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Assessment of medication adherence and quality of life among patients with type 2 diabetes mellitus in a tertiary hospital in Kelantan, Malaysia

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ABSTRACT

Introduction: Previous studies have reported the relationship between medication adherence and quality of life are interrelated. However, many of the results were found to be conflicting. This study aimed to assess the level and association of medication adherence and quality of life among type 2 diabetes mellitus patients in Raja Perempuan Zainab II Hospital, Kelantan, Malaysia.

Materials and methods: A cross-sectional survey was conducted among adult type 2 diabetes mellitus patients on treatment for over 1 year using convenience sampling at outpatient. Medication Compliance Questionnaire (MCQ) and revised Diabetes Quality of Life Questionnaire (DQOL) instrument were self-administered to eligible subjects. Data were analysed using GNU PSPP version 0.8.5 and reported for descriptive statistics as well as correlation of both parameters.

Results: A total of 200 patients were recruited and they were mostly at the age of 40 to 60 years old. The mean (SD) score for MCQ was 26.0 (1.6) with the majority of them were non-adherent (55.0%, n=110). The mean (SD) score for overall revised DQOL instrument was 25.5 (8.9) while each domain of "satisfaction", "impact" and "worry" had mean (SD) scores of 12.0 (5.0), 7.7 (3.4) and 5.9 (2.7), respectively. The scores obtained were only approximately half of the possible range of scores for QoL. There was no significant correlation between total score of medication adherence and quality of life when tested using Pearson's correlation (r=-0.083, p=0.240). Independent t-test also demonstrated no significant relationship between medication adherence status and quality of life (p=0.883).

Conclusion: Type 2 diabetes mellitus patients in our setting had unsatisfactory adherence but exhibited acceptable quality of life. We observed that both variables were not associated with one another. Further research is warranted to identify potential factors affecting non-adherence to medication.

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Introduction

Type 2 diabetes mellitus (T2DM) has become one of the most prevalent non-communicable diseases and is classified as a public health threat. The prevalence of this debilitating illness has increased dramatically in all parts of the world. The most recent estimates recorded that 463 million adults were diagnosed with T2DM in 2019, a figure that is projected to continue to escalate to 700 million in less than 3 decades (51.2%) (International Diabetes Federation, 2019).

Proper medication intake is vital in the management of T2DM which contributed to the therapeutic success (Marín-Peñalver et al., 2016). A positive impact on quality of life (QoL) as perceived by the patient is also a crucial criterion for evaluating the effectiveness of T2DM management (Hale et al., 2019). Adherence to drug treatment can be defined by the extent to which patients follow the instructions of their physician or other healthcare providers (Jimmy & Jose, 2011). Meanwhile, QoL is a measurement of an individual's functioning and well-being from various aspects of physical, emotional and social (Abedini et al., 2020). These two distinct concepts have in common that they are both interrelated and important to consider when assessing the impact of treatment in healthcare at the patient level (Zioga et al., 2016). The management plan should consider the patient's present condition and lifestyle and yet he or she must work on self-management and adherence to the treatment (American Diabetes Association, 2003). Such examples are poor medication adherence can lead to progression of uncontrolled diabetes with complications of nephropathy and retinopathy (Alodhaib et al., 2021) while poor QoL is suggestive of patient being not satisfied with the treatment due to its rigid schedule for insulin injection or adverse events (Brod et al., 2014). Together, the patient would not have received the best medical care for T2DM (American Diabetes Association, 2003).

Evidences have shown that in chronic diseases such as T2DM, patients who adhere to their treatment tend to possess better health and QoL. Those who routinely take their medications as instructed generally have more positive clinical outcome (Farhat et al., 2019). Examples of the benefits are The relationship between both variables was well-documented across studies around the globe, but many of the results were found to be conflicting (Alfian et al., 2016; Zioga et al., 2016).

To the best of our knowledge, publications that evaluate the relationship between medication adherence and diabetes specific QoL are still scarce especially in the local setting. This was because many of the investigations utilized generic tools that were not disease-specific for QoL (Alfian et al., 2016). Therefore, we aimed to assess the level of medication adherence and diabetes specific QoL as well as their association among T2DM patients in a tertiary care hospital in the state of Kelantan, Malaysia.

Materials and methods

Study design and population

A cross-sectional survey was conducted over a four-month period from November 2018 until March 2019 using self-administered questionnaires. Adult patients who were diagnosed with T2DM and received treatment for at least 1 year were considered eligible to be enrolled in the study. As the dominant language in Kelantan is Bahasa Melayu, those who were unable to speak or write in Bahasa Melayu were excluded along with patients who had cognitive impairment and end-stage renal disease.

