



**THE ASSOCIATION OF DIABETES-RELATED FACTOR AND
QUALITY OF LIFE IN TYPE 2 DIABETES MELLITUS**

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ABSTRACT

Purpose : The objective of the study was to determine the relationship of diabetes-related factor, including duration of diabetes, treatment regimen, level of glycemic control, and the presence of complications with quality of life.

Methods : An observational prospective study were carried out in Dr Sardjito Hospital in Yogyakarta Indonesia, from May 2007 to September 2008. The target population is patients with diagnosed type 2 diabetes who are failing with oral antidiabetic medication and visits to the diabetes clinic. The Diabetes Quality of Life Clinical Trial Questionnaire (DQLCTQ) was used to assess health-related quality of life in patients with type 2 diabetes mellitus at baseline and three monthly follow-up period. For each patient, data were collected on the duration of diabetes, treatment regimen, level of glycemic control, and presence of complications through medical records. Comparisons among subgroups were performed using analyses of variance (ANOVA) and Kruskal-Wallis. All tests were performed using a two-tailed test at a significance level of 0.05.

Results : Our study demonstrated that no significant association between disease duration with DQLCTQ score. Type 2 diabetes mellitus patients treated with insulin experienced significantly greater improvement compared with triple oral medications in the treatment flexibility ($p=0.013$), frequency of symptoms ($p=0.043$), treatment satisfaction ($p<0.001$), and satisfaction ($p=0.033$). We found that higher HbA_{1c} levels were associated with a lower HRQoL ($p=0.008$). The presence of two or more complications was associated with worsened quality of life ($p=0.035$).

Conclusion : These findings suggest that treatment regimen, level of glycaemic control, and the presence of complications are associated with quality of life.

Key words : Type 2 diabetes mellitus, Quality of life, Diabetes-related factor, HbA_{1c}

INTRODUCTION

Diabetes mellitus (DM) is associated with long-term damage of multiple organ systems and increased age-adjusted mortality rates. Conventional outcome assessment for diabetes mellitus, primarily on haemoglobin A_{1c} (HbA_{1c}) and complications of diseases. The clinical outcomes, however, does not necessarily reflect patients' perceptions of their health. Treatment regimens that require changes of lifestyles and behaviors can influence patients' daily functioning and well-being. Therefore, health-related quality of life (HRQoL) is increasingly used as an outcome indicator alongside conventional biomedical measures¹.

Health-related quality of life (HRQoL) is considered a patient-assessed or patient-centered outcome that relates to the individual's health perceptions, wellbeing, and functioning. Moreover, health perceptions reflect the context of cultural and value systems. Various societal and individual determinants influence physical functioning, psychological state, social relationships environmental factors, and beliefs. Several studies report lower HRQoL in people diagnosed with diabetes than for non diabetic patients. Furthermore, evidence suggests the level of HRQoL is dependent on the presence of comorbidities and the severity and the number of complications and has been significantly correlated with socioeconomic and/or familial barriers².

Several instruments are available for assessing diabetes mellitus HRQoL, including generic and diabetes-specific instruments. Generic instruments measure HRQoL domains which are universally important diseases, while diabetes-specific instruments measure specific impacts of diabetes on functioning and well-being. Specific instruments may be more sensitive to patients' score changes over time¹. The Diabetes Quality of Life Clinical Trial Questionnaire (DQLCTQ) is a reliable, valid, and comprehensive HRQoL instrument. It included both generic and diabetes-specific domains covering the importance aspects of patient's HRQoL, including physical function, psychological well-being, social function, satisfaction and frequency of symptoms³.

Diabetes is a chronic disease that requires continuing medical care and patient self-management education to prevent acute complications and to reduce the risk of long-term complications⁴. Much of the morbidity and mortality associated with type 2 diabetes mellitus is caused by complications associated with the disease. The macrovascular effects are particular concern in type 2 diabetes that give rise to cardiac, cerebrovascular, and peripheral vascular dysfunction. These complications not only result in physical function and cost, but also lead to compromised health-related quality of life (HRQoL)⁵. Subjects with diabetes and multiple comorbid conditions have poorer HRQoL than those without these conditions⁶. For example, subjects with diabetes and co-existing cardiovascular diseases reported significantly lower scores on social functioning, vitality and health-change scales. In another study, subjects with diabetes and co-existing coronary artery disease, peripheral

sensory neuropathy and peripheral vascular diseases reported significantly lower scores on several SF-36 scales⁵.

