Factors Influencing Diabetes Self-Management Among Bhutanese People with Type 2 Diabetes Mellitus

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Abstract

Studies of Bhutanese people with type 2 diabetes mellitus (T2DM) show alarmingly high rates of uncontrolled DM, yet the practice of diabetes self-management is limited. The aim of the study was to examine diabetes self-management and its influencing factors among Bhutanese people with T2DM. Simple random sampling was used to recruit 105 people with T2DM who visited the diabetes clinic at Jigme Dorji Wangchuck National Referral Hospital. Research instruments included a demographic data questionnaire, the diabetes self-management questionnaire, the diabetes management self-efficacy questionnaire, the health literacy questionnaire, the chronic illness resources survey, and the diabetes distress scale. Data were analysed by descriptive statistics and standard multiple linear regression.

Results showed that participants' mean score of diabetes self-management was 7.76 (SD = 1.03). Standard multiple linear regression analysis results indicated that self-efficacy, health literacy, social support, and diabetes distress explained 17.16% of the variance in participants' diabetes self-management. However, only self-efficacy significantly predicted diabetes self-management (β = .277, p = .015). The findings provide evidence for health care providers to develop an intervention program focusing on improving self-efficacy in order to promote diabetes self-management activities among Bhutanese people with T2DM.

Key words: Diabetes self-management, health literacy, self-efficacy, social support, diabetes distress.

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ปัจจัยที่มีอิทธิพลต่อการจัดการตนเองของผู้เป็นเบาหวานชนิดที่ 2 ประเทศภูฏาน

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บทคัดย่อ

ประเทศภูฏานมีจำนวนผู้เป็นเบาหวานที่ควบคุมน้ำตาลไม่ได้เพิ่มขึ้นอย่างมาก ในขณะที่ข้อมูลการจัดการตนเองของผู้เป็นเบาหวานกลุ่มนี้มีจำกัด การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อศึกษาการจัดการตนเองและปัจจัยที่มีอิทธิพลต่อการจัดการตนเองของชาวภูฏานที่ป็นเบาหวานชนิดที่ 2 คัดเลือกกลุ่มตัวอย่างด้วยวิธีสุ่มอย่างง่าย ได้ผู้เป็นเบาหวานชนิดที่ 2 จำนวน 105 ราย ที่มารับการรักษาที่คลินิกเบาหวาน ณ Jigme Dorji Wangchuck National Referral Hospital, Bhutan เครื่องมือที่ใช้ในการวิจัยประกอบด้วย แบบสอบถามข้อมูลทั่วไป แบบสอบถามการจัดการตนเองของผู้เป็นเบาหวาน แบบสอบถามความรอบรู้ทางสุขภาพ แบบสอบถามการสนับสนุนทางสังคม และแบบวัดความทุกข์จากเบาหวาน วิเคราะห์ข้อมูลด้วยสถิติพรรณนาและการวิเคราะห์ถดถอยพหุคูณ

ผลการศึกษาพบว่า กลุ่มตัวอย่างมีค่าเฉลี่ยการจัดการตนเองเท่ากับ 7.6 (SD = 1.03) ปัจจัย การรับรู้สมรรถนะแห่งตน ความรอบรู้ด้านสุขภาพ การสนับสนุนทางสังคม และ ความทุกข์จากเบาหวาน ร่วมกันทำนายการจัดการตนเองของผู้เป็นเบาหวานได้ร้อยละ 17.6 โดยการรับรู้สมรรถนะแห่งตนเป็นปัจจัยเดียวที่สามารถทำนายการจัดการตนเองได้อย่างมีนัยสำคัญทางสถิติ (β = .277, p = .015) ผลการศึกษาครั้งนี้ ใช้เป็นหลักฐานเชิงประจักษ์สำหรับบุคลากรทางสุขภาพในการพัฒนาโปรแกรมการรับรู้สมรรถนะแห่งตนเพื่อส่งเสริมการจัดการตนเองในผู้เป็นเบาหวานชนิดที่ 2

คำสำคัญ: การจัดการตนเองของผู้เป็นเบาหวาน ความรอบรู้ทางสุขภาพ การรับรู้สมรรถนะแห่งตน การสนับสนุนทางสังคม ความทุกข์จากเบาหวาน

