Predictors of diabetes self-management among type 2 diabetics in Indonesia: Application theory of the health promotion model

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ABSTRACT

Objective: This study aimed to identify factors predicting diabetes self-management among adults with type 2 diabetes mellitus in Malang City, East Java, Indonesia.

Methods: A cross-sectional design was used in this study. Participants were selected from five primary health centers in Malang City, East Java, Indonesia using the multistage sampling method. A total of 127 adults with type 2 diabetes mellitus were recruited. Data were collected by questionnaires which were the general diabetes knowledge, the Beliefs of Treatment Effectiveness, the Diabetes Distress Scale, the Self-efficacy for Diabetes Scale, the brief Chronic Illness Resources Survey, the Situational Questionnaire and the Summary of Diabetes Self-care Activities. A self-administered questionnaire was used to collect the data. Multiple linear regression with stepwise method was used to analyze the data.

Results: The scores of seven questionnaires (i.e, diabetes knowledge, perceived benefit of diabetes self-management, diabetes distress, perceived self-efficacy, social support, situational influence, and diabetes self-management) were 13.75 ± 3.59, 34.9 ± 4.89, 3.03 ± 0.86, 3.60 ± 0.53, 27.79 ± 5.56, 3.27 ± 0.58, 3.81 ± 1.08, respectively. The significant predictors of diabetes self-management were treatment, perceived self-efficacy, and situational influences. These variables explained 20.8% (adjusted $R^2 = 0.208$) of the variance in diabetes self-management among adults with type 2 diabetes mellitus in Malang City.

Conclusion: Diabetes self-management among adults with type 2 diabetes mellitus could be improved by enhancing their perceived self-efficacy to achieve their self-management behavior, such as having a healthy diet, exercising regularly, actively monitoring blood glucose level, taking medication and foot care, and providing support to promote good situational influence.

1. Introduction

According to Indonesia's Ministry of Health [1], the prevalence of diabetes in 2007 in Indonesia was 1.1% of the total population aged 15 years and over, increasing to 2.1% in 2013. The proportion of diabetes sufferers among the general population in the Indonesian province of East Java is greater (2.5%) than the national average (2.1%) [1]. A total of 19,167 cases of morbidity in Malang City were related to type 2 diabetes mellitus in 2013 [2]. The Public Health Center (PHC) of Gribig, Malang [3] reported 118 cases (25%) in November and December 2014 and 61 cases (20%) in January 2015 that had blood glucose levels of $\geq$200 mg/dL.

Therefore, promoting self-management adherence is important to prevent the number of complications related to diabetes mellitus. Basic diabetes self-management behavior include insulin and medication adjustments, blood glucose monitoring, alterations in the timing, frequency, and content of meals, changes in exercise patterns, and foot care [4]. The American Association of Diabetes Educator [5] also identified seven self-care behavior that are essential for successful and effective diabetes self-management, including healthy eating, being active, monitoring blood glucose level, taking medication, problem solving, healthy coping, and reducing risks.

A cross-sectional study conducted by Rahayu [6] determined

that type 2 diabetes sufferers in urban and rural areas in Malang City, East Java, Indonesia showed less than optimal level of diabetes self-management behavior. According to Rahayu's study [6], significant factors that predict diabetes self-management were gender, occupation, and diabetes knowledge. These predictors explained 15.6% of the variance in patients' diabetes self-management behavior. Thus, more factors that can predict diabetes self-management in Indonesia should be identified.

Several studies have been conducted to investigate the factors that predict successful diabetes self-management in patients with type 2 diabetes mellitus. However, several studies showed inconsistent findings. These factors include personal factors, such as age [6—8], gender [6,7,9], monthly income [7,9], education [7,9], and diabetes duration [8,10,11]. A previous study found that elderly patients showed better self-management behavior than younger patients [7]. By contrast, Berhe et al. [7] determined that younger respondents are significantly more likely to adhere to proper diabetic foot care practice. When comparing gender, Bai et al. [9] reported that males had higher self-care behavior than females, whereas Berhe et al. [7] showed that females were more likely to implement diabetes self-management practices than males.

Another factor that can affect diabetes self-management is diabetes knowledge. Rahayu [6] found that diabetes knowledge was the strongest predictor in diabetes self-management among community diabetes patient in Indonesia with $\beta = 0.32$. By contrast, Abubakari et al. [12] determined that the contribution of knowledge to self-management practice was insignificant among adult patients of African-Europeanorigin. Similarly, Little-Gregory [13] reported that no correlation between diabetes knowledge and diabetes self-management in African—American women exists.

