

Assessment of medication knowledge among patients with asthma

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Abstract

Objectives Asthmatic patient's knowledge about their treatment can affect asthma control and adherence level. This study investigated the level of medication knowledge, the level of adherence and factors affecting both knowledge and adherence in adult patients with asthma.

Methods A cross-sectional study was carried out in Jordan between 2017 and 2018. A face-to-face interview was conducted by a clinical pharmacist with asthma patients attending hospital pharmacies for refilling their prescriptions.

Key findings A total of 218 adults with asthma were included into the study and 60.6% were knowledgeable about their medications. University degree education (OR = 3.67; *P* value < 0.001), positive family history of asthma (OR = 1.89; *P* value = 0.04) and longer asthma duration (OR = 1.03; *P* value = 0.049) were significantly associated with a high medication knowledge. On the other hand, married participants were less knowledgeable than single ones (OR = 0.30; *P* value = 0.041). High medication knowledge score (OR = 4.76, *P* value = 0.008), older age (OR = 1.06, *P* value = 0.004) and male gender (OR = 3.82, *P* value = 0.01) were significant predictors of high medication adherence.

Conclusions These findings highlight the importance of educational programmes that should be conducted in primary healthcare settings, such as community pharmacies, where pharmacists should educate patients about their medication and the importance of adherence.

Keywords asthma; Jordan; medication adherence; medication knowledge; outpatient clinics

Introduction

Inhaler devices are cornerstone treatment in asthmatic patients.^[1] Despite the availability of many effective medications, poor adherence and subsequently poor asthma control are considered serious global health problems.^[2] Different factors affect asthma control, such as a patient's medication knowledge, adherence and appropriate inhaler techniques.^[3,4] Poor medication knowledge leads to wrong beliefs that further affect patients' adherence to medication.^[5] Poor adherence is linked to poor disease outcomes such as increased mortality, increased cost and increased rate of hospital admission.^[6,7] Awwad et al^[8] reported a significant correlation between level of medication knowledge and adherence in patients with chronic disease in Jordan. Therefore, improving knowledge through patient education is necessary to promote the active participation in the treatment and thus enhance adherence.^[5,9]

Previous studies investigated the level of medication knowledge for chronic disease and revealed that lack of knowledge is a predictor for nonadherence which contributes to poor disease control.^[8,10–12] A pilot study in Australia (*n* = 83) reported poor medication knowledge and adherence among adult asthma patients.^[13] In addition, a recent study in Japan indicated that recognition of adherence barriers to inhaled medicine among adult asthma patients will help in personalizing patient education.^[14] However, few studies in the Eastern Mediterranean Region were conducted among asthma patients to investigate

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the level of patients' medication knowledge and adherence. In Saudi Arabia, AlOtaibi et al found that parents had poor knowledge about asthma medication in their children.^[15]

Asthma is quite common in Jordan with a twofold increase in the prevalence over the last decade^[16] Published research in Jordan showed that two thirds of recruited adult patients had uncontrolled asthma which was correlated with a low quality of life.^[17] Bashiti et al assessed the effect of patients' education on inhaler technique, asthma control and level of medication/disease knowledge for hospitalized asthma patients ($n = 140$) and reported an improvement in these parameters.^[3] However, asthmatic patient's knowledge about inhalers and factors affecting that knowledge has not previously been examined in Jordan. Investigating this area has the potential to improve strategies of patients' interventions and subsequently promote health outcomes. The current study aimed to investigate the level of medication knowledge and factors affecting medication knowledge, as well as the level of adherence, and its predictors in patients with asthma.

Method

Study design

A multicentre, cross-sectional, non-interventional study was conducted at a couple of referral hospitals for adult patients with asthma, where they can see pulmonologists in Northern Jordan: King Abdullah University Hospital and Princess Basma hospital. The primary outcome in this study was to explore the level of medication knowledge and the predictors of knowledge in adult patients with asthma. The recruitment of patients was carried out from Jan 2017 to Dec 2018. The study was approved by the institutional review board and the Ministry of Health.

Study subject

All eligible asthma patients attending the hospital pharmacy to dispense their prescriptions were invited to participate in the study. Patients were included in the study if they were adult (≥ 18 years) and taking their inhalers at home regularly for at least 3 months. Immunocompromised patients, newly diagnosed, asthma patients who suffer from other severe respiratory chronic diseases (e.g. COPD, bronchiectasis), those who have communication problems and those with mental disability were excluded from the study. The subjects were included in the study only after they have signed an informed consent form.

