The State of Lipid Control in Patients with Diabetes in a Public Health Care Centre

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Abstract

Achieving treatment targets has been difficult in treating diabetic patients. This cross-sectional study describes the lipid profiles of patients with diabetes mellitus at a public primary health care centre in Sarawak, Malaysia. The targets for lipid control were based on the International Diabetes Federation recommendation (2002). 1031 patients (98% Type 2 Diabetes) were studied. Fasting lipid profiles were available in 990 (96%) patients. The mean total cholesterol was 5.3 ± 1.0 mmol/L, Triglycerides 1.90 ± 1.26 mmol/L, HDL-C 1.28 ± 0.33 mmol/L and LDL-C 3.2 ± 0.9 mmol/L. Overall, 22% of patients achieved the treatment target for LDL-C level <2.6mmol/L. 67% of patients had HDL-C > 1.1 mmol/L and 42% of patients had a target TG level below 1.5 mmol/L. Of the 40% of patients who received lipid-lowering drug, 17% achieved LDL-C target, 50% had LDL-C 2.6-4.4mmol/L and 33% have LDL-C > 4.0 mmol/L. For the remaining 60% not receiving any lipid lowering therapy, 68% had LDL-C between 2.6-4.0 mmol/L and 7% had LDL-C level > 4 mmol/L. Dyslipidemia is still under-treated despite the availability of effective pharmacological agents and the greatly increased risk of cardiovascular diseases in diabetic patients. ***Asia Pac J Public Health 2007; 19(3): 16–21.***

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The State of Lipid Control in Patients with Diabetes in a Public Health Care Centre

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Introduction

Diabetes mellitus (DM) is one of the most common disorders seen in primary health care clinic. The prevalence of DM in Malaysian adults was estimated to be 8.2% in 1996[1] but the number is escalating rapidly. People with diabetes have increased morbidity and mortality particularly from cardiovascular diseases. In fact, the absolute risk of cardiovascular death was three times higher for diabetic than non-diabetic men[2] and people with diabetes have a similar risk of cardiovascular events as non-diabetic patients with established cardiovascular diseases[3]. DM is thus considered to be coronary heart disease risk equivalents and diabetic patients should have their cardiovascular risk factors treated as those with established coronary heart disease[4].

Numerous clinical studies have shown that reducing lipid level effectively decreases the risk of major cardiovascular events[5–7]. The low-density lipoprotein cholesterol (LDL-C) was targeted as the primary goal in cholesterol reduction[8] and current guidelines recommend an LDL-C level of less than 2.6 mmol/L for people with diabetes. However, few studies have explored to what extent the guideline is being followed and the treatment goal is being achieved in diabetic patients, especially in a community care setting where the majority of diabetic patients are being managed. We therefore examine the rate of testing, treatment and goal attainment for lipid control in people with diabetes managed in a busy public health care centre.

Methods

This is a cross-sectional study conducted as an audit of a diabetes clinic in a public primary health care clinic - Tanah Puteh Health Centre (KKTP) in Sarawak, East Malaysia. Sarawak is one of the thirteen states in Malaysia with a population of 2.1 million where 460,000 live in Kuching, the state capital[9]. There are three public primary health care clinics in Kuching and KKTP is one of them, registering 77,301 consultation visits in 2002 with 54,429 consultations by adult patients. Twelve percent (6,460) of the consultations were held at the diabetes clinic[10]. The diabetes clinic in KKTP was established in 2002 and managed by three doctors, three medical assistants and one trained diabetic nurse educator. The clinic registered 1,337 patients by 31st of December

2002. A cross-sectional study was conducted on these patients from 1 January 2003 to 31 March 2003 to assess the effectiveness of the diabetes clinic. This report describes the state of lipid control in the clinic with regards to the rate of testing, treatment and goal attainment.

All datas were captured from the clinic based diabetes cards and entered manually into an SPSS version 10 (SPSS Inc., Chicago, Illinois, USA). Information collected included patient demography, type of diabetes, cardiovascular risk factors (blood pressure, lipids, BMI and smoking history), glycemic control (HbAlc and FBS), renal function (serum creatinine, micro-albuminuria and proteinuria) and diabetes treatment (pharmacological and non-pharmacological). The patients fasted overnight for 8 to 10 hours for the purpose of testing for fasting lipids and blood sugar profile. Laboratory data represent the most recent results available within the preceding twelve months. Data fields were left blank if no data were available. All data were tabulated and descriptive statistical analysis performed.

