

Research Article

# Can metabolic control variables of diabetic patients predict their quality of life?



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Manuscript received July 23, 2014 and accepted November 11, 2015

## Abstract

The type and the complexity of regimen aimed at achieving better glycemic control may impact patient's health-related quality of life (HRQoL) in diabetic patients. But, the relationship between HbA1c levels of diabetic patients and their HRQoL is not clear. Our study aims to determine whether metabolic control variables can predict HRQoL or not and also the impact of hypertension (HT) on HRQoL in type II diabetic patients. A total of 469 patients with type II diabetes and 134 control subjects were studied. Medical Outcomes Study Short-Form-General Health Survey (SF-36) questionnaire was used as a health survey tool to measure the QoL of patients in the study. SF-36 includes 8 individual subscales and two summary scales (physical component summary [PCS] and mental component summary [MCS]). Age, gender, fasting blood glucose, postprandial blood glucose, HbA1c, high-density lipoprotein-cholesterol (HDL-C), low-density lipoprotein-cholesterol (LDL-C), triglyceride, total cholesterol, Apolipoprotein B (apoB), non-HDL-C, and body mass index values of the subjects were recorded. For statistical evaluation, SPSS (Statistical Package for the Social Sciences) 15 under Windows 7 was used. MCS values of patients group were statistically lower than control group ( $P < .05$ ). There was no significant difference in PCS values between groups ( $P > .05$ ). Diabetic patients with HT had significantly lower PCS and MCS values than those without HT. In addition, there was a negative correlation between HbA1c level and PCS and MCS values ( $P < .05$ ). Hypertensive diabetic patients had significantly higher fasting blood glucose, postprandial blood glucose, HbA1c, HDL-C, LDL-C, total cholesterol, and body mass index values than hypertensive control subjects ( $P < .05$ ). Normotensive diabetic patients also had significantly lower PCS value than normotensive control subjects ( $P < .05$ ). But, MCS value was not different between groups ( $P > .05$ ). PCS values in diabetic male patients were significantly higher than in diabetic female patients ( $P < .05$ ). MCS value did not differ by gender in diabetic patients ( $P > .05$ ). In our study, it is clear that diabetes affected the patients' HRQoL. In addition, we showed negative correlations between HbA1c levels and PCS and MCS values. There was a significant difference in PCS scores between genders in patients with diabetes. But, there was no significant difference in PCS and MCS values by age in diabetic patients. And having concomitant HT in diabetic patients causes a decrease in both MCS and PCS scores. Thus, HT is an important factor that should be considered in QoL of the diabetic patients. *J Am Soc Hypertens* 2016;10(1):81–88. © 2016 American Society of Hypertension. All rights reserved.

**Keywords:** Metabolic control variables; quality of life; SF-36; type 2 diabetes mellitus.

## Introduction

Diabetes mellitus (DM) is one of the most common metabolic disorders in the world, and the prevalence of diabetes has been increasing. By year 2035, it is estimated that more than 500 million people across the world will live with DM.<sup>1</sup> Because of the increasing prevalence of DM, pure drug therapy will not be sufficient by the reason of the fact that large proportions of patients still continue to

Conflict of interest: This article has not been published before, and there is no conflict of interest. We have no financial support.

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have poor glycemic (46.5%), blood pressure (48.2%), and cholesterol control (47%).<sup>2</sup>

DM requires continuous medical care and needs multifactorial risk reduction strategies beyond glycemic control. But, most of newly developed treatment strategies in DM are mainly focused on laboratory outcomes. World Health Organization defined health as a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity.<sup>3</sup> Thus, quality of life (QoL) must be considered as an important health outcome and an ultimate goal of all health interventions.

Achieving HbA1c, a universally regarded index of glycemic control, lower than 7% is one of the major objectives in the current clinical management of diabetes.<sup>4</sup> However, the type and the complexity of regimen aimed at achieving better glycemic control may impact patient's health-related quality of life (HRQoL). In addition, diabetic complications lead to compromised HRQoL. The incidence (presence and number) of diabetic complications has been shown to have a significant impact on QoL in a number of studies.<sup>5–7</sup> Thus, there has been an increasing interest in the association between the QoL of patients with DM and their glycemic control.