Outcome measures

A face-to-face interview was conducted by trained clinical pharmacist with all patients. The researcher was trained before the study started to ensure consistency when administering the questionnaires (i.e. all questions were explained in the same way). The following demographic, clinical and medical data were obtained directly from patients and from their hospital charts: age, gender, family history of asthma, nonasthma-related comorbidity, prescribed medications,

asthma duration, medication knowledge, adherence to medication and asthma control.

Medication knowledge was assessed by a modified version of the McPherson index^[18] It consists of 7 questions with two answer options (know/ does not know). Patients were asked to (1) list the generic/scientific name of inhaler; (2) use/mechanism of action; (3) correct administration/ how to take their medications; (4) timing/when to take their medications; (5) side effect even if not experienced; (6) what to do if they suffered from side effect; and (7) what to do in case of missing the dose. If the patient was taking more than one inhaler at the time of interview, data regarding medication knowledge were collected for one randomly chosen inhaler. The level of knowledge was dichotomized into knowledgeable and not knowledgeable based on the correct answers of total score. The respondent was categorized as knowledgeable if the total scores was ≥ 5 (out of 7) and not knowledgeable if the total score was < 5 (out of 7).

Asthma control status was measured by a validated Arabic version of Asthma control test (ACT) questionnaire.^[19,20] The questionnaire consists of 5 items and each item scored from 1 to 5. Those who got an ACT score < 20 were classified as having uncontrolled asthma and those who got an ACT score ≥ 20 were classified as having controlled asthma. The adherence to asthma medication was measured by self-reported medications adherence using the Morisky Green Levine Medication Adherence Scale (MGLS).^[21] It is composed of 4 yes/no questions that consider both intentional and unintentional nonadherence. The 4-item questionnaire was translated from English to Arabic. The level of medication adherence was classified based on the total score into: highly adherent patients (score = 4), medium adherers (score = 2–3) and low adherers (score = 0–1).

Statistical analysis

All data were coded and entered to statistical software Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 20. Continuous variables were presented as mean \pm standard deviation while categorical variables were presented as numbers and per cent. Univariate analysis was conducted using chi-square test for categorical variables and independent t-test for continuous variables. Predictors of knowledge and adherence were determined using multivariate analysis. Binary logistic regression (LR) was conducted including all variables with $P < 0.2$ in the univariable analysis to calculate odds ratio (OR) values and their 95% confidence intervals (95% CI). Pearson correlation coefficient was computed to examine the relationship between medication knowledge and adherence. All tests were two-sided, and statistical significance was set at P value ≤ 0.05 .

Results

Patient characteristics and knowledge about their medications

Out of 446 patients with asthma screened for the study, 212 patients were excluded due to different reasons: COPD

($n = 171$), bronchiectasis ($n = 6$), immunocompromised ($n = 13$), patients who had communication problems and those with mental disability ($n = 8$), newly diagnosed patients ($n = 5$) and those who were taking their inhalers for less than 3 months ($n = 9$). Of 234 eligible asthma patients for inclusion into the study, 16 refused to participate leaving a total of 218 to be included in the final analysis with a response rate of 90.6%. Mean age of the study sample was 47.6 years (standard deviation [SD] = 12.5), 70.6% were women and 91.7 % were married. A total of 62.4% of the participants had severe asthma, 44.5% had comorbid conditions, and 43.6% had ACT scores indicating controlled asthma. Descriptive statistics for patient characteristics are reported in Table 1.

Among the study sample, 60.6% ($n = 132$) were knowledgeable about their medications. Compared to patients with low medication knowledge, patients with higher medication knowledge reported higher prevalence of family history of asthma (51.5% versus 36%; P value = 0.025) and a higher percentage of university degree education (44.7% versus 17.4%; P value < 0.001). Patient characteristics by medication knowledge status are indicated in Table 1.

The average medication knowledge score was 4.8 (SD = 1.3) ranging from 2 to 7. The majority of the respondents were knowledgeable about how and when to take their medications (93.6% for both). In addition, a high percentage of patients were aware about the purpose of taking their medication (83.5%). Only 10.1% of the participants were able to correctly answer all the medication knowledge

questions. The correct response frequencies (%) are reported in Table 2.