The diagnosis of diabetes mellitus was made according to the WHO criteria[11]. The target for control of diabetes mellitus was based on the recommendation by the IDF[12] (Table 1). The target of cholesterol treatment was Total cholesterol <4.5 mmol/L, Triglycerides <1.5 mmol/L, HDL-C >1.1 mmol/L, and LDL-C <2.6 mmol/L. Patients were managed according to the national guidelines and consensus for diabetes, hypertension and hyperlipidemia[13–15].

Lipid profiles were measured after an overnight fast (clinical chemistry workhorse system Roche/Hitachi 912®, Roche Diagnostics). HbAlc was measured by a high performance liquid chromatography method (the Bio-Rad Variant® Hemoglobin testing system).

Results

The diabetes clinic registry recorded a total of 1,337 patients by 31 December 2002. The study was conducted over a period of three months. The final analysis had excluded 23% of the patients as shown in Figure 1. The 1,031 remaining patients on active follow-up constituted the final study population.

Patient demography

The majority of the patients were Chinese (69.0%). Other ethnic groups were Malays (21.2%), Sarawak Natives (9.1%), Indians (0.5%), and others (0.2%). Women (63%) outnumbered men. Majority (98%) of the patients had type 2 diabetes.

The mean (±SD) duration of diabetes was 6.4 ±6 years. The mean age was 59 ±12 years. The mean BMI was 26.8 ±4.5 kg/m^2 with 42% of patients overweight (BMI 25-30 kg/m^2) and 21% were obese (BMI > 30 kg/m^2). 18% of men and 22% of women were obese. The mean waist circumference (WC) was 90 ±10 cm. More women (54%) had central obesity (WC >88 cm) when compared to men (WC> 102 cm) (21%)[8].

For glycemic control, the mean HbA1c was 7.4 ±1.6%. The optimal target of HbA1c<6.5% was achieved by 28% of the patients. Pharmacological treatment for hyperglycaemia was prescribed to 96% of the patients while the remaining 4% were on lifestyle modification alone.

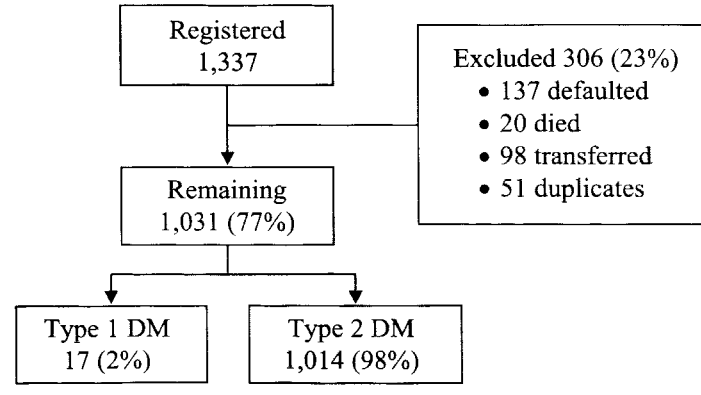
Some 75% of patients had a diagnosis of hypertension and were on treatment. The mean systolic and diastolic blood pressures were 137 ± 17 mmHg and 85 ± 10 mmHg respectively. However, only 6% of the patients had an optimal blood pressure

Table 1. Targets for glycemic, blood pressure and lipid control for diabetic patients

	optimal	Fair	poor
Fasting blood glucose (mmol/l)	4.4–6.0	6.1–7.0	>7.0
HbA_1c (%)	<6.5	6.5–7.5	>7.5
Blood pressure (mmHg)	<130/80	130/80–140/90	>140/90
Total cholesterol (mmol/l)	<4.5	4.5–6.0	>6.0
Triglycerides (mmol/l)	<1.5	1.5–2.2	>2.2
HDL-cholesterol (mmol/l)	>1.1	0.9–1.1	<0.9
LDL-cholesterol (mmol/l)	<2.6	2.6–4.0	>4.0

Modified from The Asian-Pacific Type 2 Diabetes Policy Group. Type 2 Diabetes, Practical targets and treatments, 3rd Ed. 2002: WHO. IDF.

