Diabetes Knowledge and Perceived Information Needs: The Experiences, Views, and Challenges of Patients with Type 2 Diabetes Mellitus in Malaysia (A Qualitative Study)

Diabetes Knowledge and Perceived Information Needs Among T2DM Patients

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Abstract:- **Objective** **Amidst the increased diabetes prevalence in Malaysia, it is important to look into matters that influence patients' self-management. Patients' knowledge has been determined as an initiator for the improvement in diabetes self-management. This study aimed to explore patients' experiences, views, and challenges in obtaining diabetes knowledge as well as to assess the information needs among patients. Method Type 2 Diabetes Mellitus (T2DM) patients (n=21) were recruited from Hospital Tengku Ampuan Rahimah and Meru Health Clinic in Klang via purposive sampling. In-depth Interviews (IDI) were performed using a semi-structured interview guide comprising open-ended questions. All data were analysed thematically. Results The patients aged between 29 to 79 years old and the majority were male. Most of the patients had T2DM for more than 5 years. Their main sources of information were healthcare providers (HCP) and the media. Although patients obtained the required knowledge on diabetes from the HCP, they still faced certain challenges, including the need for further information, especially on medication and dietary practice. Conclusion T2DM patients mainly sought information from the HCP and media since both sources were easily accessible and approachable. However, certain information, particularly on medication and diet, was vague and redundant. Thus, patients often requested further detailed information to aid the development of their self-management skills. An individual-based diagnostic instrument can be beneficial as it can serve as the guideline to oversee the needs and issues in tackling patients' issues in DM management. Furthermore, government and other relevant stakeholders can diversify the approaches to improve the information delivery process by optimising effective communication channels (i.e., printed, internet, broadcasting) to cater to T2DM patients' information needs.**

Keywords:- *Diabetes Management, DM, Information Need, Knowledge, T2DM.*

I. INTRODUCTION

In 2019, the worldwide prevalence of Diabetes Mellitus (DM) was 8.3% (382 million) (1). The prevalence in Malaysia was 18.3% (3.9 million) (2), thus indicating that the prevalence of T2DM among Malaysians was higher compared to the global prevalence and the value has also exceeded the initial expectation of 10.8% (2.48 million) by 2030 (3,4). The alarming rise can be attributed to demographic transition as well as behaviours such as sedentary lifestyles and unhealthy diets (2,5,6,7).

Diabetes education is an important starting point that should be addressed so that patients can be empowered to strengthen diabetes self-management (8,9). Adequate information on diabetes enables patients to make educated choices on their diabetes management. Several studies revealed that patients with a better understanding and excellent knowledge of diabetes displayed better attitudes and practices that indirectly improved their adherence. Consequently, following improved compliance with self-care management, the patients achieved better glycaemic control and health outcomes (10,11). In addition, other studies have established that insufficient diabetes education led to poor understanding of the disease and sub-optimal diabetes care. Severe knowledge deficits were discovered among people with diabetes, encompassing aspects such as glucose monitoring, diet, foot care, interpretation of HbA1c results, medication intake, and management of hypoglycaemia (12,13).

As a multi-ethnic country, the level of knowledge among Malaysians varies among different ethnicities (14,15,16). Inadequacy of knowledge among T2DM patients was revealed in diabetes self-management, especially on regular exercise, weight reduction, and diet (17,18). Meanwhile, Li et al (19) mentioned that even though patients had a good grasp of general knowledge on physical activity, diabetes-related complications, and healthy eating, a knowledge gap was still observed with regard to diet. Lack of knowledge has been

reported as a contributing factor to poor adherence to medication and dietary control (15,20).

Knowledge gaps often impede patients from implementing the recommended lifestyle changes (11). However, hardly any attention is given to exploring the reasons behind the poor knowledge among patients (21,22). For example, in a recent review, Panting et al (23) reported several factors affecting patients' knowledge about diabetes. Apart from demographic factors such as race, area of residence, and financial resources, a person's level of knowledge was also influenced by information misperception, misinterpretation, ineffective approach in the delivery of information, as well as availability and accessibility to the healthcare services. In addition, the review also outlined the potential strategies to improve diabetes management through a comprehensive health communication approach. In some countries, providers of healthcare services are required to deliver diabetes education tailored to the individual, social, and cultural needs of the patients (24,25,26).

