

Evaluation of Diabetes Care in a Primary Care Setting

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Objective: To assess the level of control of diabetes among people seen in the diabetes clinic and in a general clinic.

Design: A retrospective clinical study.

Setting: Isa Town Health Center.

Method: The records of 996 patients with diabetes were randomly selected and reviewed for screening of macrovascular and microvascular complications. The following parameters were screened: lipids, blood pressure (BP), glycated haemoglobin (HbA1C), neurovascular foot assessment, smoking, referral for retinal examination, and urine screening for albuminuria and/or proteinuria in the period from 1.3.2006 till 15.6.2006.

Result: One hundred thirty-four patients (13.5%) had HbA1C less than 7; one hundred thirty-seven patients (13.7%) had BP less than 130/80; three hundred and fifteen patients (31.6%) were on statins; forty-two (13.5%) of the patients who were on statins achieved the Low Density Lipoprotein (LDL) target level; one hundred sixty-four (16.5%) patients who were above 40 years received aspirin; three hundred and eighteen patients (31.9%) were referred for retinal examination; urine screening was done for three hundred thirty-three patients (33.4%). A highly significant statistical difference between the general and diabetes clinic was found in screening for all macrovascular and microvascular complications; with the exception of HbA1C, there was also a highly significant difference in metabolic and BP control among patients seen in diabetes versus general clinic.

Conclusion: Neurovascular assessment of the feet was missing in the records reviewed in the general clinic. Referral for retinal screening is very low especially in patients seen in the general clinic. The level of metabolic and BP control is low in both the general and diabetes clinic.

Bahrain Med Bull 2007; 29(2):

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Diabetes mellitus is a serious chronic metabolic disorder that has a significant impact on health, quality of life, and life expectancy of patients, as well as on the health care system. In the year 2000, the prevalence of diabetes was around 2.8% worldwide. It was estimated that there were about 171 million people (who were more than or equal to 20 years of age) with diabetes. This number is expected to increase to 366 million in 2030 and is attributed mainly to population aging and increased urbanization which lead to sedentary lifestyle and overweight¹.

In the Kingdom of Bahrain, it was found in a large cross-sectional survey that the prevalence rate of diabetes in the age group 50-59 was 29% in men and 36% in women. Combined impaired glucose tolerance and diabetes was found to be 40% in men in the same age group and 60% in women in the age group 60-69².

In the past three decades, diabetic care has been shifted from secondary to primary care. Surveys have found that people with diabetes are mostly seen by family doctors^{3,4}. It has also been found that these people can be effectively managed in primary care settings if guidelines were set and followed properly⁵.

Diabetes clinics were established in primary care health centres in the Kingdom of Bahrain for the last 10 years and are now available in most health centres. These clinics are run by an assigned nurse. However, the clinics are not run on a daily basis and the number of days in which the clinic is run differs from one health centre to another. In addition, not all people with diabetes are seen in these clinics. A large number are still seen in the general clinics only.

While Isa Town Health Centre provides diabetes care to more than a thousand patients and it was one of the first health centres to have a diabetes clinic, no information is available about the diabetes services provided.

The aim of this study was to evaluate diabetes care in the health centre and to determine whether there was any significant difference in the care provided between the general and diabetes clinic.

METHOD

The prescriptions of all people with chronic diseases were collected from the pharmacy from 1st September 2005 till 31st December 2005. All prescriptions that contained antidiabetic medications were collected. In addition, all the health centre's doctors were asked to refer all diabetics who were on diet control to the author to include them in the records. The records of 996 patients were reviewed for the following: smoking status, blood pressure (BP), glycated haemoglobin (HbA1C), lipids profile, retinal screening, urine screening for microalbuminuria and/or overt proteinuria, foot screening (10 grams monofilaments for neuropathy and digital palpation of distal pulses for peripheral vascular disease.), latest medications used by the patients, and finally any comments about the patients' management. Because there was no data about neurovascular assessment of the feet and body mass index in the records of the patients that were seen in the general clinic, these were not included in the analysis.

RESULTS

Out of the 996 records reviewed, 986 (99%) were Bahrainis; 579 (58.1%) were males; 984 (98.8%) were diabetes type 2 patients.

It was found that 656 patients (65.9%) underwent testing for HbA1C in the last one year. Status of control is shown in table 1. Reference range was (4.8-6%).

