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Non-adherence to pharmacotherapy and its associated factors among patients with angina in Jordan

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Abstract

Objective The study aim was to explore factors associated with medication non-adherence in patients with angina in Jordan.

Methods The current study was conducted in the outpatient cardiac clinic at the Royal Medical Services Hospital in Amman. Variables including socio-demographics, biomedical variables in addition to disease and therapy factors were collected for 500 patients with angina using medical records and custom-designed questionnaire. Medication adherence was assessed using the validated 4-item Morisky Medication Adherence Scale. Logistic regression was performed to develop a model with variables that best predicted medication non-adherence.

Key findings The majority of the study patients (79.4%) were found non-adherent to the prescribed medications. Regression analysis identified duration of illness ($P < 0.037$; OR = 1.090) and number of chronic diseases ($P < 0.035$; OR = 1.621) as significant predictors of medication non-adherence.

Conclusion Clinical pharmacists should focus on improving medication adherence for patients with angina. Patients who have longer duration of angina and those with multiple comorbid diseases should be specifically targeted in future pharmaceutical care programmes designed to improve health outcomes for patients with angina in Jordan.

Keywords adherence; angina; cardiovascular disease; Jordan; medication; pharmaceutical care

Introduction

Angina is a cardiovascular disease in which the patient suffers from chest pain caused by reduced myocardial oxygen supply and blood flow.^[1] In 2013, the World Health Organization (WHO)^[2] reported that the cardiovascular diseases (CVDs) contributed to 23.3 million deaths worldwide. In USA, approximately 600 000 patients die by a CVD including angina every year,^[3] with annual costs of approximately about 475 billion dollars.^[4] CVD is considered the leading cause of death in Jordan and the Middle East area in addition of being highly prevalent even among young individuals.^[5–7] Recent reports in Jordan suggest that CVD and other non-communicable diseases contribute to about 37% of all deaths in the country.^[8] According to the WHO, the mortality rates of coronary CVD in Jordan in 2017 reached 5248, ranking Jordan as 65 in the world.^[9]

Adherence is defined as ‘the extent to which a person’s behaviour regarding taking medication, following a diet, and/or executing lifestyle changes corresponds with agreed recommendations from a health care provider’.^[2] In addition to increasing total healthcare costs,^[10] medication non-adherence can cause worsening in the symptoms of angina^[11] and increases the risk of developing stroke, myocardial infarction, heart failure and other cardiovascular complications.^[12] Therefore, adherence to the prescribed medication is necessary to prevent disease complications and hence improve the quality of life in patients with CVD.^[13,14] However, in addition to the essential lifestyle changes, patients with angina need to take long-term multiple medications which make adherence a complex task for these patients.^[12] Identifying demographic and medical variables associated with medication non-adherence among patients with CVD is a pre-request for clinical pharmacists for developing effective and tailored intervention

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programmes aim at improving medication adherence and health outcomes for patients with different CVDs including angina.^[15]

Aim of the study

The purpose of this study was to evaluate medication adherence and to explore the factors associated with medications non-adherence among patients with angina in Jordan. Findings would help guide the development of future pharmaceutical care intervention programmes for patients with angina.

Methods

Study site and subjects

In the present cross-sectional study, the patients were recruited from the outpatients cardiac clinic at Queen Alia Heart Institute in the Royal Medical Services in Amman/ Jordan. This clinic is considered as one of the largest hospitals in Jordan that provides healthcare services to more than 100 angina patients daily. Additionally, patients were recruited from the cardiac clinic at Prince Rashid Ben Al-Hasan military hospital in Irbid/Jordan. All patients who had ischemic heart disease (IHD) for at least one year, were aged 18 years or older and were taking at least one prescribed medication for IHD were included in the study. Patients who had cognitive impairment as documented by their consultant or refused to participate were excluded from the study.

Data collection

During an outpatient cardiac clinic visit, clinical data for each patient were extracted from Hakeem medical programme. The collected data included low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), triglyceride (TG), glycosylated haemoglobin (HbA1c), fasting blood glucose (FBG), systolic (SBP) and diastolic (DBP) blood pressure, body mass index (BMI) and the presence of comorbid disease.

