Personal Features and Dropout from Diabetic Care

Yumi MASUDA¹, Akira KUBO², Akatsuki KOKAZE¹, Masao YOSHIDA¹,
Kanao SEKIGUCHI¹, Nobuki FUKUHARA² and Yutaka TAKASHIMA¹

¹Department of Public Health, Kyorin University, School of Medicine, Tokyo, Japan

²Takanawa Medical Clinic, Tokyo, Japan

Abstract

Objective: To investigate the personal features associated with dropout from regular outpatient care among persons with type 2 diabetes mellitus (DM).

Methods: A total of 160 DM patients were enrolled in the study. As a retrospective analysis, outpatient's clinical characteristics, lifestyle, or social features were gathered from their medical records or interview sheets. All the subjects were divided into two groups by adherence to diabetic care, namely, 'dropout case' (DC) or 'ongoing case' (OC), and were subjected to comparative analysis. We called the patients who did not receive outpatient treatment from the clinic on a regular basis, including treatment from other clinics or dropout of diabetic care, as DC. In contrast, patients who regularly visited the clinic were defined as OC. An unconditional multiple logistic regression analysis was performed to analyze the association of adherence to diabetic care with several personal features.

Results: Sixty-eight of 160 subjects (42.5%) were recognized as DC. The remaining 92 subjects (57.5%) were considered as OC. Young age ($p=0.045$), low plasma glucose ($p=0.005$) and hemoglobin A1c (HbA1c) levels ($p=0.005$), nonmedication ($p<0.001$) and no past history of DM ($p=0.007$) at the initial visit were the features related to dropout by crude analysis. Even after adjustment for age and gender by multivariate analysis, there remained significant inverse associations of dropout with HbA1c level, medical treatment (oral agents or insulin) and previous DM history. Neither occupation, distance from residence to clinic, smoking habit nor drinking habit was associated with dropout. Dropout mostly occurred after the initial or second visit.

Conclusions: A mild condition of DM may be related to dropout from regular outpatient care. It may be necessary to clearly show the objectives and importance of regular visit to an outpatient clinic for diabetic care, particularly for screened mild DM cases in public health activities.

Key words: type 2 diabetes mellitus, dropout, lifestyle, social features, outpatient, care

Introduction

Type 2 diabetes mellitus (DM) is a typical life-style related disease. Therefore, for the effective treatment of DM, strict life-long self-management, including diet and exercise is required, with regular professional healthcare supervision (1). The proper control of plasma glucose level by appropriate self-management enables the maintenance of well-being and QOL (Quality Of Life) of patients. DM is associated with degenera-

tive complications including nephropathy, retinopathy, and neuropathy. If for any reason patients drop out from a diabetic care, then they are likely to have higher risks of complications than patients under proper self-management. Accordingly, it is very important to prevent dropout from effective diabetic care, particularly for outpatients.

There have been more studies of adherence to diabetic care than of dropout (2–4). However, the clues for adherence to diabetic care may not necessarily apply to the prevention of dropout.

Diabetic specialists can provide appropriate patient education and nutritional counseling. These structured clinical programs can facilitate patients' understanding of their treatment regimen with an accompanying change of their lifestyle, and result in active patient participation in medical decision-making (5, 6). More specifically, physicians can inspire patients

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Reprint requests to: Yumi MASUDA

Department of Public Health, Kyorin University, School of Medicine,
6-20-2 Shinkawa Mitaka-City, Tokyo 181-8611, Japan

TEL: +81(422)47-5511, FAX: +81(422)76-0366

E-mail: lyumi@mvd.biglobe.ne.jp

to make additional effort toward improving glucose level; however, for some reason, patients often fail to maintain their motivations while under the care of health-care providers.

The reasons for dropout from a diabetic care can be generally summarized into the following three categories: 1) patient-oriented problem (2, 11–17), 2) health-care provider-oriented problem (11, 18, 19), and 3) physician-patient relationship (5, 20). For the patient-oriented problem, gender, age, ethnicity, educational level, economical status, tobacco use, obesity, the duration of disorder, glycemic control, and psychological problems among others can be considered. For the health-care oriented problem, waiting times, the status of appointment confirmations for outpatients, follow-up system, and the distance between the residence of the patient and the clinic can be considered. For the practitioner-patient relationship, this can be impaired by psychological problems, including decreasing motivation, mannerism or burnout occurring as a result of long-term treatments (7–10).

