

A study of sickness absenteeism during a year among diabetics employed by the Du Pont Company is presented. The experience of this group was compared with matched controls. The findings indicate more illness and absenteeism among diabetics. The need to assess on an individual basis the risk in hiring a diabetic job applicant is emphasized.

SICKNESS ABSENTEEISM IN EMPLOYED DIABETICS

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A STUDY of the diabetics employed by the Du Pont Company was begun in 1963. In general, the objectives of this study are to investigate certain epidemiologic aspects of the disease and to determine what effect, if any, the disease may have on the working life of the diabetic. This paper deals with the data we obtained on sickness absenteeism of the diabetics and a series of matched controls.

Company Medical Program

During the past 30 years, the Du Pont Company has maintained an extensive medical program for its employees. Under this program, a complete medical examination is given by company physicians to all employees—annually to those 30 years and over, and biennially to those under 30 years. The routine examination includes a chest x-ray, measurements of blood pressure, pulse rate, and body weight, and an electrocardiogram for older persons. The laboratory work includes a hemoglobin determination, white cell count, and urinalysis to test for the presence of sugar and albumin. A more intensive examination is given where indicated. Employees with glycosuria are given postprandial blood sugar or glu-

cose tolerance tests. Some company physicians order these tests when there is a family history of diabetes without glycosuria.

In addition to their periodic routine examinations, many employees are seen by company physicians for other reasons, such as consultations requested by the employee, special examinations in plants where there are suspected occupational hazards, and upon return to work following a period of disability. When an employee exhibits abnormal conditions, he is referred to his family physician for treatment or further diagnostic evaluation.

Except for small offices and warehouses, every company installation has a medical facility manned by at least one physician, assisted by a staff of nurses, laboratory technicians, x-ray technicians, and clerical workers. Of the 140 company physicians, 90 are employed full time; part-time physicians are located at small installations.

Characteristics of the Company Population

The company employs about 96,000 persons in 80 manufacturing plants and several laboratories, offices, and warehouses scattered throughout the

Table 1—Age and sex distribution of diabetics*

Age group	Total	Male	Female
20-24	3	3	0
25-29	8	7	1
30-34	20	20	0
35-39	41	39	2
40-44	67	60	7
45-49	100	93	7
50-54	135	124	11
55-59	140	133	7
60-64	108	102	6
Total	622	581	41

* Does not include 40 diabetics for whom information on sickness absenteeism was not available.

country. The ages of the employees extend from 17 through 64; retirement is mandatory at 65. About two-thirds of the company population are hourly-paid production workers, i.e., craftsmen, operatives, service workers, and laborers. The remainder are salaried employees, consisting of professional, technical, clerical, and managerial personnel. Women constitute about 14 per cent of the company work force.

Methods

The project was started in 1963 by a survey of company physicians to obtain the names of all known diabetics. Each diabetic was interviewed by his plant physician to obtain information not ordinarily found in the medical records, such as, the age at onset of diabetes, insulin dosage, use of oral hypoglycemic drugs, and family history of diabetes.

For each diabetic, we selected a control employee so that each pair was matched according to age (by five-year categories), sex, location, and occupation (i.e., production or salaried). The controls were chosen by means of ran-

dom numbers from a complete listing of company employees.

We then obtained the medical records of the diabetics and the controls to abstract information pertinent to the study, and from the medical and personnel units in each installation we obtained, for each diabetic and control, a list of all their sickness absences during the year 1963. These lists showed the cause of illness and the number of days of disability for each illness.

Findings

The case-finding survey revealed 662 diabetics. For 40 of these diabetics and 36 of the controls, information on sickness absenteeism was not available, so the data presented here are derived from the remaining 622 diabetics and 626 controls. The age and sex distribution of the diabetics is shown in Table 1.