People with diabetes often feel challenged by their disease and its day-to-day diabetes management demands. Patients must deal with their diabetes all day, every day, making countless decisions in an often fail effort to approximate the non-diabetic metabolic state. Diabetes therapy, such as taking insulin, can substantially affect quality of life either positively, by reducing symptoms of high blood sugar, for instance, or negatively, by increasing symptoms of hypoglycaemia for example⁷.

HRQoL not only important outcome in its own right, but also because it may influence the patient's self-care activities, which may consequently impact their diabetes control and management⁸. It is increasingly acknowledged that the patient's own perception of change in her or his health status is an important indicator of the success of treatment. Low quality of life and psychosocial status of patients with diabetes may affect metabolic control by impeding compliance³. The objective of the study was to determine the relationship of diabetes-related factor, including duration of diabetes, treatment regimen, level of glycemic control, and the presence of complications with quality of life.

METHOD

In this study, a questionnaire was administered to patients immediately after their appointments at the Department of Endocrinology Dr Sardjito Hospital in Yogyakarta Indonesia. A glycosylated haemoglobin A_{1c} (HbA_{1c}) test was performed to measure glycemic control following patients' first visits. We also collected

disease-related variables from patients' medical charts. The descriptive variables obtained from questionnaires and medical charts were sociodemographic and disease-related characteristics. Sociodemographic variables included age, education level, and household income (Table 1). Disease-related variables included duration of diabetes, type of therapy (insulin and triple oral therapy), presence of complications, and the level of HbA_{1c}.

The Quality of Life Clinical Trial Questionnaire (DQLCTQ) were need to assess health-related quality of life, consisting of 57 questions comprising 8 domains, as follows : Physical Function, Energy/Fatigue, Health Distress, Mental Health, Satisfaction (DQOL), Treatment Satisfaction, Treatment Flexibility, and Frequency of Symptoms. It included both generic and diabetes-specific domains covering the important aspect of health-related quality of life, including physical function, psychological well-being, social function, satisfaction, and symptoms^{3,9}. Validity and reliability of the DQLCTQ has been investigated in Dr Sardjito Hospital. As a measure of reliability, Cronbach's alpha were acceptable 0.85 (>0.70) for all domains. For the four primary domains test-retest reproducibility was excellent with correlation coefficients above 0.80. Validity was measured using a number of external comparisons¹⁰.

For each descriptive variable, the mean, standard deviation, frequency, and proportion of the total study population with that variable were calculated. To examine variables by sex, categorical variables were analyzed using the χ^2

test, continuous variables were analyzed using the *t* test, and continuous variables with skewed distributions were analyzed using the Mann-Whitney test. Comparisons among subgroups (disease-related characteristics, education level, and household income) were performed using analyses of variance (ANOVA) if the data were normally distributed. If the data were not normally distributed the Kruskal-Wallis test was used. All tests were performed using a two-tailed test at a significance level of 0.05.

RESULT AND DISCUSSION

One hundred and fifteenth of patients, 58 men and 57 women, aged 62.35 ± 8.88 , and diabetes duration 12.53 ± 6.97 were studied. Almost 24.35% of the patients had no complications, 6.96% only microvascular complication, 61.74% with macrovascular complications, and 6.96% had both types of complications. Microvascular complications were defined as foot ulcer, retinopathy, and neuropathy. Macrovascular complications were defined as hypertension, hyperlipidaemia, heart failure, ischaemic heart disease, and angina pectoris.

Diabetic patients reported an average DQLCTQ score of 77.23 (SD=7.22). Female and older patients reported a lower HRQOL than other patients (Table 1). Gucciardi et al (2008) suggested that men and women with diabetes mellitus have different psychosocial, behavioural, and clinical characteristics when they first come to a diabetes education centre. These differences can affect the risk of diabetes, attitudes and behaviour toward self-care, and health outcomes¹¹.

Table 1: Quality of Life as reported by Type 2 Diabetic Patients

Characteristics	DQLCTQ score±SD	p value
Overall	77.23 ± 7.22	
Sex		p=0.038*
Female	75.83 ± 7.45	
Male	78.62 ± 6.77	
Age		p=0.124***
< 50 years	79.42 ± 4.82	
50 – 59 years	77.22 ± 6.43	
60 – 69 years	78.49 ± 8.24	
≥70 years	74.42 ± 6.27	
Duration of Diabetes		p=0.866***
< 5 years	76.35 ± 8.11	
5 – 10 years	77.58 ± 7.83	
> 10 years	77.28 ± 6.87	
Treatment		p=0.004**
Triple oral therapy	77.21 ± 8.99	
Insulin	81.67 ± 6.51	
Glycaemic control		p=0.008****
HbA1C < 7%	81.52 ± 7.04	
HbA1C 7.1 – 8.5%	80.56 ± 5.75	
HbA1C 8.5 – 10%	81.51 ± 7.68	
HbA1C > 10%	73.81 ± 9.86	
Complications		p=0.035***
No complication	78.03 ± 7.71	
One complication	78.45 ± 5.95	
Two or more complications	74.45 ± 8.18	

