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Health Status Evaluation of Type 2 Diabetes Patients with Complications

การประเมินสถานะสุขภาพของผู้ป่วยเบาหวานชนิดที่ 2 ที่มีภาวะแทรกซ้อน

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ABSTRACT

Previous studies shown that one item self assessed health was a powerful and predictor of health outcomes. The question was asked as how is your health in general? and the answer was five point Likert scale from excellent to poor. The objective of this study was to explore health status of type 2 diabetes patients using one item self-perception question. A cross-sectional study was performed in outpatient diabetic clinic at a general hospital. The sample included 567 patients with 65.4% female, age between 27 and 86 years. All patients were interviewed using developed questionnaire. Chart review was done along the interview to confirm the history of diabetes complications. The results showed that there were significance differences between patients with and without complications in self-perception answers ($p < 0.01$). Multivariate analysis indicated that patients with complications reported health status of poor and very poor more than patients without complications with significance (odds ratio [OR], 3.66; 95% confidence interval [CI], 2.01 to 6.65) adjusted for age, sex, disease duration and blood sugar level. In summary by using one item self-perception question, results showed that diabetic patients with complications had lower health status than patients without complications. One item self-perception question can be use as a powerful measure of perceived health in type 2 diabetes patients.

Keywords: diabetes, health status, complications

บทคัดย่อ

จากการมีผู้ศึกษาว่าการให้ผู้ป่วยประเมินสภาวะสุขภาพของตนเองโดยใช้ข้อคำถามเดียวสามารถบอกถึงผลลัพธ์ทางสุขภาพได้อย่างมีประสิทธิภาพ โดยใช้ข้อคำถามว่า "โดยทั่วไปแล้วสุขภาพของท่านเป็นอย่างไรในขณะนี้" ซึ่งคำตอบจะมีให้เลือก 5 ระดับคือ ดีเยี่ยม ดีมาก ดี พอใช้ และไม่ดี การศึกษานี้มีวัตถุประสงค์ในการสำรวจสถานะสุขภาพของผู้ป่วยเบาหวานชนิดที่ 2 โดยให้ผู้ป่วยตอบคำถามหนึ่งข้อดังกล่าวเพื่อประเมินการรับรู้สถานะสุขภาพของตนเอง ทำการศึกษาแบบตัดขวางในคลินิกเบาหวานของแผนกผู้ป่วยนอกโรงพยาบาลทั่วไป เก็บข้อมูลในผู้ป่วยเบาหวานจำนวน 567 ราย ซึ่งประกอบด้วยเพศหญิง ร้อยละ 65.4 อายุระหว่าง 27 ถึง 86 ปี ทำการสัมภาษณ์ผู้ป่วยโดยใช้แบบสอบถามร่วมไปกับการทบทวนเวชระเบียนผู้ป่วยเพื่อเก็บข้อมูลภาวะแทรกซ้อน ผลการศึกษาพบว่ามีความแตกต่างของการตอบข้อคำถามการประเมินสถานะสุขภาพในระหว่างผู้ป่วยเบาหวานที่มีและไม่มีภาวะแทรกซ้อน ($p < 0.01$) จากการวิเคราะห์ แบบ multivariate analysis พบว่าผู้ป่วยเบาหวานที่มีภาวะแทรกซ้อนรายงานสถานะสุขภาพของตนเองในระดับพอใช้และไม่ดีมากกว่าผู้ป่วยเบาหวานที่ไม่มีภาวะแทรกซ้อนอย่างมีนัยสำคัญทางสถิติ (odds ratio [OR], 3.66; 95% confidence interval [CI], 2.01 to 6.65) เมื่อควบคุมตัวแปรอายุ, เพศ, ระยะเวลาการเจ็บป่วยและระดับน้ำตาล จึงสามารถสรุปได้ว่าผู้ป่วยเบาหวานที่มีภาวะแทรกซ้อนมีสถานะสุขภาพที่ต่ำกว่าผู้ป่วยเบาหวานที่ไม่มีภาวะแทรกซ้อน และพบว่าการประเมินสถานะสุขภาพในผู้ป่วยเบาหวาน โดยใช้ข้อคำถามเดียวในการประเมินการรับรู้สถานะสุขภาพตนเองสามารถบอกถึงความแตกต่างของผลลัพธ์ทางสุขภาพได้