Frequency and Duration of Sickness Absenteeism

In general, sickness absenteeism among the diabetics was greater than that of the nondiabetic controls. The extent of the difference can be seen in Table 2 by various indexes of sickness

Table 2—Sickness absenteeism of diabetics and controls during 1963

	Diabetics	Controls
Number of subjects*	622	626
Number of sickness absences	666	467
Number of sickness absences per 100 persons	107	74
Per cent having one or more sickness absences	56.6	47.1
Total number of days of disability	8,138	4,318
Median number of days of disability†	10.5	6.8

* Does not include 40 diabetics and 36 controls for whom information on sickness absenteeism was not available.

† Among employees with one or more sickness absences.

SICKNESS ABSENTEEISM AMONG DIABETICS

Table 3—Frequency distribution of number of sickness absences among diabetics and controls during 1963

Number of sickness absences	Number		Per cent		Cumulative per cent	
	Diabetics	Controls	Diabetics	Controls	Diabetics	Controls
0	270	331	43.3	52.9	100.0	100.0
1	181	182	29.1	29.1	56.6	47.1
2	86	76	13.8	12.1	27.5	18.0
3	47	25	7.6	4.0	13.7	5.9
4	24	6	3.9	0.9	6.1	1.9
5	10	3	1.6	0.5	2.2	1.0
6	2	2	0.3	0.3	0.6	0.5
7	2	1	0.3	0.2	0.3	0.2
Total	622	626	100.0	100.0		

NOTE: Difference between the two frequency distributions significant at the 0.001 level (chi-square test).

absenteeism. These data show that, as a group, the diabetics had more bouts of illness, almost twice as many days of disability, and when ill were disabled for a longer period of time. In addition, repeated bouts of sickness during the course of the year were more common in the diabetics than the controls, as shown in Table 3. For example, four or more absences during the year occurred in 6.1 per cent of the diabetics and in only 1.9 per cent of the controls ($P < 0.001$).

Figure 1 shows the cumulative per cent frequency distributions of the number of days of disability for the diabetics and the controls. These curves indicate that, following the onset of disability, the diabetics return to work at a slower rate than do nondiabetics ($P < 0.001^*$).

Relation of Sickness Absenteeism to Age, Occupation, and Severity of Diabetes

The effect of the severity of the diabetes on the frequency and duration of sickness absenteeism was examined by comparing absence rates of the diabetics who take insulin (the more severe cases) with those who do not (mild and mod-

erate cases). To control the effects of occupation and age, rates were computed separately for hourly-paid production workers and for salaried personnel, and broken down still further to obtain rates for subjects under 50 years of age and for those from 50 to 64 years. The results, compared with rates obtained for the controls, are shown in Table 4.

The figures clearly show that the frequency and duration of sickness absenteeism are greater in the diabetics than in the controls in both production and salaried personnel and in the

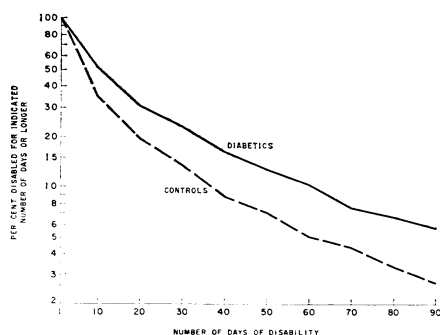


Figure 1—Cumulative per cent frequency distributions of the number of days of disability during 1963 among diabetics and controls.

* Kolmogorov-Smirnov test of significance of difference between two cumulative frequency distributions.