Data collection

The data collection process took place at the outpatient pharmacy, Raja Perempuan Zainab II Hospital (HRPZ II). Subjects were recruited using convenience sampling when the patients came for prescription filling. They were explained about the survey and voluntarily consented to participate in the study.

This survey employed two types of self-administered and validated questionnaires in Bahasa Melayu to measure the outcomes. The assessment of medication adherence was done using Medication Compliance Questionnaire (MCQ) that consisted of seven questions, scored with a 4-point Likert scale ranging from 1 (all the time) to 4 (none of the time). Respondents with a total score of 27 and above were considered as adherent to their T2DM medications (Ahmad et al., 2013). As for QoL, the evaluation was done using the revised Diabetes Quality of Life Questionnaire (DQOL) instrument. Compared to the original DQOL instrument of 46 items, the revised version was validated to maintain the same three domains with a smaller number of items. Altogether there were 13 questions: satisfaction (6 questions), impact (4 questions) and worry (3 questions). All items were scored with a 5-point Likert scale with 1 (very satisfied) to 5 (very dissatisfied) for "satisfaction" domain as well as 1 (never) to 5 (all the time) for "impact" and "worry" domains. A higher average score indicated a poorer QoL (Bujang et al., 2018). Permission was obtained from the authors before both instruments were distributed to the study population.

Single mean formula was used for the purpose of sample size calculation. The values of two-tailed $\alpha = 0.05$, $\sigma = 0.7$ and $d = 0.1$ were entered in the equation which yielded a minimum of 189 subjects (Burroughs et al., 2004).

Statistical analyses

Data analyses were carried out using GNU PSPP software version 0.8.5 (GNU Project, 2015). For descriptive statistics, numerical data were presented in mean and standard deviation (SD) while categorical data were expressed in frequency and percentage. The association between

medication adherence and QoL was determined using Pearson's correlation and independent t-test. The significance level was set at 0.05 with the corresponding confidence level of 95%.

Ethical approval

This research was registered with National Medical Research Registry (NMRR-18-2991-44264) and approved by Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia.

Results

Sociodemographic characteristics

In total, 200 respondents were recruited for this study. Patients were mostly Malay (98.0%) male (54.5%) of the age 46 to 60 years old (38.5%), married (76.5%) with secondary education (75.0%) and monthly income of less than RM1,000 (64.5%). The majority of them had been diagnosed with T2DM for over five years (69.5%) with comorbidities (97.5%), on combination oral hypoglycaemic agents (OHA) (41.0%) and more than seven types of medications (67.0%) (Table 1).

Table 1: Sociodemographic and clinical characteristics of respondents (n=200)

Characteristics	n	%
Age		
26 to 45	58	29.0
46 to 60	77	38.5
>60	65	32.5
Gender		
Female	91	45.5
Male	109	54.5
Ethnic		
Malay	196	98.0
Non-Malay	4	2.0
Education level		
Primary	22	11.0
Secondary	150	75.0
Tertiary	28	14.0
Marital status		
Married	153	76.5
Single	47	23.5
Monthly salary (RM)		
<1,000	129	64.5
≥1,000	71	35.5
Duration of T2DM (years)		
<5	61	30.5
5 to 10	84	42.0
>10	55	27.5
T2DM treatment		
Monotherapy	46	23.0
Combination OHA	82	41.0
Combination OHA and insulin	72	36.0
Comorbidities		
No	5	2.5
Yes	195	97.5
Number of medications		
<3	18	9.0
3 to 7	48	24.0
>7	134	67.0

Medication adherence score

The mean (SD) score for MCQ was 26.0 (1.7) with the majority of patients were non-adherent (55.0%, n=110). Only 90 of them managed to score a sum of 27 and higher were classified as adherent (45.0%). It was found that the main reason for non-adherence in T2DM patients was they forgot to take their medications. However, experiencing side effects or adverse drug reactions did not simply hinder the patients from taking their medications as prescribed. This could be seen in the table details whereby out of the seven questions, item Q1 had the lowest mean (SD) score of 3.4 (0.7) while item Q5 had the highest mean (SD) score of 3.9 (0.4) (Table 2).

