

Social and Economic Impact on Youth-Onset Diabetes in Japan

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OBJECTIVE— To investigate the social and economic backgrounds of youth-onset insulin-treated diabetes mellitus in Japan.

RESEARCH DESIGN AND METHODS— We conducted a case-control study on 35 diabetic patients with age at onset of 19.5 ± 5.1 yr and duration of diabetes 14.9 ± 6.7 yr. Sex- and age-matched (within 5 yr) siblings were selected as control subjects. Thirty-five matched pairs were asked to complete a questionnaire, including employment status and educational achievement.

RESULTS— Overall, diabetic patients were more likely to encounter job refusal in their lives than sibling control subjects (20 vs. 0%), and most patients (6/7) who had an experience of job refusal told job interviewers about their diabetes. Although the full-time employment rate and unemployment rate did not differ significantly between patients and control subjects, income levels were lower among patients than in the sibling (1600 vs. 2500 thousand yen). A multivariate analysis indicated that patients had lower incomes than control subjects after adjusting for the effect of physical disability. Educational achievements in the patients were similar to those in the siblings.

CONCLUSIONS— These results suggested that diabetic patients had several social and economic problems in Japan. Further studies in more subjects are required to grasp the social and economic impact on diabetes precisely, and minimize the social handicaps on diabetic patients.

After the clinical initiation of insulin therapy, the life expectancy for the patient with IDDM improved dramatically (1). However, it has been only in the last 10–20 yr that a serious discussion on the social and economic is-

ssues of youth-onset diabetes has emerged.

Several studies in the U.S. and Europe examined socioeconomic factors (2–6). In contrast, to our knowledge, no studies have evaluated the socioeco-

omic status of diabetic patients in Japan. Because of the low IDDM incidence rate and high rate of premature death in Japan (7,8), little attention has been paid to the socioeconomic background of youth-onset diabetic patients.

However, a recent decrease in excess mortality in IDDM in Japan (8) would result in an increase in the number of diabetic patients working in society. Therefore, the quality of life considerations of youth-onset diabetic patients are likely to become increasingly important in Japan.

This study evaluated whether youth-onset diabetic patients are socially handicapped in Japan, and determined what factors are associated with their socioeconomic status; we used a case-control study.

RESEARCH DESIGN AND METHODS

We conducted a matched-pair case-control study by using age- and sex-matched sibling control subjects. The subjects were 123 diabetic patients with onset age of <25 yr visiting the outpatient clinic of 3rd Department of Internal Medicine, Jikei University School of Medicine in Tokyo. They were all the youth-onset insulin-treated diabetic patients in the Tokyo area; 39% were male. The mean age at onset was 18.0 ± 5.0 yr, and the mean duration of diabetes was 13.0 ± 6.9 yr.

A questionnaire on socioeconomic status was handed out to patients at the clinic. Complete data were obtained from 75% of subjects (92 of 123). Of all responding patients, 45% ($n = 43$) had a living nondiabetic sibling of the same sex and age (± 5 yr). We asked these patients to give a questionnaire to their siblings, and we obtained complete data from 81% (35 of 43) of these sibling control subjects. The total cases of responders were very similar to the cases in the matched analysis (Table 1).

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IDDM, INSULIN-DEPENDENT DIABETES MELLITUS.

Table 1—Demographic and clinical characteristics of total respondents and case-control pairs

	RESPONDENT CASES	CASE-CONTROL STUDY	
		DIABETIC PATIENTS	CONTROL SUBJECTS
n	92	35	35
SEX (M/F)	36/56	10/25	10/25
AGE AT ONSET (YR)	18.8 ± 4.9	19.5 ± 5.1	—
AGE ATTAINED (YR)	32.1 ± 7.9	34.3 ± 7.5	35.6 ± 9.3
DURATION OF DIABETES (YR)	13.4 ± 7.0	14.9 ± 6.7	—
INSULIN DOSE (U/DAY)	34.1 ± 16.1	35.4 ± 14.6	—
HbA _{1c} (%)	9.8 ± 1.5	9.7 ± 1.4	—

Data are means ± SD. Male/female ratio, attained age, age at onset, duration of diabetes and HbA_{1c} level did not differ significantly among groups. No significant differences were noted in the age at onset and duration of diabetes between total 123 cases and 92 respondents.

Social parameters in the questionnaire

The social parameters measured in the questionnaire were employment status and educational status. Current working status was classified under seven categories. The working disability definition was the same as the 1972 Work and Disability Survey (9).