Table 4—Frequency and duration of sickness absenteeism among diabetics and controls during 1963 by age, occupation, and severity of diabetes

		Production			Salaried		
		All ages	Under 50 years	50 to 64 years	All ages	Under 50 years	50 to 64 years
Number of subjects	Diabetics—take insulin	116	61	55	73	41	32
	Diabetics—no insulin	284	98	186	149	39	110
	Controls	404	166	238	222	84	138
Per cent absent one or more times	Diabetics—take insulin	60.3	68.9	50.9	54.8	46.3	65.6
	Diabetics—no insulin	57.4	65.3	53.2	53.0	48.7	54.5
	Controls	50.0	51.8	48.7	41.9	41.7	42.0
Per cent disabled for 5 or more days	Diabetics—take insulin	50.0	54.1	45.5	37.0	31.7	43.8
	Diabetics—no insulin	39.8	40.8	39.2	33.6	28.2	35.5
	Controls	32.2	28.3	34.9	20.7	17.9	22.5
Per cent disabled for 10 or more days	Diabetics—take insulin	38.8	39.3	38.2	23.3	17.1	31.3
	Diabetics—no insulin	30.3	29.6	30.6	21.5	7.7	26.4
	Controls	19.1	13.9	22.7	11.3	9.5	12.3
Per cent disabled for 30 or more days	Diabetics—take insulin	13.8	11.5	16.4	11.0	7.3	15.6
	Diabetics—no insulin	15.1	10.2	17.7	9.4	7.7	10.0
	Controls	8.2	4.2	10.9	3.2	2.4	3.6
Median number days of disability†	Diabetics—take insulin	13.5	12.0	16.3	8.7	8.0	13.0
	Diabetics—no insulin	11.0	9.3	13.0	7.5	5.5	8.0
	Controls	7.7	6.3	9.2	5.1	4.5	5.5

* Difference among the three groups significant at 0.05 level.

† Difference among the three groups significant at 0.01 level.

‡ Among employees with one or more sickness absences.

younger as well as the older employees. Differences in rates between diabetics who take insulin and those who do not, tend to indicate somewhat more sickness absenteeism among the diabetics who take insulin. Comparing the proportions of diabetics who were disabled for five or more days during the year, we found them to be 45.0 per cent for those who take insulin and 37.6 per cent for those who do not, although the difference is within the allowable limits of sampling error. However, where the number of days of disability was 30 or greater, the difference between the two groups was very small; i.e., 12.7 per

cent for those who take insulin and 13.2 per cent for those who do not. Thus, the severity of diabetes seemed to be slightly associated with increased absenteeism of moderate duration, but not at all with absenteeism of very long duration.

Causes of Sickness Absenteeism

The frequency of sickness absenteeism among the diabetics and controls was compared for various illness categories. The data are shown in Table 5.

Notable differences were seen in digestive disorders, heart disease (which one would expect because of the known as-

Table 5—Sickness absenteeism of diabetics and controls, by condition, during 1963

Condition	Diabetics	Controls
Respiratory infections	198	175
Digestive disorders*	93	66
Musculoskeletal disorders	39	33
Heart disease	21	10
Other cardiovascular disease	16	12
Neurological disorders	18	11
Genitourinary disorders	15	14
Miscellaneous infectious diseases	10	8
Accidental injuries	15	12
Other and unspecified	56	37
Care and management of diabetes	45	—

* Difference between diabetics and controls significant at 0.05 level.

NOTE: The figures specify the number of persons absent one or more times for the indicated condition.

sociation between it and diabetes), and neurological disorders. Except for digestive disorders, however, significant differences were not found in these categories, probably because of the small numbers of cases, rather than because of the absence of an association.

Among the categories in which differences were small were respiratory infections, musculoskeletal disorders, genitourinary disorders, and accidental injuries.

The comparatively high rate of absenteeism of diabetics for digestive disorders may have occurred, to some extent, because of the special proneness of diabetics to develop diarrhea. The etiology of diabetic diarrhea has not been firmly established, but among the theories that have been proposed are disturbances in bowel motility as a result of visceral neuropathy,¹ and the absence of free hydrochloric acid in gastric juice, commonly seen in diabetic patients.² Gastrointestinal disturbances may also have developed as side effects of oral hypoglycemic agents.

