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Epidemiology of Diabetes Mellitus in and Around Faisalabad, Pakistan

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Abstract: The epidemiology of diabetes mellitus was studied in and around Faisalabad, Pakistan. The age of diabetic patients ranged from 5 to 82 years. The mean (SD) values for age, age at diagnosis of diabetes and duration of diabetes were 50.798(13.449), 44.086(13.163) and 6.744(5.668) years respectively. The most frequent age, age at diagnosis and duration of diabetes was 45, 40 and 10 years respectively. Family history of diabetes was observed in 25.962% patients. There was no association among family history, age at diagnosis of diabetes and gender. Prevalence of obesity was 28% while 30% diabetic patients were lean. In obese group a high prevalence of female patients (79.310%) was observed as compared with males (20.689%). Type 2 diabetes was (98.077%) the most prevalent type and was more common in females. Preponderance of females (86.207% vs 13.793%) was found in age group of 35-44 years based on age at diagnosis of diabetes. Any kind of late diabetic complications were observed in 76% diabetic patients. Finally obese females with diabetic history in their families should be diagnosed for diabetes during 35-44 years of age. This practice may be of great help in early diagnosis and then after proper management of diabetes.

Key words: Diabetes mellitus, epidemiology, family history, obesity, age, diabetes duration

Introduction

Diabetes mellitus (DM) is one of the leading causes of death and disability in the world (Turner *et al.*, 1999). It is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both (Alberti and Zimmet, 1998; 1999). It has been reported that nearly 7% of the world's population suffers from diabetes (Anthony *et al.*, 1999). It is predicted that there will be 42% rise in the diabetic patients in developed countries and it is likely to be close to 170% in developing countries (King *et al.*, 1998). Current estimates show that there are approximately 135 million cases world-wide (King *et al.*, 1998) and the number is predicted to increase to 230 million by 2010 and 300 million by 2025 (Zimmet and McCarty, 1995). With this observation, the International Diabetes Federation (IDF) and World Health Organization (WHO) have declared diabetes as a global epidemic (Zimmet and McCarty, 1995). Diabetes is the major cause of premature mortality (Guk *et al.*, 1998). If the diabetes is poorly controlled it can lead to diabetic complications (Alberti and Zimmet, 1998; 1999). The severity of complications is modified by genetic factors, since many of the diabetic patients do not develop complications even when their glycemic control is not optimal (Rosenstock and Raskin, 1988).

Diabetes is known to be increasing in prevalence and incidence, particularly among the elderly (Black *et al.*, 1999, Alessandro *et al.*, 1999). There is evidence that the prevalence of diabetes mellitus appeared to increase steadily with age (Mangia *et al.*, 1998). Scanty literature is available regarding the exact prevalence of diabetes in Punjab province of Pakistan. Previously some studies were conducted mainly in Sindh, (Shera *et al.*, 1995, Staines *et al.*, 1997) NWFP (Shera *et al.*, 1999) and in some other areas (Haider *et al.*, 1980; Haider and Obaidullah, 1981; Khan, 1991). No work has been done on population of Faisalabad. Present study was therefore planned to determine the epidemiology of diabetes mellitus in and around Faisalabad, Pakistan.

Materials and Methods

A total of 1104 Physician's clinically diagnosed diabetic patients attending out door or admitted in emergency at National Hospital Faisalabad from Feb., 2000 to April, 2002 with complete history of disease were included in this study. This is a retrospective study using data from patient's history files. Required information from diabetic patients was collected using a standard

questionnaire, by interviewing and browsing patient's history files. Standard questionnaire used in this study includes, basic demographic data, diabetes history, general physical examination, systematic examination, tests and diagnosis and family history of diabetes etc. Different parameters included in study were age, sex, age at diagnosis of diabetes, diabetic complications, family history of diabetes and obesity.

Diabetic patients were classified as lean, normal and obese on basis of their body mass index (BMI). The patients with BMI ranging from 19-25kg/m (Lloyd, 1991) were classified as normal, less than 2 this as lean and greater than this as obese.

Diabetic patients included in this study were screened for family history of diabetes. While collecting data for family history of diabetes, the patients with one or more diabetic in grand parents, parents and siblings were categorized as having family history of diabetes.

For variables like age, age at diagnosis of diabetes and duration of diabetes, descriptive statistics including mean, mode, median, standard deviation (SD), minimum, maximum values, range and sample variance were applied.

