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Research Article

Assessment of Adherence and Self-Efficacy in a Sample of Iraqi Patients Receiving Warfarin or Direct Oral Anticoagulants

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Abstract

Background: While warfarin and direct oral anticoagulants (DOACs) are used to manage thromboembolic events, they possess several features that impact adherence. ***Objective***: To assess medication adherence and self-efficacy in patients receiving warfarin or DOAC treatment. ***Methods***: A cross-sectional study was performed at Ibn Al-Bitar Hospital in Baghdad from December 2022 to May 2023 on patients receiving either warfarin or DOACs. The Arabic version of the Adherence to Refills and Medications Scale (ARMS) questionnaire and the Self-Efficacy for Managing Chronic Disease 6-Item Scale (SES6C) questionnaire were used to assess adherence and self-efficacy. ***Results***: 181 patients were enrolled in the study, of whom 56.9% received warfarin and 43.1% received DOACs. The mean ARMS score was 13.71, and 81.77% of the patients were adherent to anticoagulant therapy. There was a significant difference in adherence between the warfarin and DOAC groups. The mean SES6C score for the participants was 50.01. Patients in the DOAC group had significantly higher self-efficacy compared to those in the warfarin group. The adherence score correlated significantly with patients' gender, education level, hospitalization and duration of anticoagulant use, while the SES6C score did not correlate with any of the independent variables. There was a significant negative correlation between self-efficacy scores and medication adherence scores. ***Conclusions***: Patients receiving DOACs showed a higher self-efficacy to manage chronic diseases and lower medication adherence as compared to warfarin. Higher self-efficacy was associated with higher adherence to treatment.

Keywords: DOAC, Medication adherence, Self-efficacy, Warfarin.

تقييم الكفاءة الذاتية والالتزام بين المرضى العراقيين الذين يتلقون مضادات التخثر المباشرة عن طريق الفم أو الوارفارين

الخلاصة

الخلفية: بينما يتم استخدام الوارفارين ومضادات التخثر الفموية المباشرة (DOACs) لعلاج الانصمام الخثاري، إلا أنها تمتلك العديد من الميزات التي تؤثر على الالتزام. **الهدف**: تقييم الالتزام والكفاءة الذاتية لدى المرضى الذين يتلقون علاج الوارفارين أو DOAC. **الطريقة**: أجريت دراسة مقطعية في مستشفى ابن البيطار لجراحة القلب في بغداد في الفترة ما بين كانون الأول 2022 إلى أيار 2023 على عينة من المرضى الذين يتلقون علاج الوارفارين أو مضادات التخثر الفموية المباشرة. تم استخدام نسخة عربية من استبيان الخاص بالالتزام (ARMS) واستبيان الكفاءة الذاتية لإدارة الأمراض المزمنة (SES6C) لتقييم الالتزام بالأدوية والكفاءة الذاتية، على التوالي. **النتائج**: تم تسجيل 181 مريضا في الدراسة، منهم 56.9% تلقوا الوارفارين و 43.1% تلقوا DOACs. كان متوسط درجة الالتزام (ARMS) 13.71 حيث كان 81.77٪ من المرضى ملتزمين بالعلاج المضاد للتخثر. كان هناك اختلاف كبير في الالتزام الدواء بين مجموعات الوارفارين و DOACs. كان متوسط درجة SES6C للمشاركين في الدراسة 50.01 وكان المرضى في مجموعة مضادات التخثر الفموية المباشرة (DOACs) أعلى بكثير من الكفاءة الذاتية مقارنة مع تلك الموجودة في مجموعة الوارفارين. ارتبط إجمالي درجة الالتزام بالدواء بشكل كبير بجنس المريض ومستوى تعليمه ودخوله المستشفى ومدة استخدام مضادات التخثر. لم ترتبط درجة SES6C للمشاركين في الدراسة بأي من المتغيرات المستقلة وكان هناك ارتباط سلبي كبير بين درجات الكفاءة الذاتية ودرجات الالتزام بالدواء. **الاستنتاج**: أظهر الذين تلقوا علاج مضادات التخثر الفموية المباشرة كفاءة ذاتية أعلى في إدارة الأمراض المزمنة وانخفاض الالتزام بالأدوية مقارنة بمرضى الوارفارين. وارتبط ارتفاع الكفاءة الذاتية مع ارتفاع الالتزام بالعلاج.