In Malaysia, a comprehensive range of healthcare services including health promotion, disease prevention, curative, and rehabilitative care, has been put in place to improve diabetes outcomes (27). However, Neblett et al. (28) suggested considering customised patient education as diabetes management might vary across and within patients from different backgrounds such as ethnic groups. Similarly, a study by Kuan et al. (29) also showed that the utilisation of language appropriate to the Malaysian population serves as a useful tool in health education, clinical management, and research. Furthermore, an improvised information delivery approach should be applied (30). Having said that, in terms of the language issue, there is limited availability of interpreter services in the health setting. Most translations are given by healthcare providers (HCP) or family members. Apart from that, in the scenario whereby the patients are faced with a variety of information sources delivered from different channels, they might start to make a comparison on the information, subsequently leading to conflicting knowledge (31).

It is undeniable that T2DM patients should be provided with customised diabetes education at different levels of healthcare settings in a timely manner. Ideally, DM self-management education should be offered from the point of diagnosis, on an annual basis, when complications arise, and when transition in care occurs (32). Thus, this study aimed to explore the view, experiences, and challenges of T2DM patients in obtaining diabetes knowledge, as well as assessing the patients' perceived information needs. The knowledge gaps identified in this study can provide fundamental guidance towards the designing of effective educational interventions or programmes in different healthcare settings.

II. METHOD

A. Study Design

This study applied qualitative approaches to investigate the phenomenon under study through observation, with emphasis on "subjective experiences of social actors to unearth data that are not easily accessible by quantitative means" (33). This study, in particular, employed phenomenological qualitative design (34) to investigate how different diabetic patients experienced the same construct, i.e., diabetes knowledge. An exploratory qualitative study was conducted on 21 patients with T2DM from November until December 2019 using a semi-structured open-ended question guide (Appendix 1). The questions probed the patients' perspectives on their diabetes knowledge, as well as what they knew about diabetes management, how they obtained the relevant information, and whether the information received was sufficient. The questions in the interview guide were generated based on previous literature on diabetes knowledge, namely the Diabetes Knowledge test [DKT] (Diabetes Knowledge Questionnaire [DKQ] (35,36), Diabetes Knowledge and Behaviour Questionnaire [DKB] (37), Michigan Diabetes Knowledge Test (38), and The Health Education Impact Questionnaire [heiQ] (39,40). The questionnaire was cross-checked by a group of experts (endocrinologist, diabetic nurse educator, pharmacist, medical officer, and dietician).

B. Participants and data collection

The study was carried out at two health facilities: Hospital Tengku Ampuan Rahimah (HTAR) and the Meru Health Clinic. These two facilities were considered as they received a high number of diabetic patients from various ethnicities. Furthermore, HTAR is located in an urban area whereas the Meru Health clinic covers the rural population.

Purposive sampling was utilised to select the eligible participants for the IDIs. Purposive sampling is used by qualitative researchers to identify participants who can provide in-depth and detailed information about the phenomenon under study41. This study set out in investigating the knowledge of various aspects of diabetes among T2DM patients attending government health facilities. Those aged above 18 years old and diagnosed with diabetes for more than three years were included. Patients were recruited with the assistance of the nurse supervisors at the facility based on predetermined inclusion criteria. An equal proportion of gender and race was considered. Diabetic patients who were diagnosed for less than three years, unable to communicate in Malay, and refused to participate were excluded.

Figure 1 illustrates the process for the IDI data collection. Patients were first briefed about the study and written informed consent forms were obtained before the interview. All interview sessions were audio-recorded and conducted face-to-face in a private room at the health facility before or after the patient's consultation session with the HCP. Each interview lasted for 30 to 45 minutes. IDI was carried out by three moderators (RK, NA, and NI), all of whom were Health Education Officers with Master's degrees in Health Science (Education) and vast experience in conducting qualitative studies on health behavioural research. During the interview

