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A mixed methods study to examine the difficulties experienced and coping behaviours used by people with Type 2 diabetes of working age in Japan

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Objective: The aim of this study was to investigate measures to support people of working age with Type 2 diabetes by clarifying their coping behaviours.
Research methods: Mixed research methods were adopted. The questionnaires investigated PAID, SDSCA, and biomedical test data. After the questionnaires were completed, a qualitative survey in which the participants were asked to discuss any difficulties and corresponding coping measures was conducted.
Results: The participants were 100 individuals (77 men). The following three aspects of difficulties felt in coordinating work and diabetes management were revealed: 'Difficulty readjusting living hours', 'The presence of stress inhibiting a treatment lifestyle', and 'Conflict between maintaining interpersonal relationships and implementing treatment behaviors'. Among the factors associated with coping behaviours, a significant difference was seen in the presence or absence of coping measures for 'Difficulty readjusting living hours' and body mass index.
Conclusions: When assessing patients, it is best to perform assessments from the three perspectives described in the present study.

Keywords: Type 2 diabetes, Worker, Self-management, Patient education, Coping behaviour, Mixed methods research, Difficulties felt, Self-care, Employment

Background

Type 2 diabetes is greatly affected by lifestyle habits, including diet and exercise, which require self-control by patients. In Japan, measures against diabetes are becoming a serious issue for the current late middle-aged generation, who are approaching old age in an era with the highest percentage of elderly people. Therefore, measures for this generation are essential. One of the reasons why middle-aged diabetic patients have difficulty managing their disease is their employment status. In addition, several studies have pointed out that the stress felt by working people during work leads to diabetes or difficulty in controlling blood glucose levels.[1–4]

In relation to the management of work and diabetes, from the viewpoint of eating behaviours, circumstances and reasons that lead to overeating have been linked to 'social pressure'.[5] For example, working people can experience occasions in which they prioritise their social role instead of their diet, such as attending client dinners, which are often obligatory. Similarly, middle-aged male diabetic patients have been reported to routinely experience emotions such as 'a sense of burden due to the responsibility for work'.[6] Although such patients are often aware of the importance of good health, they still tend to prioritise work, which can lead to frustration and even anger. Information technology-based methods, including telephones and the Internet, should, therefore, be used to help educate such working patients.[6–9]

The above findings in the literature show that working patients with diabetes face difficulties such as stress and overwork in coordinating work and diabetes management. To alleviate these burdens, patients are expected to employ their own strategies on a trial-and-error basis. However, few studies have examined in detail coping measures employed by working patients, or whether such coping behaviours contribute to improved health. Self-management of diabetes is said to focus on patients' own intentions and behaviour. By elucidating the coping measures employed by patients and analysing how these contribute to health status, we might be able to propose behaviours that are easy for patients to adopt.

This study aimed to investigate support methods for working Type 2 diabetics by clarifying the difficulties felt and coping behaviours employed by such patients to coordinate work and diabetes management and by analysing factors associated with these behaviours.

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Methods

Study design

This cross-sectional study involved a multi-faceted examination of the difficulties felt and coping measures employed by working Type 2 diabetics. We adopted triangulation, a key component of mixed methods research, to conduct the questionnaire and qualitative surveys.[10]

First, data on the participants' backgrounds were collected using a questionnaire. The questionnaire items included the history of diabetes, HbA1c, body mass index (BMI), working hours, and the presence of any supporters, the Summary of Diabetes Self-Care Activities (SDSCA), and problem areas in diabetes (PAID).[11,12] Second, all participants who completed the questionnaire were asked if they had encountered any difficulties in coordinating work and diabetes management ('Have you had any difficulties coordinating work and diabetes management?'). The participants who answered affirmatively to this question were then asked, 'How did you cope with these difficulties?'

Study participants

All participants were currently working Type 2 diabetics at least 20 years of age who were receiving treatment on an outpatient basis. Patients with severe complications (e.g. dialysis patients and lower extremity amputees) and those who had difficulty answering the questionnaire (e.g. poor vision and cerebral infarction) were excluded from analysis.

