



Factors Affecting Fatigue in Patients with Type II Diabetes Mellitus in Korea



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SUMMARY

Purpose: This study aimed to characterize and identify the factors affecting fatigue in patients with type II diabetes mellitus in Korea.

Methods: A total of 180 patients with type II diabetes mellitus were recruited from the outpatient clinic of a tertiary care hospital. For data collection, a questionnaire survey of diabetes history, hypoglycemia symptoms, and fatigue was conducted between January and February 2011. Data were analyzed using *t* test, analysis of variance, Pearson's correlation, and hierarchical multiple regression.

Results: The mean fatigue and hypoglycemia symptom scores of patients with type II diabetes mellitus were 2.88 ± 0.61 and 6.18 ± 12.60 , respectively. Hypoglycemia symptoms ($p = .004$), disease duration ($p < .001$), and age ($p < .001$) correlated positively with fatigue. Hierarchical multiple regression analysis revealed that hypoglycemia symptoms was the variable positively influencing fatigue in patients with type II diabetes mellitus after adjustment for influences of demographic and clinical characteristic variables.

Conclusions: Hypoglycemia symptoms were confirmed to be a predictor of fatigue. Consequently, it is essential to consider age, and disease duration as well as hypoglycemia symptoms to intervene fatigue effectively among patients with type II diabetes mellitus.

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Introduction

Diabetes has become a global pandemic. According to statistical data, it is forecasted that the number of patients with diabetes will increase from 177 million in 2000 to over 360 million by 2030 [1]. This kind of trend has been detected in Korea as well. According to the Korean National Health and Nutrition Examination Survey (KNHNES), the prevalence of diabetes in adults aged 30 or older has increased from 8.6% in 2001 to 10.1% in 2010 [2].

Patients with diabetes suffer from serious health problems that relate to physical, mental, and social aspects of their lives [3–4]. Fatigue, a common symptom among diabetic patients, may be the direct result of physiological processes, treatment, and complications associated with long-term diabetes [3].

According to previous studies, up to 60% of patients with diabetes experience fatigue symptoms [3,5]. Fatigue has a negative impact on the activities of daily living. In addition, fatigue impairs a patient's concentration and leads to frequent mood fluctuations, which further aggravates their health, increasing the risk of complications and decreasing the quality of life [3–4,6].

Despite the importance of fatigue, many diabetes therapists often ignore its management and underlying factors [3,7]. There are several factors associated with fatigue in diabetes patients, including physiological factors (e.g., hypoglycemia or hyperglycemia) [3,8], psychological factors (e.g., depression and distress related to the disease) [3,8], epidemiological factors (e.g., age and educational background) [9], and health-related factors (e.g., expected disease duration and history of comorbidity) [3–4,7,10].

Hypoglycemia, which is often observed during diabetes treatment, has been suggested by several authors as a particular cause of fatigue [3,8,11]. The relationship between fatigue and hypoglycemia symptoms in patients with type II diabetes is still unknown. Blood

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glucose is the primary source of energy in the muscles and the brain, and as the frequency of hypoglycemia symptoms increases, the cells tend to receive inadequate energy supply [10,11]. However, previous studies have not established a clear link between fatigue and hypoglycemia among type II diabetes.

Therefore, the present study aimed to characterize and identify the explanatory power of hypoglycemia symptoms on fatigue in patients with type II diabetes in Korea.

Methods

Study design

This is a cross-sectional retrospective correlative study conducted by a questionnaire survey on factors affecting fatigue in patients with type II diabetes mellitus in Korea.

Samples and procedure

This study conveniently sampled the patients who met the selection criteria attending the outpatient department of a national university hospital from January 10 to February 11, 2011 for the treatment of their diabetes. The selection criteria were as follows: patients with type II diabetes mellitus aged 19 years or older; patients who had been receiving diabetes treatment for more than 6 months; and those who were aware of the purpose of the research and agreed to participate. We excluded patients suffering from any of the following conditions: malignant tumor, acute disease (e.g., infection requiring hospitalization or surgery within 3 months), hypothyroidism, hyperthyroidism, anemia, dementia, mental disease (e.g., schizophrenia or depressive disorder), stroke, kidney disease, diabetic neuropathies, proliferative retinopathy, myocardial infarction in the past 3 months, and heart failure.