session, the patient's guardians and note-takers (TPN and NIMN) were also present.
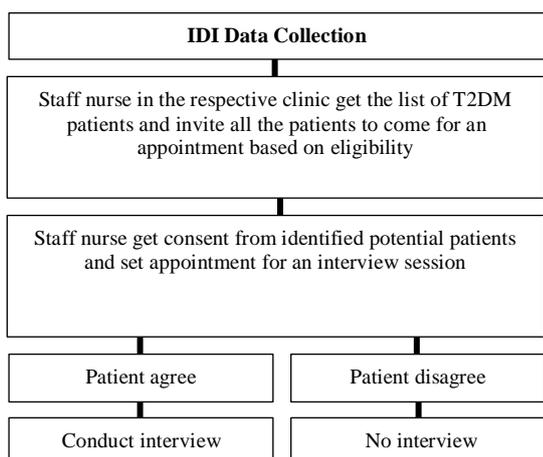

Fig. 1. Flow Chart for IDI Data Collection

The sample size of patients was determined based on data saturation. According to Francis et al. (42) and DiCicco-Bloom and Crabtree (43), the initial round of analysis should include a small number of participants and a stopping point. In this study, five interviews were conducted in the first round of analysis, followed by three more rounds. No new themes were discovered after the fourth round of analysis (19th interviews) and subsequently, the data collection was stopped after two more interviews.

C. Statistical Analysis

Raw IDI data were transcribed verbatim by TPN, NIMN, and NNN (research assistant officers) before quality control was done by other research team members (AJP, SNMA, KAM, NA, and NI) to ensure the rigour and accuracy of the transcription. The confidentiality of the participants was protected with a unique identifier (UID) made up of an alphanumeric string. The verbatim transcript was analysed thematically by the research team based on the recommendations by Gibbs (44). First, the research team read the transcribed data to extract and identify the themes independently. Transcripts were first categorised based on words, phrases, or sentences. Then, data segments were grouped into categories before being merged into general themes upon negotiation and agreement among all the research team members. The data were analysed and discussed based on sources of information, types of information, and rising issues as mentioned by the patients. Any differences were reviewed repeatedly and resolved following team discussion. For each theme, the best representative verbatims were selected to support the findings. The data analysed were presented accordingly and then checked by expert representatives from the Qualitative Research Association of Malaysia (QRAM).

III. RESULTS

A. Demographic

A total of 21 patients with T2DM were included in the IDI session. The patients' demographic characteristics are presented in Table 1. More than half of the patients were males (57%) and above 60 years old (42%). In terms of ethnicity, 38% of them were Malays, followed by Indians (33%), Chinese (24%), and others (5%), i.e., a Sinhalese. Overall, all patients in this study had attained at least a primary level of education. Lastly, most of the patients had been diagnosed with T2DM for 5-10 years (52%).

TABLE I. DEMOGRAPHIC CHARACTERISTICS OF PATIENTS INCLUDED IN THE STUDY (N=21).

Variables		N (%)
Gender	Female	9 (43)
	Male	12 (57)
Age (years old)	Less than 49	6 (29)
	50-59	6 (29)
	More than 60	9 (42)
Race	Malay	8 (38)
	Chinese	5 (24)
	Indian	7 (33)
	Others	1 (5)
Religion	Islam	8 (38)
	Buddha	4 (19)
	Hindu	7 (33)
	Others	2 (10)
Education level	Primary school	3 (14)
	Secondary	12 (57)
	Tertiary	6 (29)
T2DM Diagnosis (years)	Less than 5	5 (24)
	5-10	11 (52)
	More than 10	5 (24)

B. Diabetes Knowledge

This study identified three themes related to patients' diabetes knowledge, namely Source of Information, Type of Information, and Challenges in Acquiring Diabetes Knowledge.

1) Source of Information

The majority of the patients stated that they received diabetes-related information mainly from the HCP via counselling, demonstrations, and practical sessions.

The doctor told me [patient] to spend at least spend 30 minutes/ day...brisk walking. (I1KMM46)

Yes, the diabetic foot clinic, they [HCP] do that [footcare] and they [HCP] also showed the photos, pictures, and so on... (I3HTM61)

The doctors and nurses taught us how to control sugar and how the level [blood sugar level] should not be more than 10 or 7. (I8HTF39)

I got a family doctor and also two doctors who are related to me. They [HCP] also… any advice, they advise me. They come and visit me also. (I1HTF57)

I like to look at my report [blood test]. And then I don't stop there. I have my personal physician… Normally after this, I will consult my personal physician just to get his input. (I2HTM59)

Another main source of information for the patients was via media platforms, especially mass media such as television, newspaper, radio, articles, or magazines.