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INTRODUCTION

Oral anticoagulation therapy is used for the prevention and treatment of thromboembolic diseases. The classic history of anticoagulant drugs is warfarin. Warfarin, a vitamin K antagonist (VKA), has been the mainstay of treatment for thromboembolic conditions such as venous thromboembolism, atrial fibrillation and stroke [1]. Warfarin use can be challenging, as it has a narrow therapeutic index, slow onset and offset of action, high dose-response rate variability, requires frequent monitoring of the international normalized ratio (INR) and has interactions with drugs, food and alcohol [2]. as well as genetic variation that has a significant impact on warfarin metabolism and its therapeutic effect [3]. Currently, direct oral anticoagulants (DOACs) are the most commonly used anticoagulants for preventing stroke in patients with atrial fibrillation and for preventing and treating venous thromboembolism. They include dabigatran, a direct thrombin inhibitor; and rivaroxaban, apixaban and edoxaban, direct factor Xa inhibitors [1]. The most important advantages of DOACs over traditional oral anticoagulants include their convenience, decreased monitoring requirements, decreased drug and dietary restrictions, faster onset of action, predictable pharmacokinetics and wide therapeutic window [4]. Indeed, DOACs are relatively expensive and require strict adherence due to their fast offset of action [5]. Although DOACs are newer oral anticoagulants, there is still limited evidence on their efficacy in conditions such as antiphospholipid syndrome and mechanical prosthetic heart valves [6]. Medication adherence is defined as "the extent to which patients take medications as prescribed by their health care providers" [7]. The interplay of various factors relating to patients, treatments, and healthcare systems can have an impact on medication adherence, which is a complex issue [8]. According to the World Health Organization (WHO), adherence to therapy is a primary determinant of treatment success [7]. Non-adherence to medications leads to increased morbidity, mortality, wastage of medicine, and increased expenses [9]. Medication adherence with oral anticoagulants plays a significant role in preventing adverse events and mortality. There have been some studies focusing on adherence to anticoagulant therapy. One study conducted to assess self-reported adherence to oral anticoagulants in a specialized adult outpatient thrombosis service found that adherence to warfarin and DOACs was 87.3% and 90.9%, respectively [10]. Another aspect that significantly impacts the success of a treatment and its goal is the patient's self-efficacy. Self-efficacy is the confidence in one's own ability to achieve a specific goal, which can influence the individual's choices, persistence, and effort towards the task. It also affects the individual's cognitive and emotional states during the task execution process [11]. In addition, it enables participants to develop the necessary confidence and skills to manage their chronic conditions more effectively [12]. Previous studies have shown that self-efficacy is one of the factors that influences medication adherence in patients with chronic illnesses [13]. There have been some studies focusing on self-efficacy among patients with anticoagulant therapy. One study was conducted to investigate the association between treatment satisfaction and self-efficacy in patients using anticoagulant therapy. The study found that patients who use DOACs have higher self-efficacy and treatment satisfaction compared to those who use VKA. [14] In Iraq, there is a paucity of studies that have evaluated adherence to medication for cardiovascular diseases [15–18]. In one study, patients' adherence to cardiovascular therapy was assessed using a mixed-methods assessment utilizing quantitative dried blood spot analysis and the Morisky Medication Adherence 8-item Scale. The study results showed that adherence was higher by using the scale in comparison with laboratory-based microsample analysis [15]. Another study conducted to compare adherence to cardiovascular medications in patients from Australia and Iraq showed a significantly higher proportion of Iraqi than Australian cardiac patients reported medium or low levels of adherence to their cardiac medications [16]. Other studies were conducted to assess the adherence of patients with chronic illnesses, including systemic rheumatic diseases and diabetes mellitus [19–23]. Regarding self-efficacy, there were few studies that assessed self-efficacy in chronic conditions, such as diabetic patients [24–25]. To the best of the authors knowledge, no previous comparative studies were conducted in Iraq to evaluate self-efficacy and adherence to medications in patients receiving oral anticoagulant therapy. Therefore, the aim of this study was to assess adherence and self-efficacy in patients receiving warfarin or DOACs treatment.