Data collection and analytical methods

Participant selection and consent The data used in the present study were collected from one Japanese secondary care hospital. All working Type 2 diabetics were chosen between November 2012 and March 2013 based on information from medical records and attending physicians. The participants consented to take part in the study after receiving a written explanation from the researchers providing an overview of the study and ethical considerations.

Survey methods Both a questionnaire and an interview survey were conducted. The questionnaire contained the Japanese version of the PAID[11,12] instrument (answered on a 5-point Likert scale with scores ranging from 20 to 100 points; higher scores indicate a greater sense of burden), which measures difficulties related to diabetes, and questions regarding treatment. The questionnaire also included items on the participants' backgrounds (e.g. self-care behaviour) using the Japanese version of the SDSCA[13,14] measure, as well as questions on diabetes history, HbA1c, BMI, working hours and the presence of any cooperators, such as families and social resources. The Japanese version of the SDSCA asks respondents to answer how many days in a week they meet their objectives. In the present study, the items for diet, exercise and medication were used.

Participants who completed the questionnaire were asked about any difficulties they encountered in coordinating work and diabetes management, and those who answered affirmatively were then asked to talk about any coping measures they had employed. All answers to these questions were transcribed by a researcher and recorded as data.

Analytical methods Quantitative data on the participants were tabulated using descriptive statistics and presented as means ± standard deviation (SD) or frequencies (%). Next, qualitative data were extracted from the content of oral responses regarding coping with the difficulties felt in coordinating work and diabetes management, and were then organised into sub-categories based on their similarities. To ensure the validity of the results, the co-authors of this paper, who are experts in chronic nursing and skilled in qualitative research, discussed any potential distortion or bias in the interpretation and categorisation of the data.

Finally, the participants who indicated that they had encountered difficulties in coordinating work and diabetes management in the qualitative analysis were classified into two groups: a coping behaviour group and a non-coping behaviour group. The subjects who answered that they had encountered difficulties on more than two occasions were included in multiple categories. The two groups were then compared in terms of age, sex, diabetes history, HbA1c, BMI, and PAID and SDSCA scores. The Mann–Whitney U and chi-square tests were used to examine continuous and categorical variables, respectively. JMP 11 software (SAS Institute Inc., Cary, NC, USA) was used to conduct all analyses, with the level of significance set at 5%.

Ethical considerations The institutional review boards of the researchers' affiliated facility where the study was conducted approved this study (approval number: 16-0603). Participants gave their informed consent to take part in the study after receiving written and verbal explanations of the study purpose and the voluntary nature of their participation, as well as assurances that their refusal to participate would not negatively impact the medical care being provided to them and that they were free to withdraw from the study at any time. To protect the privacy of the participants, all data were anonymised, and the chart containing the questionnaire numbers and contact details of the participants was strictly managed.

Results

Overview of the participants

Completed questionnaires were obtained from 100 individuals (77 men and 23 women). The mean age of respondents was 53.1 ± 9.6 years, the mean disease duration was 10.6 ± 7.2 years, the mean BMI was 25.7 ± 4.4 kg/m^2, and the mean HbA1c was 7.4% ± 1.0%. In addition, the mean days of dietary therapy, exercise therapy and

medication (hereinafter 'drug') therapy in 1 week were 3.6 ± 2.1 days, 3.4 ± 2.4 days and 6.4 ± 1.6 days, respectively (Table 1).

Difficulties felt in coordinating work and diabetes management

The most difficult therapy to undergo was dietary therapy according to 27 participants (31.0%), exercise therapy according to 39 (44.8%) and drug therapy according to 21 (24.1%). The percentage of participants who answered that exercise therapy was the most difficult was therefore the highest. Furthermore, 79% of 100 participants answered that they had encountered difficulties in coordinating work and diabetes management in interviews.

When the contents of these participants' answers were categorised based on similarities, three categories and nine sub-categories were extracted. The three categories were 'Difficulty readjusting living hours', 'The presence of stress inhibiting a treatment lifestyle', and 'Conflict between maintaining interpersonal relationships and implementing treatment behaviors'. Categories are indicated by '…', while sub-categories are indicated by '…' (Table 2).

Coping measures for difficulties felt in coordinating work and diabetes management

The coping measures employed by participants were organised according to each of the three categories of difficulty, as shown in Table 3. To cope with 'Difficulty readjusting living hours', participants described measures including, 'I deliberately secure time for exercise' and 'I

Table 1 Participant characteristics.

