

Cross-sectional pilot study about the health status of diabetic patients in city of Misurata, Libya

* Elhwuegi AS¹, Darez AA², Langa AM², Bashaga NA²

1. Department of Pharmacology and clinical Pharmacy, Faculty of Pharmacy, Tripoli University, Tripoli - Libya
2. Department of Pharmacology and Clinical Pharmacy, Faculty of Pharmacy, Misurata University, Misurata - Libya

Abstract

Background: Being a leading cause of death worldwide, epidemiological studies about diabetes mellitus have encouraged governments to initiate or improve local diabetes monitoring and prevention strategies.

Objective: The main objective of this study was to examine the profile of diabetic patients in the city of Misurata, the third largest city in Libya.

Methods: 260 diabetic cases of both gender randomly selected from the total number of patients admitted to the centre of diabetes and endocrine disorders, Misurata -Libya for the period between January to March 2008. Data collected from patients' files and by directly questioning the patients. SPSS software version 13 was used for the statistical analysis and presentation of the data.

Results: 87% of all patients were type 2 diabetics, while only 9.9% were type 1. 73% of all patients had family history of diabetes. 52% of all diabetic patients were obese, with more obesity in females (70% of females) than males (33.8% of males). Obesity was more pronounced in type 2 patients (56.8%) than in type 1 patients (11.5%). 38% of all patients were treated with insulin while 35.4% were treated with oral hypoglycemics. Meanwhile 32.6% of type 2 diabetic patients were treated with insulin. Only 9.2% of all patients had fasting blood sugar below 140 mg/dl, whereas 55% had levels in the range of 140-180 mg/dl, while 35.8% had levels above 180 mg/dl. Microvascular complications included retinopathy (16.2% of all patients), neuropathy (11.2%), nephropathy (1.5%) and combination of neuropathy and retinopathy (6.5%).

Conclusion: High percentage of risk factors including obesity, family history of diabetes, hypertension and microvascular complications requires a Libyan national policy for the surveillance, prevention and control of diabetes and its complications.

Key words: diabetes mellitus status, Misurata, Libya

African Health Sciences 2012; 12(1): 81 - 86

Introduction

Diabetes mellitus (DM) is characterized by chronic hyperglycemia with disturbances in carbohydrate, lipid and protein metabolism. The world wide prevalence of DM for all age groups is set to increase from 2.8% in 2000 to 4.4% in 2030¹. Uncontrolled DM may result in several dangerous complications involving most body organs including retinopathy, nephropathy, neuropathy and cardiovascular diseases². Diabetes is now among the leading causes of death due to diseases in most countries of the world³. Therefore DM is a growing public health problem all over the world. Epidemiological studies about DM have encouraged governments to initiate

or improve local diabetes monitoring and prevention strategies. Misurata is fast growing city in the north of Libya with a district population of just over 550,000 in 2006 and it is considered to be the third largest city in Libya after Tripoli and Benghazi. No research could be found about the profile of diabetes mellitus in this city. It was decided therefore to carry out a pilot study involving diabetic patients visiting a specialized centre in Misurata in order to study the general profile of the disease including risk factors and complications.

Methods

This study is a cross-sectional observational pilot study about the profile of diabetic patients visiting the specialized centre for management and treatment of diabetes and endocrine disorders, Misurata - Libya. The numbers of diabetic cases studied were 260 cases (130 females and 130 males) randomly selected from the total number of patients visiting the centre for the period between January 2008 and March 2008. Data were collected from patient files and by directly questioning the patients. The

* Corresponding author:

Abdalla Salem Elhwuegi
Department of Pharmacology and Clinical
Pharmacy
Faculty of Pharmacy
Tripoli University
Tripoli, Libya
Mobile: +218-914483844
E-mail: hwuegi@hotmail.com

information included a detailed history about the patient (including body mass index BMI), type of DM, types of treatments used, time of diagnosis of DM, fasting blood sugar, education levels, complications of DM and time of their appearance after diagnosis. The data collected was presented on a spreadsheet using SPSS software program version 13. The frequency (count) for the specific variable and its percentage of occurrence within all patients and/or within the group (type 1 or type 2 DM) were calculated. The same software was used for the tabular and graphical presentations of the data.

Results

Types of DM and family history

The majority of the diabetic cases (87.3%) belonged to type 2 DM with nearly equal percentage in male and female patients (42.7% and 44.6% respectively). 9.9% of the patients had type 1 DM with higher percentages in males (6.9%) than in females (3%). 73.4% of all patients had a family history of diabetes (40.3% in females and 33.1% in males) (table 1).