Oh, I read Chinese books. (I11KMF79)

Sometimes I go through Google and Youtube to see what the medications for diabetes are. (I1HTF57)

Mostly I watch Youtube for health information. (I1HTF57)

… from the Internet also, search at Google. What can be eaten and what cannot. (I8HTF39)

In addition, the patients also stated that they received information on diabetes management from their family members. One patient informed that he learned through the experiences of his diabetic family member. In contrast, several patients relied on their personal experiences as their source of diabetes knowledge. Besides that, the community was also a main source of information for the patients in this study. Some of them asked their friends and neighbours about the symptoms of diabetes.

My mother was diabetic. She was an above-knee amputee for ten years. Before she passed away, she lived with me I know what is the difficulties the problem with diabetes, so that's why. (I2HTM59)

Usually…I mean, I ask my daughters. (I2HTM59)

I just mix around with people to get information. The shared information. That's all. (I2HTM59)

I get to know the symptoms. I asked my friends in surau, friends from the mosque, and they told me I have diabetes. So, the following day, during the fasting month, I went to the clinic. (I11KMM46)

2) Type of Information
During the interviews, patients' experience and knowledge of DM were explored. The questions asked included general information about DM, diet, medication, self-monitoring of blood glucose (SMBG), physical activity, eye and foot care, as well as symptoms and complications. Overall, most patients admitted that they received an explanation from the HCP about every aspect of diabetes management, including knowledge about diet. They also understood that diabetic patients must control their food intake, especially sugar, salt, and carbohydrate intake. Some patients also informed that they had been taught about carb-counting to determine the intake quantity. In addition, they were recommended to follow a regular meal time by setting the alarm as a reminder.

They [HCP] told me to control the intake of oily food, not to take fried food, and also to take extra vegetables, less rice, and more fruits. For the fruits, don't take the sweet ones. (I8KMF48)

When I was diagnosed, they [HCP] briefed me on how to reduce carbohydrates. We [patients] usually see this food pyramid in hospitals and clinics. (I2HTM59)

Diabetes, they [HCP] told me not to take salt. Don't eat sugar and control sugar intake. (I4KMM64)

Certain doctors tell you to take meals accordingly. If we tend to forget, we should set the alarm. (I5KMF50)

They [HCP] will tell me, you must eat less, like for thosai, you must eat only three quarters and drink one cup. I was thinking about how to eat so little, sometimes on weekend, I eat a bit more. (I9HTM72)

In terms of medication, the patients displayed basic knowledge on proper usage of insulin, including proper storage, medication intake schedule, and blood glucose monitoring. They were aware of the importance of self-monitoring blood glucose (SMBG), HbA1c reading, and glucometer usage. According to the patients, they also received knowledge on physical activities, eye and foot care, as well as symptoms and complications of diabetes. For physical activity, patients were taught about the type and duration of exercise. For foot care, they were briefed on how to perform regular inspections such as using a mirror to check the sole for any presence of fungus. They were also reminded of the need to wear suitable and proper footwear. Additionally, they were also made aware of the complications caused by uncontrolled diabetes.

The way to take medicine, usually I attend seminars and all. They [HCP] will tell. For example, for medicine after a meal, the duration of 4 hours, 2 hours, 1 hour, 10 minutes. (I4HTM55)

I asked the doctor during follow-up. If you have high blood glucose level but under control, you don't have to do it every day. One week check twice. So, I check it every 3 or 7 days. Sunday or weekend, I do it once. (I6KMM44)

The doctor told me to brisk walk. He said to spend at least 30 minutes/ day. (I11KMM46)

The doctor from Johor told me to go jogging after meals in the evening. At least exercise once every two to three days. (I4KMM64)

The nurse advised me to check my foot and eyes. Then the nurse said, we can know from the eye veins. If ruptured or bleeding, it is worsening. (I11KMM46)

In the diabetic foot clinic, they [HCP] do that and they also showed the photos, pictures, and so on. They [HCP] are the ones who always tell us to wear stockings. And if you have diabetes, you should not wear Japanese slippers because of the friction. Instead, you wear diabetic foot shoes. (I3HTM61)