Therefore, the aim of this study was to investigate the background factors associated with dropout from regular outpatient care among DM outpatients. There have been no previous studies showing definitive differences between DM outpatients with and without dropout from regular outpatient care. In this study, therefore, we focused on assessing whether an outpatient's clinical characteristics, lifestyle, or, social features were associated with dropout from regular outpatient care by comparing DM outpatients with and without dropout from regular outpatient care.

Materials and Methods

1) Subjects

A total of 160 DM patients, who had initially visited a diabetes clinic located in Minato-ku, Tokyo, from 1 August 2000 to 31 August 2001, were enrolled in the study. All the subjects gave written informed consent before participating in the study.

Fifty-four of these subjects were initially diagnosed as having DM at the time of their visit to the diabetes clinic, and the remaining 106 subjects had been diagnosed as having DM by other clinics or community public health centers before their initial visit to the diabetic clinic. All the subjects underwent physical examination with evaluation of past history and filling out of interview questionnaires for lifestyle assessment. After the diagnosis of DM, diet counseling given by a dietitian and regular exercise instructions given by a physical trainer were provided for the subjects. Additionally, all the subjects were advised to have regular monthly or bimonthly clinic visits for the evaluation of their glycemic status. Thus, although the subjects had appointments for their clinic visits, they however never received any service of appointment confirmation from the clinic.

DC was defined as subjects who had not visited the diabetes clinic for at least twelve months since their last visit from 1 August 2000 to 31 August 2001, including visits to other clinics or hospitals, or dropout from diabetic care. The other subjects were considered as the reference group, referred to as OC.

2) Clinical measurements

The fasting plasma glucose and HbA1c levels of all the subjects were determined by the following methods. The glucose-hydrogenase method was used for plasma glucose assay (21). The latex agglutination turbidimetric immunoassay method was used for HbA1c assay (22). Fasting plasma glucose and HbA1c levels, and complication status in addition to the types of treatment received were obtained from patients' medical records during the initial screening in the clinic.

3) Interview questionnaire for personal features

An interview questionnaire (self-report) was developed for investigating each patient's basic background that can influence adherence to regular visit to diabetic clinics. Considering the feasibility for the participation of the subjects into the investigation, only the following data were included to avoid incomplete response to the questionnaire: 1) occupation 2) smoking habit 3) drinking habit 4) distance from residence to clinic 5) whether DM was diagnosed by another physician.

4) Analysis

In this retrospective analysis, the data of age, gender, fasting plasma glucose level, HbA1c level, complication status, the types of treatment, occupation, smoking habit, drinking habit, distance from residence to clinic, and information for previous diagnosis were subjected to the comparative analysis. All the subjects were divided into two groups by adherence to diabetic care; that is, DC and OC groups. For the DC group, the number of regular outpatient visits to the diabetes clinic until dropout was counted.

Because it could be considered that there are specific associations among age, gender, and several personal features according to previous reports (23), an unconditional logistic regression analysis was performed setting age and gender, or a set of age, gender and several personal features as covariates. Here, in addition to gender and age, one or more plasma glucose and HbA1c levels, previous diagnosis (i.e., patient initially diagnosed at the clinic, or patient who came to the clinic with a previous diagnosis by another health-care provider), DM treatment (i.e., only diet and exercise, oral plasma glucose-lowering agents, or insulin therapy), complication (i.e., no diabetic complication, or one or more diabetic complications), occupation (i.e., not employed, employed, or self-employed or freelancer), alcohol habit (i.e., never or seldom, or habitual), smoking (i.e., none, 1–20 pcs/day, or more than 20 pcs/day), distance between the clinic and the residence of the patient (i.e., within 5 km, more than 5–10 km, more than 10–20 km, or more than 20 km) were included in the unconditional logistic regression analysis. All statistical analyses were conducted using SAS statistical software for Windows, version 8.2.

Results

The detailed characteristics of the subjects are shown in Table 1. In this study period, 68 (42.5%) subjects of 160 were recognized as DC. The remaining 92 subjects (57.5%) were considered as OC.

Table 1 Comparison of basic characteristics between 'ongoing cases' and 'dropout cases'

