

Profile of diabetes health care at Benghazi Diabetes Centre, Libyan Arab Jamahiriya

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مُرْتَسَم الرعاية الصحية لمرضى السكري في مركز بنغازي للسكري، بالجمهورية العربية الليبية
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الخلاصة: هدفت هذه الدراسة إلى تقييم معايير الرعاية ومعارف المرضى وممارساتهم في مركز بنغازي للسكري، وفيه أكبر سجل للسكري في الجمهورية العربية الليبية. فأجريت في عام 2002 لقاءات شخصية مع عينة شملت 805 مرضى ممن يحضرون إلى المركز على مدى شهرين، واتضح بوجه عام أن نحو 48.3% منهم لم يجروا أي قياس لضغط الدم على الإطلاق، وأن 14.2% لم يُفحص قاع العين فيهم على الإطلاق، وأن أيًا منهم لم يُجر له تقدير الهيموغلوبين الغليكوزيلاتي. ولم يكن أكثر من 2.4% من المرضى المصابين بالسكري من النمط الأول، يستخدمون مقياس سكر الدم ولا أكثر من 8.0% يستخدمون أجهزة تحري السكري في البول. وكان كثير من المرضى غير ملتزمين بالمعالجة، ويجهلون أعراض نقص سكر الدم أو مضاعفات السكري. وما يدل على أن هذه العيادة تحتاج إلى الارتقاء بمستوى التوعية وإلى تحسين الرعاية المتواصلة لمرضى السكري.

ABSTRACT The aim of this study was to assess the standards of care and patients' knowledge and practices at Benghazi Diabetes Centre, the largest diabetes registry in the Libyan Arab Jamahiriya. A sample of 805 attending patients was interviewed over 2 months in 2002. Overall, 48.3% had never had blood pressure checked and 14.2% had never had a fundus examination and none had ever had glycosylated haemoglobin estimation. Only 2.4% of type 1 diabetics used a glucometer and 8.0% of all diabetics used urine sticks. Many patients were not compliant with treatment and were ignorant about hypoglycaemia symptoms or the complications of diabetes. Better continuing care and better education is needed for diabetic patients in this clinic.

Profil de la prise en charge du diabète au Centre du Diabète de Benghazi en Jamahiriya arabe libyenne

RÉSUMÉ Cette étude avait pour objectif l'évaluation des normes de soins ainsi que des connaissances et des pratiques des patients du Centre du Diabète de Benghazi, le plus vaste registre du diabète en Jamahiriya arabe libyenne. Un échantillon de 805 patients a été interrogé sur une période de 2 mois en 2002. Les résultats montrent que, d'une manière générale, les chiffres tensionnels n'avaient jamais été contrôlés chez 48,3 % des patients, 14,2 % n'avaient jamais subi d'examen du fond d'œil et aucun d'entre eux n'avait jamais eu de dosage de l'hémoglobine glyquée. Seuls 2,4 % des diabétiques de type 1 utilisaient un glucomètre et 8,0 % de l'ensemble des diabétiques des bandelettes urinaires. La non-observance du traitement était un phénomène particulièrement répandu dans cet échantillon de patients dont, en outre, un bon nombre ignorait tout des symptômes de l'hypoglycémie ou des complications du diabète. Une amélioration de la prise en charge continue et de l'éducation des patients diabétiques est indispensable dans cet établissement.

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Introduction

With about 750 000 inhabitants, Benghazi is the second largest city in the Libyan Arab Jamahiriya. Benghazi Diabetes Centre was established by Professor Othman Kadiki in 1969 and is one of the oldest and largest diabetes registries in the world. The centre is the only diabetic outpatient clinic in Benghazi municipality and supervises diabetic clinics in the eastern part of the country. Health services in the Libyan Arab Jamahiriya are free of charge. Patients are provided with oral hypoglycaemic drugs, insulin syringes, and insulin (human) free of charge; insulin is not available in the private sector.