Predictors of high medication knowledge: Adjusted analysis

University degree education and family history of asthma were significantly associated with higher likelihoods of having high medication knowledge adjusting for potential confounders (OR = 3.67; 95% CI, 1.85–7.33; P value < 0.001) and (OR = 1.89; 95% CI, 1.03–3.46; P value = 0.04) respectively. In addition, a one-year increase in asthma duration was associated with higher odds of having high medication knowledge (OR = 1.03; 95% CI, 1.00–1.05; P value = 0.049). On the other hand, married participants were less knowledgeable than single ones (OR = 0.30; 95% CI, 0.083–0.951; P value = 0.041). Potential predictors of high medication knowledge are indicated in Table 3.

Effect of medication knowledge on patient reported adherence

Among the study sample, 107 participants completed the Morisky Green Levine medication adherence questionnaire. Approximately, a third (32.7%, $n = 35$) were highly adherent, 51.4% ($n = 55$) were moderately adherent and 15.9% ($n = 17$) were low adherent to their medications. Medication knowledge scores were positively correlated with their adherence scores (Pearson correlation coefficient of 0.359;

Table 1 Study population characteristics

Variable ^a	Total sample $n = 218$	Low medication knowledge $n = 86$ (39.4%)	High medication knowledge $n = 132$ (60.6%)	P value
Age (years)	47.6 ± 12.5	48.5 ± 11.5	46.9 ± 13.2	0.394
Gender				
Male	64 (29.4)	22 (25.6)	42 (31.8)	0.323
Female	154 (70.6)	64 (74.4)	90 (68.2)	
Marital status				
Not married	18 (8.3)	4 (4.7%)	14 (10.6)	0.118
Married	200 (91.7)	82 (95.3)	118 (98.4)	
Family history of asthma (yes)	99 (45.4)	31 (36.0)	68 (51.5)	0.025
Asthma duration (years)	16.8 ± 12.9	14.7 ± 13.0	18.2 ± 12.7	0.055
Comorbid conditions (yes)	97 (44.5)	42 (48.8)	55 (41.7)	0.298
Monthly income				
Low < 500 JD	167 (76.6)	69 (80.2)	98 (74.2)	0.557
Intermediate 500-1000 JD	44 (20.2)	15 (17.4)	29 (22.0)	
High > 1000 JD	7 (3.2)	2 (2.3)	5 (3.8)	
Asthma severity (GINA, 2017)				
Mild/ moderate (step 1-3)	82 (37.6)	32 (37.2)	50 (37.9)	0.921
Severe (step 4-5)	136 (62.4)	54 (62.8)	82 (62.1)	
Education				
School education	144 (66.1)	71 (82.6)	73 (55.3)	<0.001
University degree	74 (33.9)	15 (17.4)	59 (44.7)	
Asthma control (ACT)				
Uncontrolled	123 (56.4)	53 (61.6)	70 (53.0)	0.211
Controlled	95 (43.6)	33 (38.4)	62 (47.0)	
Number of asthma medications	2.7 (0.69)	2.7 (0.71)	2.6 (0.67)	0.297

ACT, asthma control test; GINA, Global Initiative for Asthma guideline; JD, Jordan dinar.

^aData were presented as n (%) except for age, asthma duration and number of asthma medications (mean ± standard deviation).

Table 2 Percentage of knowledgeable patients in the knowledge assessment tool

Drug knowledge item	Number of knowledgeable patients (%)
Name of medication	94 (43.1)
Purpose of medication	182 (83.5)
How to take the medication	204 (93.6)
When to take the medication	204 (93.6)
Medication side effects	88 (40.4)
What to do if side effects occurred	137 (62.8)
What to do if a dose was missed	100 (45.9)

Table 3 Predictors of high medication knowledge in adults with asthma

Variable ^a	Odds ratio	P value	[95% CI]	
Education				
School education	Ref			
University degree	3.67	<0.001	1.850	7.330
Family history of asthma				
No	Ref			
Yes	1.89	0.04	1.030	3.460
Marital status				
Not married	Ref			
Married	0.30	0.041	0.083	0.951
Asthma duration	1.03	0.049	1.000	1.050

^aThe binary logistic regression model was conducted adjusting for variables with $P < 0.2$ in the univariable analyses (variables shown in the table).

