

ORIGINAL RESEARCH

SELF-MANAGEMENT BEHAVIOR AND ITS IMPACT TO GLYCATED HEMOGLOBIN AMONG CLIENTS MEDICALLY DIAGNOSED WITH DIABETES MELLITUS: A CORRELATIONAL STUDY

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Abstract

Background: The Center for Disease Control and Prevention in 2016 identified and further classified Diabetes Mellitus as one of the chronic diseases, a leading cause of morbidity, and considered a major health problem in the Asia Pacific. Hence the quality of life as the optimum goal of any person is only achieved through appropriate self-care management. The person is a major key player of the nursing paradigm plays a crucial task in self-care since his/her responsibility is to assure balance between behavioral and environmental dynamics.

Objective: To examine the self-management behaviors of clients medically diagnosed with Diabetes Mellitus and evaluate the correlation between self-management behaviors and glycated hemoglobin (HbA1c).

Methods: The study utilized the validated Diabetes Self-Management Questionnaire (DSMQ) tool to 600 adults from the lower district of Khong Khlong, Kamphaengphet, Thailand. Through descriptive design, the investigation focused on major behavioral categories such as glucose management, physical activity, health care use and dietary control on at-risk stroke clients with DM aging 35 years old and above. Respondents with absolute complications of Diabetes Mellitus like stroke, blindness, undergoing dialysis even amputation are excluded to participate.

Results: The findings revealed that most clients with DM are married female, ages 51-60 years old and is diagnosed of living with the disease for 6-10 years. Further, the respondents are generally aware on self-management activities for DM, however not all of them submitted for glucose monitoring program. On one hand, the respondents have high regard on controlling dietary intake to avoid the increase of blood glucose during scheduled tests while results also show that most of the respondents are having poor engagement on physical activities.

Conclusion: It is concluded that self-management behaviors are strongly associated with HbA1c. Nonpharmacologic and identified independent nursing actions proven to aid clients with diabetes mellitus should be advocated in combating the disease.

KEYWORDS

glycated hemoglobin; self-management; diabetes mellitus; chronic disease; Thailand

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BACKGROUND

The [World Health Organization \(2016\)](#) reported Diabetes Mellitus (DM) becomes one of the leading serious diseases and costly health conditions in the world. The number of people with DM is expected to increase to about 439 million in 2030 from 382 million in 2014; 69% of this increase is anticipated to occur in developing countries ([Nugroho et al., 2020](#)). The disease is one of the leading causes of mortality and morbidity ([Porapakkham et al., 2010](#)), leading to 3% of total deaths in men, and 8.3% among women ranking Thailand among the top 10 Asian countries having increased prevalence rate ([Aekplakorn et al., 2011](#)).

The complications of this chronic disease are the major contributing factor to the costs associated with Diabetes Mellitus, since problem often requires more intensive care and close monitoring in the hospital. In addition to the associated cost of treatment, there are also various direct expenditures and indirect financial obligations of the disease including informal care, mortality, and worse permanent disability.

DM complications cause several medical conditions especially cardiovascular disease or stroke ([Deerochanawong & Ferrario, 2013](#)). When the disease is diagnosed during its late phase, the individual suffering from stroke can become disabled. This affects the family,

healthcare system and ultimately to society as a whole. Therefore, preventing DM complications is extremely important to reduce the social and economic burdens to society (Tsiouli et al., 2013).

Increased blood glucose level is the primary risk factor for stroke (Eerdeken et al., 2020). One third of stroke patients was diagnosed with diabetes or had been diagnosed lately. In the current findings conducted across the globe, 13% of the causes of death to people with DM are stroke-related with elevated blood glucose after fasting plasma glucose scheme (Eerdeken et al., 2020). Clot formation is easy to develop leading to blood vessel obstruction especially in the neck, brain and causing vessel breaks and ruptures (Williams et al., 2002).

Clinical and experimental research findings show association between diabetes and stroke. Diabetes is a prime risk factor and doubles the risk of recurrence for ischemic stroke (Capes et al., 2001) and DM patients are as thrice to likely develop stroke compared that of the general population (Bederson et al., 2009).

The risk of complications including stroke can be reduced when persons maintain or control their blood glucose at an optimal level (Newman et al., 2008). Diabetes self-management is essential for achieving this control (Hausmann et al., 2010). Self-management refers to individual taking measures designed to develop healthy lifestyle (Choi et al., 2014) to manage symptoms, treatments, and behavioral changes based on the recommendations of health care professionals (HCP).

Self-management emphasizes the responsibility for self-care in response to an increased risk of developing disease, and individual motivation as critical component for its success (Acob & Martiningsih, 2018). Adequate self-management strategies help persons with DM in making their choices to enhance their skills needed to reach the goal of blood glucose control, thus allowing patients to be successful (Choi et al., 2014). Researches were already conducted among Asian countries that aimed to determine potential factors influencing self-management to patients with diabetes, however only examined one aspect (Zhong et al., 2011), hence this study wants to establish the at-risk stroke patient's behavior to health care use, glucose management, dietary control and physical activity.