Table 2: MCQ score for each item (n=200)

Questions	Range of score	Min-max	Mean (SD)
Q1: How often do you forget to take your medication?	1 to 4	1 to 4	3.4 (0.7)

Q2: How often do you decide not to take your medication?	1 to 4	3 to 4	3.8 (0.4)
Q3: How often do you miss taking your medication because you feel better?	1 to 4	3 to 4	3.8 (0.4)
Q4: How often do you decide to take less of your medication?	1 to 4	2 to 4	3.6 (0.7)
Q5: How often do you stop taking your medication because you feel sick due to its effects?	1 to 4	3 to 4	3.9 (0.4)
Q6: How often do you forget to bring along your medication whenever you travel?	1 to 4	3 to 4	3.7 (0.5)
Q7: How often do you miss taking your medication because you run out of it at home?	1 to 4	3 to 4	3.8 (0.4)

QoL score

The revised DQOL instrument had 13 questions for all 3 domains. The mean (SD) score for overall revised DQOL instrument was 25.5 (8.9) while each domain of "satisfaction", "impact" and "worry" had mean (SD) scores of 12.0 (5.0), 7.7 (3.4) and 5.9 (2.7), respectively. The scores obtained were only approximately half of the possible range of scores for QoL. Since a higher average score would signify a poorer QoL, it seemed that the disease did not badly affect the QoL among T2DM patients. They were satisfied with the amount of time they spent due to T2DM, the current treatment, knowledge and life in general. Apart from that, they also felt that T2DM had very seldom impact on their life and therefore were not really worried (Table 3).

When tested using Pearson's correlation, it was found that there was no significant correlation between total score of medication adherence and QoL ($r=-0.083$, $p=0.240$) (Table 4). The outcome was further confirmed by independent t-test which also demonstrated no significant association between QoL and medication adherence status ($p=0.883$) (Table 5).

Discussion

Medication adherence remains as a major hurdle for T2DM patients. Over the years, the results regarding medication adherence among T2DM patients have been inconsistent. A systematic review by Cramer (2004) reported that the overall adherence rate in retrospective and prospective studies was between 36 to 93%. This corroborated that many T2DM patients were not adherent to their treatment, including both OHA and insulin (Cramer, 2004). Two more recent systematic reviews also reported that in some investigations, medication adherence rates were found to be as low as 31 to 33% (Capoccia et al., 2016; Odegard & Capoccia, 2007).

In Malaysia, our findings on low medication adherence were in-line with a previous report at primary health clinics in Selangor that observed non-adherence at (52.8%, n = 294) with mean (SD) score of MCQ was 25.6 (2.4) (Ahmad et al., 2013). Another study by Al-Qazaz et al. (2011) among T2DM patients at Penang Hospital also reported low level of adherence (Al-Qazaz et al., 2011). However, better medication adherence rates could be seen in other researches. For an instance, 55.2% of the patients attending a public hospital in Selangor were adherent (Abdullah et al., 2019). Another survey conducted in a tertiary hospital in Malaysia found that 66% of the subjects obtained high scores in medication adherence (Omar & San, 2014). The discrepancies in these findings might be attributed to the variation of age among the study population and the use of different measurement tools for adherence.

Table 3: DQOL score for each item (n=200)

Domains	Questions	Range of score	Min-max	Mean (SD)
Satisfaction	Q1: How satisfied are you with the amount of time it takes to manage your diabetes?	1 to 5	1 to 4	2.2 (1.0)
	Q2: How satisfied are you with the amount of time you spend getting checkups?	1 to 5	1 to 4	2.0 (0.9)
	Q3: How satisfied are you with the time it takes to determine your sugar level?	1 to 5	1 to 5	2.2 (1.1)
	Q4: How satisfied are you with your current treatment?	1 to 5	1 to 4	1.9 (0.9)
	Q5: How satisfied are you with your knowledge about your diabetes?	1 to 5	1 to 5	1.8 (1.1)
	Q6: How satisfied are you with life in general?	1 to 5	1 to 4	2.0 (1.0)
Impact	Q1: How often do you feel pain associated with the treatment for your diabetes?	1 to 5	1 to 5	2.0 (1.1)
	Q2: How often do you feel physically ill?	1 to 5	1 to 5	2.2 (1.0)
	Q3: How often does your diabetes interfere with the family life?	1 to 5	1 to 4	1.7 (0.9)
	Q4: How often do you find your diabetes limiting your social relationships and friendships?	1 to 5	1 to 4	1.8 (1.0)
Worry	Q1: How often do you worry about whether you will pass out?	1 to 5	1 to 5	1.8 (1.0)
	Q2: How often do you worry that your body looks different because you have diabetes?	1 to 5	1 to 4	1.7 (0.9)
	Q3: How often do your worry that you will get complications from your diabetes?	1 to 5	1 to 5	2.4 (1.2)
Summary	*Satisfaction*	6 to 30	6 to 24	12.0 (5.0)
	Impact	4 to 20	4 to 17	7.7 (3.4)
	Worry	3 to 15	3 to 13	5.9 (2.7)
	Overall	13 to 65	13 to 41	25.5 (8.9)

Table 4: Correlation between total score of medication adherence and QoL

Variables	Medication adherence	QoL
Medication adherence	1.63[a]	0.240[b]
QoL	-0.083[c]	8.89[a]

[a]SD, [b]*p*-value, [c]correlation coefficient (*r*).