Perceived self-efficacy is the judgment of one's personal ability to organize and accomplish a particular course of action. Self-efficacy has a central role in personal change and is the foundation of human motivation and action [14]. Didarloo [15] found that self-efficacy was the strongest predictor of intentions among Iranian women with type 2 diabetes. Sharoni et al. [11] reported a positive relationship between self-efficacy and self-care behavior in Malaysian patients with type 2 diabetes.

Social support is one of the interpersonal influences that determine an individual's predisposition to engage in health-promoting behavior [14]. A previous study found that social support is an important predictor of self-care behavior in patients with type 2 diabetes in Southern Taiwan with $\beta = 0.43$ [9]. Sonsosa [16] determined that participants who receive social support from family members showed positive diabetes self-management practices among Filipino—Americans with type 2 diabetes. However, Hagerstrom [17] reported that no relationship between social support and health-promoting behavior or health outcomes in diabetes self-care regimen in the United States exists.

Diabetes distress (DD) refers to a condition distinct from depression that is associated with diabetes outcomes. DD is defined as patient concerns about disease management, support, emotional burden, and access to care [18]. Fisher et al. [19] explained that females with a poor diet and a low rate of exercise were more likely to become distressed over time, leading to high HbA1c levels and high rates of complications. A previous study found that the proportion of adults with type 2 diabetes mellitus in Dhaka who were suffering DD was 48.5%, with 22.4% suffering a high level of distress and 26.1% suffering a moderate level of distress [20]. Aikens [21] determined that DD was significantly associated with high HbA1c levels, low medication adherence, and low frequencies of healthy diet and exercise behavior, but not of blood glucose testing behavior.

Another factor that can affect diabetes self-management is situational influences. Nuryanto [22] found that situational influences have a positive correlation with health-promoting behavior in elderly patients with hypertension with $r = 0.37$. However, Hagerstrom [17] reported that situational influences, particularly depressive symptoms, had no significant relationship with the health-promoting behavior among patients with diabetes in the United States.

Pender's Health Promotion Model explains that personal factors, perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, and situational influences are important elements in the changing of behavior [14]. Factors predicting self-management can be explained by this model. Therefore, this study aimed to investigate factors that predict self-management among adults with type 2 diabetes mellitus in Malang City, East Java, Indonesia.

2. Methods

2.1. Design, setting, and sample

A cross-sectional design was used in this study. The multistage sampling technique was used to recruit the participants. Data were collected from 127 adults with type 2 diabetes mellitus from five PHCs in Malang City, East Java, Indonesia. Data were collected from participants who met the following inclusion criteria: (1) aged 20—59 years old, (2) have diagnosed type 2 diabetes (for at least sixmonths based on the PHC's medical records), (3) have blood glucose levels between 70 mg/dL and 300 mg/dL, (4) are willing to participate in this study, and (5) are able to read and write Bahasa Indonesia. The exclusion criteria are as follows: (1) suffer from impaired vision, such as blindness, (2) have a psychiatric illness that was diagnosed by a physician, such as schizophrenia or hallucinations, (3) suffer from cognitive impairment diagnosed by a physician, and (4) are hospitalized during the data collection period.

2.2. Data collection

Data were collected by questionnaires, which were translated into the Indonesian language. The questionnaires were self-administered and completed in approximately 60 min.

2.2.1. Diabetes knowledge

Diabetes knowledge was measured using the General Diabetes Knowledge Questionnaire [4]. This scale was used to assess the participants' understanding about diabetes and its management. The general knowledge questions were related to diabetes (5 items), risk of diabetes complications (5 items), self-care on a daily basis and on sick days (6 items), and medication use (5 items). The instrument consisted of 21 items with response type of "yes," "no," and "do not know." The reliability of diabetes knowledge was 0.77.

2.2.2. Perceived benefit of diabetes self-management

Perceived benefit of diabetes self-management was measured using the Beliefs of Treatment Effectiveness questionnaire [23]. This scale was defined as the perception of the importance of self-management in managing diabetes. This questionnaire contained nine items. The first four items of the questionnaire measured the belief that diabetes self-management (i.e., diet, exercise, medications/insulin, and self-monitoring blood level) were important in controlling diabetes. The remaining five items of the questionnaire measured the belief that diabetes self-management (i.e., diet, exercise, medications/insulin, self-monitoring blood level, and foot care) were important in preventing diabetes complications. The instrument had a five-point Likert scale of 1 = not important, 2 = slightly important, 3 = fairly important, 4 = very important,