Diabetes is a major health problem in this country. Reports show that the prevalence of diabetes in Benghazi is 14.1%, the annual average incidence of type 1 diabetes among 0–14-year-olds is 7.8 per 100 000 and diabetes accounts for 22% of all medical admissions to a teaching hospital in Benghazi [1–3]. The aim of this study, which to the best of our knowledge is the first in the Libyan Arab Jamahiriya, was to audit the quality of care provided to those patients and to assess the knowledge of diabetes and its complications among diabetic patients attending this clinic, in order to target improvements in care for this major health problem.

Methods

The study was conducted at Benghazi Diabetes Centre during January to February 2002.

Benghazi Diabetes Centre

The centre is the only outpatient diabetes clinic in Benghazi, and a total of 23 420 diabetic patients (13 426 females, 10 121 males) were on the register at the end of

year 2000. The centre is run by 5–7 doctors and 10–15 nurses although none of the nurses have received any specialist diabetes training. All registered patients have files.

The centre provides care for 250–300 diabetics daily, including supplying medications, assessment of metabolic control and advice about managing hypoglycaemia. Services include testing of blood glucose (fasting and post-prandial blood glucose levels), urine for glucose and ketones, blood urea and creatinine, cholesterol and triglycerides. There are no facilities for measuring electrocardiogram (ECG), high-density lipoprotein (HDL) cholesterol, microproteinuria or glycosylated haemoglobin (HbA1c). The centre provides oral hypoglycaemic drugs, insulin and insulin syringes free of charge. Urine glucose/ketone strips are provided occasionally but not glucometers. Diabetic ketoacidosis is usually treated in hospitals where facilities for checking blood electrolytes and arterial blood gases and ECG are available. There is no current education programme for patients. A dietitian (non-Libyan) is available once a week as part of a medical students' teaching programme. An ophthalmologist is available twice week. There is no chiropodist.

Patients included in the survey were those who fulfilled the following criteria: Libyan nationality; registered in the clinic and having a file; resident in Benghazi; and registered with diabetes for at least 1 year.

Of 852 diabetic patients who fulfilled the inclusion criteria and attended during the study period, 805 (94.5%) agreed to complete the interview.

Interviews

Patients were interviewed by doctors at the centre. The questionnaire included:

- *Background data.* Age, level of education/literacy.

- *Clinical profile.* Type of diabetes, treatment being taking, frequency of drug dosage.
- *Diabetes knowledge and practices.* Patients were asked about their adherence to treatment (if they take their treatment in the prescribed dosage and frequency) and their knowledge about the symptoms of hypoglycaemia (if they knew any symptoms and if so what symptoms they knew) and how to treat it. Those on insulin were asked where they kept the insulin, whether they shake it before use, whether they change the injection site and whether they use self-injection or injection by others.
- *Food and exercise.* Patients were asked about their eating habits and if they performed any regular exercise. Libyan women do not typically practise any outdoor exercise and we defined regular exercise those who carried out the daily housework themselves, i.e. washing, cleaning, cooking and dusting alone. For men we defined taking exercise if the patient walked daily for at least half an hour.
- *Diabetes complications.* Patients were asked if they had had their blood pressure measured within the last 6 months; if they knew the effects of diabetes on the eye and the kidney; if they had ever had a fundus examination within the last year (and date of last check-up); whether they have feet check-ups; whether they walk barefoot (in the house only); if they had ever had foot ulcers (whether these had been seen by the doctor, and who treated the ulcer). Patients were asked to report any hospital admission during the previous year and the reason for admission.

Patients' records

Patients' records were used to confirm information supplied by the patient on blood pressure measurements, fundus examination and problems with foot ulcers. Patients' records were also consulted to establish the following information:

- *Type of diabetes and diabetes duration.* The diabetes classification was based on clinical presentation and the subsequent course. Patients presenting with diabetic ketoacidosis which was later controlled by oral hypoglycemic drugs were considered type 2 diabetes, while those controlled initially by oral hypoglycemic drugs but after some years became classical ketosis-prone were considered to be type 1 diabetes.
- *Lipid profile, ECG and hypertension.* We noted levels of cholesterol, triglycerides, HDL cholesterol recorded during the last year and HbA1c recorded at any time since diagnosis. The patient was considered hypertensive if he or she was on hypotensive drugs and/or had blood pressure $\geq 140/90$ mmHg.

