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BRIEF COMMUNICATION

Adherence to Medications among Type 2 Diabetes Mellitus Patients in Three Districts of Al Dakhliyah Governorate, Oman

A cross-sectional pilot study

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الالتزام بالأدوية بين مرضى السكري من النوع 2 في ثلاث ولايات في محافظة الداخلية، عمان

دراسة ارتيادية مستعرضة

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ABSTRACT: ***Objectives:*** This pilot study aimed to assess the medication adherence of type 2 diabetes mellitus (T2DM) patients in three *wilayats* (districts) of the Al Dakhliyah governorate, Oman, and to identify the probable reasons for medication non-adherence. ***Methods:*** A cross-sectional questionnaire-based pilot survey was conducted among T2DM Omani patients between February and June 2012 to assess their medication adherence and the relationship between their socio-demographic characteristics and adherence levels. ***Results:*** A total of 158 patients participated in the survey. The majority of the participants were unemployed or were housewives (66.5%). Forgetfulness was the most frequent reason for medication non-adherence (36.4%). Participants demonstrated an excellent level of adherence to their medicines (median total score = 3). No significant difference in median total adherence scores was observed based on the evaluated parameters. ***Conclusion:*** The medication adherence of T2DM patients in the area under study was good. A larger study in a wider population is warranted to obtain a more representative picture of this important factor which contributes to public health.

Keywords: Diabetes Mellitus, Type 2; Medication Adherence; Cross-Sectional Study; Oman.

الملخص: **الهدف:** تهدف هذه الدراسة التجريبية لتقييم مدى التزام مرضى السكري النوع 2 بالدواء في ثلاث ولايات من محافظة الداخلية ولتحديد الأسباب المحتملة لعدم التزام مرضى السكري النوع 2 بأخذ الدواء. **الطريقة:** تم القيام بمسح تجريبي مقطعي عن طريق توزيع استبيان على مرضى السكري النوع 2 خلال الفترة ما بين فبراير ويونيو 2012 لتقييم مدى التزامهم بأدويتهم والعلاقة بين الخصائص الاجتماعية الديموغرافية ومدى الالتزام بأخذ الدواء. **النتائج:** من مجموع 158 مريضاً شاركوا في الدراسة، معظم المشاركين من العاطلين عن العمل و ربات بيوت(66.5%) .النسيان كان السبب الأكثر تكرارا لعدم الالتزام بالدواء(36.4%). المشاركون كانوا ملتزمين بدرجة عالية بأدويتهم (متوسط الدرجة الكلية = 3). لم يلاحظ أي فرق ملموس في متوسط درجات الالتزام بالنسبة لمدة المرض أو عدد الأدوية. **النتيجة:** التزام مرضى السكري النوع 2 بالأدوية في المناطق التي تحت الدراسة كان جيدا. من المهم إجراء دراسة موسعه تشمل عدد أكبر من السكان للحصول على نتائج أكثر تمثيلا ووضوحا عن هذا العامل المهم الذي يسهم في الصحة العامة.

مفتاح الكلمات: مرض السكري؛ النوع 2؛ الالتزام بالدواء؛ دراسة مقطعية مستعرضة؛ عمان.

Adherence to a medication regimen is generally defined as the extent to which patients take medications as prescribed by their healthcare providers.[1] It is one of the major factors that determines therapeutic outcomes, especially in patients suffering from chronic illnesses. Low medication adherence has become a key healthcare issue as it greatly affects the benefits of medical care and imposes a significant financial burden on the individual patient and healthcare system as a whole.[2] It has been observed that the average adherence to long-term therapy for chronic illnesses in developed countries is only 50%.[1] Adherence rates for patients with type 2 diabetes mellitus (T2DM) range from 65–85% for oral agents and 60–80% for insulin.[3] Many factors are potentially related to adherence problems, including demographics, the psychological and social status of the patient, the type of healthcare provider and medical system and other disease and treatment-related factors.[4]