METHODS

Study Design

This study utilized descriptive quantitative survey research design to determine the self-management behavior of at-risk stroke patients using the four major categories such as glucose management (GM), dietary control (DC), physical activity (PA), and health care use (HU) on at risk stroke patients with diabetes.

Sample and Setting

Through purposive non-probability sampling method, respondents were identified. A total of 600 locals participated from the lower district of Kamphaengphet province of Thailand. The respondents could either be male or female, 35 years old and above, medically diagnosed with DM for a year since the date of survey. The respondent should at least be able to read, write and comprehend and is willing to join without coercion, force or even threat. However, those with severe

complication of DM like stroke, blindness, undergoing dialysis and other life-threatening diseases were excluded.

Instruments

The questionnaire has two parts. The first part surveyed the demographic information generated by the researchers. The second part investigated the at-risk stroke patients regarding self-management behavior using the DSMQ validated tool. The DSMQ was developed to assess DM patients' self-care activities associated with blood sugar level control. The data collected and analyzed by Schmitt et al. (2013) presented a strong case that good self-care management in persons with both type 1 and type 2 diabetes was inversely associated with blood sugar (HbA1c) levels (Schmitt et al., 2013). The DSMQ contains 16 items in four categories: glucose management (GM), dietary control (DC), physical activity (PA), and health care use (HU). Their studies showed an excellent internal consistency of 0.84 and good internal consistency for the subscales (GM= .77, DC= .77, PA= .76 and HU= .60).

Data Collection

The researcher met the qualified respondents at the clinic sites after the Ethics Review Board of the Naresuan University released the permission to conduct the study. During the collection period, the researcher explained the contents of the tool and made sure that participants were able to comprehend fully what were expected from them. Informed consent was also distributed for signature to signify full knowledge on the 15-minute survey.

Data Analysis

Data were analyzed using descriptive statistics, Pearson correlation and regression analysis.

Ethical Consideration

This study was ethically approved by the Ethics Review Board of the Naresuan University (IRB Protocol #15-079). With the inclusion criteria adapted, the researchers identified the respondents of the study. A client should be able to express himself/herself and voluntarily join the study investigation without force, coercion or threat. Their identities were treated at utmost confidentiality. Included in the ethical consent form was the contact information of the researchers to reach out whenever incidence unfavorable to the respondent happens. Further, they were guaranteed that anyone can stop anytime at the course of the investigation when they intend to or prefer to discontinue from participating the study.

RESULTS

Majority of participants aging from 51-60 years old group (66.08%), followed by 40-50 years old (30.67%). Most of the samples were married (87.53%) and female (74.81%). Sixty-seven percent of the participants completed only the primary school degree (67.58%). Just over one-third (34.67%) had been diagnosed with diabetes for six to ten years; the rest of the majority had the diagnosis for 11-15 years (29.43%) and 4-5 years (16.71%).

Family income was distributed to three main groupings: 39.40% were low income, < 10,000 baht per month (US equivalent of US \$285); 38.90% had incomes of 10,000-20,000 baht per month (US equivalent

of US \$285 – US \$571); 17.71% had incomes of greater than 20,001-30,000 baht (US equivalent of US \$571 – US \$857). As expected, a strong majority reported they did not have any other chronic diseases, 34.91% of the participants did note that they had at least one chronic condition including hypertension, lipidemia, early stage kidney disease, neurosis, and gout.

The diabetes self-management behavior total score as measured by DSMQ was fair (see **Table 1**). When looking at the subscale, it showed that the score of the physical activities was poor but glucose management (GM) and health care use (HCU) were fair. Only the dietary control aspect was high in this study.

Table 1 Descriptive of Self-Management Behavior Total and Subscales

Variable	Mean (SD)	Interpretation
Self-Management activities (Total) (SM)	4.63(0.58)	Fair
Glucose Management (GM)	4.50 (0.63)	Fair
Dietary Control (DC)	4.68 (0.51)	High
Physical Activity (PA)	4.88 (0.45)	Poor
Health Care Use (HCU)	4.65 (0.55)	Fair

The diabetes self-management activities as measured by DSMQ (glucose management, dietary control, physical activity and health care use) were inversely related to HbA1c. **Table 2** displays the correlations between the self-management activities and HbA1c. Total self-

management activities had the higher negative correlation, ($R = -.624, p \leq .001$) with HbA1c. Similarly, as predicted, the four subscales were also negatively correlated with HbA1c.

