

Association Between Diabetes-Related Knowledge, Perceived Adherence to Lifestyle Changes and Physical Activity Level Among Type 2 Diabetes Mellitus Patients at SASMEC@IIUM

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ABSTRACT

Background: Diabetes-related knowledge is fundamental to effective diabetes management, influencing self-management and health outcomes. Changes in lifestyle, including diet modification and physical activity, are all necessary for effective nutrition treatment. Therefore, this study aims to identify the relationship between diabetes-related knowledge and physical activity levels with perceived adherence to lifestyle changes among type 2 diabetes mellitus (T2DM) patients. **Methods:** Questionnaires consisting of Diabetes Knowledge Test (DKT), Perceived Adherence Lifestyle Modification (PALM-Q), and International Physical Activity Questionnaire (IPAQ) were used through self-administers. The data were analysed using Statistical Package for the Social Sciences (SPSS). A total of 33 respondents, T2DM patients aged 18 and above in SASMEC@IIUM, were involved in this study. **Results:** The Spearman Correlation test found no association between diabetes-related knowledge and perceived adherence to lifestyle changes and physical activity level ($p>0.05$). Additionally, the Chi-Square Independence test shows a significant association between perceived adherence to lifestyle changes and physical activity level ($p>0.05$). **Conclusion:** It can be concluded that there is no association between diabetes-related knowledge and perceived adherence to lifestyle changes and physical activity level, yet there is a significant association between perceived adherence to lifestyle changes and physical activity level among T2DM patients in SASMEC@IIUM.

Keywords:

type 2 diabetes mellitus; diabetes knowledge; physical activity level; perceived adherence

INTRODUCTION

Research Background

Type 2 Diabetes Mellitus (T2DM) is a significant health concern, with increased prevalence among individuals over 30 years old in the past decade (Hussein et al., 2015). Usually, once the individual is diagnosed with diabetes for the first time, they will be referred to a dietitian to proceed with lifestyle change recommendations. However, not all patients are able to comply and maintain the recommended advice. A high prevalence of noncompliance with lifestyle advice was seen among T2DM patients in Malaysia, where just 16.4% of people with diabetes follow the dietary plans recommended by dietitians (Chew et al., 2013). A study conducted at the University of Malaya Medical Centre found that Malaysian diabetes patients are prone to consuming a high carbohydrate and fat diet (Hussein et al., 2015). This also indicates that they still have an unhealthy lifestyle, even after being diagnosed with diabetes.

Practising healthy eating and increasing physical activity are necessary for improving health. Klinovszky et al. (2019) found that following physical exercise recommendations improves blood glucose levels and provides benefits. Noncompliance, on the other hand, has more severe implications for patients. T2DM patients frequently have poor diet adherence due to a failure to understand, perform, and sustain the necessary previous experiences (Al-Salmi et al., 2022).

Poor adherence to lifestyle interventions remains a persistent barrier to optimal diabetes management, leading to uncontrolled blood sugar levels and increased risk of complications. This underscores the need to investigate how patients' diabetes-related knowledge influences their perceived adherence to lifestyle changes and physical activity levels. Adequate knowledge about diabetes plays a critical role in empowering patients to take charge of their health, adopt healthier behaviours, and manage their condition more effectively. Yet, gaps in patient education continue to exist, contributing to suboptimal lifestyle changes. Thus, the current study aims to understand the association between diabetes-related knowledge, adherence to lifestyle changes, and physical

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activity among patients at SASMEC@IIUM.

MATERIALS AND METHODS

Study Area

This study was conducted at Sultan Ahmad Shah Medical Centre at International Islamic University Malaysia (SASMEC@IIUM) Kuantan, Pahang. The data were collected at Medical Clinic 1 and Medical Clinic 2.

Study Design

A cross-sectional study was conducted to collect study samples.

Study Population

The study population involves patients diagnosed with T2DM at the Medical Clinics 1 and 2 in SASMEC. All T2DM patients who are above 18 years old and able to understand Malay were included in the study. Whereas T1DM, GDM, patients, and patients below 18 years old were excluded.

Sampling Method

Convenience sampling was used as it is the most practical sampling method for this research. It was conducted by approaching any participants based on the inclusion and exclusion criteria in SASMEC. Only patients who provided consent were invited to join the study.

Data Collection

The questionnaire consists of a few sections, which are socio-demographic, the Diabetes Knowledge Test (DKT) (Md Aris et al., 2018), the Perceived Adherence Modification Questionnaire (PALM-Q) (Nor et al., 2022), and the International Physical Activity Questionnaire (IPAQ) (Shamsuddin et al., 2015). All the questionnaires have been validated in Malay.

Socio-demographic questionnaire

Data like age, gender and ethnicity were collected in the first section of the questionnaire.