คำสำคัญ: เบาหวาน สถานะสุขภาพ ภาวะแทรกซ้อน

Introduction

Diabetes mellitus is a chronic disease that affects approximately 9.6% of Thais (2.4 million people).[1] Data document that diabetes prevalence is increasing and projects a continued rise in rate as the population ages increase.[1] The disease is still being a problem and cannot be controlled effectively.[2] Type 2 diabetes is 8 to 10 times more common than type 1 diabetes and accounts for 94.6% of the diagnosed cases of diabetes in Thailand.[3] Patients with diabetes experience illness burden from the disease itself, treatment, comorbid medical conditions and complications that are prevalent in diabetes. Microvascular complications of diabetes include retinopathy and nephropathy, while macrovascular complications include cardiovascular disease and cerebrovascular disease.[4] Estimated rate of complications associated with diabetes vary between populations and with study design, but it has estimated that approximately 60% of individuals have one or more complications, while almost one quarter have two or more complications.[2]

As advanced medical technology prolongs life expectancy, the research focusing on patient-oriented outcomes is increasingly important and accepted to be an important aspect in medical care and research. Self-perceived health status, periodically referred to as health-related quality of life (HRQL), is a global outcome variable that represents a patients' perception of the impact of disease management and

complications on their health. HRQL assessments are useful in patient assessment because they evaluate global effects rather than specific clinical outcomes. As suggested by Higginson IJ, et al.[5] applying HRQL measures in clinical practice would help monitor changes or responses to treatment from patient point of view, and it might help identify and prioritize patient problems of which some might be undetectable by using clinical signs.

The impact of a chronic illness such as diabetes on HRQL is influenced by the presence of debilitating and life- threatening complications as well as by the burden of disease management.[6] Previous studies have shown that diabetes and the presence and severity of complications impact multiple dimensions of HRQL.[7-9] Many health status measures exist and subscales measuring physical, mental, and social well-being are often incorporated within these measure.[10-11] Those measures with Likert scale while adequate for many populations, have limited applicability to old, lower educated Thai patients. We sought to develop a health status measure that was powerful and easy to use for Thai population.

The objectives of this study were to explore health status of type 2 diabetes patients by using one item self-perception question and to discriminate health status among those patients with various diabetes complications.

Material and methods

The study was a cross-sectional study and was conducted at diabetes clinic, outpatient department, Prachuap Khiri Khan Hospital from February to May 2006. The diabetes clinic was performed once a week on every Tuesday so as to the data collection.

Health status measurement

First, the literature review for diabetes-generic HRQL measures was performed, and these instruments had to be reviewed for comprehensiveness and psychometric properties. The measures that were chosen had to be validated in Thais and had experience in using by Thai patients.[12] Based on this review, the Medical Outcomes Study short form 36 (SF-36) was selected to be our foundation instrument. Current SF-36 with 36 items tends to be lengthy and often lack applicability to Thai patients especially for elderly, making it difficult to integrate into routine clinical practice.

Two items (item number 1 and number 2) of general health scale and reported health transition scale were selected. Item number one was chosen to represent the health status measure while item number two was chosen to compare the health status with the one year past. Both items were scored on a 5-point Likert scale. Item number one was the self-perception question. The format asks about “In general, what would you say your health is?”. or in the meaning of “Is your health: excellent, very good, good, fair or poor ?”. The answers were scaled from excellent, very good, good, fair or poor. Item number two was the question to ask for rating of health now compared to one year ago. The question was “Compare to one year ago, how would you rate your health in general now?”. The answer was one of the following: much better now than

one year ago, somewhat better now than one year ago, about the same as one year ago, somewhat worse now than one year ago, and much worse now than one year ago. Both questions were straightforward to ask about patients' health, had no vague term and easy for patients to understand.

Questionnaire

Information was obtained by structured one-page questionnaire to reduce time consuming. The survey questionnaire consisted of 8 items in 3 parts; personal information, diabetes information, and health status measure. Personal information consisted of demographic variables included age and sex. For diabetes information, the items capturing duration of diabetes, fasting blood sugar, hemoglobin A1C, diabetes complications and side effects of medications. Two items of health status assessment were the last part of the questionnaire. The questionnaire was tested in 10 diabetes patients to assess the applicability.

