

# Diabetes Self-Management among Adult Diabetic Patients Attending a Diabetes Education Clinic in Oman: A cross-sectional study

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**ABSTRACT**

The increasing prevalence of diabetes mellitus (DM) worldwide represents a global public health emergency. Healthcare professionals play a major role in educating patients regarding important self-care and diabetes management strategies which can help prevent long-term complications. This study aimed to assess knowledge and practice regarding diabetes self-management among patients with type 1 and type 2 DM attending a diabetes education clinic in Oman. In addition, the study aimed to compare levels of knowledge and practice between new referrals and follow-up patients who had received more than two educational sessions. This cross-sectional study was conducted in a tertiary care institution in Muscat, Oman. A total of 181 sequential adult patients who attended the outpatient diabetes clinic between March and October 2018 were included in the study. Participants were categorized into new referrals who had not yet received diabetes education, and follow-up patients who had received more than two educational sessions from the diabetes educator. A previously validated self-administered survey was used to assess levels of knowledge and practice regarding diabetes self-management in the two groups. Of the 181 participants, 61 (33.7%) were newly referred, and 120 (66.3%) were follow-up patients. The mean age was  $33.3 \pm 12.9$  years and 55.8% were female. Overall, 64.1% of the cohort demonstrated excellent knowledge regarding diabetes self-management, while 23.2% and 12.7% had moderate and poor levels of knowledge, respectively. Moreover, 73.5% exhibited satisfactory practices, while inadequate practices were reported by 26.5%. Overall, the diabetes education clinic was effective, with statistically significant differences in knowledge and practice levels noted between the two groups ( $p = 0.01$  and  $0.002$ , respectively). While the whole cohort demonstrated acceptable overall levels of diabetes self-management knowledge and practice, patients who had attended a structured diabetes education program demonstrated substantial improvements in knowledge and behavior compared to the new referrals. As such, specialized diabetes education programs are recommended to help reduce the incidence of acute and chronic complications of DM, thereby reducing the burden of this disease in Oman.



## 1. INTRODUCTION

Diabetes mellitus (DM) is a metabolic health condition characterized by chronic hyperglycemia [1]. Worldwide, the increasing proportion of DMs represents a major public health emergency, with the prevalence of this disease projected to rise by 56% from 382 million in 2013 to 592 million in 2035 [2], [3]. The greatest barriers to the effective prevention of diabetes complications is a lack of awareness of long-term self-care strategies in affected patients [4].

Diabetes self-management education (DSME) refers to the ongoing process of facilitating the knowledge, skills, and abilities necessary for diabetes self-care [5]. In many countries, DSME is a standard of care, providing education, skill development, and behavioral support for patients managing diabetes. The primary objectives of DSME are to support informed decision-making, self-care behaviors, problem-solving, active collaboration with healthcare teams, and to improve clinical outcomes, health status, and quality of life. Studies carried out in Norway and the USA have shown that structured DSME programs result in improved quality of life [6], [7]. Moreover, a study of 147 DM patients in Thailand demonstrated that DSME was an effective way to improve glycemic control [8]. Similarly, [9] noted improvements in glycosylated hemoglobin levels following increased diabetes self-management among 731 patients with type 2 DM in the UK over a period of three years.

The World Health Organization estimated that the number of people living with diabetes in Oman would increase by 190% over two decades, from 75,000 in 2000 to 217,000 in 2025 [10]. As such, the Ministry of Health in Oman has prioritized the management of chronic non-communicable diseases like diabetes as part of its long-term health policy, as outlined within its Health Vision 2050 initiative [11]. In 2013, the center was founded, a tertiary institution in Muscat for high-risk patients referred from all regions of Oman. The mission of the center is to serve as a center of excellence and provide patient-centered holistic care in diabetes and endocrine disorders in order to achieve better outcomes. Moreover, highly specialized multidisciplinary teams are available not only to offer efficient and high-quality diabetes services, but also to improve patients' overall wellbeing and help guide any necessary lifestyle modifications.

While previous studies have addressed the efficacy of DSME programs within an international context, to the best of the authors' knowledge, no local studies in Oman have yet considered the theoretical or practical aspects of DM patients' education regarding self-management. Most previous research has focused solely on knowledge or has had a regional focus, lacking broader applicability on a national level. Therefore, this study aimed to assess overall levels of diabetes self-management-related knowledge and practice among patients with type 1 and type 2 DM in diabetes education clinic in Oman as well as to compare levels of knowledge and practice between new referrals and follow-up patients who had received more than two educational sessions.

## 2. Methods

This cross-sectional study was conducted between March and October 2018 at the center, Muscat, Oman. The target population comprised adult patients diagnosed with either type 1 or type 2 DM and who were currently receiving treatment at the center. A sequential sample consisting of 181 patients who attended the clinic during the study period was recruited. Patients were categorized into two groups, including patients newly referred to the outpatient center diabetes clinic who had not yet received diabetes education (i.e., new referrals), and existing patients returning to the center for follow-up who had previously undergone more than

two educational sessions with the center diabetes educator (i.e., follow-up patients).