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Statement of the problem

People living with DM are increasing and the International Diabetes Federation [IDF] in 2019 estimated that by 2045, 153 million people will be affected with DM in South East Asia. In Bhutan, 1 in every 12 adults is living with DM (IDF, 2019). About 4.2 million people died from DM in 2019 (IDF, 2019) and at least 760 million USD was spent on managing diabetes around the world. Diabetic-related complications such as microvascular and macro vascular complications contribute to increased morbidity, mortality, health care cost and reduced quality of life of the patients with T2DM (Cannon, Handelsman, Heile, & Shannon, 2018).

Diabetes self-management (DSM) is the cornerstone of diabetes care, as diabetes care becomes more patient centred and community-based care (ADA, 2019). DSM refers to activities people with T2DM perform every day to help control blood sugar level and prevent complications (Adu, Malabu, Malau-Aduli & Malau-Aduli, 2019). It includes glucose monitoring and management by adhering to diabetes medications, healthy diet, and regular physical activities (ADA, 2019).

However, studies among Bhutanese people with T2DM have shown that optimal glycaemic control was not achieved in 46% to 72% of the participants (Dorji, Deenan & Masingboon, 2017; Dorji et al., 2018). Bhutanese diabetics are found to have low to moderate level of adherence to medication (Dorji et al., 2018) and moderate level of physical activity (Dorji et al., 2017).

According to the literature review, family members play an important role in providing support in management of diabetes such as ensuring adherence to treatment regimen, providing disease related information, buying groceries and /or providing emotional support to mitigate stress (Ahmed & Yeasmeen, 2016). This information is consistent to results from previous studies (Dao-Tran, Anderson, Chang, Seib, & Hurst, 2018; Gunggu, Thon, & Whye Lian, 2016; Kurnia, Amatayakul, & Karuncharernpanit, 2017) and the individual and family self-management theory (IFSMT) proposed by Ryan and Sawin (2009) that family is the important support for an individual, also they suggested that several factors including internal and environment factors might have influence on DSM. Guided by the IFSMT (Ryan and Sawin, 2009), the influence of health literacy, self-efficacy, diabetes distress and social support on DSM were examined in this study.

Health literacy is the ability of the person to collect and analyse health information to make decisions related to health and well-being (Edwards, Woods, Davies, & Edwards, 2012). Patients with low health literacy have limited knowledge and information about their health which limits them to make decision and self-manage their health (Edwards et al., 2012). Health literacy could predict DSM significantly in a study (Schinckus, Dangoisse, Van den Brouncke, & Mikolajzak, 2018). Additionally, health literacy was found to be associated significantly with self-management in another study (Van der Heide et al., 2014).

Self-efficacy in DSM is the confidence in the skills and ability of patient with T2DM to undertake the activities that is required to maintain glycaemic control and prevent complications. People with high self-efficacy are competent to perform task and complete it successfully (Bandura, 1994). Many studies have established that high self-efficacy is associated with high DSM

and can predict DSM significantly (Dao-Tran, Anderson, Chang, Seib, & Hurst, 2018; Gunggu, Thon, & Whye Lian, 2016; Kurnia, Amatayakul, & Karuncharernpanit, 2017).

Diabetes distress is the range of psychological responses which arises when people with T2DM experience burden and worries specific to experience of living with T2DM and managing it (ADA, 2019). Diabetes distress lowers self-efficacy and lowers the patient's perception of ability to control diabetes (ADA, 2019; Gonzalez, Shreck, Psaros. & Safren, 2015), thus, lowering DSM.

Social support is the assistance provided by friends and family in times of need. Social support helps in improving knowledge, increasing self-regulations and self-efficacy skills (Ryan & Sawin, 2009), thus, leading to improve DSM. Social support can improve self-management by reducing the impact of stress and increasing self-efficacy (Miller, 2013). Studies have shown that social support can significantly predict DSM (Dao-Tran et al., 2018; Gunggu et al., 2016).