Figure 1. Patients constituting the final analyzed population and reason for exclusion



<130/80 mmHg.

Among the 970 patients tested for proteinuria, 48% had evidence of diabetic nephropathy (with 67% overt proteinuria and 33% microalbuminuria). 78% of them received treatment with either an Angiotensin Converting Enzyme Inhibitors or an Angiotensin Receptor Blockers. Table 2 shows the various cardiovascular risk factors of the study population. Detailed results of these clinical parameters were described elsewhere[16,17].

Lipid control

Figure 2 shows the fasting lipid profile of the patients. 990 patients (96%) had a fasting lipid profile tested. The mean total cholesterol was 5.3 ± 1.0 mmol/L. There were 3% (31 patients) with the serum triglycerides exceeding 4.5 mmol/L. The LDL-C results were therefore not valid. The LDL-C was available in 959 patients. The mean LDL-C was 3.2 ± 0.9 mmol/L and the median was also 3.2 mmol/L. The majority of patients (78%) did not achieve the LDL-C treatment goal. Only 22% (207 patients) achieved the optimal LDL-C level of <2.6 mmol/L. Another 61% (589 patients) had an LDL-C between 2.6-4.0 mmol/L and 17% (163 patients) had LDL-C >4.0 mmol/L.

The mean HDL-C level was 1.28±0.33 mmol/L. The HDL-C fared much better with 67% of the patients achieving the desired target of > 1.1 mmol/L. Another 24% had a HDL-C level between 0.9-1.1 mmol/L and 8% had HDL-C <0.9 mmol/L. The mean HDL-C was higher in women (1.34 ± 0.34 mmol/L) than in men (1.16 ± 0.29 mmol/L). 76% of the women and 54% of the men had a HDL-C of >1.1 mmol/L. The mean triglyceride level was 1.90 ± 1.26 mmol/L. 42% of the patients had an optimal level of serum triglycerides (<1.5 mmol/L). 32% and 24% of the patients had a serum triglyceride level of 1.5-2.2 mmol/L and >2.2 mmol/L respectively.

Forty percent (392 patients) of the 990 patients received cholesterol-lowering drugs. 85% (333 patients) were treated with statins where lovastatin was prescribed in 99%. Another 14% (56 patients) were prescribed gemfibrozil alone. Combination therapy of gemfibrozil and lovastatin was given in 1% (three patients). For those who received lipid-lowering therapy, 17% (65/392) reached the LDL-C treatment goal. For the 60% (598 of 990) who did not receive the lipid lowering drug, 31 patients did not have LDL-C reading, 24% did not need drugs as the LDL-C were <2.6 mmol/L, 68% and 7% had LDL-C level between 2.6-4.0 mmol/L and >4mmol/L respectively.

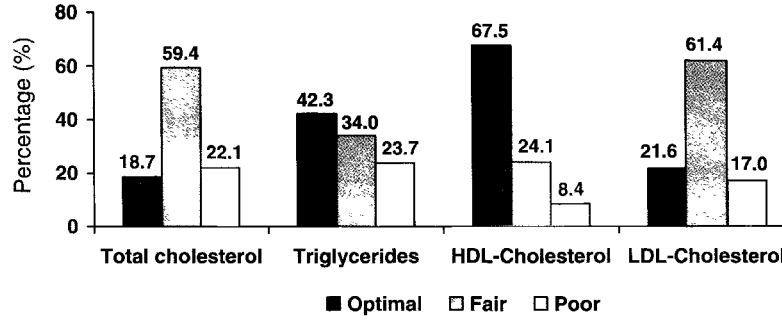
There were more patients achieving the target of optimal glycemic control than those achieving the target for

Table 2. Cardiovascular risk profiles

	Type 1 (n =17)	Type 2 (n =1014)
Age		
Male >45	78% (7)	95% (353)
Female >55	62% (5)	88% (565)
On treatment for hypertension	59% (10)	75% (762)
SBP/DBP >130/80	94% (16)	94% (951)
SBP>130	65% (11)	77% (775)
DBP>80	71% (12)	88% (893)
Obesity[a]		
BMI 25-30 (kg/m^2)	53% (9)	42% (422)
BMI >30 (kg/m^2)	18% (3)	21% (204)
Smoking	24% (4)	6% (66)
Proteinuria[b]	65% (11)	48% (458)
LDL-cholesterol[c] >2.6 (mmol/L)	82% (14)	78% (739)
Glycaemia control		
FBS>8 (mmol/L)	53% (9)	37% (375)
HbA_{1c}[d] >6.5 (%)	76% (13)	72% (687)