A total of 218 people participated in the study; however, 180 were finally chosen and others were excluded due to inadequate responses. To verify the statistical power of our sample size, we used the G*power 3.1.7 program [12]. The sample size required in multiple regression method was 103 with the following parameters: the number of independent variables was 7; power was 80%; Cronbach's alpha was .05; effect size was 0.15 based on previous research [8]. The number of participants providing valid data exceeded 103. Therefore, our sample size seemed appropriate.

To conduct this study, the objectives, methodology, participant rights, and questionnaire survey were reviewed and approved (GNUHIRB-2010-081) by the institutional review board. To maintain consistency in the research method among researchers, a research director gave them instructions on the survey before data collection. The interviews were conducted after the researchers were taught how to collect accurate data. Patients who met the criteria for this study were first confirmed by a researcher and an inspector from the digital medical records department of the Division of Endocrinology in a national university hospital. The objectives and process of the study were explained to the target patients verbally and in writing. If they agreed to participate in the study, they were asked to give written informed consent. It took about 10–15 min for each respondent to fill out the questionnaire forms. Data were collected anonymously to protect participant rights and privacy. It was agreed that data would not be used for other purposes. They were also informed that they could give up on the survey at any time.

Hypoglycemia symptom assessment

Previous studies have revealed a high frequency of hypoglycemia symptoms [13,14]. In this study, hypoglycemia symptoms refers to the frequency of tremor, palpitation, hunger, or sweating in

our patients with type II diabetes mellitus anytime during the last month. A hypoglycemia symptom assessment tool was developed based on hypoglycemia subscales of the Diabetes Symptom Checklist-Revised [15]. A preliminary version of this tool was initially assessed by one endocrinologist and three professors in adult health nursing. The final measurement tool included the following questions: "Have you experienced tremor, palpitation, hunger, or sweating in the past month?" and "If you have, how often did you experience those symptoms?"

Fatigue assessment

Fatigue refers to abnormal exhaustion, lack of stamina to complete a task that requires continued efforts and attention, or a decrease in physical activity ability [16].

In this study, we used Multidimensional Fatigue Inventory-20 (MFS-20) developed by Smets, Garssen, Bonke, and De Haes [17] with the consent of the authors. The tool consists of 20 questions that measure general fatigue, physical fatigue, mental fatigue, reduced activity, and reduced motivation. A 5-point Likert scale ranging from 1 (*Yes, that is true*) to 5 (*No, that is not true*) was used. A higher score meant greater fatigue. At the time of development, the reliability and feasibility of tools were secured in the study by Smets et al. [17]. Recent studies recommended using total fatigue summary scores to quantify a patient's fatigue [18]. The fatigue assessment tool for patients with diabetes was first translated into Korean and later reviewed by a professor who majored in Korean language and literature. Then, the revised version was read by a bilingual professor (Korean and English) from the Department of Nursing, who also compared it to the original English version of MFS-20. Fatigue scores were assumed to display a normal distribution curve (skewness 0.27, kurtosis 0.06). In terms of reliability, Cronbach's alpha was .82.

Data analysis

The collected data were analyzed using SPSS version 15.0. The general characteristics, fatigue, and hypoglycemia of the target patients were analyzed using frequency, percentage, mean, standard deviation, and scope. With respect to the assessment of hypoglycemia, when the respondents answered "1–2 times" or "2–3 times per month", the values adopted were 1.5 or 2.5, respectively. The difference in fatigue by general characteristics was analyzed using the *t* test and analysis of variance. The correlations between fatigue and the variables were analyzed through Pearson's correlation. The fatigue predictor variables were analyzed using hierarchical multiple regression.

Results

Fatigue according to participant demographics and clinical characteristics

Of the 180 participants, 118 (65.6%) were men. The patients were aged 24–90 years (mean, 58.71 ± 11.01 years). The highest education level was junior college or higher (27.8%), followed by elementary school (26.7%), high school (23.9%), and middle school (21.7%). Most of the participants lived with their spouse (50.6%) (Table 1).

The mean duration of diabetes was 142.79 ± 102.91 months (range, 6–377 months). However, in most of the patients (56.1%), the disease duration was 10 years or longer. The majority of the patients (63.3%) also suffered from concomitant diseases other than diabetes. HbA1c values ranged from 5.50% to 13.2% ($M \pm SD$, 7.24% ± 1.01%) (Table 1).

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