Table 2 Descriptive and Correlational Analysis of Self-Management Behavior Total and Sub Scales with HbA1c

Variables	HbA1c	SM (Total)	GM	DC	PA	HCU
Self-Management activities (Total) (SM)	-.6247 .0000	1.0000				
Glucose Management (GM)	-.6834 .0000	.8932 .0000	1.0000			
Dietary Control (DC)	-.5880 .0000	.9780 .0000	.8539 .0000	1.0000		
Physical Activity (PA)	-.4884 .0000	.8794 .0000	.6832 .0000	.8375 .0000	1.0000	
Health Care Use (HCU)	-.5289 .0000	.9230 .0000	.7184 .0000	.8933 .0000	.7818 .0000	1.0000

Table 3 reveals that the total that self-management activities score (DSMQ) was negatively associated with HbA1c ($\beta = -2.05$, $p \leq .001$). In addition, each of the subscales within this tool also had a statistically

significant negative association with HbA1c. The total self-management activities score and its subscales all have a negative linear relationship with HbA1c.

Table 3 Regression Analysis of the Relationship between Self-Management Behavior and HbA1c

Variables	β	Std.Err.	t	P	N/ R- square
Self-Management activities (Total) (SM)	-2.055	.131	-15.61	<.001*	Number observed= 600 R-squared = .416
Glucose Management (GM)	-2.633	.143	-18.17	<.001*	Number observed= 600 R-squared = .486
Dietary Control (DC)	-1.463	.104	-14.08	<.001*	Number observed= 600 R-squared = .371
Physical Activity (PA)	-1.794	.163	-10.98	<.001*	Number observed= 600 R-squared = .273
Health Care Use (HCU)	-1.438	.117	-12.22	<.001*	Number observed= 600 R-squared = .483

Note: Control variable include; sex, age, duration of known diabetes and education level

DISCUSSION

The purpose of this investigation was to examine potential of self-management behavior among Thai adults on the outcome of HbA1c, an indicator closely associated with disease control for persons with DM. The results of this investigation led to the conclusion that diabetes self-management behavior, as measured by the DSMQ are strongly

associated with HbA1c. The strong association between self-management behaviors and HbA1c actually communicates a negative or inverse relationship, which means that higher self-management behaviors led to a lower value of HbA1c while controlling for age, sex, education and duration of diabetes.

The study supports that healthy behavior in at risk stroke persons with DM does indeed result in a more favorable disease outcome. According

to [Schmitt et al. \(2013\)](#) to assess, the effectiveness of self-management behaviors of persons with DM by using the “Diabetes Self-Management Questionnaire” (DSMQ) has a much stronger association with HbA1c. However, [Lorig \(1993\)](#) suggested that effective self-management requires an individual with DM to have the ability to absorb and digest DM-related knowledge, apply that knowledge to his or her own situation, and make adjustments of the self-management accordingly as new challenges emerge. In this sense, after a period of self-management, the individual will become an expert on his or her own disease condition.

Research studies had conducted which examined self-management practices and diabetes outcomes ([Leeman, 2006](#)) as well as adherence to prescribed self-management activities ([Shrivastava et al., 2013](#)). Looking at the results of self-management behavior overall score, it can be found that self-management behavior score was fair. It means that the at-risk stroke with diabetes had a poor level of clinical outcome. [Schmitt et al. \(2013\)](#) presented that the DSMQ was strongest associated with HbA1c, which further explained that good self-care management to persons both type 1 and type 2 diabetes was inversely associated with HbA1c levels. The research results in this study, can clarify in another way that the samples could not control their blood sugar level because they were poor of diabetes self-management. The fact established on hyperglycemia is that it doubles the risk for recurrence of stroke ([Kissela et al., 2005](#)). In addition, stroke outcomes have increased dramatically in diabetic patients, resulting in higher rates of death and disability ([Idris et al., 2006](#)).

Limitations

The literacy level of the study participants was not measured. Although the researcher was present to help participants if they did not understand the questions, some could have been unsure of the meaning of questions and not sought help.

CONCLUSION

This study verified that the self-management score of at-risk stroke in diabetes and verified the relationship between diabetes self-management behaviors and HbA1c. The diabetes self-management behaviors were strongly associated more with HbA1c which measured by DSMQ. Actually, the research result found that lower self-management behavior led to a higher blood sugar level. The study suggests that non-pharmacologic management in the care of medically diagnosed DM patients should be augmented. Further, this research capacitates primary health practitioners to execute independent care approaches to strengthen the campaign towards sustainable nursing interventions. The results can be used to draft policy that empowers independent health care practitioners in initiating tailored-fit, a culturally responsive technique in addressing the problem. Community health nursing as a program aimed at disseminating information at the grassroots benefits the result as it is used to convey the importance of the primitive-preventive schemes to health.

Declaration of Conflicting Interest

There is no conflict of interest in conducting the study.

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Authorship Contribution

S.T initiated the collection of data and partial analysis. J.R.U.A conducted the interpretation and corrections made based on the comments from the panel reviewers. The proposal stage was done by both authors.

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