Table 1: The incidence of DM according to family history and BMI

Variable	Male				Female				Total Count(%)
	Count (% from total)				Count (% from total)				
	Type 1	Type 2	Other*	Total	Type 1	Type 2	Other*	Total	
Numberof cases	18(6.9)	111(42.7)	1(0.4)	130(50)	8(3)	116(44.6)	6(2.3)	130(50)	260(100)
Family history	9(3.5)	76(29.2)	1(0.4)	86(33.1)	6(2.3)	93(35.7)	6(2.3)	105(40.3)	191(73.4)
BMI (<25kg/m ²)	12(4.6)	18(6.9)	0(0)	30(11.5)	3(1.15)	4(1.5)	0(0)	7(2.7)	37(14.2)
BMI (25-30kg/m ²)	4(1.5)	51(19.6)	1(0.4)	56(21.5)	4(1.5)	25(9.6)	3(1.2)	32(12.3)	88(33.8)
BMI (>30kg/m ²)	2(0.77)	42(16.2)	0(0)	44(16.9)	1(0.4)	87(33.5)	3(1.15)	91(35)	135(51.9)

Association of DM with body mass index (BMI)

It was found that 51.9% of all diabetic patients were obese (BMI > 30 kg/m²), 33.8 % were overweight (BMI 25-30 kg/m²) and only 14.2% were lean (BMI < 25 kg/m²) (Table 1). When a comparison was made between the type of DM and BMI, it was found that 57.7% of Type 1 diabetic cases (15 out of 26) were lean, 30.7% (8 out of 26) were overweight, while only 11.5% (3 out of 26) were obese. On the other hand, 56.8% of type 2 diabetic cases were obese (129 out of 227), 33.5% were overweight (76 out of 227), while only 9.7% were lean (22 out of 227). The percentage of female obese type 2 patients was much higher than the percentage of male obese type 2 patients (33.5% versus 16.2% respectively). On the contrary, the percentage of overweight male patients was higher than percentage of overweight female patients (19.6% versus 9.6% respectively).

Age groups of diabetic patients

It was found that 85.7% of all diabetic patients (223 out of 260) were above 40 years old with the highest frequency seen in the age group 50-70 years old. Almost all patients with type 2 DM were above 30 years old (218 out of 227), while most of Type 1 DM were below 30 years old (19 out of 26).

Types of treatments of DM

As a whole, 38.8% of all diabetic patients were treated with insulin, while 35.4% of the patients were treated with oral hypoglycemics. On the other hand, it was found that 17.3% of the patients were started on hypoglycemics and then changed to insulin. 2.7% of the patients were on diet and exercise alone, while 0.4% were started with insulin then changed to oral hypoglycemics (table 2). Only 39.2% of the patients with type 2 DM (89 out of 227) were treated with oral hypoglycemics while 32.6% of these patients (74 out of 227) were treated with insulin and 5.7% (13 out of 227) were treated by both classes. On the other hand, 96.2% of type 1 diabetics (25 out of 26) were treated with insulin and only one diabetic patient (3.84% of type 1) was treated with oral hypoglycemics (table 2).

Table 2: Types of therapy used in DM

Treatments		Type of DM (count)			
		Type 1 (26)	Type 2 (227)	Other* (7)	Total (260)
Oral hypoglycemics	Count	1	89	2	92
	% within the group	3.8	39.2	28.5	---
	% from total	0.4	34.2	0.8	35.4
Insulin	Count	25	74	2	101
	% within the group	96	32.6	---	28.5
	% from total	9.6	28.5	0.8	38.8
Oral + Insulin	Count	0	13	1	14
	% within the group	0	5.7	14.2	---
	% from total	0	5.0	0.4	5.4
Start oral now insulin	Count	0	44	1	45
	% within the group	0	19.3	14.2	---
	% from total	0	16.9	0.4	17.3
Diet and exercise only	Count	0	6	1	7
	% within the group	0	2.6	14.2	---
	% from total	0	2.3	0.4	2.7

* This includes other types of diabetes mellitus, e.g. gestational and drug induced.