Analysis

Data are presented as percentage of total or as mean and standard deviation (SD). A chi-squared test was used to test the significance of education/literacy on diabetes knowledge; the criterion of significance was $P < 0.05$.

Results

There were 805 patients (453 females, 352 males), with a mean age of 52.3 years (SD = 15). The majority (74.2%) were illiterate.

Patients' diabetes treatment and practices

The mean duration of diabetes was 12.1 (SD = 3.9) years. The majority (702, 87.2%) had type 2 diabetes (Table 1). Among patients with type 2 diabetes, 405 (57.7%) were taking oral hypoglycaemic drugs and 278 patients (39.6%) were using insulin. Only 19 (2.7%) of them were on diet control. None of the type 2 diabetes patients was taking insulin and oral drug combination. Of the 278 insulin-treated type 2 diabetic patients 162 (58.3%) were taking 2 daily doses. All 103 patients with type 1 diabetes were taking insulin, and all were on 2 daily doses.

The assessment of patient's diabetes care practices revealed that 218 patients (27.1%) did not take treatment regularly and the evening dose was omitted in 66 patients (30.3%). Among 381 patients taking insulin, 116 (30.5%) reported that they are injected by others, 58 (15.2%) did not keep insulin in the refrigerator, 43 (11.3%) did not shake insulin before use, 36 (9.4%) did not change the injection site, and 313 (82.2%) used the insulin syringe more than once (Table 2). Only 9 (2.4%) of those on insulin use a glucometer while 64 (8.0%) of all diabetic patients used urine sticks.

Table 1 Background characteristics of the sample of diabetes patients attending the Benghazi Diabetes Centre

Variable	Males (n = 352)		Females (n = 453)		Total (n = 805)	
	Mean	(Range)	Mean	(Range)	Mean	(Range)
Age years (years)	55.9	(15–83)	49.6	(14–77)	52.3	(14–83)
Duration of diabetes (years)	11.8	(1–32)	12.3	(1–28)	12.1	(1–32)
	No.	%	No.	%	No.	%
Level of education						
Illiterate	212	60.2	385	85.0	597	74.2
Elementary school	42	11.9	21	4.6	63	7.8
Preparatory school	32	9.1	23	5.1	55	6.8
Secondary school	43	12.2	18	4.0	61	7.6
University	23	6.5	6	1.3	29	3.6
Type 1 diabetes treatment						
Total	38	10.8	65	14.3	103	12.8
Insulin	38	(100.0)	65	(100.0)	103	(100.0)
Type 2 diabetes treatment						
Total	314	89.2	388	85.7	702	87.2
Oral drugs	194	(61.8)	211	(54.4)	405	(57.7)
Sulfonylurea alone	103	(32.8)	121	(31.2)	224	(31.9)
Sulfonylurea + biguanides	82	(26.1)	77	(19.8)	159	(22.6)
Biguanides alone	9	(2.9)	13	(3.4)	22	(3.1)
Insulin	109	(34.7)	169	(43.6)	278	(39.6)
Diet control	11	(3.5)	8	(2.1)	19	(2.7)
Frequency of dosage						
Single dose	148	42.0	109	24.1	257	31.9
Two doses	193	54.8	336	74.2	529	65.7

Table 2 Patients' clinical profile and diabetes care practices

Item	Males	Females	Total	
	(n = 352) No.	(n = 453) No.	(n = 805) No.	%
Not taking treatment regularly	89	129	218	27.1
Ever had hypoglycaemic attack	155	276	431	53.5
Admitted to hospital within last year	84	109	193	24.0
Reason for admission to hospital:				
Blood glucose control	19	25	44	22.8
Cataract surgery	13	18	31	5.5
Hypoglycaemia	8	14	22	3.9
Stroke	9	7	16	2.7
Acute myocardial infarction	7	6	13	2.0
Diabetic ketoacidosis	6	9	15	1.6
Infection including tuberculosis	4	6	10	1.2
Diabetic foot including amputation	5	3	8	1.0
Hypertension and congestive cardiac failure	2	5	7	0.9
Other problem	11	16	27	3.4
Known hypertensive	34	89	123	15.3
No blood pressure check-up (in last 6 months)	157	232	389	48.3
ECG and lipid profile recorded	76	117	193	24.0
Smokes cigarettes	94	0	94	11.7
No regular exercise	283	188	471	58.5
No eye check-up (in last 1 year)	139	156	295	36.6
Never had eye check-up	51	63	114	14.2
Never had feet check-up	155	304	459	57.0
Ever had foot ulcer	70	106	176	21.9
Foot ulcer seen by a doctor	43	70	113	14.0