For foot care, we are asked to use a mirror because we cannot see the bottom part. We cannot see well if we have blurry vision. Secondly, we need to be careful with water because sometimes diabetics like us feel numb and don't know whether the temperature is hot or cold. So, we must use soft cloth. (I4HTM55)

They [HCP] told me to watch out for fungus. If my leg becomes mouldy on the side, it indicates a critical level. They [HCP] informed me if whitish mould is seen, I must quickly come [to the clinic]. (I1KMM46)

...amputated leg, with purulent discharge, then can attack organs, all from diabetes. (I1KMM46)

I observed that amputation, kidney failure, and heart diseases are the main things, also glaucoma. (I2HTM59)

Kidney problems, stroke...if too high sugar (level), memory loss... that I know. (I8HTF39)

3) Challenges in Acquiring Diabetes Knowledge

The patients mentioned some challenges with regard to certain aspects of diabetes knowledge. Among the challenges were confusions and misinformation related to diabetic medication. Patients were unaware of the actions to be taken if they missed or forgot their medication schedule. Besides, some patients were also uncertain about how to consume medicine. For instance, whether different medications can be taken simultaneously, or whether it can be taken with alcohol or carbonated drinks. Some also worried about the effects of the medication on the kidneys as they assumed that these medications are chemicals that can cause kidney problems.

Apart from that, some patients were confused about insulin intake, especially in the event of hypoglycaemia. A few patients expressed their lack of understanding of how insulin intake should be adjusted based on their consumed food. Also, one patient was uncertain as to why they were not prescribed other medications that they deemed as more suitable for diabetic patients. Another patient was also unsure if his other illnesses were complications arising from diabetes.

For medication intake, [I need to know] how to take the medicine if I forgot, delayed, or missed the medicine. (I5KMF50)

Many patients are taking medicines, they don't really know if they can take all the medicines in one go. You cannot take any medicine with alcohol or carbonated drink that is acidic. (I3HTM61)

I'm also concerned about the quantity of medication because it could affect the kidney. (I2HTM59)

My father also has diabetes and he eats a lot of painkillers. He consumes a lot of medications. So, one of the causes of this kidney problem is the chemicals 'lah'. (I1KMM46)

For the medicine that I'm taking, I will also get more information about each of these medicines from the internet. There are various medicines available, so you must know which of these medicines are most suitable for you and why the hospital is recommending that medicine for you. Then...I ask the doctor, doctor, are these medicines available, why are these medicines not prescribed in this hospital and so on. (I3HTM61)

If I don't take insulin, it will be high [blood glucose]. Hands became numb. But when I took insulin and I didn't eat or ate just a little, I got hypo[hypoglycaemia]. (I8HTF39)

People said that insulin (can bring down blood glucose) very fast without you knowing, sometimes you can get hypo, or anything all this. (I9HTM72)

Actually, to be honest, the information is insufficient because the dietician only says about calories but they don't tell you precisely the amount of insulin that you have to take. (I3HTM61)

I got other sicknesses 'coming in', skin problems and all these. I don't know whether it's because of diabetes, that's the thing... itchy. (I9HTM72)

Patients also revealed some challenges in obtaining information from the HCP. They perceived that HCP did not think that the patients needed to know the details. Furthermore, some were hindered from acquiring all the relevant information due to time constraints during the consultation.

Some doctors are okay. They [HCP] are willing to explain in detail. Some of them [HCP], maybe they thought it is not important for me. Ask me to take medicine only, that's all. (I2HTM59)

Sometimes, actually we like to ask a lot of questions to get more answers from them, but because the quantity of patients is so high, you find that they don't have much time. (I3HTM61)

C. Information Need

In this study, even though most patients mentioned that they received a fair amount of information, a few declared that they perceived extra information was necessary. For instance, a patient asked for further explanation of his blood results as he was confused about the suitability of the medications consumed based on his HbA1C reading. Another patient claimed that the information he received was insufficient, especially in terms of food choices. Others also mentioned the need for a detailed explanation of lifestyle modifications based on gender, age, and occupation.