Fasting blood sugar levels of diabetic patients

This study revealed that only 9.2% of the total number of patients with DM had fasting blood sugar levels below 140 mg/dl, 55% of all patients had their fasting blood sugar levels in the range of 140-180 mg/dl, while 35.8% had their fasting blood

sugar levels above 180 mg/dl (table 3). High percentage (57.7%) of type 1 DM patients had their fasting blood sugar levels above 180 mg/dl level, while 32.6% of type 2 DM patients had their fasting blood sugar levels above 180 mg/dl level.

Table 3: Fasting blood sugar levels of patients with different types of DM

Type of diabetes mellitus		Blood sugar analysis (mg/dl)			Total
		Less than 140	140-180	More than 180	
Type 1	Count	2	9	15	26
	% within the group	7.7	34.6	57.7	100
Type 2	Count	22	131	74	227
	% within the group	9.7	57.7	32.6	100
Other	Count	0	3	4	6
	% within the group	0	33	66	100
Total	Count	24	143	93	260
	% from total	9.2	55.0	35.8	100

Microvascular complications of DM

41.5% of all diabetic patients suffered from at least one microvascular complication. The most common was retinopathy (seen in 16.2% of the patients), followed by peripheral neuropathy (11.2%), then peripheral neuropathy and retinopathy (6.5%). Most

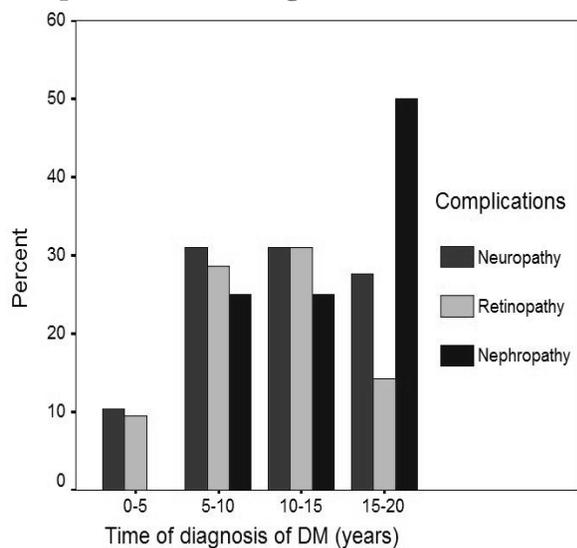
of the complications (87.3%) were seen in patients with type 2 DM. Retinopathy was seen in 13.1% of these patients (table 4).

Table 4: Microvascular complication of DM

Complications	Types of DM				Total
		Type 1	Type 2	Other*	
Non	Count	22	127	3	152
	% from total	8.5	48.8	1.2	58.5
Retinopathy	Count	4	34	4	42
	% from total	1.5	13.1	1.6	16.2
Nephropathy	Count	0	4	0	4
	% from total	0	1.5	0	1.5
Neuropathy	Count	0	29	0	29
	% from total	0	11.2	0	11.2
Neuropathy and Retinopathy	Count	0	17	0	17
	% from total	0	6.5	0	6.5

Microvascular complication usually relates to the duration of illness, where it was found that the incidence of the complication increases by increasing the duration of the illness. Diabetic nephropathy took a longer time to develop, where most of the cases were seen after 10 years of the illness (figure 1).

Figure 1: Development of microvascular complication after diagnosis of DM



Discussion

The majority of the diabetic cases in the study belonged to type 2 DM, these results are well correlated with the results of a study done in USA which reported that type 2 diabetes accounts for about 90 to 95 percent of all diagnosed cases of diabetes⁴. Identical results were reported on a Libyan population in Benghazi (2007), where the majorities (87.2%) of the diabetic patients were of type 2⁵. 73.4% of all patients had a family history of diabetes. Family history of diabetes has been

recognized as an important risk factor of the disease. In the U.S. population, family history of diabetes has a significant independent and graded association with the prevalence of diabetes⁶. These findings are consistent with a summary review of ten studies performed in various countries, which reported that individuals with a positive family history of diabetes had two to six times the risk of type 2 diabetes, compared with individuals without a family history of the disease⁷. Moreover, close relative marriage is very common in the Libyan society. It has been suggested that among all demographic and risk factors, the presence of three or more diabetic first-degree relatives corresponded to the highest diabetes prevalence for diabetes⁸. This might explain the high percentage of patients with family history of diabetes reported in this study. This association opens the possibility of adding family history to public health strategies in Libya aimed at detecting and preventing the disease at early stages.