Patients' clinical profile

A total of 123 (15.3%) patients were recorded to have hypertension (Table 2). Among males, 94 (26.7%) were smokers; none of the females were smokers. More than half (471, 58.5%) of the patients did not practice regular exercise. Overall, 193 (24.0%) patients had been admitted to hospital within the previous year. Disorders of metabolic control (poor control, diabetic ketoacidosis, and hypoglycaemia) accounted for 81

patients (42.0% of the admissions), cataract surgery in 31 (16.1%), stroke in 16 (8.3%), myocardial infarction in 13 (6.7%), and diabetic foot and amputation in 8 (4.1%).

Diabetes health care provided at the clinic

The study showed that 389 (48.3%) patients had not had a blood pressure check-up in the previous 6 months, only 49.2% had fundus examination during the previous year,

while 14.2% never had such an examination (Table 2). Many patients 459 (57.0%) had never had a foot check-up. Among 176 (21.9%) patients who had ever had a foot ulcer, the ulcer was not examined by doctor for two-thirds of them (113) (Table 2). Only 193 (24.0%) had records of ECG and lipid profile: 76 male and 117 female.

Patients' diabetes knowledge

The assessment of knowledge showed that 214 patients (26.6%) did not know the effects of diabetes on the eye and 327 (40.6%) did not know the effect on the kidney, 294 (41.4%) did not know the symptoms of hypoglycaemia and 333 (41.4%) did not know how to treat hypoglycaemia (Table 3). Many patients (71.3%) did not know the risks of walking barefoot (in the house).

Compared with educated patients, significantly more illiterate patients were unaware of the symptoms of hypoglycaemia (40.7% versus 24.5%; $P < 0.05$) and its treatment (50.3% versus 15.9%; $P < 0.05$), or the effects of diabetes on the kidney (44.9% versus 28.4%; $P < 0.05$) (Table 3).

Discussion

This study shows that, although diabetic health services are free of charge at this clinic, there is room for improvement in the

standards of diabetes health care provided. The assessment of patients' knowledge and practices suggests that education for diabetic patients also needs to be improved.

The findings about self-monitoring show that in our clinic, 8.0% of our patients used urine sticks, which is lower than 26% reported from Egypt [4] but is comparable to 10.6% reported from India [5]. In the present study, the self-monitoring of blood glucose was reported by 2.4% of insulin-users which is lower than 8% among Egyptians [4], 9.5% among Omanis [6], 21.4% among Singaporeans [7], and 40% among African-Americans [8]. None of our patients had had estimation of HbA1c compared with 17% of diabetics in England [9].

Treatment non-compliance (27.1% of patients reported not taking their treatment regularly) was higher than among Egyptians (11%) [4], this means that there is greater risk for these patients to develop complications of diabetes.

The finding that 193 (24.0%) of the diabetic patients questioned had been admitted to hospital in the previous year is comparable to 26% in USA [15]. Disorders of metabolic control (poor control, diabetic ketoacidosis, and hypoglycaemia) accounted for 81 patients in our study.

Table 3 Patients' knowledge of diabetes care by educational level

Patient does not know about:	Educated (n = 208)		Illiterate (n = 597)		Total (n = 805)		P-value
	No.	%	No.	%	No.	%	
Hypoglycaemia symptoms	51	24.5	243	40.7	294	36.5	$P < 0.05$
Treatment of hypoglycaemia	33	15.9	300	50.3	333	41.4	$P < 0.05$
Effect of diabetes on eye	49	23.6	165	27.6	214	26.6	NS
Effect of diabetes on kidney	59	28.4	268	44.9	327	40.6	$P < 0.05$
Risk of walking barefoot	163	78.4	411	68.8	574	71.3	NS

Hypoglycaemia is a serious problem with significant morbidity and mortality, yet 37.8% of our diabetic patients did not know the symptoms of hypoglycaemia. This is lower than a survey of Saudi diabetics (50%) [10], but higher than among Omani diabetics (24%) [6]. An important finding in this study is that 41.4% of our patients did not know how to treat hypoglycaemia. More than half of the patients in our study had a history of hypoglycaemia, and this may explain the finding that among patients admitted with hypoglycaemia to a teaching hospital in Benghazi, diabetes accounted for 40% of the cases [Roaeid RBM, personal communication].

