PREVALENCE OF DIABETES MELLITUS AMONG ADULT POPULATION IN NARLIDERE DISTRICT-IZMIR; WITH REFERENCE TO THE AFFECTS OF SOME MAJOR CAUSES*

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SUMMARY

Objectives: Objectives were to determine the prevalence of diabetes, analyse the causal relations, and assess the validity of the diagnostic criteria from the history.

Method: A cross-sectional study was administered on a cluster sample of 3,004 males and females over 20 years of age. Personal characteristics and family history aiming at the independent variables were obtained. History of known diabetes was taken and capillary blood glucose and fasting venous serum glucose were measured in order to reach the diagnosis of diabetes as the dependant variable in Narlıdere, a semi-urban district in Izmir.

Results- Prevalence of diabetes was 4.5%, being significantly higher in female population(5.4%) than in male population(3.4%)(OR:1.56). Prevalence increased significantly by age groups, by the increase in the body mass index and the existence of family history. Clinical symptoms indicated high specificity.

Conclusions- Having been determined as a disease with high prevalence, diabetes should be taken seriously especially in the elderly, female and obese people. Clinical symptoms with their high specificity might be used for the elimination of the suspected cases.

Key words: Diabetes mellitus, prevalence-diabetes mellitus, epidemiology-diabetes mellitus.

ÖZET

Amaçlar: Araştırmanın amaçları diyabet prevalansını belirlemek, nedensel bağıntıları incelemek ve öyküden gelen tanı kriterlerinin geçerliliğini ölçmektir.

Yöntem: Küme örnekleme ile seçilen 20 yaş üzerindeki 3,004 erkek ve kadında kesitsel bir araştırma yapılmıştır. Bağımsız değişkenler olarak kişisel özellikler ve aile öyküsü seçilmiştir. Bağımlı değişken olarak diyabet tanısına ulaşmak amacıyla, İzmir'in yarı kentsel bir bölgesi olan Narlıdere'de, kapiller kan şekeri ve açlık serum glukozu ölçülmüş ve tanısı olan diyabetiklerde öykü alınmıştır.

Bulgular: Diyabet prevalansı %4.5 bulunmuştur. Cinsiyete ilişkin olarak kadınlarda(%5.4) erkeklere (%3.4) oranla anlamlı yüksek olduğu görülmüştür(OR:1.56). Prevalansın yaş grubu, beden kütle indeksindeki artış ve aile öyküsü ile anlamlı olarak arttığı saptanmıştır. Klinik semptomların seçiciliğinin yüksek olduğu saptanmıştır.

Yorum: Yüksek pravalansa sahip olan diyabetin, özellikle yaşlılar, kadınlar ve şişmanlarda ciddiye alınması gerekir. Klinik semptomlar, yüksek seçicilikleri ile, kuşkulu olguların ekarte edilmesinde kullanılabilir.

Anahtar sözcükler: Diyabetes mellitus, diyabetes mellitus prevalansı, diyabetes mellitus epidemiyolojisi.

The rapidly increasing prevalence of Diabetes Mellitus (DM) has become emergent while WHO estimates that over 143 million people are affected according to 1997 statistics, and the world-wide total will rise to 300 million by the year 2025 (1). In many populations the prevalence of DM is increased by age and this is affected by the age pattern of the community (2). Early morbidity and mortality caused by cardiovascular and renal complications are of vital importance regarding the developed countries (3). In 1997, 63% of persons with DM were resident in the developing countries, and by 2025 this proportion will rise to 76% (1). A field study on the prevalence of DM in Turkey based on the assessment of blood glucose was not performed before this particular study. The objectives of this survey were to; i) determine the prevalence of Noninsulin-Dependent Diabetes Mellitus (NIDDM), ii) analyse the causal relations between certain variables

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and DM, and iii) assess the sensitivity and specificity of the diagnostic criteria from the history.