Data are means ± SD, * Mann-Whitney test **t test ***One-way analysis of variance ****Kruskall-Wallis

Our study indicated that female respondents showed significantly greater perceived negative impact of mental health (p=0.001) and health distress (p=0.003) than did males. Compared with males, females showed a tendency towards greater perceived negative impact of diabetes on physical

function, energy, health distress, mental health, treatment satisfaction, and frequency of symptoms, but greater positive impact on satisfaction and treatment flexibility. There were significant associated with age for the physical functioning (p=0.004), indicating worsening present QoL with

increasing age. Ageing is clearly associated with a decline in most physiological systems that limited physical capacity. The cardiovascular and musculoskeletal systems have involved with the most basic functions of everyday life. Regarding the cardiovascular system, ageing is associated with a decline in maximal aerobic performance that is due to a decrease in cardiac output and oxygen uptake at the muscle¹². Previous studies have related diabetes to decreased HRQoL, including decreased physical, role and social functioning, and increase dependence on others to perform activities of daily living. Diabetes has also been related to cognitive decline, which could affect physical disability¹³.

There were no significant association between quality of life and disease duration. Consistent with Redekop studied (2002) that the duration of diabetes was not associated with quality of life after adjustment for other patients characteristics. Several studies found that increased duration of diabetes was associated with decreased HRQoL, as studied either by Nottingham Health Profile in a Finnish population of people with each type of diabetes or by the SF-36 and SF-20 in populations of people with both types of diabetes¹⁴.

The long-term benefit of glycemic control in diabetes mellitus is to reduce the risk of complications (e.g., cardiovascular disease, retinopathy, nephropathy, neuropathy). Since these complications are known to reduce HRQoL, intensified glycaemic control is an important way to reduce risk of complications and improve HRQoL¹⁵. Our study indicated that higher HbA_{1c} levels were associated with a lower HRQoL. Patients with good glycaemic control might report better HRQoL because of fewer hyperglycaemic

symptoms and decreased morbidity. The relationship between glycaemic control and quality of life is unclear. Previous studies have produced inconsistent findings regarding the relationship between glycemic control and patient-reported outcomes including HRQoL. Some correlational studies indicate that better glycemic control, assessed using HbA_{1c}, is variously associated with lower emotional distress, better well-being, better health status, worse health status, and better QoL¹⁶. Other studies report no association with health status⁵. Direct relationship was found between changes in HbA_{1c} and changes in HRQoL outcome, but improved HRQoL outcome was positively associated with the decrease of hyperglycaemic complaints¹⁷. A randomised controlled double blind trial showed that improved HbA_{1c} was associated with short-term improvement in HRQoL and economic benefit in type 2 diabetes¹⁸.

Type 2 patients treated with insulin experienced significantly greater improvement compared with triple oral medications in the treatment flexibility ($p=0.013$), frequency of symptoms ($p=0.043$), treatment satisfaction ($p<0.001$), and satisfaction ($p=0.033$). Results of research on the association between treatment regimen and quality of life are mixed, with some indication that increasing treatment intensity in patients with type 2 diabetes mellitus from diet and exercise alone, to oral medications, to insulin, is associated with worsening quality of life⁷. Okanovick et al., (1998) indicated that introducing insulin therapy in patients with type 2 diabetes mellitus and sustained elevated HbA_{1c} levels might positively affect their quality of life¹⁹. Improvement of glycemic control by the addition of insulin therapy may increase HRQoL because of a reduction in

hyperglycemic symptoms and an associated reduction in morbidity. Conversely, increased hypoglycemic events or the introduction of a complex injection regimen requiring substantial lifestyle changes could potentially decrease patient HRQoL. Nevertheless, several studies of patients with type 2 diabetes switching from oral treatment to insulin therapy reported a positive effect on patient HRQoL in addition to improved glycemic control²⁰.

Presence of complications were associated with a lower quality of life. Patients without complications reported the highest HRQoL, whereas patients with two or more complications reported the lowest HRQoL ($p=0.035$). The research addressing presence of diabetes-related complications is consistent in finding that the presence of two or more complications, is associated with worsened HRQoL⁷. Redekop et al. assessed health utility scores by applying the EuroQol to a

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