Results

The descriptive statistical analysis of parameters like age of diabetic patients, age at diagnosis of diabetes, and duration of diabetes was performed (Table 1). The age of diabetic patients ranged from 5 to 82 years with mean (SD) value 50.798(13.449) years. The most frequent age of diabetic patients included in this study was 45 years. The age at diagnosis of diabetes ranged from 3 to 80 years with mean (SD) value 44.086(13.163) years. The most frequent age at diagnosis was 40 years. For duration of diabetes the mean (SD) value was 6.744(5.668) years and ranged from 0.1 to 30 years. The most common duration of diabetes found in this study was 10 years.

Diabetes mellitus was more common in females as compared with males. In this study 41.346% diabetic patients were male and 58.654% patients were female. Diabetic patients were divided into different age groups based on their current age. This grouping was done to find any increased incidence of diabetes in any specific age group. Most of diabetic patients belong to Age ranging from 35 to 64 years.

The diabetic patients were also classified into different types of diabetes mellitus on the basis of 1998 WHO criteria. Only 1.923%

Table 1: Descriptive statistical analysis of age, age at diagnosis, and duration of diabetes

Parameters	Age	Age at diagnosis	Duration of diabetes
Mean	50.798	44.086	6.744
Median	50.00	44.00	5.00
Mode	45.00	40.00	10.00
Standard deviation	13.449	13.163	5.668
Sample variance	180.881	173.264	32.131
Range	77.00	77.00	29.9
Minimum	5.00	3.00	0.1
Maximum	82.00	80.00	30.0

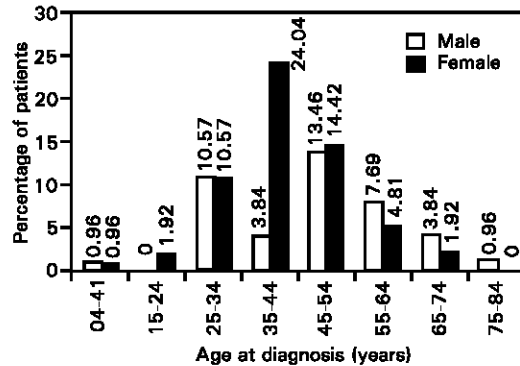


Fig. 1: Relation between sex and age at diagnosis of diabetes mellitus

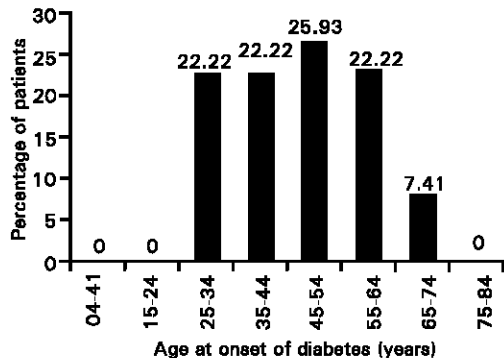


Fig. 2: Age at onset of diabetes mellitus and family history of diabetes

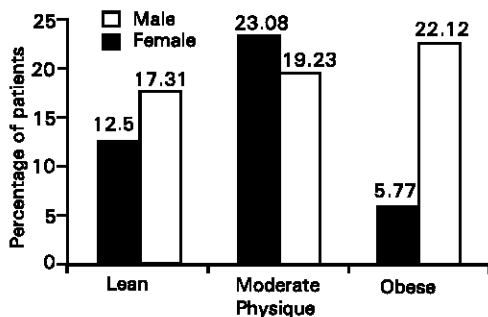


Fig. 3: Physique of diabetic patients and gender

patients belonged to Type 1. In this type, there was equal percentage of male and female patients. While, a total of 98.077% were classified in Type 2 diabetes. In this second type, there were 42.0% males and 58.0% females. So, type 2 diabetes was the most common one.

Increased prevalence of diabetes mellitus (Fig. 1) was found in the age groups of 35-44 years and 45-54 years (27.884% patients of both sexes). The data also indicates that diabetes mellitus occurred more in females (24.04%) (Fig. 1) than in males (3.84%) in the age group of 35-44 years.

Diabetic patients were screened for family history of diabetes. Family history of diabetes was present in 25.962% diabetic patients. This indicates that in these populations 25.962% diabetic patients have the risk to acquire diabetes due to genetic susceptibility and majority of diabetic patients (74.038%) develop diabetes due to different environmental factors. The data also show that most of genetic susceptible diabetic patients (diabetic patients with family history of diabetes) develop diabetes between 25 to 64 years (Fig. 2) and no specific age group was common. So there was no association between genetic susceptibility and age at diagnosis of diabetes. With respect to sex, 48.148% of diabetic patients with positive family history were male and 51.852% were female. Almost equal percentage in both sexes means that there is no effect of gender on genetic susceptibility of diabetes.