MATERIAL AND METHOD

A cross-sectional study was planned to determine the prevalence of DM and was administered between 1991 and 1994. Study population consisted of the residents of Narlıdere District, a western seacoast semi-urban area in Izmir, affiliated to Dokuz Eylul University, with a midyear population of 63,996 in 1991, living in different urban and rural characteristics and economic diversity. A cluster sample of 3,591 inhabitants over 20 years of age was selected, calculating at least 2,963 persons as the minimum target for an expected rate of occurrence not over 5% for the sample size reliability of ±1%, with a confidence level of 99%(4). Members of the sample population were visited at home by the interns of the School of Medicine. Each individual was interviewed on the risk factors of DM, and his/her random blood glucose was assessed. People who were not found at home in the first visit were revisited in the evening and/or during the weekend. Those who were not encountered on three successive visits were excluded from the survey. Following the detection of the diabetics, a match-paired design on 135 diabetics and their pairs regarding age group, gender and socio-economic status was administered concerning the diabetic complications, which was the subject of another presentation (5). The interview on the previous diagnosis of DM together with the assessment of capillary glucose were used for the *diagnosis of the disease* as the dependant variable. In order to reach the independent variables *age, gender, and family history* of the disease for close relatives(parents and siblings) were recorded. People were also interviewed on the existence of *polyuria, polydipsia, polyphagia,* and *vaginal pruritis*. Body Mass Index (BMI) of each individual was evaluated. Portable glucometers (Glucometer ^{5421} Ames/Bayer) were used to measure the random capillary blood glucose (RCBG). Those with RCBG <115 mg/dl were considered non-diabetic. Fasting venous plasma glucose (FVPG) 8-12 hours after having their last meal was measured in those who had RCBG ≥115 mg/dl. Of those whose RCBG was between 115 and 200 mg/dl, those with FVPG <115 mg/dl were accepted as non-diabetic, those with FVPG ≥140 mg/dl on two occasions were considered diabetic; those who had a FVPG value between ≥115 mg/dl and <140 mg/dl, together with those who had FVPG ≥140 mg/dl in the first measurement and <140 mg/dl in the second measurement, were given a standard 75 g oral glucose tolerance test (OGTT). For those who had a measurement of ≥200 mg/dl for RCPG, a single value of FVPG ≥140 mg/dl was found sufficient for the diagnosis of DM, otherwise an OGTT was administered. OGTT, like all the other methods used, was interpreted according to National Diabetes Data Group (NDDG) criteria (6) for the classification and diagnosis of DM. Samples collected for FVPG and OGTT were evaluated with an autoanalyser (Technicon RA-1000). Obtained data were analysed on IBM 4341 (II), using Minitab statistics software. In order to achieve internationally comparable rates, a direct standardisation of age was applied using Segi's standard world population (7). Chi square, chi square for trend and Mantel Haenszel chi square tests were used for statistical significance. Of the 3,591 target population, 3,166 were eligible. 222 had moved permanently, 12 had died, and 191 were not detectable on three home visits. Of the eligible candidates 97 refused to participate from the very beginning, and 65 were dropped during the ongoing procedure due to non-attendance although the first contact had been made. 3,004 of the eligible 3,166 candidates participated in the survey, with a response rate of 94.9%.

RESULTS

135 people in the study population were diabetic. 98 were detected by a physician with a given history of

previous diagnosis and an additional group of 37 were diagnosed according to the measurements with the above mentioned biochemical criteria. The prevalence of DM in the study group was 4.5%. Prevalence increased by age, reaching the highest rate by 15.7% for the 65 and older age group. Gender and age distribution revealed that the prevalence in women were higher (5.4%) than that of men (3.4%) and increase in prevalence occurred earlier in women than in men (Table I, Figure 1). The higher prevalence of DM in females compared to that of males was significant (OR: 1.56, 95% CI: 1.07<OR<2.28). For both gender groups, occurrence of DM increased sharply by the positive trend in the BMI, reaching an odds ratio of 9.50 for the grossly obese people (Table II, Figure 2). Considering obesity as the confounding factor, Mantel Haenszel chi square test indicated a high significance for women over men ($p<0.001$). Those who reported a family history of DM had a much higher prevalence than those who did not reveal a family association with the disease (Table III). Considering the symptoms of DM, specificity rates seemed to be much higher than the sensitivity rates (Table IV).