In this study only 15.3% of our diabetics were known to suffer from hypertension, which is significantly lower than 54% in Mexican-Americans, 66% in Caucasians and 71% in African-Americans [11]. This low level of hypertension is probably related to the fact that 48.3% of our patients had no blood pressure check-up in the previous 6 months compared with 25.9% of diabetics in Cape Town [12], 16.4% in England [9] and 11% in Kansas [13].

Smoking is a serious health problem, and in diabetic patients it adds to the increased risk of coronary artery disease and peripheral vascular disease. In our study 26.7% of male diabetics reporting being smokers compared with 22% reported by Harris [14].

Exercise is an important component in the management of diabetes, yet only 334 (41.5%) of the studied group practice regular exercise. However, this is higher than 31% among African-Americans [8].

Diabetic retinopathy is one of the leading causes of vision loss worldwide [15]. Of the diabetic patients in this study 214 (26.6%) patients did not know the ocular effects of diabetes, comparable to 21.5% from Australia [19]. The other finding is

that 36.6% diabetic patients had had no fundus examination for over 1 year, and 114 (14.2%) had never had a fundus examination. Thus in the year before the study, only 49.2% of the patients had fundus examination; this is comparable to 49% reported by Brechner et al. [17], but lower than 62% from Egypt [4], 63.3% from United States [18], 65% from Kansas in the USA [13] and 77% from Australia [19].

Of the diabetic patients in this study, 40.6% did not know the serious effects of diabetes on the kidney. Diabetes is a leading cause of end-stage renal disease, and among Libyan diabetic patients 30.5% were found to have diabetic nephropathy [16].

More than half of patients (57.0%) had never had a foot check-up, which is comparable to 54.8% in African-Americans [19], and 50% in Australians [19], but is higher than 24% in Americans [8]. Among our diabetic patients 231 (28.7%) did not know the risk of walking barefoot in the house and this is lower than 47% in Caribbean patients [20]. Previous foot ulcerations were reported from 21.8% of diabetic patients in this study and this is higher than 12% among Caribbean patients [20]. Among those patients who had ever had a foot ulcer, the ulcer was not seen by a doctor for two-thirds (64.2%) and was treated by patient him/herself; this is comparable to 63% among Caribbean patients [20].

The finding in this study that the majority (74.2%) of our patients are illiterate, particularly women (85.0%), suggests that extra efforts are needed to deliver diabetes education. Education status and illiteracy did not seem to influence our patient's knowledge of all aspects of diabetes. Educated patients had better knowledge about hypoglycaemia and its management, and effects of diabetes on the kidneys than illiterate patients, but this was not the case with respect to the effects of diabetes on the eyes,

feet examination, urine examination, blood pressure check up, and walking barefoot, where the difference between educated and illiterate patients was not different.

Conclusions and recommendations

We conclude that better continuing care and better education is needed for diabetic patients in this clinic.

- Fundus examination, blood pressure check-up and urine testing should form the corner stone of diabetes care. Patients on insulin, particularly those who are young and educated, should be provided with glucometers for self-monitoring of blood glucose. Laboratory facilities should include estimation of HbA1c, lipid profile and urine for micro-and macroproteinuria.
- Patients should be educated about the nature of the disease, importance of treatment compliance, foot care, exer-

cise, symptoms and treatment of hypoglycaemia, and dangers of smoking. There should be visual demonstrations on how to inject insulin, feet check-ups, and nail-cutting.

- A dietitian, preferably someone knowledgeable about Libyan food and eating habits, should be available daily in the clinic. A chiropodist and full-time ophthalmologist are necessary. Health care providers (doctors, nurses, and other medical personnel) should be trained both locally and abroad on diabetes health care.

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