Table 5: Comparison of QoL and medication adherence status

Variable	Mean (SD)		Mean difference (95% CI)	***t*-statistic (df)**	***p*-value[a]**
QoL	Non-adherent (n=110)	Adherent (*n*=90)	0.2 (-2.3, 2.7)	0.15 (198)	0.883
	25.61 (9.11)	25.42 (8.67)			

In many cases, forgetting to take the medication as instructed is the common cause for non-adherence. This statement is supported by systematic reviews of diabetes medication-taking behaviour which identified that remembering to take medication or obtaining refills was one of the several key barriers to medication adherence (Capoccia et al., 2016; Odegard & Capoccia, 2007). Other factors involved were regimen complexity, adverse events, fear of insulin injection, depression and a patient's lack of belief in the benefits of the medication (Capoccia et al., 2016; Odegard & Capoccia, 2007). A similar result was seen in our respondents whereby they scored the least for the question addressing forgetfulness in taking medications.

It is well-known that T2DM is a challenging disease and the changes it inflicted on lifestyle will in time lead to impairment of QoL. The never-ending demands of diabetes care, the symptoms of hypoglycaemia and hyperglycaemia as well as fear about or the reality of complications could influence the well-being of T2DM patients' lives. The presence of comorbidities would further deteriorate one's QoL (Jannoo et al., 2017; Trikkalinou et al., 2017). However, there were patients who showed lack of concern on some aspects of QoL even though they were affected. This could be due to inadequate information or a perception of lack of vulnerability. It might also signify a mean of coping strategy to reduce anxiety. Other possible reasons were the absence of initial symptoms and timing, as perception of risk was related to visible signs while the complications of poor diabetes control were obvious only in the long run (Pera, 2011). This could best explain why our respondents maintained an acceptable QoL score despite many being diagnosed with T2DM for over 5 years with comorbidities.

Contradicting to other literature, no significant relation was found between medication adherence and QoL among our patients. Adherence to prescribed medication generally showed improvement in QoL in patients with T2DM (Alfian et al., 2016; Khayyat et al., 2019; Zioga et al., 2016). It was suggested that treatment adherence could influence QoL, improve clinical condition, reduce morbidity and mortality rates as well as slow down the disease progression (Asche et al., 2011). However, a systematic review reported that the analysis of the relationship between both variables had mixed results. While there were investigations which showed positive effect between QoL and adherence, however, another research also failed to recognize this association (De Fátima Gusmai et al., 2015). Some authors suggested that this inconsistency might be due to the diversity of the methods and study populations (Khayyat et al., 2019; Zioga et al., 2016). We opted to use the MCQ as the questions assessed patients' intentional as well as unintentional non-adherence to medication regimen and probed their reasons for non-adherence (Ahmad et al., 2013). As for the revised version of DQOL, it was chosen for its excellent construct with lesser number of items (Bujang et al., 2018).

There were a few drawbacks of this survey. Firstly, the study population was conveniently sampled from a single site which did not necessary represent the actual population of Malaysian living with T2DM. In addition to that, the use of self-reporting assessment made it prone to biases as the respondents might resort to more socially acceptable answers rather than being honest. Also, the interpretation of the questions could be different among them and the respondents might not be able to assess themselves accurately without a proper clinical examination by a medical practitioner. Finally, this study only evaluated the aspect of medication adherence and did not include other important therapies such as dietary and lifestyle, exercise, foot care, smoking and blood sugar testing. Having said that, the findings of this survey is still essential to improve the medication adherence among T2DM patients in Malaysia. The results can be used to assist with the planning for delivery of personalized counselling and health education which ultimately optimize their disease management.

Conclusion

Patients with T2DM had unsatisfactory medication adherence but exhibited acceptable QoL. Medication adherence on its own was not associated with QoL. However, QoL is undeniably complex and multifaceted. Nevertheless, high level of medication adherence is crucial to ensure successful management of T2DM. Further research is warranted to identify potential factors affecting non-adherence to medication.

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Conflict of Interest

The authors certified that there was no conflict of interest to declare from this research publication.

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