Table I. Prevalence of diabetes mellitus by age and gender

	MEN		WOMEN		TOTAL	
Age Group (year)	n	%	n	%	%	Odds Ratio
20-34	1/554	0.2	4/721	0.6	0.4	1.00
35-49	9/408	2.2	24/533	4.5	3.5	9.23
50-64	21/257	8.2	40/301	13.3	10.9	31.18
65+	14/102	13.7	22/128	17.2	15.7	47.13
Total	45/1,312	3.4	90/1,683	5.4	4.5	
Age Standardised Rate:		4.0±1.3		7.5±1.5		
Chi square$_{trend}$: 166.083		p: 0.00000				

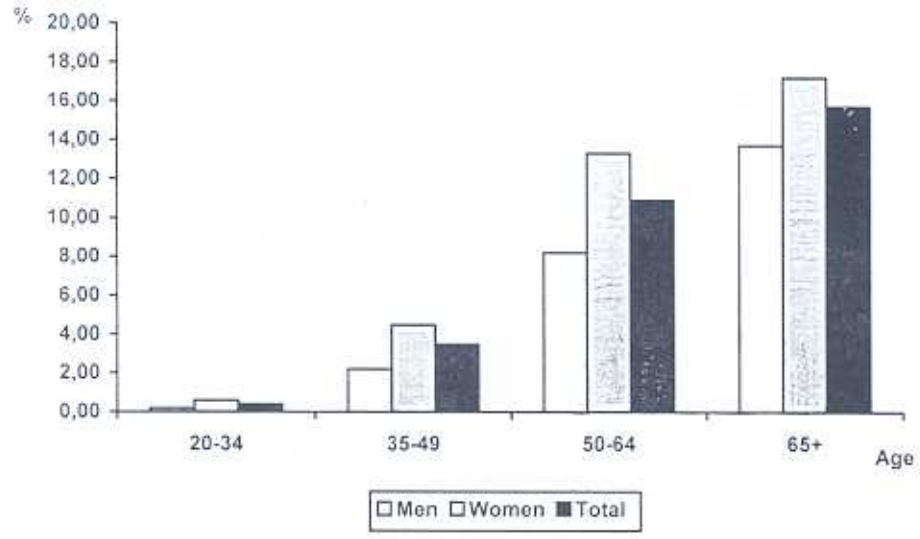

Figure 1. Prevalence of diabetes mellitus by age and gender

Table II. Diabetes mellitus distribution by body mass index

BMI(kg/m^2)	n	Diabetics	Prevalence(%)	Odds Ratio
≤19.9	278	5	1.8	1.00
20.0-24.9	1270	32	2.5	1.41
25.0-29.9	954	47	4.9	2.83
30.0-39.9	475	47	9.9	6.00
≥40.0	27	4	14.8	9.50
Total	3,004	135	4.5	
Chi square$_{trend}$: 49.215		p: 0.00000		