Previous studies have produced inconsistent findings regarding the relationship between glycemic control and QoL. Thus, the relationship between HbA1c levels of diabetic patients and their QoL is not clear. Some studies found limited relation between glycemic control and HRQoL by using a number of measures,<sup>8–12</sup> whereas others did not.<sup>10,13</sup> Although the association is inconclusive, poor glycemic control in diabetic patients may result an increase in the risk of developing complications that will lead to poor QoL.<sup>14</sup>

QoL can be measured with instruments such as questionnaires. One of the most widely used generic measures of QoL in studies of diabetic patients is the Medical Outcomes Study Short-Form-General Health Survey (SF-36). SF-36 helps to determine the QoL of diabetic patients and about their functional health statuses, and is also a valid, suitable, and reliable test, which helps observation of relationships between other chronic disease coexistence and patient's experience.<sup>15,16</sup> SF-36 yields an 8-scale profile of functional health and well-being scores (so called domain scores) as well as psychometrically based physical and mental health summary measures (physical component summary [PCS] and mental component summary [MCS]) and a preference-based health utility index.<sup>17</sup>

Our study aims to determine whether metabolic control variables can predict QoL or not and also the impact of hypertension (HT) on QoL in type 2 diabetic patients.

## Material and Methods

A total of 469 patients with type 2 diabetes and 134 control subjects were included in our study. Patients, who had

acute and chronic infections, thyroid impairment, malignancy, renal failure, and history of rheumatological disease, were not included in the study. Additional exclusion criteria were as follows: those with a history of cognitive impairment or substance abuse and complications unrelated to DM based on a personal declaration or information from their medical records. Approval of the local ethics committee was obtained for this study. The study subjects were informed both verbally and in writing about the contents of the study, and they were included in the study after their consents were taken.

Medical Outcomes Study Short-Form-General Health Survey (SF-36) questionnaire was used as a health survey tool to measure the QoL of patients in the study.<sup>17</sup> SF-36 includes 8 individual subscales (physical function, physical role, emotional role, social function, bodily pain, mental health, vitality, and general health perceptions), one extra item (change in health status since last year), and two summary scales (PCS and MCS). A higher SF-36 score indicates better functioning. Patients completed the SF-36 using the pencil and paper method in a separate and quiet room while their relatives and/or friends are waiting outside the room to avoid bias. During the administration of the questionnaire, a researcher was readily available to assist the patients in understanding the SF-36 if required. The researchers were instructed to minimize the explanation, and the patients were asked to answer the question according to their understanding. After completion of the questionnaire, the researcher determined the completeness of the returned SF-36.

Age, gender, fasting blood glucose (FBG), postprandial blood glucose (PBG), HbA1c, high-density lipoprotein-cholesterol (HDL-C), low-density lipoprotein-cholesterol (LDL-C), triglyceride, total cholesterol, Apolipoprotein B (apoB), non-HDL-C, and body mass index (BMI) values of the subjects were recorded. FBG, PBG, HDL-C, LDL-C, triglyceride, and total cholesterol values were measured using a Roche Cobas 8000 device and Roche commercial kits (Roche Diagnostics, Mannheim, Germany) with the enzymatic colorimetric method. ApoB was measured by an immunonephelometric assay. HbA1c levels were measured with a Premier Hb9210 (Trinity Biotech, USA) device using its original kits with the HPLC Borronate Affinity method. BMI was calculated as weight in kilograms divided by square of height in meters. All HbA1c values were given as relative concentration in percentage (Diabetes Control and Complications Trial, DCCT, aligned results). The participants were asked to fast and arrive before breakfast to undergo blood sampling and a thorough clinical examination.

For statistical evaluation, SPSS (Statistical Package for the Social Sciences) 15 under Windows 7 was used. During the evaluation of study variables, categorical, and continuous variables were summarized using the descriptive statistics (eg, median, range, frequency, and percentage) and compared with Kruskal-Wallis *H* and Mann-Whitney *U*

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