According to results from previous studies on factors influencing DSM in different setting showed inconsistency, thus reducing the possibility of generalization (Dao-Tran et al., 2018; Gunggu et al., 2016; Kurnia et al., 2017). Moreover, no study on DSM and its influencing factors have been carried out in Bhutan till now. Bhutan is a predominately Buddhist country and it is common for Bhutanese to involve spirituality, faith and belief while taking care of their health. Bhutanese culture requires people to help each other and take care of each other especially if they are family. Even the Food culture in Bhutan is different from the western world, where rice and potatoes are the main staple, consumed with large amount of spicy chilies and dairy products. These different traditions and culture practices in Bhutan might have influence on the DSM and factors influencing DSM among Bhutanese diabetics, thus making it distinct from studies done in other countries.

Objectives

1. To explore Diabetes Self-management among Bhutanese people with T2DM.
2. To examine factors influencing Diabetes Self-management among Bhutanese people with T2DM.

Conceptual framework

The framework of the study was designed based on the individual and family self-management theory (IFSMT) of Ryan and Sawin (2009) and literature review. IFSMT describes how three different dimensions (context, process and outcome) of different individuals and family affect the self-management process. The process of collecting information related to health management, the confidence to carry out self-care activities, the different kinds of support received during the process of self-management and the ability to control emotions are some factors under the process dimension which might have influence on how individual and family self-manage their T2DM (Ryan & Sawan, 2009).

According to literature review, low health literacy was found to be associated with less diabetes knowledge, thus leading to suboptimal DSM (Bailay et al., 2014). High self-efficacy is associated the individual's competency to carry out self-management activities, thus increasing DSM (Bandura, 1994) and it is found that self-efficacy can predict DSM significantly (Kurnia et al., 2017). Higher social support has found to

be associated with positive outcomes such as glucose monitoring, diet self-mangment and self-care (Strom & Egede, 2012). Diabetes distress influences medication adherence, lowers self-efficacy and it results in poorer dietary and exercise behaviours thus reducing the overall DSM (ADA, 2019). Therefore, the influence of health literacy, self-efficacy, social support and diabetes distress on DSM was examined in this study.

Research Design

A predictive correlational study was used for this study. Sample size was calculated using G* power with small effect size of 0.12, alpha of .05 and power of .80. One hundred and five people with T2DM who came to the diabetes OPD of Jigme Dorji Wangchuck National Referral Hospital (JDWNRH), Thimphu Bhutan were recruited by a simple random sampling, fulfilling the following inclusion criteria: 1) aged 18-60 years old, 2) a diagnosis of T2DM for at least 6 months, 3) ability to read and write in English, 4) good orientation and no history of mental illness, and 5) no major physical disability. The queue number of the volunteers who fulfilled the criteria were placed in a container and randomly drawn to recruit maximum of 15 participants in a day, two days in a week for period of one and half month.

Instruments for data collection

1. Demographic data of the participants included age, sex, level of education, marital status and income and health information of the participants which included BMI, diagnosis duration, medications, comorbidities, diabetic related complications and HbA1c were collected using the demographic data questionnaire developed by the researcher.

2. Diabetes self-management was measured by the Diabetes Self-Management Questionnaire (DSMQ) (Schimitt et al., 2013), which consisted of 16 items used in assessing self-care activities in four subscales including glucose management, dietary control, physical activity and health care use. Each item was scored on a 4-point Likert Type Scale (0 = doesn't apply to me, 1 = applies to me to some degree, 2 applies to me to considerable degree, 3 = applies to me very much) with possible score range of 0 to 48. Nine negatively worded items were reversed scored. The final raw score was converted to score ranging from 0 to 10. The higher the score the better the diabetes self-management and vice versa. The item analysis test using minitab was performed using the data collected to check the reliability of the instrument. The Cronbach's alpha of DSMQ was .66 for this study

3. Health literacy was measured by The Functional, Communicative and Critical health literacy scale (Ishikawa, Takeuchi, & Tano, 2008). The scale has 14 items which can be divided into 3 subscales - functional, communicative and critical health literacy. Each item was scored on a 4-point Likert Type scale, and final score was given as either mean of each subscale or of all 14 items ranging from ranging from 1 (never), 2 (rarely), 3 (sometimes) to 4 (often). Higher score indicates higher health literacy level and vice versa. The Cronbach's alpha was .89 for this study, which was obtained by running an item analysis test using minitab using the data collected with this scale.