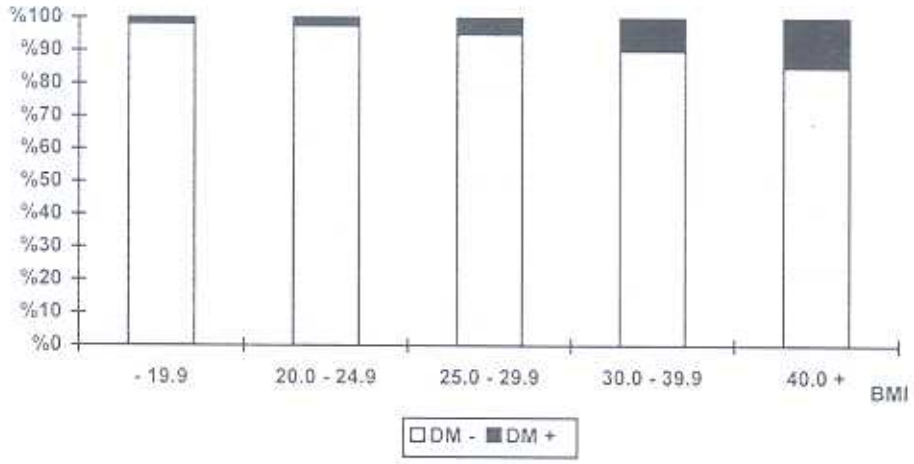

Figure 2. Diabetes mellitus distribution by BMI

Table III. Diabetes mellitus by family history

Family History	n	Diabetics	Prevalence(%)
Yes	468	52	11.1
No	2,536	83	3.3
Total	3,004	135	4.5
Chi square$_{Yates}$: 54.74		p: 0.00000	

Table IV. Sensitivity and specificity of the symptoms (%)

Symptom	Sensitivity	Specificity	n
Polyuria	67.4	87.0	3,004
Polydipsia	73.0	87.2	3,004
Polyphagia	55.0	87.2	3,004
Vaginal pruritis	46.7	88.0	1,683*
*Women only			

DISCUSSION

No epidemiological data regarding DM prevalence based on blood glucose assessment was available in Turkey prior to the results of this study. A WHO estimation on the overall prevalence for the country population in 1985 was 1-2% (8). That is a quite moderate figure compared to the rate of 4.5% of this study, which indicates a prevalence of 3.4% for males and 5.4% for females. With the determined prevalence, the population included in this survey would be comparable to the members of the medium DM prevalent group of countries which have a prevalence of 3-10%, according to WHO criteria (7). In the same group, Tunisian men by 6.8% and women by 7.9%, Sri Lankan men by 5.1% and women by 2.4% and Chinese people (for both genders) by 1.6% can be found (7). The same applies to the men and women of the populations living in Aragon, Spain with 6.1% (9), Galicia, Spain with 7.5% (10), and Sudan with 3.4% (11) prevalences of DM. Impaired glucose tolerance was determined in only 0.3% of the population which stands as the smallest figure noticed among the published data (7,9,11). According to the WHO 1980 Diabetes Report, female/male ratio of diabetes is 1.4 in developed countries, while the disease is more prevalent in men than in women in the South East Asian populations (3). Frequency of DM increases sharply by the change in age groups which is completely relevant to the common trend displayed in the national and international studies (11,12-15). Like the WHO DM prevalence report, prevalence increases with age reaching its peak at the 65-79 years age group and decreases for the 80 years and over age group most probably due to the rise in the fatality of the disease (7). For the developed countries this peak overlaps the oldest age group, while for the Pima Indians who have the highest known NIDDM prevalence rate for all the age groups the highest proportion is in the 40-50 year age group (15,16). Obesity, like genetic inclination, ethnic origin, age, impaired glucose tolerance, hypertension and hyperlipidemia, is one of the major risk factors (11,17,18). Narlıdere survey reflects a very high presence of obesity of almost half of the population (48.5%) and 72.6% of the diabetics, 60.0% of males and 78.9% of females among the diabetic group were defined obese. Familial role of diabetes is well known (19,20). Those with a family history have 2-6 times higher risk compared to those who do not report the disease in their relatives (11,21). Narlıdere study indicated a genetic inclination for 38.5% of the diabetics which is considerably higher than the Italian (25.0%), Tanzanian (14.4%) and Greek (19.8% males, 21.3% females) cases (22-24).

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