	Ongoing (n=92)	Dropout (n=68)	Statistical significance of difference in mean values or distribution by p-value
Gender			
male/female	51/41	39/29	0.809
Age	58.66±11.11	54.74±13.44	0.045
Occupation			
not employed	41 (44.6%)	30 (44.1%)	0.374
employed	41 (44.6%)	24 (35.3%)	
self-employed, freelancer	10 (10.9%)	14 (20.6%)	
Plasma glucose (mg/dl)	208.07±96.32	180.03±84.58	0.005
HbA1c level (%)	8.92±2.44	7.74±1.97	0.005
Treatment			
nonmedication	30 (32.6%)	46 (67.6%)	<0.001
only oral agents	44 (47.8%)	16 (23.5%)	
Insulin injection	18 (19.6%)	6 (8.8%)	
Complication* (+)	18 (19.6%)	6 (8.8%)	0.06
Smoking habit			
never	67 (72.8%)	45 (66.2%)	0.202
1–20 cigarets/day	19 (20.7%)	14 (20.6%)	
more than 20 cigarets/day	6 (6.5%)	9 (13.2%)	
Alcohol habit			
% of habitual drinker	45 (48.9%)	33 (48.5%)	0.962
Previous DM diagnosis (+)	69 (75%)	37 (54.4%)	0.007
Distance from residence to clinic			
within 5 km	38 (41.3%)	19 (27.9%)	0.26
more than 5–10 km	14 (15.2%)	14 (20.6%)	
more than 10–20 km	27 (29.3%)	27 (39.7%)	
more than 20 km	13 (14.1%)	8 (11.8%)	

* denotes; 'complication' means retinopathy or renal dysfunction.

Age, plasma glucose level, HgA1c level, and treatment regimen were significantly associated with dropout.

The DC subjects were significantly younger than the OC subjects ($p=0.045$). The DC subjects had significantly lower levels of fasting plasma glucose ($p=0.005$) and HbA1c ($p=0.005$).

Treatment regimen was significantly inversely related to dropout ($p<0.001$). Forty-six subjects (67.6%) of the 68 DC subjects were treated only with diet and exercise, in contrast to the 30 subjects (32.6%) of the 92 OC subjects. For the DC subjects, 6 (8.8%) and 16 (23.5%) of the 68 subjects were treated with insulin and oral blood glucose-lowering agents, respectively. In contrast, 18 (19.6%) and 44 (47.8%) of the 92 OC subjects were treated with insulin and prescribed oral agents, respectively (Table 1). As shown in Table 2, the age and gender-adjusted odds ratio for dropout from oral agent regimen to nonmedication was 0.253 (95% CI: 0.119–0.539). The age and gender-adjusted odds ratio of insulin regimen to nonmedication was 0.215 (95% CI: 0.076–0.610) for dropout. Even after adjustments for complication and a past history of DM, these inverse associations remained (OR; 0.269 and 0.238 for only oral agents and insulin injection, respectively).

Patients with complications had a tendency for regularly visiting the clinic ($p=0.06$). The age and gender-adjusted odds ratio for dropout from complication (+) to complication (–) was 0.438 (95% CI: 0.160–1.196).

Previous DM diagnosis history (+) was significantly

inversely associated with dropout ($p=0.007$). The age and gender-adjusted odds ratio for dropout from DM diagnosis history (+) to DM diagnosis history (–) was also statistically significant, that is, 0.424 (95% CI: 0.211–0.852). However, this significant association disappeared after the adjustments for type of treatment received and complications. Neither of occupation, distance from residence to clinic, smoking habit nor drinking habit was associated with dropout. As regards the number of visit to the clinic before dropout, as shown in Table 3, dropout mostly occurred after the initial or second visit.

Discussion

Our findings suggest that outpatients without any prescribed medication tend to stop regular attendance to the clinic for diabetic care and treatment by physicians. In other words, the adherence to regular visit to a diabetic clinic may largely depend on the prescribed medication from physicians. According to the logistic regression analysis in which mutual adjustments were made for the status of treatment, complications and DM past history, only treatment status showed a significant independent negative relationship to dropout. This finding suggests that prescribed medication may be a key factor for preventing dropout. For patients with DM, oral agents or insulin injection may provide some benefits for in terms of treatment efficacy, apparent improvement of complications, or improvement of subject symptoms (1, 4, 24). However,

Table 2 Adjusted odds ratios for dropout

	Point estimate* ¹	(95% wald confidence limits)	Point estimate* ²	(95% wald confidence limits)
Occupation				
not employed	1			
employed	0.481	(0.201–1.151)		
self-employed, freelancer	1.125	(0.375–3.380)		
Plasma glucose* ³	0.836	(0.430–1.624)		
HbA1c level	0.761	(0.633–0.916)		
Treatment				
nonmedication	1		1	
only oral agents	0.253	(0.119–0.539)	0.269	(0.111–0.650)
Insulin injection	0.215	(0.076–0.610)	0.238	(0.073–0.777)
Complication				
(–)	1		1	
(+)	0.438	(0.160–1.196)	0.720	(0.244–2.122)
Smoking habit				
never	1			
1–20 cigarettes/day	1.044	(0.460–2.367)		
more than 20 cigarettes/day	1.980	(0.621–6.318)		
Alcohol habit				
never/seldom	1			
habitual	0.888	(0.431–1.832)		
Previous DM diagnosis				
history (–)	1		1	
history (+)	0.424	(0.211–0.852)	0.970	(0.408–2.303)
Distance from residence to clinic				
within 5 km	1			
more than 5–10 km	2.047	(0.799–5.241)		
more than 10–20 km	2.138	(0.978–4.673)		
more than 20 km	1.361	(0.472–3.923)		