	Overall data
Age (years)	53.1 ± 9.6
Sex	
Male	77 (77.0)
Female	23 (23.0)
Diabetes history (years)	10.6 ± 7.2
BMI (kg/m^2)	25.7 ± 4.4
HbA1c (%)	7.4 ± 1.0
PAID score	38.0 ± 13.1
Working hours	
8 hours or less	22 (22.2)
8–10 hours	63 (63.6)
10 hours or more	14 (14.1)
Most difficult therapy	
Dietary	27 (31.0)
Exercise	39 (44.8)
Drug	21 (24.1)
Presence of cooperators	
Yes	65 (66.3)
No	33 (33.7)
Dietary therapy in 1 week (days)	3.6 ± 2.1
Exercise therapy in 1 week (days)	3.4 ± 2.4
Drug therapy in 1 week (days)	6.4 ± 1.6

n = 100 (working hours: unanswered by 1 participant; most difficult therapy: unanswered by 13 participants; presence of cooperators: unanswered by 2 participants).
Data are presented as mean ± SD, or % (*n*).
BMI: body mass index; PAID: problem areas in diabetes survey.
Drug therapy includes all things related to diabetes such as injection and internal medicine.

Table 2 The difficulties felt in coordinating work and diabetes management.

Category	Sub-category	Typical content
Difficulty readjusting living hours	I am unable to take time to exercise	I have no time to exercise because I am busy with work
		I want to exercise more, but I cannot because I return home from work late; I wish I had more free time
	I am unable to assign time for medication	It is difficult to time doses of my medication during work
		I tend to forget to take my medication when I am concentrating on work
	My meal times are inconsistent	I eat dinner late because I finish work late
		My work sometimes overruns into my lunch hour
	My life is centred around work	My life tends to become centred around work
		I cannot treat my diabetes because I am busy with work
The presence of stress inhibiting a treatment lifestyle	Work-related stress	Workplace interpersonal relationships are stressful
		I am stressed by work-related quotas
	Stress from being unable to manage diabetes	Knowing that I am not managing my diabetes makes me stressed about not being able to manage my disease
		I cope with work-related stress by eating and this in turn makes me stressed
Conflict between maintaining interpersonal relationships and implementing treatment behaviours	Sweets are provided in the workplace	Even when I decide to perform dietary therapy, I have occasions where sweets are eaten in the workplace
		I cannot refuse sweets that I am given
	Whenever there is a dinner party, I eat	Whenever there is a dinner party with work colleagues, I eat
		At dinner parties, I am encouraged to drink alcohol that I want to stop drinking
	I struggle to find time to take my medication because I am worried about people seeing me	I struggle to find time to inject insulin at dinner parties
		It is difficult to inject insulin because I worry about other people seeing me

deliberately take time away from work'. To cope with 'The presence of stress inhibiting a treatment lifestyle', participants described measures including, 'I make sure to enjoy myself' and 'I successfully distance myself from work colleagues'. To cope with 'Conflict between maintaining interpersonal relationships and implementing treatment behaviors', participants described coping measures including, 'I employ treatment behaviors without those around me knowing' and 'I have people who support me'. Many participants mentioned dietary therapy and experienced occasions when meal times were fixed and when they ate at a later time, but at a reduced quantity (Table 3).

Comparison according to the presence or absence of coping behaviours for difficulties

Data obtained from the questionnaire were compared for whether participants employed coping measures for the three categories of difficulty. Thirty-six participants responded that they had 'Difficulty readjusting living hours', and of these participants, 27 (75%) employed coping behaviours. In an analysis of the relationship between the presence or absence of coping behaviours and factors such as age, sex, diabetes history, BMI, HbA1c, PAID score, frequency of dietary therapy in 1 week, frequency of exercise therapy in 1 week and frequency of drug therapy in 1 week, the group that employed coping behaviours had the lowest BMI ($p = 0.003$). The same analysis was done in 'The presence of stress inhibiting a treatment lifestyle' and 'Conflict between maintaining interpersonal relationships and implementing treatment behaviors', but no significant differences were seen (Table 4).