Table 1: Glycated haemoglobin in the records reviewed

Glycated haemoglobin (HbA1C)	Number of patients (%)
Less than 7	134 (13.5)
7- Less than 8	109 (11)
8- Less than 9	89 (8.9)
9- Less than 10	98 (9.8)
10- Less than 11	72 (7.2)
More than or equal to 11	154 (15.5)
No data	340 (34.1)
Total	996 (100)

It was also found that 740 patients (74.3%) underwent screening for serum cholesterol level and 506 (50.8%) for low density lipoprotein (LDL) level in the last one year. Similarly, 511 patients (51.3%) underwent screening for high density lipoprotein level. The status of cholesterol control is shown in table 2.

Table 2: Cholesterol level in the total records reviewed

Cholesterol level (mmol/l)	Number of patients (%)
Less than 4	65 (6.5)
4-5	233 (23.4)
5.1-6	264 (26.5)
6.1-7	128 (12.9)
More than 7	50 (5)
No data	256 (25.7)
Total	996 (100)

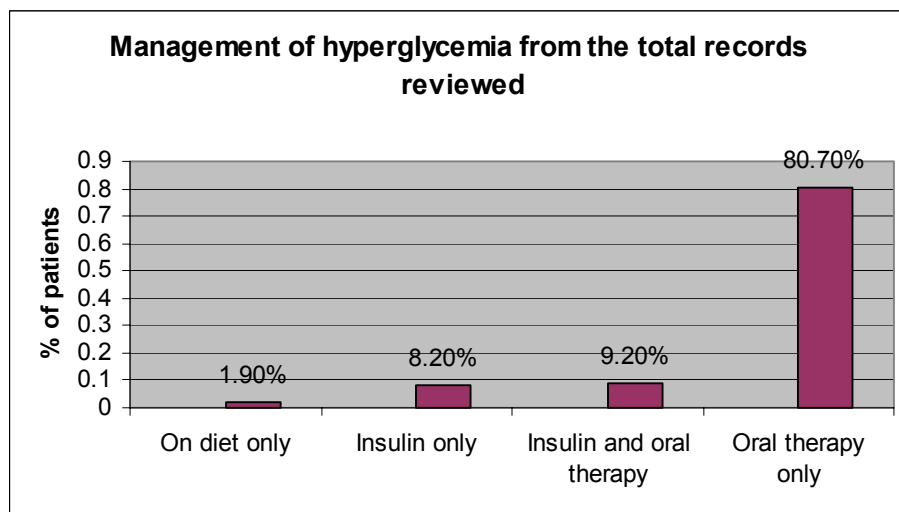
It was found that 389 patients (52.6%) had serum cholesterol level more than or equal to 5.3 mmol/l. Three hundred fifteen patients (31.6%) were receiving statins and 4.5% were on fibrates. It was found that 100 patients (31.7%) who were on statins achieved

a cholesterol level less than 5.3 mmol/l and 42 patients (13.3%) achieved LDL less than 2.6 mmol/l. A total of 735 patients (73.8%) underwent testing for triglycerides (TG) level; 376 (51.1%) achieved a TG level that is less than 1.8 mmol/l.

From the total 996 records, blood pressure (BP) readings were recorded in 914 (91.8%) in the last one year. Four hundred ninety-seven (54.3%) patients were receiving antihypertensive medications. Sixty-seven (13.5%) of these hypertensive patients were receiving shared care from secondary care clinics in Bahrain Defence Force Hospital and Salmaniya Medical Complex. It was found that 137 patients (13.7%) out of the total records (996) had BP readings less than 130/80. Of those on antihypertensive treatments and receiving care from the health centre only (total 430 patients), it was found that 216 (50.2%) were on a single medication.

Retinal screening was done for 318 patients (31.9%) and urine screening (by microalbuminuria or 24 hours urine for proteins) was done for 333 patients (33.4%) in the last one year. It was found that 312 patients were on angiotensin-converting enzyme inhibitors and 24 were on angiotensin-receptors blockers.

The method used to manage hyperglycemia is shown in the figure.



From the total records reviewed, 164 (16.5%) patients above 40 years were on aspirin tablets. The study also showed that 28 patients (2.8%) were on thyroxin and 28% were on multivitamins.

