Inadequate Self-Care Behaviors among Malaysian Diabetic Patients: The Need for Action by Hospital Pharmacists

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Abstract

**Background:** Self-care behaviors have been confirmed to be strongly associated with clinical outcomes of diabetes management. **Objective:** To determine the prevalence and risk factors of inadequate self-care behaviors among the Malaysian patients with type two diabetes mellitus (T2DM) through screening by hospital pharmacists. **Methods:** A cross-sectional study was undertaken over a nine-month period at a public tertiary care center in Northern Malaysia. Self-care behaviors of 103 patients with T2DM were evaluated using the 16-item Diabetes Self-Management Questionnaire (DSMQ), and the scores were dichotomized to represent “adequate” (>6 out of 10) and “inadequate” (<6 out of 10) self-care behaviors. The risk factors for inadequate self-care behaviors were identified using logistic regression analysis. **Results:** The participants recorded a mean DSMQ score of 7.48±1.32, and 16 (15.5%) of them were found to have inadequate self-care behaviors. Among the four subscales assessed, the “Health-Care Use” had the highest score (8.36±1.99), while the “Physical Activity” had the lowest score (6.82±2.56). Patients with a duration of T2DM less than one year (OR: 12.00; 95%CI: 1.80, 80.05; p=0.010) and between six to ten years (OR: 7.11; 95% CI: 1.36, 37.31; p=0.020) were found more likely to have inadequate self-care behaviors, as compared with those with a disease duration greater than 10 years. **Conclusion:** A noticeable proportion of patients with T2DM in Malaysia had inadequate self-care behaviors, and were found to be associated with the disease duration. This study suggests a more active role for hospital pharmacists in monitoring and improving the diabetes management of patients.

**Key words:** Malaysia, Tertiary care centers, Pharmaceutical services, Pharmacists, Self-care, Type 2 diabetes mellitus.

INTRODUCTION

Diabetes, notably type two diabetes mellitus (T2DM), is a major cause of mortality, morbidity and increasing healthcare cost worldwide. The global prevalence of diabetes has risen at an alarming rate, from 4.3% in 1980 to 9% in 2014 in men, and from 5% in 1980 to 7.9% in 2014 in women. A similar trend was also observed in Malaysia, as the prevalence of diabetes increased steadily from 6.3% in 1986 to 14.9% in 2006, and the increasing number of diabetic patients is expected to reach approximately 2.48 million by 2030. The total healthcare cost of diabetes and its complications in Malaysia is estimated to be in the range of USD 1.07 to 1.83 million annually, posing a burden, especially on the public healthcare system. Hence, there is an urgent need for a population-based strategy that prevents diabetes and delays its progression in Malaysia.

When it comes to optimizing glycemic control in diabetes, one of the most important factors is the self-care behaviors of patients. Good self-care management, including diet control, regular physical activity, self-monitoring of blood glucose, and adherence to medications, enables patients to effectively manage the disease on their own. Within this context, pharmacists were confirmed to have a positive impact on health outcomes of diabetic patients through their role in providing education on both medication and lifestyle issues. In fact, along with other health professionals, hospital pharmacists in Malaysia have long been involved in diabetes management, mainly through the Diabetes Medication Therapy Adherence Clinic (DMTAC).

Nevertheless, to date, the information on the level of self-care behaviors among the Malaysian diabetic patients is still limited. Additionally, although education on medications, management of hypoglycemia and hyperglycemia, diet and exercise has been incorporated into the pharmacist-operated DMTAC, there is a lack of standardized tools to effectively and systematically evaluate the self-care behaviors of patients. Therefore, this hospital pharmacy-based study was designed to determine the prevalence of inadequate self-care behaviors among diabetic patients in Malaysia, and to determine the risk factors of inadequate self-care behaviors by using a structured questionnaire.

METHODS

This cross-sectional study was undertaken at the Raja Permaisuri Bainun Hospital, a public tertiary care center with 990-bed capacity in Northern Malaysia, from December 2015 until August 2016. The study protocol was registered with the National Medical Research Register (NMRR-15-1193-24276) and was reviewed and approved by the Medical Research and Ethics Committee. A convenience sample of outpatients with T2DM, who were aged 18 years or above, was recruited at the Medical Department of the...
hospital. All participants were briefed on the study objectives, and a written informed consent was obtained from each of them.

The evaluation of self-care behaviors was conducted using the 16-item Diabetes Self-Management Questionnaire (DSMQ), which consists of four subscales: “Glucose Management” (five items), “Dietary Control” (four items), “Physical Activity” (three items) and “Health-Care Use” (three items). Each item was designed for patients to self-describe their self-care activity over the past eight weeks by using a four-point scale (3 – “applies to me very much”; 2 – “applies to me a considerable degree”; 1 – “applies to me to some degree”; 0 – “does not apply to me”).