Respiratory Infections—The number of diabetics disabled by a respiratory infection was only slightly higher than that of the controls, and the difference is not significant. Moreover, repeated bouts of respiratory infections occurred with approximately the same frequency in both groups (Table 6). Among the diabetics, however, it was more common to find prolonged disability (Figure 2). For example, disability of ten or more days was seen in 27.7 per cent of the diabetics and in only 14.8 per cent of the controls ($P < 0.01$).

Absenteeism Resulting from Diabetes

The diabetics had 199 more absences than did the controls during the course of the year (666/467). Fifty absences,

Table 6—Frequency distribution of number of sickness absences due to respiratory infections among diabetics and controls during 1963

Number of sickness absences	Number		Per cent		Cumulative per cent	
	Diabetics	Controls	Diabetics	Controls	Diabetics	Controls
0	425	451	68.3	72.0	100.0	100.0
1	139	129	22.3	20.6	31.7	28.0
2	46	40	7.4	6.4	9.4	7.4
3	9	3	1.5	0.5	2.0	1.0
4	3	3	0.5	0.5	0.5	0.5
Total	622	626	100.0	100.0		

NOTE: Difference between the two frequency distributions not significant at the 0.05 level (chi-square test).

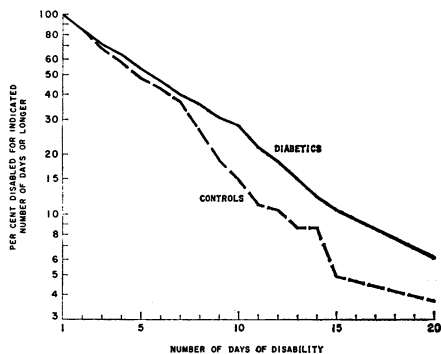


Figure 2—Cumulative per cent frequency distributions of the number of days of disability because of respiratory infections during 1963 among diabetics and controls.

or about one-quarter of this excess, were for the care and management of diabetes. Moreover, these absences accounted for 985 days of disability. Thus, a substantial portion of the excess absenteeism of the diabetics arose directly from the disease itself. These absences were incurred, however, by only 45, or 7.2 per cent, of all the diabetic subjects, so it is worth while to examine closely the characteristics of these diabetics.

In Table 7, the absence rates for diabetes (the per cent absent at least once for treatment of diabetes) are shown by age, occupation, and the severity of the diabetes. It is quite clear that the rates were considerably higher among the severe cases, regardless of their age or occupation. The over-all rate among diabetics who take insulin was 13.2 per cent, but only 4.6 per cent among those who do not take insulin ($P < 0.001$). It is also noteworthy that the rate was as high as 21.3 per cent among production workers under 50 years of age with severe diabetes.

Discussion

Controlled studies of sickness absenteeism among diabetics are scarce. One

such study was done by the Bureau of Labor Statistics comparing 144 diabetics with 244 controls, all production workers.³ Using days lost per 100 work days as a measure of sickness absenteeism, they found the rates to be 4.4 among the diabetics and 3.1 among the controls. Loss of ten or more days occurred in 15.3 per cent of the diabetics and 8.1 per cent of the controls.

Among 56 diabetics, Wyshak and others⁴ reported the frequency rate equal to that of the controls, but the disability and severity rates were higher. The number of days of disability per disabling incident (the severity rate) was 4.8 among the diabetics and 3.1 among the controls. That diabetics have more sickness absenteeism than nondiabetics should come as no surprise in view of the occasional disabling nature

Table 7—Sickness absenteeism during 1963 for care and management of diabetes, by age, occupation, and severity of diabetes

	Total	One or more absences for diabetes	
		Number	Per cent
All diabetics	622	45	7.2
No insulin taken	433	20	4.6
Take insulin	189	25	13.2
Production:			
No insulin			
under 50	98	6	6.1
50 to 64	186	8	4.8
Take insulin			
under 50	61	13	21.3
50 to 64	55	6	10.9
Salaried:			
No insulin			
under 50	39	2	5.1
50 to 64	110	4	3.6
Take insulin			
under 50	41	4	9.8
50 to 64	32	2	6.3

of the disease itself, the frequent untoward effects of diabetic therapy, and the complications that arise out of or are concomitant with the disease process.