From the total 996 records reviewed, 251 patients were and are being seen in the diabetes clinic. When the data from the diabetes clinic were analyzed, it showed the following:

- Serum cholesterol was done for 226 (90%) patients; LDL for 195 (77.7%); TG for 225 (89.6%). 117 (46.6%) patients were on statins. 132 (52.6%) patients achieved a total cholesterol less than 5.3; 52 patients (26.7%) achieved LDL level less than 2.6; and 110 patients (48.9%) achieved a TG level less than 1.8 mmol/l.

- BP was measured in all the patients in the last one year. It was less than 130/80 in 49 (19.5%) patients.
- HbA1C was done for 225 (89.6%) patients. It was less than 7 in 33 (14.7%) patients.
- Retinal screening was done for 199 (79.3%) patients and urine screening (for microalbuminuria and 24 hours urine collection for proteinuria) was done for 168 (66.9%) patients.

The level of adherence and degree of control in patients seen in the diabetes clinic compared to those seen in the general clinic is shown in table 3 and 4, respectively.

Table 3: Level of adherence in the general versus diabetes clinic

Investigation / Intervention (in the last one year)	General Clinic [745 patients] (%)	Diabetes Clinic [251 patients] (%)	95% confidence interval	P value
HbA1C	431/745 (57.5)	225/251 (89.6)	0.60-0.70	0.0001
BP	663/745 (90)	251/251 (100)	0.87-0.91	0.0001
Total Cholesterol	514/745 (69)	226/251 (90)	0.72-0.82	0.0001
HDL	316/745 (42.4)	195/251 (77.7)	0.49-0.61	0.0001
LDL	311/745 (41.7)	195/251 (77.5)	0.58-0.69	0.0001
Triglycerides	510/745 (68.5)	225/251 (89.6)	0.72-0.81	0.0001
Urinalysis	165/745 (22.1)	168/251 (66.9)	0.28-0.39	0.0001
Referral for Fuduscopy	119/745 (16)	199/251 (79.3)	0.17-0.24	0.0001
Statins	198/745 (26.6)	117/251 (46.6)	0.48-0.68	0.0001
Aspirin	111/745 (14.9)	53/251 (21.1)	0.53-0.95	0.02

Table 4: Level of metabolic and BP control in the patients seen in the general versus diabetes clinic

Investigation/Intervention	General Clinic (%)	Diabetes Clinic (%)	95% Confidence Interval	P value
HbA1C (less than 7)	101/745 (13.5)	33/251 (14.7)	0.72-1.49	0.86
BP (less than 130/80)	88/745 (11.8)	49/251 (19.5)	0.44-0.83	0.002
Total Cholesterol (less than 5.3)	245/745 (32.9)	132/251 (52.6)	0.54-0.72	0.0001
LDL (less than 2.6)	68/745 (9.1)	52/251 (26.7)	0.32-0.58	0.0002
Triglycerides (less than 1.8)	266/745 (35.7)	110/251 (48.9)	0.69-0.97	0.02

DISCUSSION

While diabetes accounts for a massive burden of morbidity and mortality through its macrovascular and microvascular complications, strict control of blood sugar, blood pressure, and cholesterol has been found to result in a significant reduction of these complications in many large randomized controlled trials⁶⁻¹⁰.

This study reveals that the feet of seven hundred forty-five patients were not assessed in the last one year. This is largely due to the absence of the tools used for screening in the general clinics. For example, although monofilaments are simple, cheap, assessment requires less than a minute, and were effective screening tool for neuropathy; but still are unavailable in the clinics where the bulk of patients are seen¹¹⁻¹⁵.

Palpation of foot pulses should be the first step in identifying the asymptomatic patients with peripheral vascular disease¹⁶. According to the American Diabetes Association (ADA), the absence of both pedal pulses, when assessed by a person experienced in this technique, strongly suggests the presence of vascular disease. However, Doppler ultrasound is preferred¹⁷.

Foot examination has been consistently found to be one of the least areas to receive attention in the primary care settings. The rate of foot examinations during a one year period in a physicians' office was found to range from 30-50%¹⁸. Nonetheless, it was found that guidelines-based care resulted in improved life expectancy, gain of quality-adjusted life-years, reduced the incidence of foot complications, and was cost-effective compared with standard care¹⁹. For example, it was found that using clinical practice guidelines by the clinicians resulted in reduction of amputation rate by 48%²⁰.