A study conducted by Al Moosa *et al.* in Oman shows that rising rates of diabetes and associated risk factors have been observed in populations undergoing epidemiological transition and urbanisation.[5] Another study conducted in Oman shows that the prevalence of diabetes mellitus (DM) is on the rise and that there

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are high rates of diabetes-related complications.[6] More than 14% of people with DM in Oman were found to have diabetic retinopathy and 27% of those with T2DM had microalbuminuria.[7,8]

Although there have been some studies on the quality of diabetes care, there is a paucity of published data on medication adherence among the diabetic population in Oman.[9,10] Of the studies conducted in the Middle East, non-compliance with medications was reported by 10% of diabetic patients in the United Arab Emirates (UAE).[11] Poor practices of taking medications in relation to meals and modifying doses when necessary were reported among Qatari patients with DM[12] and the level of diabetes knowledge among Kuwaiti adults with T2DM was poor.[12,13] Hence, this cross-sectional pilot study was conducted to assess the medication adherence of T2DM patients in three *wilayats* (districts) of the Al Dakhliyah governorate of northern-central Oman and to determine their opinions on the probable reasons for medication non-adherence. The association between socio-demographic characteristics and adherence levels was also investigated.

Methods

A cross-sectional questionnaire-based pilot study was conducted during the period February to June 2012 in Bid Bid, Nizwa and Bahla, which are three *wilayats* of the Al Dakhliyah governorate of Oman. The Research Committee of the College of Pharmacy & Nursing of the University of Nizwa approved the study's research and ethical components. A questionnaire was developed for the study based on the parameters to be evaluated and themes from previous studies.[14,15]

Considering an Omani population of 269,069 in the Al Dakhliyah governorate for the year 2011 and the prevalence of DM to be 12% in Oman, a target population of 33,200 was assumed, the estimated population diagnosed with DM.[16,17] Based on this target population, an appropriate sample size of 150 was estimated with a confidence level of 95% and an interval of 8.

Three investigators visited houses in the study sites to enquire about residents potentially diagnosed with DM. These investigators were undergraduate students in pharmacy and co-authors of the study. All of them were involved in preparing the data collection tool and they were trained specifically in data collection by the two other co-authors, faculty members in pharmacy. The three investigators conducted the data collection independently in the three *wilayats* selected for the purpose of the study. Potential participants were identified and, with the help of the study information sheet, asked if they were willing to participate in the study. Those who were willing to participate and sign the informed consent form were enrolled for the study based on the inclusion and exclusion criteria. A convenience sampling method was adopted, taking into consideration the inherent difficulty in using other sampling methods to identify and enroll the diabetic patients from their households. Potential participants were selected from households rather than from a healthcare setting so as to reduce the chance of exaggeration in self-reported adherence, which is common when patients are interviewed in a healthcare setting.

T2DM patients between 35–70 years old and having been on anti-diabetic medication(s) for at least six months were included in the study. Patients who were debilitated or had any disease affecting their cognition and those who were not willing to participate were excluded. The questionnaire was completed by the participant in most of the cases (158 out of 192) and the investigator was available for any clarification on the questionnaire. Even though the majority of participants in the study had not received a formal education, they were not completely illiterate, having learnt to read and write from *madrassa*, the Islamic school where the Holy Quran is learnt. The questionnaire was completed by the investigator or the patient's relative for those few of the participants who had not received any education.

The questionnaire consisted of three parts. The first part collected information on the participants' knowledge of their prescribed anti-diabetes medications, such as its proper dosage and the frequency and time of administration with regard to food. It also had questions to evaluate patients' adherence to their medications and their reasons for non-adherence. The second part was designed to obtain information on the duration of each patient's DM and its management. The third part was designed to capture the demographic details of the participants. The questionnaire was prepared in English and translated into Arabic. Content validity was assessed by another expert who was not involved in the preparation of the data collection instrument. It was pre-tested with 10 prospective respondents. An Arabic study information and informed consent form was also developed.