Study patients

Eligibility criteria included aged 18 years or older; diagnosed with type 2 diabetes; received continually care by the hospital for at least 6 months. Patients were excluded if they had a diagnosis of type 1 diabetes or aged less than 18 years, had psychiatric disorder or cognitive impairments that interfered the interview. A written informed consent was obtained from all patients before enrolled to the study.

Data collection

We collected data on voluntary sample of 567 type 2 diabetes patients attending diabetes clinic. Interviews were performed by outpatient nurses after the physical examinations were completed. The interview took 5 minutes for each patient. Data of diabetes complications were directly obtained from the medical records.

Statistical Analyses

The primary analysis examined the relationship of type 2 diabetes characteristics especially complications to health status measures. The following characteristics were also studied: sex, age, duration of diabetes, presence of complications, fasting blood glucose, HbA1c. Complications were categorized in two ways: 1) presence/ absence of any complications; 2) type of complications patients experienced including both microvascular and macrovascular complications. We hypothesized that diabetes patients with complications would be more likely to report worse health status than patients with no or less complications.

The analysis included simple descriptive statistics and multivariate analysis. Frequency distributions and summary statistics were generated on the independent variables and dependent variables of interest. Univariate analysis were performed to describe the data. Multivariate analysis using logistic regression model was used to establish which complications were associated with declined health status after adjustment for other characteristics. All statistical computations were performed using commercially available software (STATA version 8).

Results

A total of 567 patients completed the health status measure. The characteristics of the diabetes patients were presented in Table 1. Of the 567 patients, 65.4% were female. Overall, the mean age of patients was 60.1 years (ranged 27-86 years). Mean age indicated that most of patients in this study were elderly as 54.1% aged more than 60 years. Mean duration of diabetes was 7.1 years. Mean FBS (155.1 mg%) and HbA1c level (8.2%) revealed of uncontrolled diabetes in study patients. 25.5% of patients had diabetes complications.

Much of concern for treatment of diabetes is focused around the complications of the disease. Most diabetes-related deaths result from the long-term diabetes complications. Types of complications in study patients are presented in Table 2. Foot ulcer was the most common complications which found in 6.8% of the patients. Other microvascular complications were as following; retinopathy 6.6%, neuropathy 5.9% and nephropathy 3.0%. For macro-vascular complications, 4.5% experienced cardio-vascular complications of coronary heart disease while 0.5% had stroke. For acute complication, hypoglycemia and hyperglycemia happened in 6.1% and 1.3% respectively.

Table 1 Characteristics of diabetic patients

Characteristic	**N = 567**
Sex, female (%)	371 (65.4)
Age, mean (S.D.), yrs	60.1 (11.6)
Age categories, n (%)	
≤ 40 yrs	26 (5.4)
41-59 yrs	196 (40.5)
60 yrs	262 (54.1)
Duration of DM, mean (S.D.), yrs	7.1 (6.9)
Duration of DM categories, n (%)	
Less than 1 yr	76 (14.2)
1-5 yrs	195 (36.3)
6-10 yrs	182 (33.9)
More than 10 yrs	84 (15.6)
FBS, mean (S.D.), mg %	155.1 (55.8)
HbA1c level, mean (S.D.), %	8.2 (2.0)
Complications, n (%)	144 (25.5)

Diabetes medications have many side effects. Both oral and injection hypoglycemic agents can cause side effects from mild to severe symptoms. Side effects of medications found in this study were listed in Table 3. Dizziness was the most frequently found side effects in 0.9% of patients. Rash and cough were found in 0.7% and 0.5% of patients.