Statistical analysis

McNemar's test and paired Student's *t* tests were used in matched-pair, case-control analyses. A multiple linear regression analysis was applied to evaluate the independent contribution of social characteristics to income.

RESULTS

Employment

Despite no significant difference in the current employment status, control subjects received higher income than diabetic patients (Table 2). Regarding work disability, 6 patients had work disability as a result of diabetic complications. Patients still had lower income levels than control subjects after excluding these 6 case-control pairs. Several more diabetic patients experienced job refusal than control subjects. Six of 7 patients who had been refused a job developed diabetes before obtaining a job and mentioned their diabetes to job interviewers.

Multivariate analysis revealed that four variables contributed significantly to income independently (Table 3). Therefore, diabetes status was associated with income level after adjusting for the effect of a number of factors. The proportion of individuals who had experienced absenteeism did not differ between patients and control subjects.

Education

As shown in Table 2, the distribution of educational achievement was similar between patients and control subjects. No significant difference was seen in school absenteeism of >1 mo.

CONCLUSIONS— Most reports from the U.S. and Europe have demonstrated that diabetic patients appear to be discriminated against in social and economic areas (4–6). Some reports, however, showed no significant difference in the unemployment rate between diabetic patients and the general population (2,3). The difference in conclusions might differ depending on who the subjects were, which indexes were chosen for socioeconomic background, where and when the survey was made, and whether general unemployment was

Table 2—Socioeconomic characteristics of patient-control pairs

	PATIENT	CONTROL	P VALUE
	n (%)	n (%)	
CURRENT WORKING STATUS			
FULL-TIME	22 (62.9)	21 (60.0)	>0.05
PART-TIME	3 (8.6)	4 (11.4)	>0.05
HOUSEWIFE	8 (22.9)	9 (25.7)	>0.05
UNEMPLOYMENT	1 (2.9)	—	
DISABLED	1 (2.9)	—	
RETIRED	—	—	
STUDENT	—	1 (2.9)	
REFUSAL AT EMPLOYMENT	7 (20.0)	0 (0.0)	<0.05
CHANGE OF OCCUPATION	15 (42.9)	18 (51.4)	>0.05
ABSENTEEISM AT WORK (>1 MO)	10 (28.6)	8 (22.9)	>0.05
EDUCATIONAL ACHIEVEMENT			
JUNIOR HIGH SCHOOL	1 (2.9)	1 (2.9)	>0.05
HIGH SCHOOL	21 (60.0)	16 (45.7)	>0.05
VOCATIONAL SCHOOL OR WOMEN'S JUNIOR COLLEGE	8 (22.9)	13 (37.1)	>0.05
COLLEGE OR UNIVERSITY	5 (14.3)	5 (14.3)	>0.05
YR IN SCHOOL*	12.9 ± 1.6	13.2 ± 1.6	>0.05
INCOME (10,000 YEN)*	161.4 ± 146.6	255.7 ± 207.1	<0.05

Experiences of job refusal, changing occupation, and absenteeism are measured over the lifetime of the respondents.

*Data are means ± SD.

Table 3—Multiple linear regression model for income

VARIABLE	B	P VALUE
HOUSEWIFE	-157.8	<0.01*
SEX	107.5	0.015†
DISABILITY	-160.2	0.019†
DIABETES STATUS	-75.3	0.049†
ATTAINED AGE	4.1	0.07

We selected six variables as independent variables: sex (male), attained age, number of years in school, diabetes status, housewife, and work disability. Dummy variables were used for all categorical ones. For example, the variable "diabetes status" was allocated to 0 or 1, respectively. The level for entry into the model and for staying in the model used in the stepwise techniques were <0.20 to control the effect of variables that had some predictive power. However, the significance level for the independent contribution in the model was <0.05.

*Significant at $P < 0.01$.

†Significant at $P < 0.05$.

high in that place and at the time. In particular, the selection of appropriate control subjects is extremely important for evaluating socioeconomic background. Age- and sex-matched siblings appear to be appropriate for control subjects because they provide an effective match for socioeconomic background during childhood, which may have a strong influence on career path (5).

Patients in our study may not perfectly reflect the characteristics of the total youth-onset diabetes in Japan because it was based on a hospital cohort. However, because all patients live in the Tokyo area, their living standard is higher than the general population, and they seem to experience less discrimination than those who live in rural areas. However, if we could find the socioeconomic discrimination our subjects have experienced, then it is very likely that patients in other area of Japan also have encountered discrimination.