When they [HCP] did the HbA1C, it was 5.8 and I asked what was the meaning of the reading. Then the doctor said, 'it's okay, it's okay. Don't worry about it.' I listened to him

but then I googled, I found out what HbA1C was and its purpose, and then I realise that, according to my reading, I'm not diabetic. Diabetic is 6.0 above. So, I'm wondering whether my medication is too much and maybe I can reduce my medication, you know… (I2HTM59)

Maybe there are other things we need to know. What is important to eat, like 'ulam', some can be eaten, some cannot be eaten. Because here [hospital], they [HCP] just taught us to eat less rice and more vegetables. There are some who don't know [about diet]. (I8HTF39)

We don't have an education [about suitable food] for the diabetics, like wheat flour, potato… we don't know [if suitable to eat]. (I6KMM44)

[We must know] how to control diabetes based on what type of food we can eat and what we cannot eat, because you must take the insulin dosage according to the type of food you are taking and the glucose content in it. (I3HTM61)

The information given clinically is still not enough because it requires self-compliance and support. For example, the doctor's appointment is only once in three months and for the rest of the days, we need to self-manage. That means [we] need to know food choices and control the level of [blood glucose] to be not more than 8 and not less than 4. (I4HTM55)

Different information initiatives [should be implemented] because A, B, and C are different persons. Different levels of age, level of pain, gender…maybe also, occupation. It depends on that individual. (I4HTM55)

Besides, several improvements in terms of information delivery were suggested by patients via the use of certain materials such as pictures, pamphlets, or charts.

So, that is why I request you all [HCP] to give [information] in pictorial form. Okay, even the various fruits that they [patients] are eating, if one slice of this fruit, how many units of intermediate insulin or actrapid insulin [is needed], or if you are taking at night, the insulatard… They [HCP] don't explain all that and we have to search for all these on the internet. (I3HTM61)

There are very few handouts in the form of pamphlets or booklets that are given to the patients. That is very important because not everybody has internet access, some are very poor patients. (I3HTM61)

They [HCP] should have a chart, you know, a system. For example, if you take one slice of banana, how much insulin you can take. Bananas also got various types. If you take porridge, one bowl, see how many litres and the volume of it. Then, for 100 millilitres, this is the unit you inject, so if you take 500 millilitres, you must time it by five. But then, you must check whether your body can withstand that [amount] of insulin or not. Otherwise, you will get hypo. (I3HTM61)

IV. DISCUSSION

In the context of self-care management of chronic diseases particularly diabetes, patients' behaviour towards managing their disease can be influenced by their understanding of the disease. A good understanding can improve disease control and health outcomes. In addition, the Information Motivation Behaviour (IMB) model by Fisher et al. (45) also highlighted the importance of knowledge as one of the primary constructs in affecting health outcomes. Therefore, considering this, patients' knowledge or cognitive understanding of diabetes self-care management was the main interest of this study. We sought to explore this domain of knowledge from the perspectives of patients with T2DM in Selangor, Malaysia.

First, we explored the source of information on diabetes management. We sought to identify where patients obtained or who they referred to regarding their diabetes management. In this study, the most commonly mentioned source of knowledge was HCP. This corresponds with another study (46) whereby HCP was reported as the preferred source of information. This shows that HCP plays an important role in providing relevant information. All patients will be routinely given a diabetic clinic appointment to discuss their condition following the T2DM diagnosis (47). Besides, the reliance on media as an alternative source of information was also frequently mentioned during the IDI regardless of the age of the patients. The common media platforms included television, YouTube, and Facebook. On a similar note, many other studies also highlighted media as the most preferred choice of obtaining an alternative source of information (48,49,50). In this digital era, social media such as YouTube, Facebook, and Instagram are the easiest and most convenient sources of information for most people. Thus, it is not surprising that these platforms have evolved into patients' preferred sources of knowledge.

As patients may receive health information from various sources, it is important to ensure that the information delivered on all the channels are as accurate as possible to avoid any conflict that may result in self-care mismanagement. Given that HCP is the commonest source of information, any deficiencies in the information delivery chain between HCP and patients could result in the patients seeking alternative sources of information, inherently exposing them to unreliable or incorrect information. Worse still, they may become confused and sceptical following the mixed information and become discouraged to perform self-management (51). Poor HCP knowledge and interpersonal communication skills have also been reported to negatively affect patients' level of trust toward HCP (52,53). As revealed in this study, some flaws in the HCP's information delivery method were identified. As a result, patients resorted to alternative sources of information to meet their diabetes information needs.