HbA1c and health status

According to American Diabetes Associations (ADA), HbA1c is the primary target for diabetes control. The HbA1c goal for patients in general is a goal of < 7% (ADA, 2007). Associations of HbA1c and health status are presented in Table 4. Subgroup analysis of controlled vs. uncontrolled DM was

Table 2 Types and frequency of diabetic complications in the study patients

Diabetic complications	Frequency	Percent
foot ulcer	38	6.8
retinopathy	37	6.6
hypoglycemia	34	6.1
neuropathy	33	5.9
coronary heart disease	25	4.5
nephropathy	17	3.0
hyperglycemia	7	1.3
stroke	3	0.5

Table 3 Types and frequency of side effects of diabetic medications

Side effects	Frequency	Percents
Dizziness	4	0.9
Rash	3	0.7
Cough	2	0.5
Nausea	1	0.2
Headache	1	0.2
Hyperpigmentation	1	0.2

performed by using HbA1c cutoff point at 7%. Data show that 17.7% of patients with uncontrolled diabetes while 13.0% of controlled patients reported poor health status. For "very good" health status 1.7% of patients of controlled DM and 0.7% of uncontrolled diabetes reported their health in that level. All the associations between HbA1c and health status did not reach statistical significance.

The reported health transition indicates the difference of present health status with that of one year ago. Table 5 presented the associations of HbA1c and the reported health transition. Patients with controlled DM reported better health transition than patients with uncontrolled diabetes (26.1 % vs. 20.6 %). Conversely, patients with uncontrolled diabetes reported worse health transition than patients with controlled DM (35.2% vs. 26.1%). The statistical significance (P 0.04) was reached for this association.

Characteristic of diabetes complications

Diabetes complications are the leading cause of death in diabetes patients. All efforts on diabetes treatment are for complications prevention. In this study 25.6% of patients had complications. Characteristics of patients present with complications are shown in Table 6.

Data in Table 6 indicated that there was no difference between male and female in having complications. As age and duration of diabetes increased, number of patients with complications increased with statistical significance. HbA1c of patients with

Table 4 HbA1c level and health status

Health status	HbA1c	
	Less than 7% (controlled DM) n = 115	**Equal or more than 7% (uncontrolled DM) n = 283**
excellent	-	-
very good	2 (1.7)	2 (0.7)
good	50 (43.5)	123 (43.5)
fair	48 (41.7	108 (38.2)
poor	15 (13.0)	50 (17.7)
total	**115 (100)**	**283 (100)**

NS (non-significance)

Table 5 HbA1c Level and reported health transition

Reported health transition	HbA1c (N = 396)	
	Less than 7% (controlled DM) n = 115	Equal or more than 7% (uncontrolled DM) n = 281
much better now than one year ago	4 (3.5)	4 (1.4)
somewhat better now than one year ago	26 (22.6)	54 (19.2)
about the same as one year ago	55 (47.8)	124 (44.1)
somewhat worse now than one year ago	25 (21.7)	98 (34.9)
much worse now than one year ago	5 (4.4)	1 (0.4)
total	**115 (100)**	**281 (100)**

P 0.04

Table 6 Characteristics of patients with and without diabetic complications

Characteristic	Diabetic complications		P-value
	No complications n = 418	Having complications n = 144	
Sex, female (%)	275 (74.7)	93 (25.3)	NS
male	143 (73.7)	51 (26.3)	
Age categories, n (%)			
≤ 40 yrs	23 (88.5)	3 (11.5)	0.01
41-59 yrs	146 (76.4)	45 (23.6)	
≥ 60 yrs	174 (66.4)	88 (33.6)	
Duration of diabetes, n (%)			
< 1yr	64 (87.7)	9 (12.3)	0.01
1-5 yrs	145 (74.7)	49 (25.3)	
6-10 yrs	127 (69.8)	55 (30.2)	
≥ 10 yrs	55 (66.3)	28 (33.7)	
HbA1c, mean (S.D.), %	8.13 (.11)	8.16 (.20)	NS

NS = non-significance

complications was higher than patients without complications but there was no statistical significance observed between HbA1c of the two groups.

Diabetes complications and health status

Table 7 presents self-perceived health status of patients according to the presence or absence of diabetes complications. There were differences in number of patients reported different scale of health status between those with or without complications. Patients with complications reported fair and poor health status more than patients who had no complications (56.3% vs. 33.8% for fair; 18.3% vs. 14.1% for poor).

Table 8 presents reported health transition of patients according to the presence or absence of diabetes complications. There were differences in number of patients reported different scale of health transition between those with or without complications. Patients with complications reported somewhat worse and much worse health transition more than patients who had no complications (39.4% vs. 28.9% for somewhat worse; 4.2% vs.1.3% for much worse).