In contrast to reports from Robinson et al. (4,6), we could not detect a difference in unemployment rate between patients and control subjects. As

control subjects in those studies responded much less than patients, those surveys were likely to have underestimated the unemployment rate in control subjects. Another possibility is that we may not have found the difference because of our small sample size.

The yearly income level and the experience of job refusal were investigated to further evaluate employment status. Songer et al. (5) reported that the difference in income level could be attributed exclusively to disability. Unlike that study, a multivariate analysis in our study indicated that diabetic patients had lower incomes than control subjects, after adjusting for disability. This suggests that the presence of diabetes itself may have contributed to a lower yearly income level independent of disability—by their reporting of diabetes status to employers. Diabetic patients may be able to obtain a job because of low unemployment rates in general in Japan (unemployment rate in 1988, Japan vs. U.S. vs. U.K.: 2.5 vs. 5.4 vs. 8.4%) (10), but this does not necessarily mean that they could choose a preferred occupation.

Patients were more likely to encounter job refusal in their life than control subjects. Similar to Songer et al.'s study (5), most of the refused patients had apprised the job interviewer of their diabetes status, which suggested that Japanese diabetic patients did experience discrimination in the job market in Japan, despite the low unemployment rate of patients. Furthermore, it is quite interesting that control subjects changed jobs more frequently than diabetic patients. This suggests that the high proportion of job refusal in patients was not attributable to the effect of changing of job, and it is possible that if diabetic patients feel the disadvantage concerning finding a job, they might seldom apply for higher paying jobs.

In contrast to some previous studies (5,6), our study showed no difference in absenteeism between the two groups. It appears that no difference in

absenteeism arises until patients become disabled as a result of diabetic complications. Another possibility is that the result may depend on the definition of absenteeism. Asking the number of days absent from work may have been a better question.

Ardron et al. reported that diabetic patients had no disadvantage concerning educational achievement (3). These researchers also stated that patients who developed diabetes during adolescence might be thrown into emotional turmoil. Although many patients in our study developed diabetes after adolescence, educational achievements of patients were similar to those of siblings.

These results suggest that diabetic patients had several social and economic problems and that there was a discrimination against youth-onset diabetic patients in Japan. Actually there may be more discrimination, for we might not detect some differences because of the small number of subjects in our study. Further studies in more subjects are needed to precisely grasp the social and economic impact on diabetes.

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References

1. Borch-Johnsen K: The prognosis of insulin-dependent diabetes mellitus. *Dan Med Bull* 36:336–48, 1989
2. Hutchinson SJ, Kesson CM, Slater SD: Does diabetes affect employment prospects? *Br Med J* 287:946–47, 1983
3. Ardron M, MacFarlane I, Robinson C: Educational achievements, employment and social class of insulin-dependent diabetics: a survey of a young adult clinic in Liverpool. *Diabetic Med* 4:546–48, 1987
4. Robinson N, Yateman NA, Protopapa LE, Bush L: Unemployment and diabetes. *Di-*

- abetic Med* 6:797–803, 1989
5. Songer TJ, LaPorte RE, Dorman JS, Orchard TJ, Becker DJ, Drash AL: Employment spectrum of IDDM. *Diabetes Care* 12:615–22, 1989
 6. Robinson N, Yateman NA, Protopapa LE, Bush L: Employment problems and diabetes. *Diabetic Med* 7:16–22, 1990
 7. Tajima N, LaPorte RE, Hibi I, Kitagawa T, Fujita H, Drash AL: A comparison of the epidemiology of youth-onset insulin-dependent diabetes mellitus between Japan and the U.S. (Allegheny County, Pennsylvania). *Diabetes Care* 8 (Suppl. 1):17–23, 1985
 8. Tajima N, Kitagawa T, Matsushima M, DERI group: Epidemiology of IDDM mortality in Japan (Abstract). *Diabetes* 38 (Suppl. 2):35A, 1989
 9. Ferron DT (Ed.): *Social Security Administration, Disability Survey '72. Disabled and Nondisabled Adults: A Monograph*. Washington, DC, U.S. Govt. Printing Office, 1981 (DHHS res. rep. no. 30; SSA publ. no. 13–11812)
 10. The Management and Coordination Agency (Ed.): *The Outline of International Statistics* (in Japanese). The Office of Printing of the Ministry of Finance, Tokyo, Japan, 1990, p. 47