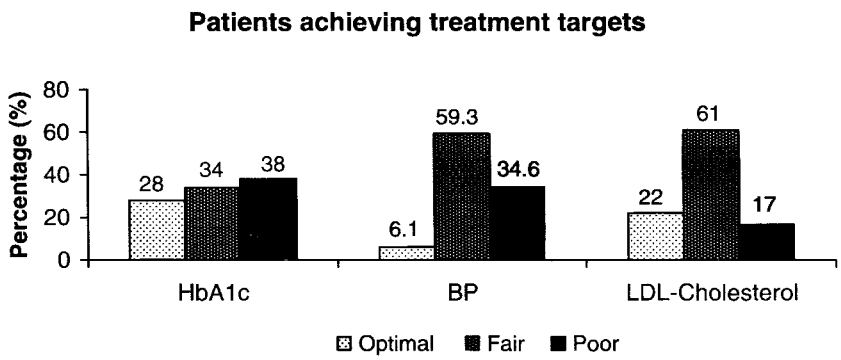
Some patients have missing data and are not included in the calculation of percentages.
Total number of patients with type 2 DM included in analysis – a: 999 subjects, b: 954 subjects, c: 943 subjects, d: 959 subjects.

Figure 2. Fasting lipid profile and level of lipid control according to IDF[12]



	Total Cholesterol N=990	Triglycerides N=983	HDL-Cholesterol N=990	LDL-Cholesterol N=959
Mean ± sd (mmol/L)	5.3 ± 1.0	1.90 ± 1.26	1.28 ± 0.33	3.2 ± 0.9

Figure 3. Percentage of patients achieving treatment targets in terms of HbA_1c, overall blood pressure and LDL-C level



Optimal: HbA_1c <6.5%; BP <130/80mmHg; LDL-Cholesterol <2.6mmol/L
Fair: HbA_1c 6.5-7.5%; BP 130/80-140/90 mmHg; LDL-Cholesterol 2.6-4.0mmol/L
Poor: HbA_1c >7.5%; BP >140/90mmHg; LDL-Cholesterol >4.0mmol/L

LDL-C or blood pressure. The HbA1c treatment target of <6.5% was achieved in 28% of patients while 22% achieved target LDL-C <2.6 mmol/L. Only 6% achieved the target blood pressure <130/80 mmHg (Figure 3).

Discussion

Diabetes mellitus independently predicts mortality as well as cardiovascular complications. The successful treatment of DM requires more than the control of hyperglycemia. A multifaceted approach paying particular attention to the multiple cardiovascular risk factors is crucial in reducing excess morbidity and mortality associated with diabetes[18-20]. Dyslipi-demia outweighs other risk factors as a risk factor for coronary artery disease[21]. Large clinical trials have established the effectiveness and benefits of lipid lowering drugs, especially statin, in reducing cardiovascular events in diabetic patients. The importance is further highlighted in two recent large clinical trials which demonstrate similar beneficial effect in diabetic patients even in the absence of cardiovascular disease or elevated LDL-C[22,23]. This has led to increasingly stringent lipid treatment goals being put forward in recent guidelines[24,25].

This study is an audit of the healthcare centre showing that the management of hyperlipidemia in diabetic patients is suboptimal and illustrating that doctors still target glucose alone in the management of diabetic patients. Although testing for dyslipidemia was performed in 96% of the diabetic patients, only 40% received a lipid lowering drugs and even less patients, i.e 22% achieved the recommended treatment target with an LDL-C >2.6 mmol/L. Even for patients receiving the lipid-lowering drugs, the LDL-C goal attainment rate was only 17%. This treatment gap between recommended standard of care and what the patients actually received had been reported in other studies[26–28]. Our results are better than the findings reported in a large managed care organisation where only 54% of their diabetic patients were tested for an LDL-C and only 28% received lipid lowering drugs[29]. Similar to our study, they also reported a low goal attainment rate of 23% for LDL-C for those tested. The AusDiab study, a large population based survey conducted in Australia, showed a similar disappointing result with 80% of their diabetic patients not achieving the target LDL-C of < 2.6 mmol/L and only 36% of the patients receiving the lipid lowering treatment[30]. Comparatively better results with 47% goal attainment rate for LDL-C < 2.6 mmol/L had been reported for diabetic patients managed in a University primary care clinic[31].