Associations of diabetes complications and health status

Based on logistic regression analysis, Table 9 presents association between diabetes complications and the reported of fair or poor health status, adjusting for demographics, duration of diabetes and blood sugar level. The patient with a presence of the any types of complications was 3.66 times more likely to report fair or poor health status, compared with an absence of complications. Having hypoglycemia and neuropathy were 15.15

Table 7 Diabetic complications and health status

Health status	Diabetic complications	
	No complications n = 397	**Having complications n = 142**
excellent	-	-
very good	4 (1.0)	3 (2.1)
good	203 (51.13	33 (23.2)
fair	134 (33.8)	80 (56.3)
poor	56 (14.1)	26 (18.3)
total	**397 (100)**	**142 (100)**

P 0.000

Table 8 Diabetic complications and reported health transition

Health transition	Diabetic complications	
	No complications n = 394	**Having complications n = 142**
much better now than one year agon	8 (2.0)	10 (7.0)
somewhat better now than one year ago	87 (22.1)	19 (13.4)
about the same as one year ago	180 (45.7)	51 (35.9)
somewhat worse now than one year ago	114 (28.9)	56 (39.4)
much worse now than one year ago	5 (1.3)	6 (4.2)
total	**394 (100)**	**142 (100)**

P 0.000

Table 9 Results of Logistic Regression analyses of the relationship of diabetic complications to fair or poor health status

Complications	Adjusted OR	95% CI	P-value
Having any complications	3.66	(2.01-6.65)*	0.000
Hypoglycemia	15.15	(1.96-117.19)*	0.009
Neuropathy	11.04	(2.54-47.97)*	0.001
Hyperglycemia	2.73	(0.26-28.90)	NS
Coronary heart disease	2.66	(0.92-7.71)	NS
Foot ulcer	1.65	(0.69-3.96)	NS
Retinopathy	1.25	(0.47-3.31)	NS

Adjusted for age, sex, duration of diabetes, blood sugar level
* P < 0.01
NS = non-significance

and 11.04 times respectively more likely to report fair or poor health status, compared with an absence of such a complication. Patients who had hyperglycemia, cardiovascular disease, foot ulcer and retinopathy were 2.73, 2.66, 1.65 and 1.25 times respectively more likely to report fair or poor health status but no significance was found for all four types of complications.

Results from multivariate analysis in Table 9 indicated that diabetes complications especially hypoglycemia and neuropathy had a strong relation with self perceived health status.

Discussion

The results of this study indicate that health status of diabetes patients was affected by the presence of complications as evaluated by one item self-perceived health status measure. Patients with diabetic complications reported their health status worse than patients without complications. Overall health status deficits associated with diabetes in combination with complications were 3.66 times of patients without complications. For complications of hypoglycemia and neuropathy, the associations were considerably larger with the health status deficits (15.15 and 11.04 times respectively). For all other complications (hyperglycemia, cardiovascular disease, foot ulcer and retinopathy), there were associations between those complications and health status deficits even no statistical significance was reached. This indicated that most diabetic complications can ameliorate patientsí health status, considering the importance of self-care in the control of DM, specifically the management of diet, blood pressure monitoring and exercise.

Hypoglycemia is the acute complication in diabetes patients. Decreasing food intake, intensive exercise, alcohol and medications can cause hypoglycemia. It is also the most common side effect of sulfonylurea and insulin therapy. Hypoglycemia is the leading limiting factor in the glycemic management of type 2 diabetes.[2] Due to many sign and symptoms of hypoglycemia such as headache, confusion, visual disturbances, irritability; it considerably affected health status of patients. This finding was not different from the study performed by Lloyd CE, et al.[13] which presented that having hypoglycemia at least once episode per month was associated with poorer HRQL.

Neuropathy is the long term microvascular complication that can cause painful symptoms. Symptoms may begin as tingling or burning sensations with a definite loss in vibratory sensation.[2] As the results indicated, patients with neuropathy reported their health status of fair and poor 11.04 times more than those who had no such complication.