Levels of knowledge and practice regarding diabetes self-management were self-assessed by the participants using a previously validated and structured questionnaire [12], [13]. The questionnaire was composed of three sections, with the first part assessing the patients' sociodemographic characteristics. The second part consisted of a series of multiple-choice questions regarding diabetes self-management knowledge (eight items) and practice (four items). The final section of the questionnaire included a series of open-ended questions. The original questionnaire was professionally translated into Arabic using a blinded forwards-backwards translation technique. The translated questionnaire was subsequently pilot-tested on 10–20 residents to assess its feasibility and validity, as well as to estimate the time required for completion. The final Arabic-language version was then distributed to the participants, with the research team available to guide respondents during completion of the questionnaire.

All data were analyzed using the Statistical Package for the Social Sciences (SPSS), Version 20 (IBM Corp., Armonk, NY). Percentages, means, and standard deviations were calculated for descriptive variables. Correct answers to the knowledge items received one point each for a maximum score of 8, with scores of 7–8, 5–6, and  $\leq 4$  indicating excellent, moderate, and poor levels of knowledge, respectively. For the practice items, each item received a score of 0 or 1 according to best practices for a total score of 4, with scores of 3–4 and  $\leq 2$  indicating satisfactory and inadequate practices, respectively. A Chi-squared test was used to compare differences in knowledge and practice levels between the two groups. A *p* value of 0.05 was considered statistically significant. This study received ethical approval from the institutional research committee. Written consent was provided.

### 3. Results

Of the 181 participants surveyed, 61 (33.7%) were newly referred patients who had not previously received DSME, while the remaining 120 patients (66.3%) consisted of follow-up patients who had received more than two educational sessions from the center's diabetes educator. Table 1 shows the sociodemographic characteristics of the participants. The mean age was  $33.3 \pm 12.9$  years (range: 12–85 years), with most participants being between 25 and 40 years old (41.4%). In total, there were 101 female (55.8%) and 79 male (43.6%) participants.

In terms of knowledge of diabetes self-management, 64.1% of the cohort demonstrated excellent levels of knowledge, while 23.2% were considered to have moderate levels of knowledge, and 12.7% had poor levels of knowledge. With regards to diabetes self-management practices, 73.5% of the total sample exhibited satisfactory levels of practice, while the remaining 26.5% displayed poor levels of practice (Table 2).

A comparison of the two groups revealed that 71.7% of the follow-up patients demonstrated excellent knowledge levels compared to 49.2% of the newly referred patients, with this difference being statistically significant ( $p = 0.01$ ). With regard to the importance of the education program on practice, 80.8% of follow-up patients who had previously undergone health education sessions at the center reported satisfactory practice levels compared to 59% of newly referred patients who had not yet received DSME ( $p = 0.002$ ).

**Table 1:** Sociodemographic characteristics of the participants in percentage.

	Follow up	New
<b>Variable</b>		

<b>Gender</b>		
Male	34.4%	48.7%
Female	65.6%	51.3%
<b>Age</b>		
below 25	24.6%	30.8%
25-40	44.3%	40%
above 40	31.1%	29.2%
<b>BMI (kg/m<sup>2</sup>)</b>		
<18	1.6%	2.5%
18-25	14.8%	28.3%
25-30	31.1%	26.7%
>30	52.5%	42.5%
<b>Duration of diabetes</b>		
<5	47.5%	29.2%
5-10	31.1%	34.2%
>10	21.3%	36.7%
<b>Education level</b>		
None	23.0%	11.7%
Primary	1.6%	5.0%
Secondary	39.3%	42.5%
University	36.1%	40.8%

**Table 2:** Levels of knowledge and practice regarding diabetes self-management among the participants.

<b>Domain</b>	<b>Level</b>	<b>Percentage</b>
Knowledge	Poor	12.7%
	Moderate	23.2%
	Excellent	64.1%
Practice	Inadequate	26.5%
	Satisfactory	73.5%

#### 4. Discussion

To the best of the authors' knowledge, this is the first study in Oman to evaluate knowledge and practice of diabetes self-management strategies among adult DM patients in diabetes education clinic. We observed that around two-thirds of the cohort demonstrated excellent levels of knowledge, while approximately three-fourths exhibited satisfactory levels of practice. Critically, both knowledge and practice levels were significantly higher among patients who had previously received DSME during the course of a nurse-led diabetes education clinic compared to newly referred patients who had not yet received DSME. The findings of this study underscore the importance of DSME in improving self-management outcomes among DM patients.