Generally, T2DM patients in this study displayed a satisfactory level of knowledge of diabetes. Most of the patients were knowledgeable on diet, medication, eye and foot care, as well as potential complications. However, certain challenges arose from the discrepancies in diabetes knowledge, especially in terms of confusion and uncertainties surrounding

medication, food intake, and lifestyle modification. These challenges can hinder the effectiveness of self-management among diabetic patients. Similar results were reported by Ranasinghe et al. (54) whereby the patients claimed that they were unaware of the recommended amount and types of food intake. In addition, most of the patients also lacked clarity about the type, duration, timing, and frequency of recommended physical activity. In relation to this, the challenges could also be partially attributed to unfounded myths or misconstrued data as reported in several studies (55,56,57,58). A study in Nigeria presented the various misconceptions surrounding diabetes self-management resulting from the lack of facilities to convey accurate information, especially in geographical regions where the population's staple diet consisted of high carbohydrate food such as rice (59). In other words, despite positive awareness of DM management may not presuppose a better management practise.

Patients' empowerment could be comprehended in fostering patients' knowledge and skills. In support to this, the Health Empowerment Model by Schulz and Nakamoto (60) explained that being highly empowered and simultaneously possessing a high level of health literacy is the ideal situation while a mismatch between empowerment and health knowledge may not be enough to improve one's health or may even have negative effects. Therefore, future efforts should focus on reinforcing positive practices apart from increasing awareness of the disease. As an example, a self-efficacy enhancing programme was found to improve foot self-care behaviour. However, after programme was delivered, there was a deterioration in patients' knowledge, thus suggesting continuous and regular education is essential (61).

In addition, this study identified patients' need for further information, especially on medication, dietary practice, and other suitable lifestyle modifications. In fact, the patients requested more effective information delivery via specific materials. Similarly, a study showed that even though HCP has provided ample information to fulfil the patient's needs, they still need more information on long-term and short-term consequences as well as in-depth information on diabetes management (62). The study also highlighted the need for customised information based on personal needs. The information required would also differ based on the duration of the diseases. In support of this, other published studies have reported the influence of sociodemographic factors on health-related information requirements (63,64).

T2DM patients' understanding can be improved by successful awareness programmes that emphasise the delivery of accurate information obtained from credible sources. This is parallel with another study that suggested effective awareness campaigns that utilise the latest relevant information from reliable sources to foster favourable attitudes and practices of disease management among the public (65). Last but not least, health facilities must customise educational programmes based on the actual needs of patients with T2DM. It is vital to take into account all the factors that may influence patients' information need to ensure the efficiency of the intervention.

In short, our study findings shed important light on the issues regarding patients' knowledge of diabetes. However, there are some limitations to this study. The research team was unable to explore in detail during the interviews to avoid patients' discomfort. Thus, future research may need to run more few cycles of IDI to uncover a wider aspect of diabetes knowledge. Furthermore, the same proportion of gender and race among the participants could not be achieved as some patients refused to participate. Lastly, as this study was conducted among a small number of participants from two centres, further research among a larger population is needed to obtain a broader picture of the problems in different healthcare settings.

V. CONCLUSION

This study explored the sources and types of information as well as the challenges in acquiring diabetic-related information from the patients' perspective. HCP is still the main source of information along with the media. Despite the fact that patients managed to attain most of the basic knowledge of diabetes self-management, several gaps in certain areas have been identified. These gaps in dietary, medication, and physical activity should be addressed via the provision of more comprehensive information. In the presence of various channels that provide diabetes information, it is challenging to deal with patients' uncertainty on which channel to trust and which information is vital based on patients' current needs. As this is more of an explorative study, we faced limitations in visualising the actual knowledge of the patients as a whole. Therefore, it is necessary to establish a diagnosing standard that can be used in healthcare services to assess patients' knowledge so that the findings can be used to review and address the patients' needs. By incorporating it into suitable intervention based on current patients' needs, this standard can be beneficial to the self-management of different diseases.

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