Diabetes Knowledge Test (DKT)

A validated Malay version of the simplified diabetes knowledge test (DKT) was used for this section. Questions regarding diabetes-related knowledge consisting of

correct, incorrect, and don't know answer options were included in the second section. It has 20 questions, consisting of 18 questions focusing on general diabetes knowledge and two questions specifically for diabetes patients who take insulin. A correct answer was given one mark, while an incorrect answer received no mark. This questionnaire aims to identify the knowledge levels regarding diabetes among T2DM patients. There is no specific cut-off point, and the highest mark is 20. However, a higher score reflects a better understanding of diabetes management, which can be used to infer the respondent's level of knowledge about their condition (Md Aris et al., 2018).

Perceived adherence modification questionnaire (PALM-Q)

PALM-Q was a questionnaire that determined the perceived adherence levels among T2DM patients, including knowledge, beliefs, and barriers. The questionnaire consists of 18 questions. The response option is in Likert-scale format with four choices: Strongly Disagree, Disagree, Agree, and Strongly Agree, with points of 4, 3, 2, and 1, respectively. The scoring was used to categorize respondents into three groups: the presumed perceived adherence with 54 points and above, unpredictable perceived adherence with a score of 32-53; and perceived non-adherence, which scores less than or equal to 31 (Nor et al., 2022).

International Physical Activity Questionnaire (IPAQ)

The IPAQ questionnaire, which uses a shortened version of 7 questions, required respondents to self-report their daily physical activity. The IPAQ-M monitors the frequency and duration of time spent in vigorous-intensity, moderate-intensity, and sedentary activities such as sitting and sleeping. Participants were instructed to report on their activities during the previous seven days, including only activities that lasted 10 minutes or more per session. The total amount of time was then used to categorize the participants as either sufficiently active or insufficiently active based on their ability to meet the physical activity guidelines by the NHMS 2019, at least 150 minutes of moderate-intensity per week.

RESULTS

Demographic Data

A total of 33 Malay with T2DM patients participated in this study. The majority of respondents were from the age group of 40 – 59 years old, which includes 18 (54.5%), followed by 60 and above and 22 – 39 years old, with 11 (33.3%) and 3 (9.1%), respectively. In contrast, the least respondents came from the age group of 18 – 21 years old

with 1 (3%). Out of the 33 respondents, 17 (51.5%) were female and 16 (48.5%) were male. Table 1 shows the demographic data of the participants.

Table 1: Demographic data of the respondents (n=33)

Demographics	Subjects (n=33)	
	n	%
Age		
18 – 21 years old	1	3
22 – 39 years old		
40 – 59 years old	3	9.1
60 years above	18	54.5
	11	33.3
Gender		
Male	16	48.5
Female	17	51.5

Diabetes-related Knowledge

The respondents were asked regarding diabetes-related knowledge. Table 2 displays the lowest score as 7, while the highest is 17, with a mean score of 11.15.

Table 2: Diabetes-related knowledge among T2DM patients in SASMEC (n=33)

Variable	Minimum	Maximum	Mean ± SD
Diabetes-related knowledge	7	17	11.15 ± 2.539

Association of Diabetes-related Knowledge and Perceived Adherence to Lifestyle Changes

Table 3 indicates the correlation between diabetes-related knowledge and perceived adherence to lifestyle changes. There is no significant correlation, and a weak positive correlation was found with a p-value of 0.732 ($r = 0.062$). Similarly, the correlation between diabetes-related knowledge and physical activity levels was not significant with $p\text{-value} > 0.05$. However, the variables showed a weak negative correlation (Table 4), indicating that participants with good diabetes-related knowledge participate less in physical activities.

Association of Perceived Adherence to Lifestyle Changes and Physical Activity Levels

The result from the Chi-Square Test shows the association between perceived adherence to lifestyle changes and

Table 3: Correlation between diabetes-related knowledge and perceived adherence to lifestyle changes and physical activity level (n=33)

Variable	r-value	p-value
Diabetes-related knowledge and perceived adherence to lifestyle changes	0.062	0.732
Diabetes-related knowledge and physical activity level	-0.242	0.175

physical activity levels among T2DM patients.

Participants were categorized into three physical activity levels: low (11 participants, 33.3%), moderate (15 participants, 45.5%), and high (7 participants, 21.2%). A significant association was found between physical activity level and perceived adherence to lifestyle changes, $X^2 (2, n=33) = 7.457, p = 0.017, \text{Cramers } V = 0.480$.

DISCUSSION

Diabetes-related Knowledge

This study revealed that the mean scores of diabetes-related knowledge among T2DM patients were in a good category. Since all participants answered more than half of the questions correctly, they had moderate and acceptable levels of knowledge. Other studies by Al-Qazaz et al. (2010) and Fitzgerald et al. (2016), showed similar results, with more than half of the participants having good knowledge regarding diabetes. Additionally, T2DM patients in Kuala Muda District, Kedah, have good diabetes-related knowledge and demonstrate good attitudes and practices in diabetes management (Abbasi et al., 2018). However, compared to a study conducted by Lee et al. (2019), in a primary care clinic in Seremban reported lower diabetes knowledge scores, with only 3.6 % of the respondents well-versed regarding diabetes. The low diabetes knowledge scores recorded in the survey could be attributed to Negeri Sembilan having the highest diabetes prevalence among Malaysian states, according to NHMS 2019.