Obesity is another major problem reported in this study, especially with type 2 female diabetic patients (table 1). The association between obesity and risk of developing diabetes has been well documented in several nations (e.g. China⁹, USA¹⁰, Turkey¹¹, France¹² and Italy¹³). Environments with plentiful food and low physical activity are well suited for the development of obesity and ultimately type 2 diabetes. Previous studies have demonstrated that changes in lifestyle are effective in preventing diabetes and obesity in selected groups of adults who are at high risk¹⁴. Therefore, obesity could be a major factor in the development of diabetes mellitus in the Libyan patients that requires intervention by educating diabetic patients of the importance of regulating their diet and the involvement in more physical activity to improve their health style.

High percentage of diabetic patients were above 40 years old, where almost all patients with type 2 DM were above 30 years old. This is in accordance with the findings that over 95 percent of persons with type 1 DM develop the disease before the age of 25, while type 2 tend to occur at older age¹⁵. The influence of age on the development of diabetes is an international phenomena. In a study done in USA the prevalence of diabetes rose rapidly from a range of 1.4-3% for age category 20-39 years to an average of 17.3-29.3% for age category 60-74 years¹⁶. Similar results were reported with other nations^{17,18}.

Insulin was given to 38.8% of all diabetic patients, while 35.4% of the patients were treated with oral hypoglycemics. 32.6% of the patients with type 2 DM were treated with insulin (table 2). In the study done in Benghazi (2007), 39.6% of all type 2 diabetic patients were treated with insulin⁵. In Australia, data show that 96% of type 1 DM and only 6.4% of type 2 DM were treated with insulin. On the other hand, nearly equal percentage were treated with a combination of insulin and oral hypoglycemics (3%), and about 58% of the type 2 diabetic patients were treated with oral hypoglycemics¹⁹. In USA, a 2006 study showed that among adults with diagnosed diabetes (type 1 or type 2) 14% take insulin only, 13% take insulin and oral medication, 57% take oral medication only, and 16% do not take either insulin or oral medication⁴. The high percentage for the use of insulin in type 2 DM in this study might indicate the poor compliance of the patient to therapy with oral hypoglycemics, the condition that will result in poor control and will force the physician to prescribe insulin in order to avoid or delay the appearance of diabetic complications.

Most of diabetic patients in this study had fasting blood sugar levels above the international recommended levels in spite of the fact that 38.8% of them were treated with insulin (table 3). The acceptable fasting blood sugar level as it is recommended by the American Diabetes Association and the European Association for the Study of Diabetes is in the range of 70-130 mg/dl²⁰. Three possibilities can be drawn from these results, patients' incompliance with therapy, patients were not fasting before sampling, or inaccurate measurements of blood glucose levels. The clinical trials, in concert with epidemiological data, support decreasing glycemia as an effective means of reducing long-term microvascular and neuropathic complications²⁰.

Further more, other more accurate measures such as postprandial blood sugar and A1C levels should be used as a measure of glycemic control in Libyan patients.

41.5% of all diabetic patients suffered from at least one microvascular complication (retinopathy, peripheral neuropathy or a mixture of neuropathy and retinopathy) (table 4). These microvascular complications were found to be related to the duration of illness where diabetic nephropathy took a longer time to develop (figure 1). This is in agreement with other reports that retinopathy can be detected in nearly every patient after diabetes duration of 20 years²¹. It was reported that diabetic nephropathy accounts for 19% of end stage renal disease, microalbuminuria which is an early marker of diabetic nephropathy, can be found in 30% of the patients after 10 years of diabetes²¹. Due to the severity of the diabetic complications many studies regarded that an early intensified antidiabetic treatment is highly important for the prevention of microvascular events.

The limitation of this study was the small number of patients involved which should be extended to a larger number of patients.

Recommendation

A national diabetic policy following the guidelines set by World Health Organization (WHO) is urgently needed. Education and training of the patients and their families about diabetes mellitus are the key steps in improving health outcomes and quality of life. It should focus on self-care behaviors, such as healthy eating, being active, monitoring blood glucose and strictly adhering to treatments.

Conclusion

This study revealed many important facts related to diabetic patients in the city of Misurata and indicated the need of a national policy about the diseases, that majority of the patients had family history of diabetes.

Acknowledgements

We are grateful to the staff of the centre for management and treatment of diabetes and endocrine disorders, Misurata – Libya for helping us in the acquisition of data from their patients file. We are also thankful to the patients who were very helpful and understanding.