Although the diabetics had a greater number of sickness absences than did the nondiabetics, the effect of the disease on the occurrence of disabling illness was more pronounced with respect to the duration rather than the frequency of illness. This is evident in the data presented in Table 1, which shows that the diabetics had 42 per cent more bouts of illness (666/467) but 88 per cent more days of disability (8,138/4,318).

Two possible reasons for the greater duration of disability among the diabetics are these: First, the diabetes itself may contribute to the severity of other illnesses, as a result of metabolic derangements, slow healing of infections, and nutritional imbalances. Second, it is possible the diabetics were disabled longer because their physicians may have been inclined to treat them more conservatively than they would nondiabetics with similar conditions.

The data in this study did not show striking relationships between any characteristic of the diabetics and their general sickness absence experience. The severe cases did have slightly higher frequency rates and somewhat greater length of disability, but the differences between them and the mild and moderate cases were not significant. On the other hand, the data did show, as one would expect, that absenteeism for the treatment of diabetes was much more likely to occur in severe cases. These absences were also relatively more common among production workers than salaried personnel, probably because the latter being, on the whole, more educated, are better equipped to understand and do what must be done to control the disease.

The data presented here should not be construed as meaning that the hir-

ing of a diabetic necessarily encumbers an employer with a worker who will have a record of chronic sickness absenteeism. It is important to note that in this series of diabetics, 72 per cent had either no absences or only one absence during the course of the year, and that only 6 per cent had more than three bouts of illness. Thus, the problem of excessive sickness absenteeism, in diabetics as well as nondiabetics, arises from a small minority of individuals, and the assessment of the risk incurred in hiring a diabetic must be done on an individual basis.

Summary

Sickness absenteeism during a one-year period of 622 diabetics employed by the Du Pont Company was compared with that of a series of matched controls.

As a group, the diabetics had more bouts of illness, almost twice as many days of disability, and when ill were disabled for a longer period of time. Employees with severe diabetes (those who take insulin) had slightly more absenteeism than did the mild and moderate cases.

Absenteeism because of digestive disorders was significantly more frequent among the diabetics than the controls. The diabetics also had notably more absences for heart disease and neurological disorders, but the numbers of cases in these categories were too small to detect real differences statistically.

Respiratory infections occurred with about the same frequency in both groups, but prolonged disability for these illnesses was more common among the diabetics.

About 7 per cent of the diabetics had at least one absence during the year for the care and management of their diabetes. Absenteeism for this reason was strikingly high among the younger production workers with severe cases.

Seventy-two per cent of the diabetics had either no absences or only one absence during the year, and only 6 per cent had more than three absences. The need to assess the risk in hiring each diabetic job applicant on an individual basis was emphasized.

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Alcoholism Courses for Public Health Workers

The Rutgers Summer School of Alcohol Studies recently announced that two of its 17 courses in 1967 will be specifically for public health workers.

The first, "Organizing and Developing Alcoholism Programs in a Public Health Setting," will focus upon the work of public health educators and administrators. The second, "Alcoholism and Public Health Nursing," will be offered for public health nurses. In addition to one of these basic courses, each student is expected to participate in a second course of his choice and to attend the general lectures given to the entire student body.

The 1967 Summer School of Alcohol Studies will be held on the campus of Rutgers—The State University, New Brunswick, N. J., from June 25 to July 14. This will be the 25th annual session since the establishment of the school at Yale in 1943.

The total cost for this three-week school, including tuition, room and board (except week-end meals), will be \$325. USPHS traineeships will be available, application to be made to the Summer School before April 25, 1967. For prospectus and application form, write: Summer School of Alcohol Studies, Rutgers—The State University, New Brunswick, N. J. 08903