The reported adherence to dose, frequency and administration of medicine with regard to food of the individual patients was compared with the instructions on the medication prescription or label from the healthcare provider. A score of 1 was given if adherence was observed and 0 if there was no adherence to these

Table 1: Relationship of median total adherence score with demographics of respondents

Demographics	n (%)	Median total score (IQR)	*P* value
Gender			
Male	63 (39.9)	3 (1.0)	0.235
Female	95 (60.1)	3 (0.5)	
Age group in years			
30–45	53 (33.5)	3 (1.0)	
46–60	60 (38.0)	3 (1.0)	0.991
61–75	45 (28.5)	3 (1.0)	
Educational qualification			
No formal education	88 (55.7)	3 (1.0)	
Primary school	23 (14.6)	3 (0.5)	
Secondary school	25 (15.8)	3 (0.0)	0.840
Higher secondary	17 (10.7)	3 (1.0)	
Higher education	5 (3.2)	3 (1.0)	
Employment status			
Employed	34 (21.5)	3 (1.0)	
Self-employed	19 (12.0)	3 (1.5)	0.263
Unemployed/ Housewife	105 (66.5)	3 (0.75)	

IQR = interquartile range.

Table 2: Relationship of median total adherence score with disease and drug details

Demographics	n (%)	Median total score (IQR)	*P* value
Duration of diabetes			
6 months–1 year	17 (10.8)	3 (0.0)	0.287
2–9 years	56 (35.4)	3 (1.0)	
10–15 years	58 (36.7)	3 (1.0)	
≥15 years	27 (17.1)	3 (1.0)	
Number of anti-diabetic medications used			
1	86 (54.4)	3 (1.0)	0.346
2	68 (43.1)	3 (1.0)	
≥3	4 (2.5)	3 (0.75)	

individual parameters. A total median adherence score was obtained by combining the individual scores for dose, frequency and administration. Accordingly, a maximum score of 3 was obtained for patients who adhered to all three parameters of dose, frequency and administration with regard to food, and a minimum score of 0 was obtained if they did not adhere to any of the parameters. This total median score was related to the demographics of the patient and the disease and medication details.

The results were analysed using the Statistical Package for the Social Sciences (SPSS), Version 15 (IBM, Corp., Chicago, Illinois, USA) while the Mann-Whitney U and Kruskal-Wallis tests were used for continuous variables for non-parametric data depending on the number of comparative groups. A *P* value of <0.05 was considered statistically significant.

Results

A total of 158 completed questionnaires were obtained from the 192 questionnaires distributed, giving a response rate of 82.3%. Most of the respondents were female (60.1%) and a slightly higher percentage of participants were 46–60 years old (38%) [Table 1]. The majority of them had received no formal education (55.7%) and were unemployed or were housewives (66.5%).

Many of them had been diagnosed with DM approximately 2–15 years before the study period [Table 2]. Most of the participants were taking either one (54.4%) or two (43%) drugs to control their DM [Table 2]. An evaluation of participants' most likely reasons for non-adherence indicated that 'forgetting to take' their medication was the most frequent reason (36.4%) preventing optimal adherence to their prescribed drug regimen [Table 3]. Upon evaluation of the patients' understanding of their medication regimen, it was observed that the vast majority of them (80%) understood their medication orders as instructed by their doctors.

The median total score of adherence with regard to dose, frequency and taking medicine before or after food, was 3 out of the maximum score of 3, which demonstrates an excellent level of patient adherence to their medicines. Upon evaluation of the association of the median total adherence score and demographics of participants, no significant difference was observed for gender, age, educational qualification or employment status. The median total adherence scores were evaluated to determine their relationship to other parameters such as number of years with DM and the number of diabetic medications prescribed. No significant difference was observed between median total adherence score and the number of years the patient had suffered from DM or the number of medications prescribed.