The biomedical parameters including total cholesterol, LDL, HDL TG, SBP, DBP and HbA1C were classified as controlled or uncontrolled based on the American Heart Association guidelines for each parameter respectively.^[16–18]

A custom-designed questionnaire was used to collect information about age, gender, duration of disease, smoking status, marital status (single, married or others), educational level (classified as high for patients who completed University level or more, low for patients who had primary, secondary or high school), career (classified as medical or non-medical), average monthly income (classified as low (<1000JD) and high (≥1000JD)), place of residency (inside or outside Amman) and living conditions (classified as living with family others including family members or living alone). Eligible patients were interviewed by the researcher AJ in a separate room at the cardiology clinic, and they were provided with an information sheet about the study. The researcher asked the patients to take their time to read

the study information sheet, and those who agreed to participate were asked to sign a consent form. The patients were assured that their participation is not mandatory, and they have the right to refuse to participate or withdraw from the study at any time. Furthermore, the patients were assured that any information they provide through the study will be kept confidential. Out of 650 patients who met the inclusion criteria and were invited by the research pharmacist to participate in the study, a total of 500 patients agreed to participate and signed a consent form. A pilot test was performed for questionnaires in a small sample ($n = 20$) prior to implementing the main study. The data were collected over a period of 5 months from November 2018 through March 2019.

Study instrument

The validated 4-item Morisky medication adherence scale^[19] was used to evaluate medication adherence. This scale has been commonly used to evaluate medication adherence and to reflect the number of ways medications omission can occur: forgetting, carelessness, stopping when feeling better and stopping when feeling worse. The questions were as follows: Do you forget to take your medications? Are you careless about time of taking your medications? Do you stop taking your medications when you feel better? Do you stop taking your medications when you feel worse? In scoring the questionnaire, each 'yes' response was given a score of one, and each 'no' response was given a score of zero. The score was then summed for a total score ranging from 0 to 4. According to Morisky classification, adherence is divided into three groups: high for those scoring zero, medium for those scoring one or two and low for those scoring three or four. For the purpose of the present analysis, the patients were divided into two groups: those scoring zero were considered adherent and those scoring 1–4 were considered non-adherent.

The Morisky scale has been validated in Arabic language, and it has been used to assess medication adherence in patients with different chronic diseases in Jordan such as hypertension^[20] and diabetes mellitus.^[21]

Ethical approval

The study received ethical approval from the institutional review board at both Jordan University of Science and Technology and the Royal Medical Services in October 2018.

Statistical analysis

Data were analysed by the researchers AJ and AR using SPSS software (version 23), IBM SPSS, Armonk, NY, USA. Since double data entry was not performed, visual checking for preventing and catching data entry errors was conducted. Descriptive statistics using mean (SD) for continuous variables and frequency (%) for categorical variables were used to describe the sample characteristic and to assess medication adherence. Chi-square analysis and the independent *t*-test were conducted to identify the categorical and the continuous variables that were significantly

associated with medication non-adherence respectively. Factors that were found significant on the single predictor level ($P < 0.05$) were entered into the multiple predictor analysis. A binary logistic regression was conducted to explore the variables that were significantly and independently associated with medication non-adherence.

Results

A total of 500 patients completed the study. Table 1 represents the demographic and medical characteristics of the study patients. The mean age of the patients was 59.04 (SD = 10.89) years. The majority of the study patients were male (74.2%), married (90.8%) and had a low monthly income (87.6%). Only a quarter of the patients (25.8%) have completed university level of education, and less than half of the patients were smokers (41%). Almost all of the study patients had chronic medical conditions (99.6%) with a mean of 4.60 (SD = 5.33) years of angina. The mean number of prescribed medications was 6.67 (SD = 1.99) for each patient. Additional sample characteristics are represented in Table 1.

As shown in Table 2, results revealed that 31.8, 51.6 and 29.4% of the patients were found to have high levels of total cholesterol, LDL and TG respectively, and 31.4% of the patients had low levels of HDL. The mean scores of HbA1c were 8.0% (SD = 2.23). The mean SBP and DBP were 133.8 (SD = 18.89) and 80.0 (SD = 9.98) respectively.