Table 3 The coping behaviours in coordinating work and diabetes management.

Category (difficulty balancing work and diabetes self-care)	Category of coping measure employed
Difficulty readjusting living hours	I deliberately secure time for exercise I devise means of moving my body during work I devise means of preserving time for treatment behaviours during work I make adjustments to balance my daily dietary intake I deliberately take time away from work
The presence of stress inhibiting a treatment lifestyle	I make sure to enjoy myself I successfully distance myself from work colleagues I do not worry I sometimes eat what I like
Conflict between maintaining interpersonal relationships and implementing treatment behaviours	I employ treatment behaviours without those around me knowing I have people who support me I prioritise treatment behaviours I adjust my treatment behaviours before and after dinner parties I adjust my medication to eat meals normally

Discussion

Three aspects of difficulty felt in coordinating work and diabetes management and corresponding coping behaviours

From the results of the analysis, only 'Difficulty readjusting living hours' showed a significantly lower value for BMI when coping behaviours were employed. In previous studies of working patients with diabetes,[15–17] physical stress has been found to affect working hours and shift work has been shown to affect diabetes; therefore, adjusting working time may help manage diabetes. Furthermore, while no significant difference was seen, HbA1c was 0.5% lower when coping behaviours were employed. Due to the small sample size in the present study, no conclusion could be reached regarding whether supporting patients with diabetes in successfully adjusting their living hours improves BMI and HbA1c. The results nonetheless suggested that such support is likely to improve these factors. Despite the lack of a significant difference, the fact that the group of participants who employed coping behaviours for 'Difficulty readjusting living hours' spent more days on average engaging in dietary and exercise therapies also supports this finding.

A look at the results for qualitative data regarding coping behaviours also revealed behaviours that could allow living hours to be adjusted in daily life with work, such as 'I devise means of moving my body during work' and 'I devise means of preserving time for treatment behaviors during work'. An earlier study[18] demonstrated the utility of making particular use of commuting time, which is an effective coping measure for workers with no free time.

Support for workers with Type 2 diabetes

According to the results of the present survey, working patients with Type 2 diabetes were suffering primarily from the following three problems: 'Difficulty readjusting living hours', 'The presence of stress inhibiting a treatment lifestyle', and 'Conflict between maintaining interpersonal relationships and implementing treatment behaviors'. Therefore, when seeking information on working patients with Type 2 diabetes, categories related to these three items should be included. In addition, working patients with Type 2 diabetes responded that they felt substantial regret regarding their incapability of self-control.[19,20] Considering this point, it must be made clear to such patients that they will likely feel even worse if they fail to adequately manage their disease. Therefore, regardless of the direct self-control of their diet and exercise, if information is shared with such patients that enables them to conduct their lives in a comprehensive manner in terms of how they are linked to society and whether they are able to spend time at their own discretion, and measures are

Table 4 Comparison according to the presence or absence of coping behaviours for difficulties.