P value < 0.001). Knowledge about what to do if a dose was missed was significantly associated with higher likelihoods of being highly adherent (OR = 4.833; 95% CI, 1.785–13.08; P value = 0.002). Association between each item in the medication knowledge assessment tool and medication adherence is indicated in Table 4. Adjusting for potential confounders, high medication knowledge was a significant predictor of high medication adherence (OR = 4.76, 95% CI, 1.501–15.07; P value = 0.008). Furthermore, older age (OR = 1.06, 95% CI, 1.018–1.099; P value = 0.004) and male gender (OR = 3.82, 95% CI, 1.375–10.62; P value = 0.01) were also significantly associated with high medication adherence as shown in Table 5.

Discussion

Successful asthma treatment depends greatly on a patients' knowledge, which is important for their medication-taking behaviour and adherence. The current study aimed to assess the level of medication knowledge and factors affecting that knowledge in addition to medication adherence level in patients with asthma. A previous study in Jordan showed that 62.3 % of the patients with chronic disease were knowledgeable about their medications with average score of 4 (out of 7).^[8] This finding goes in line with the current

Table 4 Relationship between medication knowledge and high adherence

Drug knowledge item	Odds ratio	P value	[95% CI]
Names of all medication	1.2	0.668	0.521–2764
Purpose of medication	2.75	0.209	0.568–13.34
How to take the medication	–	–	–
When to take the medication	–	–	–
Medication side effects	1.263	0.576	0.557–2.865
What to do if side effects occurred	1.185	0.739	0.437–3.217
What to do if a dose was missed	4.833	0.002	1.785–13.08

– Not enough data in the low medication knowledge category (only one patient).

Table 5 Predictors of high medication adherence in adults with asthma

Variable ^a	Odds ratio	P value	[95% CI]	
Medication knowledge status				
Low medication knowledge (score < 5)	Ref			
High medication knowledge (score ≥ 5)	4.76	0.008	1.501	15.07
Age	1.06	0.004	1.018	1.099
Gender				
Female	Ref			
Male	3.82	0.01	1.375	10.62

^aThe binary logistic regression model was conducted adjusting for variables with $P < 0.2$ in the univariable analysis (variables shown in the table).

study as 60.6% of our asthmatic participants were knowledgeable with a score of 4.8 (out of 7). In 2018, Basheti et al reported an improvement of knowledge level for hospitalized asthma patient after education by a pharmacist (from 6.53 to 7.79 out of 10).^[3] Asthmatic patients in Jordan visit outpatient hospital pharmacies monthly to refill their regular inhalers. This highlights the importance of clinical pharmacists in education as they are the last healthcare professionals to see the patients before they start using their inhalers; therefore, this may have an impact on their medication knowledge.

Not surprisingly, a higher education level was associated with higher medication knowledge in the current study. This result is consistent with previous studies.^[8,12,22] This finding could possibly be justified by the ability of patients with a university degree to better follow and understand different aspects of drug-related information.^[12,22] Additionally, single patients were found to have higher odds of better medication knowledge compared to married ones. A potential explanation is that single individuals may have more time to understand and obtain more information about their medications than married people, who usually carry heavier responsibilities and experience more time constraints.

Moreover, the current study showed that patients with a family history of asthma and those who have had the disease longer were more likely to know more about their medications. This fact could be attributed to the frequent visits to medical centres for refills and adjustments of their medications, as well as asking healthcare professionals about their management plan and how to follow it. Marital status, family history and duration of disease were not evaluated in previous asthma studies as factors for medication knowledge to compare with our findings. A study in Vietnam found a significant correlation between poor knowledge on asthma self-management and asthma control.^[23] However, we did not find any association between medication knowledge or adherence and asthma control in our study.

In the current study, a high level of knowledge was found in some of the parameters used in the knowledge assessment tool such as the purpose of medication, how to take medication, and when to take the medication. Similarly, a previous study in Jordan showed that knowledge about the purpose of medication and how to take the medication achieved higher responses among patients with chronic disease.^[8] On the other hand, less than half of our participants were knowledgeable about other important information such as name of medication, side effects, and what to do in case of missing doses. These findings highlight the importance of effective communication between patients and healthcare professionals to address different aspects related to medications and to promote active involvement of patients in the treatment process.