Table 3 represents the medications prescribed for the study patients. The majority of the patients received statins (96.6%) and beta blockers (88.4%). These medications were followed by nitrates (49.6%), ACEI (49.2%), ARBs (26.0%), CCB (21.2%) and thiazide diuretic (1.8%). Regarding the medications used for diabetes control, 34.8, 18.2 and 19.4% of the patients received metformin, sulphonylureas and insulin respectively. Results also showed that 29.2% of the patients reported receiving PPI and 21.2% reported receiving H2 antagonists. Most of the study patients reported receiving a combination of clopidogrel and aspirin (49.2%) instead of aspirin (44%) or clopidogrel (0.8%) monotherapy. The majority of the patients (61.2%) were taking their medications twice or more daily, and only 38.8% of the patients were prescribed once daily medication.

The current study results showed that the majority of the patients (79.4%) were categorized as non-adherent to their medication. Variables that were significantly associated with medication non-adherence in the single predictor analysis including receiving nitrate therapy, SBP, DBP, LDL, number of chronic diseases, duration of illness and HRQOL were included in the multiple logistic regression analysis. Results showed that duration of illness (OR = 1.090; $P < 0.037$) and number of chronic diseases (OR = 1.621; $P < 0.035$) were significantly and independently associated with medication non-adherence as shown in Table 4.

Discussion

The current study provides baseline data about the extent of medication non-adherence in patients with angina in

Table 1 Demographic and medical characteristics of the study patients ($n = 500$)

Variable	Category	Frequency (%)	Mean (SD)
Age (years)			59.04 (10.89)
Gender	Male	371 (74.2)	
	Female	127 (25.4)	
Marital status	Married	454 (90.8)	
	Single	9 (1.8)	
	Other	36 (7.2)	
Education level [†]	High	129 (25.8)	
	Low	371 (74.2)	
Career	Medical	21 (4.2)	
	Non-medical	476 (95.2)	
Average monthly income [‡]	Low	438 (87.6)	
	High	50 (10)	
Place of residency	Amman	182 (36.4)	
	Out Amman	318 (63.6)	
Living conditions	Live with family or others	478 (95.6)	
	Live alone	21 (4.2)	
Family support	Yes	305 (61.0)	
	No	189 (37.8)	
Smoking status	Yes	205 (41.0)	
	No	294 (58.8)	
Having comorbid conditions	Yes	498 (99.6)	
	No	2 (0.4)	
Number of chronic diseases			3.47(.898)
Family history of cardiovascular diseases [†]	Yes	256 (51.2)	
	No	238 (47.6)	
Duration of illness			4.60 (5.33)
BMI [†] (kg/m ²)	Normal	11 (23.8)	
	High	371 (74.2)	

[†]Educational level was classified as follows: high for patients who completed University level or more, low for patients who had primary, secondary or high school. Average monthly income was classified as low (<1000JD) and high for (≥1000JD). BMI was classified as normal (19.9–24.9) and high (≥25).

Jordan. Although several research studies have addressed medication adherence among patients with CVD in the developed countries, little is known about this concept in developing countries including Jordan. In the current study, more than three quarters of the study patients were categorized as non-adherent, which represents a real threat for health outcomes in patients with angina in Jordan. The current study finding is consistent with the previous research in the Arab world and the Western countries which indicated that patients with CVD poorly adhere to their prescribed medications.^[12,22–25] In general, medication adherence rate in patients with CVD has varied widely across different studies. While only 24% of the patients were found to be adherent in one study,^[26] another study showed that 69.2% were adherent to their medications.^[27] This large variation in adherence rates among the various studies may be attributed to the

Table 2 Biomedical variables of the study patients ($n = 500$)

Variable	Category	Frequency (%)	Mean (SD)
Total cholesterol	Normal	234 (46.8)	
	High	159 (31.8)	
	Total	393 (78.6)	
LDL (mg/dl)	Normal	28 (5.6)	
	High	258 (51.6)	
	Total	286 (57.2)	
Triglyceride	Normal	236 (47.2)	
	High	147 (29.4)	
	Total	383 (76.6)	
HDL (mg/dl)	Normal	122 (24.4)	
	Low	157 (31.4)	
	Total	279 (55.8)	
HbA1C (%)			8.008 (2.23)
FBS (mg/dl)			3.47 (0.90)
SBP (mm Hg)			133.79 (18.89)
DBP (mm Hg)			80.03 (9.98)

DBP, diastolic blood pressure; FBS, fasting blood sugar; HbA1C, glycosylated haemoglobin; HDL, high-density lipoprotein; LDL, low-density lipoprotein; SBP, systolic blood pressure.

diversity in the study population and the type of instruments used for adherence assessment.