4. Self-efficacy was measured by The Diabetes Management Self-Efficacy Scale - UK version (DMSES-UK) was used to measure the self-efficacy (Sturt, Hearnshaw, & Wakelin, 2010).

It has 15 items, where each item was scored between 0-10 (0 = cannot do at all to 10 = certain can do), with a possible score range of 0 to 150. Self-efficacy can be divided into low (score 0-50), moderate (score 51-100) and high self-efficacy (101-150). For this study, the Cronbach's alpha of self-efficacy was .82.

5. Diabetes distress was measured by the Diabetes Distress Scale (DDS), which consisted of 17 items and can be divided into four subscales - emotional burden, physician related distress, regimen-related distress and interpersonal distress (Polonsky et al., 2015). Each of the item was scored in a 6-point Likert Type Scale and was scored as a mean of each subscale or total items. The possible score range was from 1 to 6 (1 = Not a problem, 2 = A slight problem, 3 = a moderate problem, 4 = Somewhat serious problem, 5 = A serious problem and 6 = A very serious problem). A score of 2 or less shows no or little distress, score of 2 to 2.9 shows moderate diabetes distress and score of 3 or more shows high diabetes distress. The Cronbach's alpha was .68 for this study

6. Social support was measured by 'Family and friends' and 'doctor and health care team' subscales of the Chronic Illness Resource Survey (CIRS) (Glasgow, Strycker, Toobert, & Eakin, 2000). The subscales are made up of 8 items and 7 items respectively, and each item was scored on a 5-point Likert-type scale ranging from 1 to 5 (1 = not at all to 5 = a great deal). The possible score range for the 2 subscales combined was 15 to 75. Higher score indicates higher social support (instrumental and information support) received. (Dao-tran et al., 2018). The Cronbach's alpha was .73 for this study.

Ethical considerations

This study was approved by the Institutional Review Board (IRB) of Burapha University, Thailand (IRB number: G-Hs 005/2563) and Research Ethical board of Ministry of Health (REBH), Bhutan (REBH/Approval/2020/001). Permission to collect the data was asked from the hospital where this study was conducted. Written inform consent were taken from all the interested participants before data collection started. During the time of the data collection, the researcher made sure that the participants had proper designated areas to fill out the questionnaires and it was also made sure that they do not miss out on their appointments with the physician while they were providing data. The confidentially of the participants were assured by not using names or identifications that can trace the participants in any of the documents and the reports. All data collected from the participants were kept in a secured place, which was only accessible to the researcher.

Data collection

Questionnaires were distributed to the participants on the day of data collection. Participants were given adequate time and a private room to complete the questionnaires. Each participant was able to fill out the questionnaires in average time of 40 minutes. Data collection was carried out every Tuesdays and Thursdays for a period of one and half month. All the data were collected by the researcher directly from the participants and the medical record book of the participants.

Data Analysis

The data were analysed by performing standard multiple linear regression (MLR) at significant level of .05. All assumptions of MLR were tested and met. Demographic data of the participants were analysed using descriptive statistics. All statistical analysis was performed using Minitab17 software.

Results

A total of 105 participants were recruited for this study, which consisted of 47 males and 58 females. The mean age of the participants was 49.6 years, with 84.8% of the participants in the age group of 41 to 60 years old. Majority of the participants (91.3%) claimed that they earn adequate income for daily use. The mean diabetes duration was 74.7 months (approximately 6 years). Majority of the participants (91.5%) were on oral diabetic medications, while the others were either on insulin therapy or combined oral and insulin therapy. Approximately one-third (32.4%) of the participants had no comorbidities while 60.9% of them had only one type of comorbidities. Overall, only 20.9% of the participants had developed one or more complications related to diabetes. Interestingly, 75.2% of the participants were either overweight or obese, while only 36.2% of them had uncontrolled T2DM (HbA1C > 7).