The study results confirmed that complications could induce morbidity and thereby affect HRQL. These results correspond remarkably well with the findings reported by another large study. The U.K. Prospective Diabetes Study Group (UKPDS)[7] performed two cross-sectional studies to determine the effects of diabetes therapies, macrovascular, microvascular complications and hypoglycemic episodes on quality of life (using EQ5D). The result indicated that the occurrence of a complication during the previous year significantly reduced HRQL. Previous studies on diabetic outcomes also supported the results. Klein BE, et al.[14] evaluated the self-reported HRQL in 14 years duration of diabetic patients. Results of the study indicated that patients with sensory neuropathy, nephropathy and cardiovascular disease affected HRQL of patients. Glasgow RE et al.[15] found that diabetes patients who had more complications,

comorbid illnesses and lower levels of physical activity, reported a moderate to low quality of life. Frequency and severity of complications also affected patients' perceptions of their HRQL in both type 1 and 2 diabetes.[16] Peyrot M, et al.[17] found that diabetes was associated with increased risk of psychological disturbance, especially for those with more diabetes-related complications.

In this study reported health transition was assessed to confirm the health status measurement. Results by univariate analysis indicated that reported health transition was affected by diabetic complication (Table 8). The detail of question is to compare patients' health with one year past and may not match with some chronic complications. Chronic complications normally happen for long time period certainly more than one year. For this reason health status assessment is more suitable to assess than health transition.

Major reason to treat diabetes and to attempt to restore blood glucose levels to normal, is to avoid the acute and chronic complications. ADA[4] estimates that more than 10 million persons with diabetes have experienced long term complications. Results also presented that complications also increase as age of patients and duration of diabetes increase. Older patients should be closely monitored for complications. Strong support to achieve optimal glycemic control and identifying therapies to prevent the progression of the complications must be a priority. Pharmacist should have important role to help diabetes patients achieving the goal of treatment. They should educate patients to prevent complications by help patients using medications appropriately, assist patients to control glucose level, teach patients about self-monitoring of blood glucose, teach patients to detect and prevent any complications of DM especially hypoglycemia and help patients to detect adverse effects of all medications.

Although health status or HRQL is not usually evaluated as outcome assessment in Thailand before, interest in measuring health status in relation to health care has increased in recent years. Two reasons support the usefulness of health status measurement. First, health status or HRQL can capture a broader range of health and functioning than usual clinical outcome assessment.[18] Second, for complete assessment of the benefits of an intervention it is essential to provide evidence of the impact on the patient in terms of health status and health related quality of life. This indicates that the patient's perspective of outcome is incorporated such as broader impacts of illness and treatment need.[10] In this study general health perception was evaluated in term of health status. It includes measures that are personal evaluations of health, based on whatever health means to the respondent. The category of measures depends on each person's own health values. The person might be mental health-oriented or physical health-oriented.

The reason that one item measure was selected in this study because it was practical and easy to use. Multi-item scale questionnaires for Thai patients are time consuming and hard to use in real practice.[19] Furthermore, older patients may confuse with multi items questionnaire. Another advantage of singleitem measures are that they allow the subject

to define the concept in a way that is personally meaningful, providing a measure that can be responsive to individual differences. Singleitem measures require that subjects consider all aspects of a phenomenon, ignore aspects that are not relevant to their situations, and differentially weight the other aspects according to their values and ideals in order to provide a single rating. A global singleitem measure is a more valid measure of the concept of interest than a score from a multiitem scale.[20]

Some limitations of this study deserve special mention. First, some social and demographic factors such as education, income and marital status were not collected in the data collection process as the questionnaire of this study was designed to be a short completion time instrument. Income and social status have been recognized as two of the most important determinants of health in Canadian population.[21] Second, as we used one item health status measure, the problems of less reliable and less interpretability might occur. In practice, many instruments include at least one global question in addition to a number of multiitem scales. Often a global question is used for overall HRQL, for overall health, or for similar concepts that are assumed to be broadly understood by the majority of patients.[20] Third, samples in this study were patients from one hospital so they were not representative of general population of people with diabetes. This might limit the generalizability of the instrument. Fourth, a health status measure in this study focused on only ambulatory patients which were the front line of care. Further study may be performed in hospitalized patients although it is harder to retrieve data from patients with more severe disease state.

In summary, by using one item self-perception question, results showed that diabetes patients who presence with complications had lower health status than patients with absence those complications. Despite of limitations, one item self-perception question have captured the health status deficits associated with common diabetes complications and can be used as a powerful measure of perceived health status in type 2 diabetes patients.