Results of the multiple logistic regression analysis showed that duration of illness and number of chronic diseases were found significantly associated with medication non-adherence. Consistent with the current study findings, Boratas & Kilic found a significant association between duration of illness and medication non-adherence in patients with hypertension in Turkey.^[28] A study conducted by Marinho *et al.*^[29] has also found that increased duration of disease was associated with increased risk of non-adherence to medications in patients with type 2 diabetes in Brazil. Another study reported that longer duration of disease was a predictor of medication non-adherence in patients with diabetes in Gaza, but this association was not statistically significant.^[30]

Patients with angina who have multiple comorbidities including dyslipidemia and hypertension usually need long-term management by multiple medications and complex medication regimens to control their conditions and prevent other complications, which could make medication adherence a complex task for such patients.^[3,31] This association between number of chronic diseases and medication adherence was reported by the multiple regression analysis in the present study. Consistent with our finding, Kassab *et al.*^[32] found that patients who have several comorbidities need to take many medications, which make the patients feel torment about following treatment recommendations and therefore negatively influence medication adherence. Parmaksiz *et al.*^[33] reported that the presence of multiple comorbidities was associated with difficulty in following treatment recommendation and decrease in life satisfaction among patients with CVDs. A systematic literature review conducted by Oosterom-Calo *et al.*^[34] reported that the increased number of comorbidities was significantly associated with medication non-adherence.

Table 3 Medications prescribed for the study patients

Variable	Category	Frequency (%)
Medications for dyslipidemia		
Statin	Yes	483 (96.6)
	No	17 (3.4)
Non-statin	Yes	25 (5.0)
	No	474 (94.8)
Medication for hypertension		
ACEI	Yes	246 (49.2)
	No	253 (50.6)
Beta blockers	Yes	442 (88.4)
	No	57 (11.4)
Angiotensin II receptor blockers	Yes	130 (26.0)
	No	369 (73.8)
Calcium channel blockers	Yes	106 (21.2)
	No	393 (78.6)
Thiazide diuretic	Yes	9 (1.8)
	No	490 (98.0)
Nitrates	Yes	248 (49.6)
	No	251 (50.2)
Medication for diabetes mellitus		
Metformin	Yes	174 (34.8)
	No	325 (65.0)
Sulphonylureas	Yes	91 (18.2)
	No	408 (81.6)
Insulin	Yes	97 (19.4)
	No	402 (80.4)
Other medications		
Proton pump inhibitor	Yes	146 (29.2)
	No	353 (70.6)
H2 antagonists	Yes	106 (21.2)
	No	393 (78.6)
Antiplatelets	Aspirin	221 (44.2)
	Clopidogrel	4 (0.8)
	Clopidogrel and aspirin	246 (49.2)
	Ticagrelor and aspirin	16 (3.2)

Table 4 Multiple logistic regression of variables associated with medication adherence ($n = 500$)

Variable	B	Sig.	Odds ratio
Receiving nitrates	−0.001	0.997	0.999
SBP	0.015	0.184	1.015
DBP	0.009	0.631	1.009
LDL	0.006	0.188	1.006
Number of chronic diseases	0.483	0.023	1.621
Duration of IHD	0.086	0.03	1.090
HRQoL score	−0.303	0.455	0.739

DBP, diastolic blood pressure; LDL, low-density lipoprotein; SBP, systolic blood pressure.

Study limitations

The cross-sectional design of the present study could not help establishing cause–effect relationship. The current study used a self-report method to assess medication adherence, which could have influenced the accuracy of the collected data due to the social desirability bias. Despite these limitations, the

current study has a unique contribution to literature since it provides baseline data about the predictors of medication non-adherence in patients with angina in Jordan.

Conclusion

The present study clearly demonstrates low level of medication adherence and shed the light on the necessity to improve medication adherence among patients with angina in Jordan. Clinical pharmacists should specifically address patients with longer duration of angina and those with multiple comorbidities in future intervention programmes designed to improve health outcomes in patients with angina.

Declarations

Conflict of interest

The Author(s) declare(s) that they have no conflicts of interest to disclose.

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Authors' contributions

The research idea and study design were provided by Jarab with the assistance of Rababa'h and Mukattash. The data were collected by Almousa and interpreted by Jarab and Bsoul. The manuscript was written by Jarab with the assistance of Almousa and checked and finalised by Rababa'h.

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