For the DSMQ to be used in the current study, its English version was translated into Malay (M-DSMQ) and Simplified Chinese (SC-DSMQ) according to the methods recommended by Beaton et al.[18] including forward translation (by a bilingual pharmacists and a bilingual non-medical personnel each), synthesis (discrepancies dissolved by consensus between two translators), backward translation (by two bilingual pharmacists each), and expert review (a panel of research officers to ensure that the translated versions were comprehensible and conceptually as close as possible to the original version). Subsequently, the finalized M-DSMQ and SC-DSMQ were pilot-tested with 12 bilingual patients each, yielding Cronbach’s a coefficients of 0.91 and 0.82, respectively.

The self-reported demographic details of the participants, including age, gender, ethnicity, and educational level, were recorded using a data collection form. On the other hand, the information on their disease and treatment, including the most recent glycated hemoglobin (HbA1C) level, disease duration, number of medications taken, and number of co-morbidity, was obtained from the electronic medical records. Furthermore, the HbA1C levels were used to categorize the participants into “controlled” (≤7.5%) or “uncontrolled” (>7.5%) T2DM.[14]

Subsequently, the participants were given the option to use either the M-DSMQ or the SC-DSMQ. On average, each of them took 20 min to complete the questionnaire. Their responses were then transformed into a total score (DSMQ score) and four subscale scores ranging from 0 to 10 such that a higher score was indicative of better self-care behaviors.[19]

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The anticipated prevalence of inadequate self-care behaviors was 6% based on a previous study reporting the self-management behaviors of patients with T2DM in China.[17] To account for a 20% non-response rate, the required sample size was determined to be 105.

RESULTS

A total of 120 participants completed the survey, but 17 (14.2%) of them were excluded from the analysis due to incomplete responses. The 103 participants included had a mean (SD) age of 62.2 (11.3) years. The majority of them were male (26.2%), Chinese (36.9%), and with secondary education (61.2%). Besides, it is found that approximately half of them had been diagnosed with T2DM for more than ten years, and most reported having at least one other chronic illness (84.5%) and taking at least four prescription medications (81.6%). It is also noted that nearly half of the patients had uncontrolled T2DM, with a HbA1C level above 7.5% (Table 1).

The participants recorded a mean DSMQ score of 7.48 ± 1.32, and 16 (15.5%) of them were identified to have inadequate self-care behaviors. Among the four subscales of self-care behaviors evaluated, the “Health-Care Use” had the highest score (8.36 ± 1.99), followed by “Glucose Management” (7.61 ± 2.56), “Dietary Control” (7.49 ± 1.89), and “Physical Activity” (6.82 ± 2.56). Moreover, in comparison with those with a duration of T2DM greater than ten years, the patients with a duration of T2DM less than one year (OR: 12.00; 95% CI: 1.80, 80.05; p=0.010) and between six to ten years (OR: 7.11; 95% CI: 1.36, 37.31; p=0.020) were found more likely to have inadequate self-care behaviors. Apart from that, no other baseline characteristics of the patients were associated with self-care behaviors (Table 2).

DISCUSSION

To the best knowledge of the investigators, the current study is the first using a validated self-administered questionnaire to evaluate the self-care behaviors of patients with T2DM in Malaysia. Different from a previous study that reported a number of poor self-care practices in Malaysian diabetic patients,[18] the different aspects of self-care behaviors of the patients were represented by a single score ranging from 0 to 10 in the current study. Therefore, by providing an objective assessment for the level of self-care behaviors of the patients, the findings could be useful for the Malaysian pharmacists, who have been actively involved in designing, implementing, improving, and

| Table 1: Baseline characteristics of the participants (n=103). |
|-----------------|--------------------|
| Age, years, mean (SD)* | 62.19 (11.30) |
| Gender, n (%) | Male 71 (68.9) Female 32 (31.3) |
| Ethnicity, n (%) | Malay 27 (26.2) Chinese 38 (36.9) Indian 38 (36.9) |
| Educational level, n (%) | Primary (6 years of elementary education) 27 (26.2) Secondary (pre-university) 63 (61.2) Tertiary (university and college) 13 (12.6) |
| Duration of T2DM*, years, n (%) | < 1 7 (6.8) 1-5 32 (31.1) 6-10 13 (12.6) ≥10 51 (49.5) |
| Number of co-morbidity, n (%) | 0 16 (15.5) 1 39 (37.9) 2 32 (31.1) ≥3 16 (15.5) |
| Number of medications taken, n (%) | 1-3 19 (18.4) 4-6 56 (54.4) ≥7 28 (27.2) |
| Most recent HbA1C level, %, n (%) | ≤7.5 57 (55.3) >7.5 46 (44.7) |

SD*, standard deviation; T2DM†, type 2 diabetes mellitus.
monitoring the effectiveness of diabetes management in collaboration with other healthcare providers.