Table 3: Most common reasons for patient medication non-adherence

Reason	Number of participants (%)
Forgetting to take	79 (36.4)
Missing one dose is not an issue	32 (14.7)
I feel I am fine	23 (10.6)
Too many medicines	23 (10.6)
Side-effects	19 (8.7)

Discussion

Medication adherence has a great impact on outcomes in chronic diseases. However, as many chronic disease patients often do not experience noticeable symptoms, following treatment recommendations can be difficult. Presently, there is no single measure accepted as the gold standard to measure medication adherence as all of the commonly employed methods have disadvantages. Patient interviews, while straightforward and inexpensive, are clearly limited by their subjective nature.[18] This study was designed with the consideration that no previous published studies had assessed medication adherence among Omani patients with DM.

A total of 158 self-administered questionnaires from patients with T2DM were evaluated as a part of this study. The results showed that compliance levels were similar in male and female participants as well as among various age groups. A lack of significant association between compliance practice scores related to DM and gender and age was similarly observed in a study conducted in the UAE.[13] In contrast, studies conducted in Uganda[19] and Saudi Arabia[20] showed a significant association of compliance with the female gender and education levels. One factor that might contribute to medication adherence is the influence of employment status since those who are working have a higher tendency towards non-adherence due to work schedules.

The social norms in countries like Oman mean that males are generally the primary income-earning members of the family. The majority of participants in this study were unemployed older men who were more likely to be retired. Hence, the combined influence of gender and work status might not have a significant influence on adherence as reported by the study participants. The number of years since participants had been diagnosed with DM did not affect levels of adherence in the present study. Similar results were found in a study in Saudi Arabia.[20] This findings would seem to contradict the idea that patients with a longer history of the disease would be keener to adhere to their medications since complications would have developed, or that they would have a greater awareness and fear of developing them.

Unlike other studies where the cost of medication was reported as a reason for non-adherence, only a small proportion of patients in this study reported this as a reason for failing to follow medication guidelines.[14,19] This is a reflection of Oman's healthcare system, which is dedicated to maintaining the health of all citizens and thereby improving their quality of life. The financial burden of the disease does not affect Omani patients due to the availability of free medical care, including medications. This might also have influenced the absence of any significant relationship between the number of years since the diabetes diagnosis and the adherence level among participants in the study.

As was found in a study by Richard *et al.*, the number of anti-diabetic drugs prescribed to a patient did not affect the participants' medication adherence scores.[21] Forgetting to take medications was the most frequently given reason for failing to adhere to treatment guidelines. It is of note that a large percentage of participants believed that missing one dose would not cause any problem, which highlights the importance of the need for counselling by healthcare professionals.

The study results reveal good patient adherence overall to the medication regimen in areas such as dose, frequency and following instructions as to administration. This positive reported adherence could be attributed to many factors, including good communication between patients and healthcare professionals; patients' knowledge of the disease and awareness of its complications; the availability of medicines free of cost through government healthcare facilities, and the convenient availability and location of healthcare facilities.

The current study has some limitations. The sample size was small, which makes it difficult to generalise the results. It was difficult to identify and enroll patients in the manner used here as compared to recruiting a study population within a healthcare facility; hence, the quota sampling was challenging. The use of convenience sampling has its own inherent disadvantages. Further, the patients' levels of adherence were self-reported, which needs to be taken into account when interpreting the results. However, to reduce any tendency to over-report adherence to the regimen, the potential participants were selected from households rather than from healthcare institutions, as exaggerated self-reported adherence is greatest when patients are interviewed in healthcare settings.

Conclusion

Overall, the findings from the present study indicate that the medication adherence of T2DM patients in the Al Dakhliyah Governorate of Oman is good. However, this finding should be interpreted with caution as the data is based on self-reported measures of adherence. Nonetheless, this study gives insight into the various factors that affect patient adherence to medication guidelines among an Omani patient population; these factors should be targeted by healthcare professionals. Awareness of these factors will allow healthcare professionals to be more effective in their medication counselling and patients to become more self-responsible in adhering to a medication regimen.

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