Diabetic patients were classified as lean, moderate and obese on the basis of BMI. The data indicates that 30% of diabetic patients had BMI less than normal value and were categorized as lean. While 42% patients had normal physique with BMI in normal range and 28% patients had BMI greater than 30 kg/m and were categorized as obese. Thus diabetic patients with 2 normal physique are much more as compared with lean and obese diabetic patients in this study. The patients in lean, moderate and obese groups were also investigated for their gender (Fig. 3). In lean and normal groups there was almost equal number of male and female patients. While in obese group an increased number of female patients (22.12%) as compared with male patients (5.77%) were observed. It means obesity is nearly four times more common in female diabetic patients as compared with male diabetic patients. In other words obese females have four times more risk to develop diabetes in comparison with males.

Late diabetic complications were common in diabetic patients included in this study. Seventy six percent cases had at least one or more complications while remaining (24%) cases had no diabetic complication up till time of sampling.

Discussion

The Type 2 diabetes was most prevalent (98.077%) type of diabetes. This is in accordance with the previous studies conducted in Sindh province of Pakistan (Shera *et al.*, 1995) and in other countries (Levitt *et al.*, 1997). As a result 1.923% patients were classified in type 1 diabetes. Type 1 diabetes is also said to be extremely rare in the Karachi city of Pakistan (Staines *et al.*, 1997) and in India (Bodansky *et al.*, 1987).

Previously it has been reported that the Type 2 diabetes was more in females (11.1%) as compared with males (9.4%) in the rural areas of North West Frontier Province (NWFP) in Pakistan (Shera *et al.*, 1999) and also in other countries (Rosenbloom *et al.*, 1998). Similarly in our study a high sex specific prevalence was reported in females (58.0% vs 42.05) in Type 2 diabetes mellitus. Data in present study indicates that diabetes mellitus was more common in females (58.654%) as compared with males (41.346%). Female preponderance in prevalence of diabetes mellitus in Pakistani patients has also been reported previously (Shera *et al.*, 1999, Haider *et al.*, 1980, Hameed *et al.*, 1995). It means diabetes mellitus is more common in females of Pakistani population.

Family history of diabetes was present in 25.962% patients. Association between diabetes mellitus and family history of diabetes has also been reported in Sindh (Shera *et al.*, 1995) and NWFP of Pakistan (Shera *et al.*, 1999) and in children of Pakistani, Indian or Arabic origin residing in UK (Ehtisham *et al.*, 2000).

Prevalence of obesity was 28% while 30% of diabetic patients were lean. It has been reported that prevalence of diabetes in females is higher than in males as they are more prone to obesity (Trusvel *et al.*, 1991, Gaillard *et al.*, 1998, Sumner *et al.*, 1999, Falkner *et al.*, 1999, Shera *et al.*, 1995, 1999). This is also evident from our study as in obese group a high prevalence of female patients (79.310%) as compared with males (20.689%) was

observed. So, obese individuals especially females with family history of diabetes should be targeted for diabetes. Substantial reduction in diabetes in men and women is achievable if the waist size is decreased (Okosun *et al.*, 1998) with an aerobic exercise program (Sowers, 1998) in high-risk populations.

There is an evidence that the prevalence of diabetes mellitus appeared to increase steadily with age (Mangia *et al.*, 1998). Diabetes is known to be increasing in prevalence and incidence, particularly among the elderly (Black *et al.*, 1999, Alessandro *et al.*, 1999). It has been reported that one in four black women (23.4 percent) older than age 55 has diabetes and it is the fourth leading cause of death among African and American women (Rajaram and Vinson, 1998). In view of these reports when the diabetic patients were grouped according to their age, it was reported that most Maphumolo, 1997. Audit of public sector primary diabetes care in common age of diabetic patients ranged from 35 to 65 years.

These findings are in accordance with those reported previously (Khan, 1991, Hameed *et al.*, 1995, Shera *et al.*, 1995). We may conclude that most common age of diabetic patients in this region range from 35 to 65 years and individuals with family history of diabetes should be screened for diabetes in this period of life. When patients were grouped on basis of age at diagnosis of diabetes, preponderance of females (86.207% vs 13.793%) was found (Fig. 1) in age group of 35-44 years. We first time reported increased prevalence of diabetes mellitus in females (86.207%) compared with males (13.793%) in age group of 35-45 years based on age at diagnosis of diabetes.

In conclusion obese individuals especially females with family history of diabetes should be diagnosed for diabetes at different intervals during 35-44 years of age. This practice may be of great help in early diagnosis of diabetes. Early diagnoses of diabetes using this approach will play an important role in delaying or avoiding the late diabetic complications by proper management of disease.

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