*¹ Adjusted for gender and age.*² Adjusted for gender, age, and other two items except corresponding item among treatment, complication, and previous DM diagnosis.*³ 10 mg/dl was considered as one unit.**Table 3** Number of visits to clinic before dropout among ‘dropout cases’

Number of visit	Number of patients	%
1 time	38	55.9
2 times	19	27.9
3 times	4	5.9
4 times	2	2.9
5 times	3	4.4
6 times	1	1.5
7 times	0	0
8 times	1	1.5
Total	68	100

physicians generally insist that diet and exercise are the basic treatment regimens for mild DM (25). Some physicians often hesitate to prescribe medication, considering the potential adverse effects of prescribed drugs on insulin secretion or their side effects, such as diarrhea, liver dysfunction, or gastrointestinal disturbance (26).

Whereas the nonmedical approach of diet or exercise has been strongly recommended, treatment based solely on lifestyle modification could veil objectives of outpatient treatment on a regular basis, leading to a decrease in compliance to attendance. This situation may have failed to maintain an adequate glyce-

mic control for many mild DM cases without any medication. It may be necessary to discuss the advantages and disadvantages of taking medication independently from the duration and severity of the disorder.

In this study, plasma glucose and HbA1c levels of the DC subjects were lower than those of the OC subjects. Many DC subjects may have been in a mild glycemic status resulting from the early stage of disorder or from an appropriate previous voluntary DM control. On the other hand, the inverse association of dropout with complications or DM past history may reveal that many OC subjects have progressive DM or serious glycemic status often accompanied by complications. It may be suggested that they could not help receiving prescribed medication from physicians on a regular basis.

It was also clarified that many patients tend to drop out after a few visits to the clinic, or within a short duration after diagnosis. However, it usually takes a long time to develop a physician-patient relationship. The persistence of regular outpatient visit may generally enhance patient and physician relationship with desirable outcomes. Moreover, the establishment of communication between physician and patient including the understanding of patient's lifestyle, social and psychological statuses, and preferences or hobbies may also increase the degree of adherence to regular clinic visits (5). Thus, many patients may become dropout before the establishment of

physician-patient relationship. Physicians may have to cope fine with a patient's initiation of regular attendance.

It is reported that there are numerous mild DM cases in Japan and the number of these cases is rapidly increasing (23). The results of this study suggest the necessity of clearly informing the objectives and importance of regular visits to outpatient clinics for diabetic care of mild DM cases in public health activities.

This situation can also be applied to other mild chronic diseases necessarily involving self-care. The increase in compliance for regular outpatient care for many chronic diseases

may result in a favorable reduction of health expenditure (27).

As a limitation of this study, the effects of other disorders except DM on dropout were not considered. Moreover, because it was not a follow-up study, whether dropout patients attempted to visit another clinic was not clarified.

In the future, further studies will be necessary to develop a solution for effectively reducing the number of dropouts. Moreover, intervention studies will also be necessary to examine whether improvements of clinical service at initial evaluation and the development of a physician-patient relationship can effectively reduce dropout.