Implications

From the study results, it is possible that one item health status measure can be use as a tool in outcome assessment in diabetes clinical studies and randomized controlled trial. Furthermore, it may be used to compare health status in diabetes patients with normal subjects or subjects with other diseases during an epidemiologic study and may eventually be used during clinical trials assessing the efficacy of therapeutic intervention. Although, it is necessary to study whether the measure may be responsive to within-subject changes during trials. The reproducibility of the questionnaire must be tested in patients with well-controlled diabetes.

References

1. Aekplakorn W, Stolk RP, Neal B, et al. The prevalence and management of diabetes in Thai adults. Diabetes Care. 2003;26:2758-63.
2. Steil CF. Diabetes Mellitus. In: DiPiro JT, Talbert RL, Yee GC, et al. (ed.). Pharmacotherapy: a pathophysiologic approach. Stamford Conn:

Appleton & Lange; 1999.

3. Rawdaree P, Ngarmukos C, Deerochanawong C, et al. Thailand diabetes registry (TDR) project: clinical status and long term vascular complications in diabetic patients. J Med Assoc Thai. 2006; 89(Suppl 1):S1-9.
4. American Diabetes Association. Standard of medical care in diabetes 2007. Diabetes Care. 2007;30:S4-S34.
5. Higginson IJ, Carr AJ. Using quality of life measures in the clinical setting. BMJ. 2001;322: 1297-1300.
6. Elasy TA, Samuel-Hodge CD, DeVellis RF, et al. Development of a health status measure for older African-American women with type 2 diabetes. Diabetes Care. 2000;23:325-9.
7. U.K. Prospective Diabetes Study Group. Quality of life in type 2 diabetic patients is affected by complications but not by intensive policies to improve blood glucose or blood pressure control (UKPDS 37). Diabetes Care. 1999;22:1125-36.
8. Coffey JT, Tabael BP, Brandle M, et al. Valuing health-related quality of life in diabetes. Diabetes Care. 2002;25:2238-43.
9. Redekop WK, Rutten GEHM, Koopmanschap MA, et al. Health-related quality of life and treatment satisfaction in Dutch patients with 2 diabetes. Diabetes Care. 2002;25(3):458-63.
10. Ware JE. Conceptualizing and measuring generic health outcomes. Cancer. 1991;67(3 Suppl): 774-9.
11. Brooks RG. Health status measurement : a perspective on change. Basingstoke: Macmillan; 1995.
12. Leurmarnkul W, Meetam P. Development of a quality of life questionnaire: SF 36 (Thai version). Thai J Pharm Sci. 2000;24(2):92-111.
13. Lloyd CE, Orchard TJ. Physical and psychological well-being in adults with type 1 diabetes. Diabetes Res Clin Pract. 1999;44(1):9-19.
14. Klein BE, Klein R, Moss SE. Self-rated health and diabetes of long duration. The Wisconsin Epidemiologic Study of Diabetic Retinopathy. Diabetes Care. 1998;21:236-40.
15. Glasgow RE, Ruggiero L, Eakin EG, et al. Quality of life and associated characteristics in a large national sample of adults with diabetes. Diabetes Care. 1997;20:562-7.
16. Jacobson AM, de Groot M, Samson JA. The evalua-tion of two measures of quality of life in patients with type I and type II diabetes. Diabetes Care. 1994;17:267-74.
17. Peyrot M, Rubin RR. Levels and risks of depression and anxiety symptomatology among diabetic adults. Diabetes Care. 1997;20:585-90.
18. Curtis JR, Martin DP, Martin TR. Patient assessed health outcomes in chronic lung disease: What are they, how do they help us and where do we go from here?. Am J Respir Crit Care Med. 1997; 156:1032-39.
19. Sirimai P. Quality of care and outcomes in asthma [Ph.D. Thesis in Social and Administrative Phar-macy]. Khon Kaen: The Graduate School, Khon Kaen University; 2007.
20. Fayer PM, Machin D. Quality of life; assessment, analysis and interpretation. Chichester : Wiley; 2000.
21. Maddigan SL, Feeny DH, Johnson JA. The impact of dibetes and co-morbidity on health-related quality of life: finding from the 1996-97 national population health survey. National Library Canada; 2000.