2 diabetes ^(25,26).

Smoking is associated with insulin resistance, inflammation and dyslipidemia. However, smoking cessation is one of the important targets for diabetes control and the prevention diabetic complications ⁽²⁷⁾. Cigarette smoking is an independent and modifiable determinant of type 2 diabetes mellitus. Smokers had a dose-dependent increased risk of developing type 2 diabetes mellitus compared with never smokers. ^(28, 29) In this study, the prevalence of cigarette smoking was high in diabetics and in non diabetics, but higher in diabetic patients with marginal significance (30.30%Vs.18.73%) ($P > 0.05$).

Conclusions

The issue of screening for type 2 diabetes is important both in terms of individual health, day-to-day clinical practice and public health policy. We found that age, positive family history, and high BMI were significantly associated with Type 2 diabetes. BMI is potentially modifiable, and should be addressed by preventive health activities. The high prevalence of Type 2 diabetes mellitus and its potential increase as a result of the aging of this population constitutes a major public health problem. The figure of asymptomatic patients is significant. There was no role of opportunistic screening or education in this setting of patients. We recommend :

- Selective or targeted screening programs should be part of goals of family practice training
- Establishment of national screening committee as part of updating family practice care
- Promoting health through opportunistic screening and education
- Obesity is major modifiable risk factor should be part of education in diabetic clinics for patients and companions.

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