References

- (1) Naithan DM. Initial management of glycemia in type 2 diabetes mellitus. *N Engl J Med*. 2002;347:1342–1359.
- (2) Griffin SJ. Lost to follow-up: the Problem of Defaulters from Diabetes Clinics. *Diabetic Medicine*. 1985;15(suppl.3):S14–S24.
- (3) Anderson LA. Health-care communication and selected psychosocial correlates of adherence in diabetes management. *Diabetes Care*. 1990;13:66–76.
- (4) Cramer JA. A systematic review of adherence with medication for diabetes. *Diabetes Care*. 2004;27:1218–1224.
- (5) Golin CE, DiMatteo MR, Gelberg L. The role of patient participation in the doctor visit. Implications for adherence to diabetes care. *Diabetes Care*. 1996;19:1153–1164.
- (6) Hitchcock PN, Larme AC, Meyer J, Marsh G, Correa A, Pugh JA. Patient choice in diabetes education curriculum. *Diabetes Care*. 1998;21:896–901.
- (7) Polonsky WH, Jacobson M, Anderson BJ, Aponte JE, Loerer PA, Schwartz C, Welch G. Assessment of diabetes-related distress. *Diabetes Care*. 1995;18:754–760.
- (8) Ismaili K, Winkley K, Rabe-Hesketh S. Systematic review and meta-analysis of randomised controlled trials of psychological interventions to improve glycaemic control in patients with type 2 diabetes. *Lancet*. 2004;363:1589–1597.
- (9) Grigsby AB, Anderson RJ, Freedland KE, Clouse RE, Lustman PJ. Prevalence of anxiety in adults with diabetes, A systematic review. *J Psychosom Res*. 2002;53:1053–1060.
- (10) Anderson RJ, Freedland KE, Clouse RE, Lustman PJ. The prevalence of comorbid depression in adults with diabetes: A meta-analysis. *Diabetes Care*. 2001;24:1069–1078.
- (11) Graver AL, Davidson P, Brown AW, McRae JR, Woolridge K. Dropout and relapse during diabetes care. *Diabetes Care*. 1992;15:1477–1483.
- (12) Hammersley MS, Holland MR, Walford S, Thorn PA. What happens to defaulters from a diabetic clinic? *Br Med J*. 1985;291:1330–1332.
- (13) Archibald LK, Gill GV. Diabetic clinic defaulters—who are they and why do they default? *Practical Diabetes*. 1992;9:13–14.
- (14) Belville R, Florman D, Nechemias C. Health services research in action: explaining a decrease in patient visits at a diabetes clinic. *Mt Sinai J Med*. 1985;52:702–707.
- (15) Cook CB, Lyles RH, El-Kebbi I, Ziemer DC, Gallina DL, Dunbar VG, et al. The potentially poor response to outpatient diabetes care in urban African-Americans. *Diabetes Care*. 2001;24:209–215.
- (16) Simmons D, Fleming C. Prevalence and characteristics of diabetic patients with no ongoing care in South Auckland. *Diabetes Care*. 2000;23:1791–1793.
- (17) Kawahara R, Amemiya T, Yoshino M, Miyamae M, Sasamoto K, Omori Y. Dropout of young non-insulin-dependent diabetics from diabetic care. *Diabetes Res Clin Pract*. 1994;24:181–185.
- (18) Scobie IN, Rafferty AB, Franks PC, Sonksen PH. Why patients were lost from Follow-up at an urban diabetic clinic. *Br Med J*. 1994;1983:189–190.
- (19) Hardy HJ, O'Brien SV, Furlong NJ. Information given to patients before appointments and its effect on non-attendance rate. *Br Med J*. 2001;323:1298–1300.
- (20) Dulmen MD, Verhaak PFM, Bilo HJG. Shifts in doctor-patient communication during a series of outpatient consultations in non-insulin-dependent diabetes mellitus. *Patient Educ Couns*. 1997;30:227–237.
- (21) The expert committee on the diagnosis and classification of diabetes mellitus. Report of the expert committee on the diagnosis and classification of diabetes mellitus. *Diabetes Care*. 1997;20:1183–1197.
- (22) Hatakeyama I, Maruko T, Ida Y, Tsuruoka A, Machata E. Fundamental and clinical evaluation for glycosylated hemoglobin measurement kit “Determiner HbA1c” using latex agglutination immunoassay. *Medicine and Pharmacy* 1999;41:1181–1186.
- (23) Itoh C. Countermeasure for diabetes care based on “Healthy Japan 21”. *Diabetes Journal*. 2005;33:69–72.
- (24) Riddle M. Combining sulfonylureas and other oral agents. *Am J Med*. 2000;108:15s–22s.
- (25) American Diabetes Association. Standards of medical care for patients with diabetes mellitus. *Diabetes Care*. 2000;23 suppl.1:s32–s42.
- (26) Bergenstal RM, Kendall DM, Fanz MJ, Rubenstein AH. Management of type 2 diabetes: a systematic approach to meeting the standards of care II: oral agents, insulin, and managements of complications. In: DeGroot LJ, Jameson JL editors. *Endocrinology*, 4th ed. Vol. 1. Philadelphia: W.B. Saunders Company; 2001. P. 821–835.
- (27) Balkrishnan R, Rajagoparan R, Camacho FT, Huston SA, Murray FT, Anderson RT. Predictors of medication adherence and associated health care costs in an older population with type 2 diabetes mellitus: a longitudinal cohort study. *Clin Ther*. 2003;25:2958–2971.