Diabetes self-management (DSM)

The mean score of DSM was 7.76 (SD = 1.03), out of 10. The mean score for subscale glucose management (GM), dietary control (DC), physical activity (PA) and healthcare use (HCU) were 7.59, 7.61, 7.02 and 8.73 respectively. HCU had the highest mean score followed by DC subscale, then GM subscale and physical activity subscale had the lowest mean score, as shown in Table 1.

Table 1 Mean and standard deviation of Diabetes self-management and its subscales (n = 105)

DSM and subscales	Possible score	Actual score	M	SD
Diabetes self-management	0 - 10	5.4 - 9.8	7.76	1.03
Glucose management	0 - 10	3.3 - 10	7.59	1.52
Dietary control	0 - 10	1.7 - 10	7.61	1.45
Physical activity	0 - 10	1.1 - 10	7.02	2.18
Health care use	0 - 10	3.3 - 10	8.73	1.60

In this study, five independent variables were investigated. The health literacy score ranged from 1.2 to 4, with mean of 2.61 (SD = 0.65). The self-efficacy score of the participants ranged from 70 to 143, with a mean score of 106.9 (SD = 15.73) which indicated high level of self-efficacy. The overall score of diabetes distress (DDS) ranged from 1 to 2, which indicated no or little distress, with a mean of 1.40 (SD = 0.23). The social support score ranged from 43 to 72 with a mean score of 58.99 (SD = 5.90), as shown in table 2.

Table 2 Score of health literacy, self-efficacy, diabetes distress and social support (n = 105)

Factors	Possible score	Actual score	M	SD
Health literacy	1 - 4	1.3 - 4	2.61	0.65
Self-efficacy	0 - 150	70 - 143	106.9	15.73
Diabetes distress	1 - 6	1 - 2	1.40	0.23
Social support	15 - 75	43 - 72	58.99	5.90

Factors influencing DSM

The standard multiple regression analysis showed all the variables could explain 17.16% variance in DSM. However, only self-efficacy could predict DSM among the Bhutanese people with T2DM significantly. The detail of the results from correlation testing and MLR is presented in table 3 and table 4.

Table 3 Correlation matrix between DSM and factors predicting DSM (n = 105)

	Diabetes self-management	Self-efficacy	Health literacy	Social support	Diabetes distress
Diabetes self-management	1.000				
Self-efficacy	0.365***	1.000			
Health literacy	0.059	0.428***	1.000		
Social support	0.351***	0.525***	0.326***	1.000	
Diabetes distress	-0.300**	-0.314***	-0.094	-0.416***	1.000

***p < .001; **p < .01

Table 4 MLR for factors predicting DSM (n = 105)

Predicting factors	B	SE	β	T	p-value
Self-efficacy	.018	.007	.277	2.48	.015
Health literacy	-.214	.158	-.135	-1.35	.181
Social support	.033	.019	.188	1.68	.096
Diabetes distress	-.653	.439	-.148	-1.49	.140
Constant = 5.34, Adj R^2 = 17.16 %, $F_{(4, 100)}$ = 6.39, p < .001					

Discussion

DSM among Bhutanese people with T2DM

The results indicated that adult Bhutanese people with T2DM had optimal diabetes self-management. The study result was similar to results of the study in Iran which showed that the mean score of DSM, GM, DC, HCU and PA were 6.92, 6.25, 7.48, 7.23 and 7.05 respectively (Khalooei & Benrazavy, 2019). Result of this study was similar to a study done in Australia which showed that DSM was higher among the

participants (Maneze, Everett, Astorga, Yogendra, & Salamonson, 2016).

The IFMST (Ryan & Sawin, 2019) suggests that individual and family characteristics, severity and complexity of disease conditions, social and environmental factors such as access to health care, income or tradition have influence on how the individual and family manage T2DM. In this study, majority of the participants were middle age adults, thus, they could carry out diabetes self-management activities more effectively, as opposed to older adults (> 65 years old) with unique issues such as changed mental and physical abilities, increased comorbidities and complications, altered nutrition requirement and changed support system which has impact on self-care abilities (Weinger, Beverli & Smaldone, 2014).