	Difficulty readjusting living hours			The presence of stress inhibiting a treatment lifestyle			Conflict between maintaining interpersonal relationships and implementing treatment behaviours		
	No coping measures $n = 9$	Coping measures $n = 27$	*p*-value	No coping measures $n = 4$	Coping measures $n = 14$	*p*-value	No coping measures $n = 7$	Coping measures $n = 30$	*p*-value
Age (years)	50.2 ± 8.6	52.4 ± 9.3	0.621	43.5 ± 4.8	53.5 ± 10.3	0.043	53.6 ± 5.7	53.1 ± 13.0	0.786
Sex									
Male	5 (55.6)	19 (70.4)	0.443	3 (75)	11 (78.6)	1.000	5 (71.4)	23 (76.7)	1.000
Female	4 (44.4)	8 (29.6)		1 (25)	3 (21.4)		2 (28.6)	7 (23.3)	
Diabetes history (years)	9.0 ± 4.5	9.6 ± 5.4	0.941	13 ± 2.8	11.5 ± 7.5	0.489	8.2 ± 6.6	10.1 ± 6.3	0.393
BMI (kg/m^2)	29.8 ± 3.5	25.2 ± 3.0	0.003*	30.1 ± 5.1	25.8 ± 2.9	0.089	26.1 ± 6.8	24.9 ± 4.1	0.816
HbA1c (%)	7.9 ± 1.4	7.4 ± 1.0	0.280	7.4 ± 0.5	7.1 ± 1.3	0.287	7.1 ± 0.8	7.1 ± 0.9	0.938
PAID score	36.3 ± 13.2	41.1 ± 13.7	0.078	49 ± 7.8	38.6 ± 15.3	0.286	32.3 ± 13.7	40.4 ± 12.9	0.095
Presence of cooperators									
Yes	6 (66.7)	15 (57.7)	0.712	2 (50.0)	8 (61.5)	1.000	4 (66.7)	13 (44.8)	0.402
No	3 (33.3)	11 (42.3)		2 (50.0)	5 (38.5)		2 (33.3)	16 (55.2)	
Dietary therapy in 1 week (days)	2.4 ± 2.4	4.0 ± 1.8	0.056	2.3 ± 2.1	2.6 ± 1.7	0.625	3.1 ± 3.2	3.9 ± 1.7	0.541
Exercise therapy in 1 week (days)	2.4 ± 2.4	3.3 ± 2.1	0.256	2.5 ± 3.3	2.9 ± 2.6	0.785	2.6 ± 1.8	4.2 ± 2.5	0.106
Drug therapy in 1 week (days)	6.2 ± 1.6	6.4 ± 1.6	0.596	7 ± 0.0	6.5 ± 0.8	0.177	6.7 ± 0.5	6.3 ± 1.6	0.979

Results are shown as means ± SD and *n* (%). *$p < 0.05$.
The Mann–Whitney *U* test was used to test for differences in age, diabetes history, BMI, HbA1c, PAID score, dietary therapy in one week, exercise therapy in one week and drug therapy in 1 week.
The chi-square test was used to test for differences in sex and the presence of cooperators.
One participant gave no answer to 'Difficulty re-adjusting living hours' and two participants gave no answer to 'Conflict between maintaining interpersonal relationships and implementing treatment behaviors' regarding the presence of cooperators.
BMI: body mass index; PAID: problem areas in diabetes survey.
Drug therapy includes all things related to diabetes such as injection and internal medicine.

discussed that help them realise these tasks, the potential for self-control could be developed.

Furthermore, it is interesting that the results of this study suggested that, among the three aspects of difficulty, measures to readjust living hours are likely to lead to improvement in BMI and HbA1c. Re-evaluating one's life along a time axis precisely because one is busy could become a form of self-reflection and an opportunity to reconsider what is truly important in one's life. For busy workers, this means that examining solutions, and the timing of these solutions, that can be incorporated into each living hour is more important than forcing oneself to participant in uniform diet and exercise therapies.

Meanwhile, despite the lack of a significant difference, the group of participants who employed coping behaviours for 'Difficulty readjusting living hours' and 'Conflict between maintaining interpersonal relationships and implementing treatment behaviors' had higher PAID scores than those who did not. This suggests that employing treatment behaviours increases the psychological burden. An interview survey of patients who maintained good control of blood glucose found that these patients did so while making adjustments in the form of occasional breaks from dietary therapy. These adjustments included deviating from their prescribed diet within a defined range and eating a small quantity when they felt like it.[21] This also indicates the importance of successfully incorporating both behaviours and relaxation into one's life.

Study limitations

The sample size may have been insufficient to compare data in the qualitative analysis according to the presence or absence of coping measures among participants who answered that they felt difficulties in coordinating work and diabetes management. We plan to increase the sample size and add difficulties and coping measures revealed in the present study to questions in a future study in order to obtain more valid and reliable results for the utility of coping behaviours in working patients with diabetes.

Conclusions

The following three aspects of difficulty were identified as being encountered by working Type 2 diabetics in coordinating work and diabetes management: 'Difficulty readjusting living hours', 'The presence of stress inhibiting a treatment lifestyle', and 'Conflict between maintaining interpersonal relationships and implementing treatment behaviors'. These findings suggest that when assessing such patients, it is best to do so from these three perspectives. Among the factors associated with coping behaviours employed by patients, a significant difference

was seen in the presence or absence of coping measures for 'Difficulty readjusting living hours' and BMI.

Conflict of interest

Have no financial relationships to disclose.

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