References

1. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004; 27(5): 1047-1053.
2. Stolar M. Glycemic control and complications in type 2 diabetes mellitus. *Am J Med*. 2010; 123(3 Suppl): S3-11.
3. Alicic RZ, Tuttle KR. Management of the Diabetic Patient with Advanced Chronic Kidney Disease. *Semin Dial*. 2010; 23(2): 140-147.
4. National estimates and general information on diabetes in the United States of America. [<http://www.diabetes.niddk.nih.gov/dm/pubs/statistics/index.aspx>]
5. Roaeid RB, Kablan AA: Profile of diabetes health care at Benghazi Diabetes Centre, Libyan Arab Jamahiriya. *East Mediterr Health J*. 2007; 13(1): 168-176.
6. Valdez R, Yoon PW, Liu T, Khoury MJ: Family History and Prevalence of Diabetes in the U.S. Population: The 6-year results from the National Health and Nutrition Examination Survey (1999–2004). *Diabetes Care*. 2007; 30:2517–2522.
7. Harrison TA, Hindorff LA, Kim H, Wines RC, Bowen DJ, McGrath BB, et al: Family history of diabetes as a potential public health tool. *Am J Prev Med*. 2003; 24(2): 152-159.
8. Annis AM, Caulder MS, Cook ML, Duquette D. Family history, diabetes, and other demographic and risk factors among participants of the National Health and Nutrition Examination Survey 1999–2002. *Prev Chronic Dis*. 2005; 2(2): A19
9. Wang Y, Mi J, Shan XY, Wang QJ, Ge KY. Is China facing an obesity epidemic and the consequences? The trends in obesity and chronic disease in China. *Int J Obes (Lond)*. 2007; 31(1): 177-188.
10. Mokdad AH, Bowman BA, Ford ES, Vinicor F, Marks JS, Koplan JP. The continuing Epidemics of Obesity and Diabetes in the United States. *JAMA*. 2001; 286: 1195-1200.
11. Yumuk VD, Hatemi H, Tarakci T, Uyar N, Turan N, Bagriacik N, Ipbuker A: High prevalence of obesity and diabetes mellitus in Konya, a central Anatolian city in Turkey. *Diabetes Res Clin Pract*. 2005; 70(2): 151-158.
12. Defay R, Delcourt C, Ranvier M, Lacroux A, Papoz L, POLA Study Group. Relationships between physical activity, obesity and diabetes mellitus in a French elderly population: the POLA study. *Int J Obes Relat Metab Disord*. 2001; 25(4): 512-518
13. Calza S, Decarli A, Ferraroni M: Obesity and prevalence of chronic diseases in the 1999–2000 Italian National Health Survey. *BMC Public Health*. 2008; 28:8: 140.
14. Tuomilehto J, Lindstrom J, Eriksson JG, et al: Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med*. 2001; 344: 1343-1350.
15. Mayfield JA: Diagnosis and Classification of Diabetes Mellitus: New Criteria. *Am Fam Physician*. 1998; 58(6): 1355-1361
16. Harris MI, Flegal KM, Cowie CC, Eberhardt MS, Goldstein DE, Little RR, et al. Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in U.S. adults. The Third National Health and Nutrition Examination Survey, 1988-1994. *Diabetes Care*. 1998; 21(4): 518-524.
17. Vanderpump MP, Tunbridge WM, French JM, Appleton D, Bates D, Rodgers H, Evans et al. The incidence of diabetes mellitus in an English community: a 20-year follow-up of the Whickham Survey. *Diabet Med*. 1996; 13(8): 741-747.
18. Blanchard JF, Ludwig S, Wajda A, Dean H, Anderson K, Kendall O, Depew N. Incidence and prevalence of diabetes in Manitoba, 1986-1991. *Diabetes Care*. 1996; 19(8): 807-811.
19. Australian Government, Australian institute of health and welfare, Use of medicines by Australians with diabetes. [<http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=6442453548>]
20. Nathan DM, Buse JB, Davidson MB, Ferrannini E, Holman RR, Sherwin Ret al. American Diabetes Association; European Association for Study of Diabetes: Medical Management of Hyperglycemia in Type 2 Diabetes: A Consensus Algorithm for the Initiation and Adjustment of Therapy: A consensus statement of the American Diabetes Association and the European Association for the Study of Diabetes. *Diabetes Care*. 2009; 32: 193-203.
21. Resl M, Clodi M: Diabetes and cardiovascular complications. *Wien Med Wochenschr*. 2010; 160(1-2): 3-7.