The differences in diabetes knowledge might be due to numerous factors such as demographic profiles like age and ethnicity, the duration for which patients had T2DM, and the tools used to assess knowledge (Hamuleh et al., 2010). Furthermore, variations in the availability and

quality of diabetes education programs in certain areas may impact participants' knowledge. This highlights the need for standardized educational programs to improve the overall understanding of diabetes and improve health outcomes.

Association between Diabetes-related Knowledge with Perceived Adherence to Lifestyle Changes and Physical Activity Level.

Higher diabetes knowledge is associated with better adherence among T2DM patients (Yeh et al., 2018), and higher levels of physical activity (Klupa et al., 2016; Sodeno et al., 2022). However, this study found no association between diabetes-related knowledge and perceived adherence to lifestyle changes or physical activity levels. An improved knowledge may not ensure sustained commitment to food and lifestyle changes. A study by Ahola & Groop (2013) emphasized that there is no association between knowledge and adherence due to social support, denial of current disease, and depressive symptoms negatively impact adherence. Adherence to dietary and physical activities involves many interrelated factors beyond individual knowledge.

Financial constraints and access to healthy foods significantly determined adherence (Peter et al., 2022). The high costs of healthy food items with time constraints restrict food choices, as people usually opt for something quick and easy. Beyond knowledge, addressing behavioral, psychological, and environmental barriers to adherence is essential (Yeh et al., 2018). Healthcare providers should incorporate strategies to enhance adherence to lifestyle changes.

Patients with poor knowledge lack of basic understanding needed for effective self-management. They are likely more vulnerable to the same psychological, social, and environmental barriers that affect those with higher knowledge (Marciano et al., 2019). This aligns with the general understanding that knowledge is fundamental for effective diabetes self-management.

A study by Martin et al. (2021) and Pelluri et al. (2022) found no significant relationship between physical activity and diabetes knowledge, suggesting that motivation is essential in determining the level of physical activity among T2DM patients. Research by Sazlina et al. (2013) on interventions to promote regular physical activity among older adults found that peer support groups, goal setting, and individualized coaching are essential for engagement. Knowledge of diabetes alone does not seem significant in promoting physical activity.

Many studies emphasize that factors such as individual current disease status; BMI, especially obesity and overweight individuals, age, lifestyle behavior, and mental health significantly influence physical activity (Colberg et al., 2010; Daryabor et al., 2020; Tyson et al., 2010). Individuals with higher BMI, particularly those who are obese or overweight, are often associated with decreased engagement in physical activity and are uninterested in managing their weight and improving their overall health (Duta et al., 2023).

According to a few studies, people will not exercise even if they have substantial knowledge about diabetes because of psychological barriers or a lack of motivation (Al-Salmi et al., 2022; Harrington & Henson, 2021; Klinovszky et al., 2019). These studies highlight the difficulty in changing behavior and the need for comprehensive interventions targeting behavioral, psychological, and informational components.

Association Between Perceived Adherence to Lifestyle Changes and Physical Activity Level

This study found an association between perceived adherence to lifestyle changes and physical activity level. When individuals have high perceived adherence to lifestyle changes, their physical activity levels are expected to increase. High perceived adherence indicates that patients feel they are successfully following their prescribed lifestyle modifications, which may include diet, medication adherence, and mental health practices (Klinovszky et al., 2019). This sense of success can enhance motivation and self-efficacy, leading patients to engage more actively in physical exercise as part of their overall commitment to improve health (Shabirah et al., 2022). When patients perceive themselves as adherent, they may also be more likely to adopt additional positive behaviors, including increased physical activity, because they recognize the benefits and feel capable of integrating these behaviors into their daily routines.

Furthermore, perceived adherence may foster positive feedback where the successful adoption of one healthy behavior reinforces the adoption of others. For instance, patients who feel confident in their dietary changes and medication adherence might be more willing to incorporate regular physical activity, perceiving it as another manageable and beneficial component of their lifestyle. This holistic approach to adherence can lead to comprehensive improvements in health and well-being.

CONCLUSION

In conclusion, increased knowledge alone did not lead to higher perceived adherence to lifestyle changes, including physical activity. On the other hand, physical activity levels are influenced by patients' perceived adherence to lifestyle changes. While knowledge is essential, motivation plays a more significant role in prompting behavioral changes among T2DM patients. Therefore, healthcare providers should prioritize fostering behavioral change rather than focusing solely on imparting knowledge.

ACKNOWLEDGEMENT

This research was not funded by any grant.

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