Moreover, most of the participants were married and lived with family and friends, therefore, receiving good social support in managing their diabetes (Gunggu et al., 2016). Furthermore, the government of Bhutan provides universal health coverage to all the people in the country, which includes diabetes care services, thus, helping reduce financial burden related to treatment. Additionally, most of the participants of the study claimed to have adequate monthly income. Financial stability could help maintain higher DSM (Gonzalez-Zacarias, Mavarez-Martinez. Arias-Morales, Stoicea, & Rogers, 2016). The presence of fewer co-morbidities and diabetes-related complications can result in better and effective DSM (Ryan & Sawin, 2009), as seen in this study.

Factors influencing DSM

Self-efficacy was the only factor that could significantly predict diabetes self-management (β = .277, p = .015) in this study. The correlation test revealed that self–efficacy has a significant moderate correlation with DSM (r = .365, p < .001), which was highest compared to correlation among DSM and other factors, thus, making self-efficacy able to predict DSM significantly. The result is congruent with many precious study which show self-efficacy as a significant predictor of DSM. Results from previous study supported this finding and showed that self-efficacy is a strong predictor of DSM (Dao-Tran et al., 2018; Gunggu et al., 2016; Kurnia et al., 2017). This relationship can be explained by Bandura's self-efficacy theory (Bandura, 1994) which suggests that people with high self-efficacy have the competency and the confidence to initiate, perform and complete self-management activity effectively. The relationship can also be supported by the IFSMT which suggests that individuals and families develop self-efficacy by gaining knowledge, thus, helping improve self-management (Ryan & Sawin, 2009). Likewise, Self-efficacy among the participants in this study was reported to be high, thus, resulting in mean score of total DSM to be closer to the optimal score.

In this study, diabetes distress could not predict DSM significantly. However, it was found to be associated with DSM, similar to findings from previous study which revealed that diabetes distress lowers adherence to self-management activities and lowers self-efficacy, thus, resulting in poor DSM (ADA, 2019; Gonzalez et al., 2015). Bhutanese people mainly live together as a big family and support each other. Additionally, most of Bhutanese are religious and believe in law of 'Karma'. Good social support from family members and their religious belief might act as a buffer in reducing the impact of diabetes distress

on DSM (Baek, Tanenbaum, & Gonzalez, 2014). Therefore, diabetes distress could not predict DSM significantly in this study.

Similarly, social support could not predict DSM significantly as suggested by previous studies (Dao-Tran et al., 2018; Gunggu et al., 2018). Social support can help improve knowledge and self-efficacy, thus, resulting in better DSM among people with T2DM (Ryan & Sawin, 2019). However, in this study, only two sources of social support - family and health care professional were assessed, while it was possible that the participants might have receive support from other source as well. Inconsistency and imbalance in the support received from these two sources was also report by the participants, which might have caused some participants to perceive relatively low social support. Additionally, majority of the participants were healthy middle-aged adults, who were capable of caring for themselves, thus not requiring support to perform activities related to them. Therefore, social support could not predict DSM significantly.

Another study finding revealed that there was no association between health literacy and DSM, which contradicted previous study (Van der Heide et al., 2014). High level of health literacy can improve DSM by increasing knowledge, and it was lack of knowledge that predicted low self-management (Maneze et al., 2016). In this study, the actual knowledge of participants was not measured. Moreover, most of the participants lived with their family, thus, health literacy of the family could also have affected the DSM among the participants, which was not assessed in this study.

This study was conducted among the people with T2DM who can read and write English, thus, the results may not be generalizable to people who cannot read and write English. Similarly, the study was carried out in only one hospital of Bhutan, thus, making it difficult to generalize to the whole diabetic population of Bhutan. Therefore, similar study should be carried out in other hospitals in Bhutan to cover more people for increased generalizability.

Conclusion and Recommendations

The study findings highlight that adults Bhutanese with T2DM had high DSM, with the highest mean score in the healthcare use subscale. This study showed that self-efficacy could predict diabetes self-management significantly, while health literacy, social support and diabetes distress could not predict diabetes self-management significantly. Therefore, healthcare providers should implement strategies to promote DSM self-efficacy among Bhutanese people with T2DM to achieve proper DSM. Furthermore, studies should be conducted to investigate the other factors influencing DSM such as diabetic knowledge or illness perception since the factors in this study explained only 17% of variance in DSM.

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