The current study results show that most of the patients (84.1%) were moderately to highly adherent to their medication. In contrast, Awwad et al^[8] reported that most of the patients with chronic diseases (73.4%) in Jordan were non-adherent to their medications. This disparity could be explained by different reasons; the current study included patients with younger age (mean of 47.7 years in the current study Vs mean of 55.4 years in Awwad study), less comorbid conditions (44.5% in the current study Vs 82.2% in Awwad study) and lower number of prescribed medication (mean of 2.7 in the current study Vs mean of 3.9 in Awwad study). The positive correlation between medication knowledge and adherence among asthmatic patients is parallel with that attained by Awwad et al among patient with chronic disease.^[8] There was a significant association between knowledge about what to do if a dose was missed and better adherence among our asthmatics which is consistent with Awwad et al study.^[8] This finding could be explained by the complexity of this aspect of drug information that is supposed to be primarily supplemented by the prescribers and from package leaflets. This may also reflect patients' caution from the consequences in case of missing the dose. Future studies with a larger number of asthma patients investigating adherence level to inhalers can shed more light on the potential association between knowledge items and adherence.

In the present study, knowledgeable patients were shown to be five times more likely to have better adherence compared to nonknowledgeable participants. This association between medication knowledge and adherence was supported by a recent study in Japan that investigated the

adherence barriers to inhaled medicines based on knowledge questions among asthma and COPD patients.^[14] Similar association was also demonstrated in previous studies conducted in other chronic diseases.^[8,10,24] In regard to gender and age, males and older participants demonstrated a higher adherence percentage in our study. In contrast, in a pilot study conducted in rural Australia, older patients showed poor adherence to their asthma medications due to forgetfulness and deteriorating cognitive functions.^[13] In terms related to gender, regardless of lower number of participating males (23.4%, $n = 25$) who answered the adherence questionnaire, male gender was a strong predictor for adherence. Interestingly, detailed analysis showed that men were significantly more educated than women (P value = 0.004), a possible link between knowledge and adherence. Further studies that investigate the reasons behind nonadherence of asthma patients towards their medications and the effect of patients' education on the level of adherence in Jordan are needed.

Limitation

The present study has the following limitations: (1) asthma patients who had certain mental disorders were excluded from the study, which may have led to an overestimation of adherence levels because all study participants had full cognitive abilities and awareness; (2) it was not possible to assess cause-effect relationship between medication knowledge and adherence due to the nature of cross-sectional studies; (3) susceptibility to social desirability bias, since disclosing medical nonadherence might be seen as unfavourable, (4) an objective measurement method of inhaler technique (e.g. checklist) was not used to assess the correct administration of inhalers as we relied on subjective pharmacist assessment, and (5) the translated Arabic version of the Adherence Scale has not been validated; however, we assumed that responses observed for both English and Arabic versions are the same.

Conclusions

As far as we know, this is the first study to assess the level of medication knowledge, factors affecting knowledge, in addition to the linkage between knowledge and the degree of medication adherence among asthmatic patients in Jordan. The present study has shown that Jordanian asthmatic patients have a good level of knowledge about their medications, in addition to a positive relationship between knowledge and adherence. This result provides a positive impression about the healthcare practices in Jordan. However, patients with low educational level, married patients, negative family history of asthma and shorter disease duration had poor medication knowledge along with consequent poor adherence. This highlights the importance of conducting educational campaigns in primary healthcare settings such as community pharmacies. Pharmacists should have more time to focus on all aspects related to medications. Pharmacists can provide ongoing support in optimizing inhaler technique and subsequently enhancing patient medication adherence. In addition, health literacy is an important

consideration in asthma management as it could help customize patient care. Pharmacists can address/assess health literacy to identify patients with additional needs (e.g. polypharmacy, comorbid condition, having health concerns...) who require more education and resources. Other aspects should be also be considered such as effective communication and engaging patients in shared decision making. Despite the fact that pharmacist-led services can be time consuming at the beginning, it has the potential to optimize the use of asthma medications.

Declarations

Conflict of interest

The authors declare that they have no conflict of interest.

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Author contributions

Basima Almomani and Shoroq M. Altawalbeh conceived and designed the study. Basima Almomani and Suleiman M. Momany collected and processed the data. Basima Almomani and Shoroq M. Altawalbeh analysed and/or interpreted the data. Basima Almomani and Munther S. Alnajjar drafted the manuscript. Basima A. Almomani, Shoroq M. Altawalbeh, Munther S. Alnajjar and Suleiman M. Momany revised the manuscript. The submitted version was approved by all authors.

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