As patient education programs, including the DMTAC and pharmacy-based counseling, have long been implemented in the public health centers across Malaysia to support patient participation in diseases management since the last decade, the majority of the participants in the current study were found to have adequate self-care behaviors. Nonetheless, it is noteworthy that the prevalence of inadequate self-behaviors is still relatively high as compared to diabetes-related information, which is essential to strengthen their disease awareness and treatment in general. Hence, besides ensuring medication adherence among diabetic patients, continuous efforts should be made by pharmacists to determine specifically how an individual would meet the recommended lifestyle modification.

Furthermore, in parallel with the findings of a number of studies, it is noted that disease duration of the patients was a significant predictor of the level of self-care behaviors. Generally, the patients with disease duration less than ten years were found more likely to have inadequate self-care behaviors, approximately 45% of them were still found to perpetuate suboptimal glycemic control, indicated by a HbA1C level above 7.5%. A similar trend was also observed in a UK study, in which many diabetic patients were shown to have persistent HbA1C elevations despite standard diabetes management.25 In particular, among the four subscales assessed in the current study, the mean scores for the “Physical Activity” and “Diet Control” were lower than those of the other two subscales. This is consistent with the previous findings, suggesting that the lack of physical activity and poor diet control in patients still remain the major challenges in the management of T2DM in Malaysia. Hence, besides ensuring medication adherence among diabetic patients, continued efforts should be made by pharmacists to determine specifically how an individual would meet the recommended lifestyle modification.

Table 2: Risk Factors for inadequate self-care behavior.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Adequate</th>
<th>Inadequate</th>
<th>OR* (95% CI†)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years, mean (SD)</td>
<td>58.25 (8.10)</td>
<td>62.92 (11.58)</td>
<td>0.97 (0.92, 1.01)</td>
<td>0.133</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td>Female</td>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>29 (90.6)</td>
<td>58 (81.7)</td>
<td>3 (8.4)</td>
<td>13 (18.3)</td>
</tr>
<tr>
<td>Ethnicity, n (%)</td>
<td>Indian</td>
<td>Chinese</td>
<td>Malay</td>
<td></td>
</tr>
<tr>
<td></td>
<td>33 (86.8)</td>
<td>33 (86.8)</td>
<td>21 (77.8)</td>
<td></td>
</tr>
<tr>
<td>Educational level, n (%)</td>
<td>Primary</td>
<td>Secondary</td>
<td>Tertiary</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 (92.6)</td>
<td>51 (81.0)</td>
<td>11 (84.6)</td>
<td></td>
</tr>
<tr>
<td>Duration of T2DM, years, n (%)</td>
<td>≥10</td>
<td>6-10</td>
<td>1-5</td>
<td>&lt;1</td>
</tr>
<tr>
<td></td>
<td>48 (94.1)</td>
<td>9 (69.2)</td>
<td>26 (81.2)</td>
<td>4 (57.1)</td>
</tr>
<tr>
<td>Number of co-morbidity, n (%)</td>
<td>≥3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>15 (90.8)</td>
<td>26 (81.2)</td>
<td>35 (89.7)</td>
<td>11 (88.8)</td>
</tr>
<tr>
<td>Number of medications taken, n (%)</td>
<td>≥7</td>
<td>4-6</td>
<td>1-3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 (89.3)</td>
<td>47 (83.9)</td>
<td>15 (78.9)</td>
<td></td>
</tr>
<tr>
<td>Most recent HbA1C level, %, n (%)</td>
<td>&gt;7.5</td>
<td>≤7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>39 (84.8)</td>
<td>48 (84.2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OR*, odds ratio; CI†, confidence interval; SD‡, standard deviation; T2DM§, type 2 diabetes mellitus.

in order to delay the disease progression, it is imperative for pharmacists to intensify education on self-care, particularly among those who are newly diagnosed with T2DM.

Besides, notwithstanding that the majority of the participants had adequate self-care behaviors, approximately 45% of them were still found to have persistent HbA1C elevations despite standard diabetes management.25 Aside from that, numerous studies have confirmed that increased HbA1C levels, especially above 7.5%, are strongly associated with increased risks of cardiovascular complications and all-cause death.24 Accordingly, further investigation into the factors associated with persistent poorly-controlled T2DM in Malaysia is warranted.

The current study had several limitations. First, it was a single-center study, which only included diabetic patients actively followed up at a public tertiary care center. Therefore, the prevalence of inadequate self-care behaviors might be underestimated, as the participants were likely to have better awareness of their health conditions and treatment in general. Apart from that, the assessment of self-care behaviors was based solely on self-reporting by the participants, and the data could be affected by bias arising from social desirability or selective recall.24

CONCLUSION

The findings imply that a noticeable proportion of patients with T2DM in Malaysia had inadequate self-care behaviors. In addition, increased disease duration was confirmed to be significantly associated with improved self-
care behaviors. As efforts have been made to broaden the scope of pharmacy practice, especially in the public health sector across Malaysia, the current study suggests a more active role for hospital pharmacists in improving the management of patients with T2DM.

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**CONFLICT OF INTEREST**

The authors declare no conflict of interest.

**REFERENCES**