In this study, just under two-thirds of the total sample demonstrated acceptable levels of knowledge with regards to diabetes self-management. Similar findings were reported in Cameroon in which most members of the general population (80%) displayed high levels of knowledge regarding DM [14]. A quantitative cross-sectional study from Ethiopia also found that most DM patients demonstrated good knowledge of their condition (93.7%) [15]. On the other hand, a cross-sectional study from Bangladesh reported moderate levels

of DM knowledge (~78%) among newly diagnosed type 2 DM patients [16]. Moreover, [17] found that 72.3% of type 2 DM patients at a clinic in Congo demonstrated poor knowledge levels, while [18] reported that only 27.2% of community members in Kenya displayed good levels of knowledge. Variations in levels of knowledge regarding DM or diabetes self-management among both DM patients and members of the general population could be explained by discrepancies in the provision and quality of health education across different settings, alongside differences in social support, patient-related factors, and literacy.

Almost three-quarters of participants in the present study exhibited satisfactory levels of practice with regards to diabetes self-management. This contradicts findings from the existing literature which suggests that most DM patients have poor self-care practices. In Bangladesh, [16] illustrated that 78% of newly diagnosed type 2 DM patients had average practice scores, whereas only 10% had good scores. Similarly, a study performed in the United Arab Emirates indicated that the majority of DM patients had poor practices with regards to diabetes control [19]. A cross-sectional study from Ethiopia also found that half of the subjects displayed poor self-care behaviors [20]. Moreover, poor practice levels were noted among 49.3% of subjects participating in a study conducted in Kenya [18]. A study from Pakistan showed that levels of knowledge, attitudes, and practices among DMs were suboptimal in most areas of diabetes care [21].

In our study, follow-up adult DM patients who had attended at least two health education sessions provided by a diabetes education clinic demonstrated significant improvements in self-management knowledge compared to new referrals, with 71.7% of follow-up patients demonstrating excellent levels of knowledge compared with 49.2% of newly referred patients ( $p = 0.01$ ). According to a meta-analysis of 50 randomized controlled trials (RCTs), DSME interventions have been linked to significant improvements in knowledge among adult patients with type 2 diabetes, with a weighted mean effect size of 1.29, 0.51, and 0.36 for knowledge, metabolic control, and self-management behaviors, respectively [22]. Similarly, an RCT conducted by [6] in Norway confirmed the efficacy of group-based DSME among patients with type 2 DM. [23] reported similar findings following the implementation of a DSME program in Iran ( $p < 0.001$ ). However, it is important to note that the current study was able only to determine associations between attendance at the diabetes education clinic and levels of knowledge and practice, whereas the aforementioned RCTs were able to determine causation between these variables.

Significantly better self-management practices were also reported by the follow-up group compared to newly referred patients in the present study (80.8% versus 59%;  $p = 0.002$ ). These findings are supported by those of [23] in which participants undergoing a DSME program in Iran also demonstrated significant improvements in behaviors, particularly in self-care activities ( $p < 0.001$ ). In addition, an Iranian RCT also demonstrated that DSME improves self-care behaviors and influences self-efficacy among patients with type 2 DM [24]. [25] found that lifestyle behaviors, including dietary habits, physical activity, and blood glucose self-monitoring, were remarkably improved after an education program conducted in South Korea, particularly among newly diagnosed DM patients. However, while patients who underwent a DSME program in Mexico involving group sessions supplemented with daily text/picture messages demonstrated significant improvements in dietary behavior over time ( $p < 0.01$ ), this effect was also apparent in the control group [26].

Although the current study demonstrated significant associations between group allocation and levels of knowledge and practice, the cross-sectional design precluded conclusions regarding a causative link between the diabetes education clinic and levels of knowledge and practice. In particular, it is not possible to confirm that the follow-up patients had higher scores solely because of the education provided by the nurse diabetes educators. Additional research is therefore recommended to support these findings and to determine the impact of the diabetic education clinic on knowledge and practice levels among adult Omani DM patients,

possibly using a pre-post RCT design. This would allow researchers to compare differences between knowledge and practices before and after the educational intervention in order to determine causation.

## 5. Conclusion

This study noted significant differences in levels of knowledge and practice of diabetes self-management strategies between newly referred DM patients and those who had previously attended a diabetes education clinic. These findings support the idea that structured education programs related to diabetes self-management may improve patient knowledge and behavior. This can, in turn, help to reduce acute and chronic DM-related complications, thus improving patient outcomes and reducing disease burden. However, further research utilizing a pre-post design is necessary to support these findings and to determine a causative link between the diabetes education clinic and changes in self-management-related knowledge and practices among adult Omani DM patients.

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## Ethics

This study was conducted in accordance with the guidelines of the World Medical Association Declaration of Helsinki. Ethical approval was received from the institutional research committee of the Directorate General of Royal Hospital (SRC#75/2019, dated 7th January 2020). Written informed consent was obtained from all patients prior to their participation in the study.

## Conflict of Interest

The authors have no conflicts of interest to declare.

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No funding was received for this study.

## Author Contributions

FA and NA contributed to the research idea, questionnaire, data collection, and the writing of the paper and discussion. AB contributed to the data analyses. NJ contributed in reviewing article and publication.

## Data Availability

The data that support the findings of this study are not publicly available due to their containing information that could compromise the privacy of the research participants, but are available from the corresponding author (NA) upon reasonable request.

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