Several factors may explain the under-treatment of dyslipidemia observed in our study. The high testing rate for lipid profile in our centre contrasted with the low rate of drugs prescription for dyslipidemia. In our centre, the nurses or medical assistants had been instructed to test for fasting lipid profile in diabetic patients annually. This may account for the high lipid-testing rate. However, initiation and titration of lipid-lowering drugs was dependant entirely on the practising doctors. The under treatment reported in the study may be due to lack of awareness for both patients and physicians on the importance of treating dyslipidemia in diabetic patients. Only 40% of patients received lipid-lowering drugs whereas 96% received the pharmacological treatment for hyperglycaemia, 78% for proteinuria and 75% for hypertension. Even in those treated, only 17% achieved the treatment goal. An alarming 50% and 33% of those treated had LDL-C of 2.6-4.0 mmol/L and > 4.0 mmol/L respectively (Table 1). If the NCEP ATP III treatment goal was applied, more patients would need pharmacological agents and intensification of therapy. The healthcare providers need to lower the threshold for initiating and titrating pharmacological agents in order to maximise the potential benefits of treatment.

Increasing the awareness of the healthcare providers may increase the number of patients receiving the lipid-lowering therapy. However,this may not necessarily translate to better control. A study in Europe showed that although the proportion of patients treated with statin increased from 21% to 49%, 83% of patients on lipid lowering drugs still did not achieve the goal targeted for LDL-C[32]. Poor adherence to prescribed medication by patients. lack of follow up, inappropriate starting doses or failure to titrate lipid lowering therapy are all

potential barriers to goal achievement. A study in a managed care diabetes programme demonstrated that adherence to statin therapy by patients is an important determinant of the LDL-C goal attainment with a marked rise in the probability of successful treatments when the medication possession rate is above 80%[33]. As medical therapy for patients with diabetes becomes more complex, reinforcement of practice guidelines should go hand in hand with education and empowerment of patients in order to improve compliance and achieve mutual goals.

Another potential contributing factor to the under-treatment of dyslipidemia in our study may be due to the limited access to lipid lowering drugs, despite the availability of generic preparations. In the Malaysian government health service formulary, the use of these drugs is a privilege restricted to family medicine specialist and physicians. This can be a hindrance to treatment of dyslipidemia in diabetes. A change of policy is very much desired. This may encourage the use of effective and proven therapy like statin in the treatment of dyslipidemia in high-risk population like people with diabetes.

The strength of our study is that this large study population consists of unselected people with diabetes receiving primary care in the community, and is thus likely to be representative of the status of care in similar setting in our country where the majority of diabetic patients are being managed. There are limitations to our study. As the data were collected from the clinic-based card, we did not assess patient's awareness of the importance of dyslipidemia, their compliance to treatment or any potential adverse effect with lipid lowering drugs. We also did not have the data on doctor's knowledge on guidelines and attitude towards management of dyslipidemia in diabetics. It would also be interesting to examine demographic data of goal achievers against the non-achievers to determine the reason for poor goal attainment. Similarly, although 99% of treated patients received lovastatin, we did not examine the dosage used. However, given the low treatment rate of 40% in the study, failures to initiate and to titrate the dose were both likely to be important contributing factors towards poor goal attainment.

Conclusion

This audit study shows that hyperlipidemia in diabetic patients is still untreated or under-treated despite their greatly increase risk of cardiovascular disease. This may be due to several contributory factors as highlighted. Given the high lipid-testing rate in our clinic, more efforts should now focus on the implementation of clinical practice guidelines in terms of initiation, monitoring and titration of lipid lowering therapy, as well as on creating greater awareness among patients and health care providers on the importance of controlling dyslipidemia in people with diabetes.

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