METHODS

Study design and setting

The study was designed as a single-center, cross-sectional study. It was performed at Ibn Al-Bitar Hospital for cardiac surgery in Baghdad in the period between December 2022 to May 2023.

Ethical approval

The research proposal was approved by the local Research Ethics Committee of the College of Pharmacy, University of Baghdad. Additionally, verbal consent was obtained from the patients prior to enrolment in the study.

Patient selection criteria

The patients comprised a convenience sample of those who were undergoing treatment with either DOACs or warfarin. The study participants comprised adult patients who met the following criteria: they had to be at least 18

years old, be on oral anticoagulation therapy for a minimum of two months using warfarin or DOACs (rivaroxaban or apixaban), were able to speak and understand Arabic, and gave verbal consent to participate in the research. Exclusion criteria for the study included patients who were incapable of verbal communication, had a prior diagnosis of mental illness, refused to provide informed consent, provided incomplete responses, or had end-stage renal disease or liver disease with malignancy.

Data Collection

Data was collected during face-to-face interviews with study participants after obtaining their consent. A data collection sheet was used to collect the information required for the study. This included socio-demographic characteristics that involved age, gender, body mass index, educational level, marital status, occupational status, smoking habit and governorate. In addition, clinical characteristics of the patients include indication of anticoagulant use, medical history, medication history, type of anticoagulant used, duration of anticoagulant use, concomitant use of antiplatelet drugs, adverse effects (bleeding) and hospitalization due to adverse effects. Adherence was assessed by using the Arabic version of the Adherence to Refills and Medications Scale (ARMS) [26]. It is a self-reported medication adherence scale that consists of 12 items and was originally developed in English. It has two subscales: one for adherence to filling medications and another for adherence to taking medications. The subscale for adherence with taking medications comprises eight items, while the subscale for adherence with filling medications comprises the remaining four items. Each item is scored using a 4-point Likert scale, where 1 indicates none, 2 indicates some, 3 indicates most, and 4 indicates all. The ARMS score can range from 12 to 48, with higher scores indicating poor adherence, although the 12th item is reverse-scored [27]. In addition, a score of ≥16 was used as a cut-off point to categorize surveyed patients as non-adherent and <16 as adherent [26]. Self-efficacy was assessed using the Arabic version of the Self-Efficacy for Managing Chronic Disease 6-Item Scale (SES6C) [28]. The SES6C measures a patient's confidence level in managing their chronic disease. it covers common domains in chronic diseases such as emotional functions, role function, communication with physicians and symptom control. Developed by Lorig *et al*., the SES6C consists of six items scored on a 10-point scale ranging from "not at all confident" to "totally confident." Total scores on this scale range from 6 to 60, with higher scores indicating higher self-efficacy perception. A median cut-off of 33 was used for scoring, where scores less than 33 indicate low self-efficacy and scores equal to or higher than 33 indicate high self-efficacy [29].

Statistical analysis

The data was analyzed using Statistical Package for the Social Sciences (SPSS) software version 25. Descriptive statistics were conducted for all study items. Continuous variables were expressed as means ± standard deviation (SD), whereas categorical variables were expressed as frequencies and percentages. An independent *t*-test was used to compare the differences in the means of continuous variables between the two treatment groups (DOAC *vs*. warfarin). A one-way ANOVA was used to measure the difference in means of the continuous variables (total scores) across demographics with more than two categories. