

Development of a Diabetes Diet-Related Quality-of-Life Scale

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OBJECTIVE— The purpose of this study was to assess the reliability and validity of the Diabetes Diet-Related Quality-of-Life (DDRQOL) scale, which is a measure of the influence of diet therapy on patients' quality of life (QOL).

RESEARCH DESIGN AND METHODS— Patients with type 2 diabetes ($n = 236$) who were being treated on an outpatient basis were asked to complete the self-administered DDRQOL instrument. The factor validity, convergent and discriminant validity, internal consistency, and reproducibility of the DDRQOL scale were then assessed. Spearman's rank correlation coefficients among the DDRQOL scale and each of the SF-36 subscale scores were calculated to evaluate its convergent and discriminant validity.

RESULTS— Based on the results of the factor analysis, the following seven subscales were adopted for the DDRQOL: "satisfaction with diet," "burden of diet therapy," "perceived merits of diet therapy," "general perception of diet," "restriction of social functions," "vitality," and "mental health." As hypothesized, the DDRQOL scale was associated with each of the SF-36 subscales, with convergent and discriminant validity being generally exhibited. Cronbach's α -coefficient was between 0.71 and 0.84, suggesting strong internal consistency. The intraclass correlation coefficient of the subscales, with the results of a test-retest conducted 2 weeks later, was between 0.46 and 0.75, suggesting some degree of reproducibility.

CONCLUSIONS— These findings indicate that the DDRQOL scale has a reasonable degree of reliability and validity, and its application for the assessment of the needs of a patient's diet and the evaluation of diet education with regard to QOL is awaited.

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The prevalence of diabetes is rapidly increasing all over the world (1). The same is true of Japan, and the number of the people who are strongly suspected to have diabetes is estimated to amount to 7.4 million (2). Because diabetes is a chronic disease, life-long treatment for maintaining glycemic control is necessary (3). Above all, diet therapy should be the basic treatment approach for all patients with diabetes (4).

Although the efficacy of diet therapy

in diabetes is widely recognized (4), it is by no means easy for patients to learn and sustain self-management behaviors (5). The burden and difficulty felt in adhering to diet restrictions, as well as the conflict between having to carry out social roles and the necessity to sustain self-management behavior, have been revealed to have a great influence on the patients' quality of life (QOL) (6–10). Therefore, patients are known to show a declined diet-related QOL. Diet educa-

tion for diabetic patients is aimed at improving the patients' QOL while maintaining proper glycemic control (11). Accordingly, determination of the diet-related QOL appears to be of great significance.

However, most of the diabetes-specific QOL scales developed to date (10,12–16) have been designed mainly to evaluate new treatments and complications. Therefore, items related to diet are limited; these scales may not necessarily be appropriate for the assessment of the needs of a patient's diet and the evaluation of the intervention in the form of diet education. For these purposes, diet-related QOL scales, which are designed to evaluate multiple aspects of the QOL, are believed to be more appropriate. While diet-related QOL scales have been developed for the general population, patients with renal failure, and the elderly (17–19), such a scale for diabetic patients has yet to be developed. The objectives of this study were to develop the diet-related QOL scale for individuals with diabetes and to evaluate its reliability and validity.

RESEARCH DESIGN AND METHODS

Among the diabetic patients attending the outpatient clinic of the Department of Internal Medicine at a general hospital in Gunma Prefecture in the North Kanto District of Japan, 291 patients who satisfied the following conditions were selected as subjects. The inclusion criteria were: diagnosis of type 2 diabetes, age 40–65 years, and at least a 6-month interval after the diagnosis of diabetes. The exclusion criteria were: serious underlying disease, cognitive disorder, or psychiatric disorder interfering with diabetes diet therapy, inability to fill out the self-administered instrument, and restriction of protein intake as advised by a doctor. The patients in the last category were excluded because the composition of the diet in these patients would be different. The study period was between July and October 2002.

The subjects were selected on the basis of the information provided by the physicians of the general hospital. When the subjects visited the hospital, the hos-

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Abbreviations: DDRQOL, diabetes diet-related quality of life; QOL, quality of life.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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pital staff handed out a document requesting their cooperation for this study. The investigator obtained written informed consent from the individual patients and handed them the self-administered instrument. After informed consent had been obtained, detailed information was collected from the medical records. Two weeks after the first survey, the instrument was sent again by mail to the 150 patients who had given informed consent to evaluate the reproducibility of the scale.

Measures

The Diabetes Diet-Related Quality-of-Life (DDRQOL) scale was compiled by a slight modification of the Renal Failure Diet-Related QOL scale of Suzukamo et al. (17,18). The scale of Suzukamo et al. was designed to determine the quantitative and qualitative satisfaction with diet and the degree of restriction of daily life and social life functions due to the dietary changes. It consists of the following eight subscales: 1) satisfaction with diet, 2) psychological burden of diet therapy, 3) physical burden of diet therapy, 4) perceived merits of diet therapy, 5) general perception of diet, 6) restriction of social functions, 7) vitality, and 8) mental health. The subscales 1–4 were designed to determine the QOL directly related to diet therapy. The subscales 6–8 were applied or transferred from the SF-36 Japanese version (20–22) as a comprehensive scale of the health-related QOL reflecting the restriction of daily life functions. The Renal Failure Diet-Related QOL scale further includes two items for exploring the effects of any changes in the diet during the previous 1 year and the compliance with the diet therapy, but they are not used for evaluation of the subscale scores. The response to each item was scored on a 5-point Likert scale. For calculation of the subscale scores, the sum of the scores for each item of the subscale was reflected as a figure between 0 and 100. A higher subscale score is reflective of a better QOL.

For this study, the Renal Failure Diet-Related QOL scale was modified to compile the DDRQOL scale. The modifications were as follows: the terminology changes from “protein restriction” to “energy restriction” in three places and the addition of two items relating to perceived merits of diet therapy. As a result, the DDRQOL scale consisted of a total of 31 items. Among these, 17 items directly pertained

Table 1—Characteristics of the sample

Sex	
Male	146 (61.9)
Female	90 (38.1)
Employment status	
Full-time	144 (61.0)
Part-time	34 (14.4)
Unemployed	58 (24.6)
Education	
High school or less	186 (78.8)
College or more	50 (21.2)
Living situation	
Living with another	218 (92.4)
Living alone	18 (7.6)
Treatment	
Diet and exercise	55 (23.3)
Tablets	142 (60.2)
Insulin	39 (16.5)
Age (years)	55.2 ± 5.8 (40–64)
Duration of diabetes (years)	9.5 ± 5.9 (0.5–34)
HbA _{1c}	7.9 ± 1.6 (5.1–14.3)
BMI (kg/m ²)	23.4 ± 3.4 (14.0–37.6)

Data are n (%) or means ± SD (range). n = 236.

to diet therapy. The basis for modification of the scale and the face validity were examined based on the opinions of one diabetologist, two certified diabetes educators, and two nurses with experience in taking care of diabetic patients.

For examination of the convergent and discriminant validity of the DDRQOL scale, the SF-36 Japanese version (20–22), which is widely used as a comprehensive scale to evaluate health-related QOL, was used. In the SF-36, a higher subscale score is reflective of a better QOL.

As background factors for the subjects, age, sex, occupation, academic background, whether living with any family members, method of treatment of diabetes, duration of diabetes, HbA_{1c}, and BMI (which were determined at the time of examination) were investigated.

Data analysis

The reliability and validity of the DDRQOL scale were evaluated by the following procedure. Factor analysis (principal factor method, promax rotation) of the 17 items reflective of the QOL directly related to diet therapy was performed to evaluate the factor validity. For evaluation of the convergent and discriminant validity, Spearman's rank correlation coefficients between the DDRQOL scale and each of the SF-36 subscale scores were calculated. Then the following hypotheses were examined: 1) “satisfaction with

diet” is moderately associated with “vitality” and “mental health,” 2) “burden of diet therapy” is moderately associated with “social functioning” and “mental health,” and 3) “restriction of social functions” is moderately associated with “social functioning” and “role emotional.” Cronbach's α -coefficient was calculated for each subscale to examine the internal consistency. The intraclass correlation coefficient was calculated for each subscale, and the weighted *k* coefficient for each item was calculated to evaluate reproducibility. SPSS 11.0J for Windows was used for the analysis, and the level of significance was defined as 5% (two-sided test).

RESULTS

Subjects' background

Of the 291 patients who satisfied the eligibility criteria, 238 patients gave their informed consent for the study, and the filled-in instruments were collected from all of these patients. Two patients were excluded from the analysis because they had not responded to >20% of the questions in the instrument. Thus, 236 patients (99.3% effective response ratio) were included in the final analysis. The reasons for failure to obtain informed consent from other patients were as follows: no time (14), declined vision (8), not on diet therapy (4), poor health condition (3), and unknown (24). In the test-retest, the instrument was collected from

Table 2—Factor analysis of 17 items reflective of QOL and directly related to diet therapy

	Factor 1	Factor 2	Factor 3
Factor 1: Satisfaction with diet			
Feeling that the meals are delicious*	0.77	−0.05	0.01
Feeling satisfied after meals*	0.86	0.03	0.00
Able to enjoy meals*	0.74	−0.05	0.08
Having a feeling of fullness after meals*	0.64	0.05	−0.06
Factor 2: Burden of diet therapy			
Necessity to eat meals at regular hours	−0.04	0.41	0.07
Necessity to keep the energy intake constant	−0.12	0.73	0.04
Necessity to make menus	−0.04	0.65	0.01
Not being able to eat favorite foods	0.07	0.70	−0.13
Not being able to eat the same foods as others in gatherings, etc.	0.09	0.73	−0.01
Economic burden associated with the diet therapy	0.07	0.44	0.02
Not being able to eat the same foods as other family members	0.04	0.75	0.00
Necessity to cook or have someone cook the diabetic diet	−0.07	0.62	0.04
Factor 3: Perceived merits of diet therapy			
Feeling that the health condition is good*	0.06	0.08	0.62
Feeling that the glycemic control status is good*	0.02	−0.01	0.64
Having learned to lead a regular life*	−0.04	0.02	0.75
Feeling that the family bond has become closer*	0.04	−0.04	0.51
Feeling that worsening of diabetes has been successfully kept under check*	−0.04	0.02	0.61

* Reverse items. $n = 236$.

133 of the 150 patients it was given to, and all of them gave effective responses. The effective response ratio was 88.7%. The subjects' background characteristics are presented in Table 1.

Analysis of each item

The distribution of the responses to each item was examined. No marked bias was noted in the choices of response for any of the items. Two items, i.e., changes in diet during the previous 1 year and compliance with diet therapy, were excluded,

and the remaining 29 items were included for the following analyses.

Factor validity

For the examination of factor validity, four factors were established for the 17 QOL items that were directly related to diet therapy, according to the scale of Suzukamo et al. (17,18), but the expected factor structure was not obtained. Therefore, according to the scree plot, three factors were established, and the analysis was conducted. As a result, unlike the Re-

nal Failure Diet-Related QOL scale, “psychological burden of diet therapy” and “physical burden of diet therapy” were combined into one factor. All variables contributed to only one factor, with a factor loading of ≥ 0.4 (Table 2). Judging from the contents of the items of the psychological burden and physical burden of diet therapy factors, interpretation of them as one factor was possible. Therefore, this factor was referred to as “burden of diet therapy.” Thus, the DDRQOL scale consisted of seven subscales.

Concerning the correlations among the subscale scores for the DDRQOL, there were almost no correlations among the QOL factors that were directly related to diet therapy subscales, namely, “satisfaction with diet,” “burden of diet therapy,” and “perceived merits of diet therapy.” Spearman's rank correlation coefficient between the “burden of diet therapy” and “restriction of social functions” was 0.46 ($P < 0.01$), suggesting a moderate positive correlation. In contrast, a negative correlation ($\rho = -0.20$, $P < 0.01$) was observed between the “perceived merits of diet therapy” and the “restriction of social functions.” “General perception of diet” showed a weak correlation with all of the subscales except “restriction of social functions.”

Convergent and discriminant validity

Spearman's rank correlation coefficients for the DDRQOL scale and the SF-36 subscale scores are shown in Table 3. As hypothesized, “satisfaction with diet” showed stronger correlations with “vitality” and “mental health” than other subscales, and “burden of diet therapy” showed stronger correlations with “social functioning” and “mental health” than

Table 3—Correlations among the DDRQOL scale and the SF-36 subscales

DDRQOL subscales	SF-36 subscales							
	Physical functioning	Role physical	Bodily pain	General health perception	Vitality	Social functioning	Role emotional	Mental health
Satisfaction with diet	0.15*	0.15*	0.06	0.16*	0.28†	0.19†	0.23†	0.27†
Burden of diet therapy	0.12	0.21†	0.19†	0.28†	0.28†	0.37†	0.23†	0.31†
Perceived merits of diet therapy	0.12	−0.06	0.08	0.03	0.04	−0.08	0.01	−0.02
General perception of diet	0.13*	0.17*	0.19†	0.29†	0.25†	0.22†	0.14*	0.26†
Restriction of social functions	0.04	0.28†	0.12	0.20†	0.13*	0.51†	0.25†	0.33†
Vitality	0.33†	0.40†	0.43†	0.49†	1.00	0.32†	0.49†	0.65†
Mental health	0.21†	0.37†	0.27†	0.47†	0.65†	0.41†	0.46†	1.00

$n = 236$. Boldface indicates an expected relationship. * $P < 0.05$; † $P < 0.01$.

Table 4—Internal consistency and reproducibility of the DDRQOL scale

Subscale	Number of items	Mean \pm SD*	α †	ICC
<i>n</i>		236		133
Satisfaction with diet	4	68.0 \pm 20.3	0.84	0.71
Burden of diet therapy	8	66.7 \pm 19.6	0.84	0.75
Perceived merits of diet therapy	5	51.3 \pm 21.2	0.76	0.70
General perception of diet	1	51.8 \pm 21.4	—	0.46
Restriction of social functions	2	75.2 \pm 21.5	0.71	0.59
Vitality	4	62.5 \pm 19.9	0.76	0.70
Mental health	5	69.7 \pm 18.6	0.80	0.67

*All measures are scored from 0 to 100; † α , Cronbach's α . ICC, intraclass correlation coefficient.

with other subscales. "Restriction of social functions" showed a strong correlation with "social functioning," but its correlations with "role physical" and "mental health" were stronger than that of "role emotional." "Perceived merits of diet therapy" showed no significant correlations with any subscale of SF-36.

Internal consistency

Cronbach's α -coefficient for each of the subscales of the DDRQOL was between 0.71 and 0.84 (Table 4).

Reproducibility

The intraclass correlation coefficient for each subscale calculated using the data for the 133 subjects who sent back their responses for the test-retest was between 0.46 and 0.75 (Table 4). The weighted *k* coefficient for each variable was between 0.36 and 0.70.

CONCLUSIONS— We developed the DDRQOL scale as a scale that can be used for the assessment of diet-related QOL and the evaluation of intervention in the form of diet education in diabetic patients and evaluated its reliability and validity.

According to the report of Suzukamo et al. (17,18) regarding patients with chronic renal failure, the results of the factor analysis of the QOL directly related to diet therapy suggested a four-factor structure. In our study, however, "psychological burden of diet therapy" and "physical burden of diet therapy" were included as one factor, and a three-factor structure was suggested. The different factor structure from the diet-related QOL for renal failure may be explained as follows. Because patients with diabetic nephropathy were excluded from this study, the focus

of the patients' diet therapy was on the restriction of energy intake. In the case of patients with chronic renal failure, on the other hand, the quality of the diet is restricted more severely because protein, salt, and potassium are also restricted, and it takes more time and trouble to prepare this diet for patients than the diabetes diet. Moreover, the use of therapeutic food supplements imposes additional economic burden. Such differences in relation to diet therapy between the two conditions might have affected the results.

Examination of the correlations among the subscale scores for the DDRQOL showed almost no correlations among the QOL directly related to diet therapy subscales. These findings suggest that "satisfaction with diet," "burden of diet therapy," and "perceived merits of diet therapy" constitute the diet-related QOL as independent concepts. Moreover, a moderate positive correlation was observed between "burden of diet therapy" and "restriction of social functions," and a negative correlation was noted between "perceived merits of diet therapy" and "restriction of social functions." It is possible that the patients perceive the diet therapy as a burden or fail to perceive the merits of the diet therapy because it restricts social functions. Further examination is necessary to clarify the intrafactor structure.

As to examination of the convergent validity and discriminant validity, SF-36 was used in the same way as in the development of the diet-related QOL scale for renal failure, because an appropriate scale for evaluation of the validity of the construct concepts is not available. As a result, almost the same results as hypothesized were obtained. "Perceived merits of diet therapy" was regarded as a

concept that was not included in SF-36 and did show a significant correlation with any subscale of SF-36. There were no other items that were particularly difficult to interpret, which generally appeared to suggest good convergent validity and discriminant validity of the scale (23). These results indicate the possibility of expressing the diet-related QOL of diabetic patients with greater sensitivity.

Because Cronbach's α -coefficient was 0.7 or higher for all subscales, strong internal consistency was confirmed (24). Concerning the reproducibility, the intraclass correlation coefficient was 0.7 or higher for four of the seven subscales (23) and that for "mental health" was 0.67. The intraclass correlation coefficient for "general perception of diet" and "restriction of social functions" was slightly low, probably because of the small number of items included in these subscales. Furthermore, in almost all instances, the weighted *k* coefficient was over the standard of ≥ 0.4 (23).

In previous evaluations of diabetic patient education, mainly indicators such as QOL, HbA_{1c}, and self-management behavior have been used (25). Although diet education support was considered necessary to maximally improve the QOL, in addition to maintenance of proper glycemic control and prevention of complications (11), no indicators exist for evaluating what these patients' perceptions are in relation to diet and whether the diet education helps in improving the QOL of the patients. It may be possible to use the DDRQOL scale to assess the areas of concern for patients. Furthermore, it is significant in that it enables quantitative evaluation of the effects of diet education from the aspect of the QOL. Moreover, because this scale consists of seven subscales, it would seem that it might allow understanding of the details of the changes from multiple dimensions. The DDRQOL scale is believed to enable evaluation of the effectiveness of diet education by the medical staff from the point of view of QOL.

In this study, a scale was developed for middle-aged patients with type 2 diabetes in Japan. In many cases, dietitians and nurses, focusing on how to use a food exchange list, perform the education of diet therapy in Japan. Further study is required for its application to other ethnic populations and patients with type 1 dia-

betes as well as to younger patients and elderly patients with type 2 diabetes.

In conclusion, the DDRQOL scale was found to have a reasonable degree of reliability and validity. Therefore, its application for the assessment of patients' needs and the evaluation of intervention in the form of diet education in diabetic patients is awaited.

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References

1. King H, Aubert RE, Herman WH: Global burden of diabetes, 1995–2025: prevalence, numerical estimates, and projections. *Diabetes Care* 21:1414–1431, 1998
2. Ministry of Health and Welfare: Diabetes mellitus survey in Japan [article online], 2003. Available from <http://www.mhlw.go.jp/shingi/2003/08/s0806-4.html>. Accessed 14 November 2003
3. American Diabetes Association: Standards of medical care for patients with diabetes mellitus (Position Statement). *Diabetes Care* 26 (Suppl. 1):S33–S50, 2003
4. American Diabetes Association: Evidence-based nutrition principles and recommendations for the treatment and prevention of diabetes and related complications (Position Statement). *Diabetes Care* 26 (Suppl. 1):S51–S61, 2003
5. Nelson M, Reiber G, Boyko EJ: Diet and exercise among adults with type 2 diabetes: findings from the third National Health and Nutrition Examination Survey (NHANES). *Diabetes Care* 25:1722–1728, 2002
6. Glasgow RE: Social-environmental factors in diabetes: barriers to diabetes self-care. In *Handbook of Psychology and Diabetes: A Guide to Psychological Measurement in Diabetes Research and Practice*. Bradley C, Ed. Chur, Switzerland, Harwood Academic Publishers, 1994, p. 335–349
7. Schlundt DG, Rea MR, Kline SS, Pichert JW: Situational obstacles dietary adherence for adults with diabetes. *J Am Diet Assoc* 94:874–879, 1994
8. Handron DS, Leggett-Frazier NK: Utilizing content analysis of counseling sessions to identify psychosocial stressors among patients with type II diabetes. *Diabetes Educ* 20:515–520, 1994
9. Rubin RR, Peyrot M: Psychological issues and treatments for people with diabetes. *J Clin Psychol* 57:457–478, 2001
10. Bradley C, Speight J: Patient perceptions of diabetes and diabetes therapy: assessing quality of life. *Diabetes Metab Res Rev* 18:S64–S69, 2002
11. Schlundt DG, Pichert JW, Gregory B, Davis D: Eating and diabetes: a patient-centered approach. In *Practical Psychology for Diabetes Clinicians*. 2nd ed. Anderson BJ, Rubin RR, Eds. Alexandria, Virginia, American Diabetes Association, 2002, p. 73–82
12. The DCCT Research Group: Reliability and validity of a Diabetes Quality of Life Measure for the Diabetes Control and Complications Trial. *Diabetes Care* 11:725–732, 1988
13. Polonsky WH, Anderson BJ, Lohrer PA, Welch G, Jacobson AM, Aponte JE, Schwartz CE: Assessment of diabetes-related distress. *Diabetes Care* 18:754–760, 1995
14. Fitzgerald JT, Davis WK, Connell CM, Hess GE, Funnell MM, Hiss RG: Development and validation of diabetes care profile. *Eval Health Prof* 19:208–230, 1996
15. Boyer JG, Earp JA: The development of an instrument for assessing the quality of life of people with diabetes: diabetes-39. *Med Care* 35:440–453, 1997
16. Bott U, Muhlhauser I, Overmann H, Berger M: Validation of the diabetes specific-quality-of-life scale for patients with type 1 diabetes. *Diabetes Care* 21:757–769, 1998
17. Suzukamo Y, Fukuhara S, Ohishi A, Shigai T: Development and validation of "Diet-Related QOL Scale." *Qual Life Res* 9:322, 2000
18. Suzukamo Y, Ono T, Fukuhara S: Assessment of diet-related QOL [in Japanese]. *Diabetes Journal* 28:87–90, 2000
19. Takemi Y: Development of a scale on positive dietary behavior and attitude among the elderly for diet related quality of life. *Minzoku Eisei* 67:3–27, 2001
20. Fukuhara S, Bito S, Green J, Hsiao A, Kurokawa K: Translation, adaptation, and validation of the SF-36 Health Survey for use in Japan. *J Clin Epidemiol* 51:1037–1044, 1998
21. Fukuhara S, Ware JE, Kosinski M, Wada S, Gandek B: Psychometric and clinical tests of validity of the Japanese SF-36 Health Survey. *J Clin Epidemiol* 51:1045–1053, 1998
22. Fukuhara S, Suzukamo Y, Bito S, Kurokawa K: *Manual of SF-36 Japanese Version 1.2*. Tokyo, Public Health Research Foundation, 2001
23. Fayers PM, Machin D: Scores and measurement: validity, reliability, sensitivity. In *Quality of Life: Assessment, Analysis and Interpretation*. Chichester, John Wiley & Sons, 2000, p. 45–71
24. Fayers PM, Machin D: Multi-item scales. In *Quality of Life: Assessment, Analysis and Interpretation*. Chichester, John Wiley & Sons, 2000, p. 72–90
25. Glasgow RE: Outcomes of and for diabetes education research. *Diabetes Educ* 25 (Suppl. 6):74–88, 1999