This study shows that only 13.5% of the patients have an acceptable HbA1C according to ADA²¹. Although it is comparable to a recent study done in another health centre, this puts a large number of patients at high risk for microvascular complications that may adversely affects their quality of life^{22,23}. It has been found that even a small reduction in HbA1C (less than 1%), resulted in a significant reduction in all microvascular complications⁶. However, controlling HbA1C is not an easy task to achieve even in clinics with adequate resources. For example, in a survey done in general practice in Canada, it was found that only 18.5% have optimal HbA1C⁴. It was slightly better in an American study²⁴. The low control rate in this study could be explained by several reasons: firstly, low rate of measuring HbA1C (65.9%) and reliance on fasting blood sugar; 65.9% is high when compared to other studies, but the fact that more than 80% of the screened patients have a level above the target means that these patients need more frequent measurement of their HbA1C (3-monthly); secondly, delay/hesitancy in initiation of insulin in these patients^{22,25}. For example, while only 13.5% of the patients were under control, less than 20% were on insulin (Figure); thirdly, time factor which plays an important role. Seeing a patient with this complex disease for a total of less than an hour a year and in between other patients mandates reconsideration. Time was found to be one of the main barriers to deliver good care in a large survey²⁶.

Hyperlipidemia and smoking are potentially modifiable risk factors for coronary artery disease²⁷. Data about smoking was found in only 9 records reviewed. This indicates that these patients might have not been counselled about smoking which increases their risk of cardiovascular diseases. It was found that quitting has greater impact on morbidity and mortality than changing diet, weight, or exercise²⁸.

The result of lipid control is poor in this study as shown in table 2. About 45% of the patients had total cholesterol more than 5mmol/l. This could be due to the low rate of prescribing statins (31%). Keeping the patients on statins resulted in significant reduction of cardiovascular diseases even in patients with an initial cholesterol level as low as 4 mmol/l and regardless of their initial LDL level^{10,29}.

Blood pressure had been measured in more than 90% of the patients; however, the level of control is low. Only 13.7% achieved the target according to the ADA recommendations. It was found that 50% of these patients were on a single antihypertensive drug (data not shown) which may explain the low rate of control. The majority of hypertensive patients need 2 or more drugs to achieve their BP goal³⁰. For example, in a large randomized controlled trial; it was found that about 40% of the patients needed 2 or 3 drugs at 5 years to achieve a BP less than 140/90³¹. Similarly, in a landmark study, 29% of the patients needed 3 or more drugs to achieve a BP of 144/82 after 9 years of follow up⁸. On the other hand, patients' factors (e.g., compliance) should also be kept in mind as one of the contributors to this low control rate.

This study indicates that more than 80% of the patients seen in the general clinic missed screening for retinopathy and more than three-fourth missed screening for proteinuria (table 3) which can lead to a significant impact on secondary care resources and the patients' quality of life if these complications were not discovered and managed early. Another finding that needs to be highlighted is the low rate of prescribing aspirin in patients above 40 (16.5%). Aspirin is recommended as a primary preventive measure in these patients (unless contraindicated) by ADA²¹. Furthermore, aspirin was found to reduce major cardiovascular events by 15% and all myocardial infarction by 36% in a large study⁹. On the other hand, 28% of the patients are on multivitamins in which there is no consistent evidence for its benefit²¹. The study also showed that only 2.8% were on thyroxin which may indicate under screening of these patients because people with diabetes are at a higher risk for thyroid disease and it is recommended that all people (even without diabetes) above 60 (which constitutes about 37% of the sample size in this study) should be screened for thyroid disease³².

The study indicates that there is a highly significant statistical difference in screening for macrovascular and microvascular complications between the general and diabetes clinic. Furthermore, with the exception of HbA1C, statistically significant difference in metabolic and BP control was also found. However, it should be noted that around 60% of the patients seen in the general clinic were not screened for LDL which may make it difficult to speculate about their exact LDL level. While metabolic control is not very impressive, table 3 and 4 clearly show that, regardless of the presence of many barriers, patients seen in the diabetes clinic are receiving better care, but, as can be seen, only about 25% of them are being seen in this clinic.

CONCLUSION

This study shows that neurovascular assessment of the feet was missing in the records reviewed in the general clinic; referral for retinal screening is very low especially in patients seen in the general clinic; the level of metabolic and BP control is low in both the general and diabetes clinic. The level of care is currently unsatisfactory to both the providers and the policy makers, there is therefore a lot of room for improvement and serious steps should be taken to improve the care for this high risk group of patients.

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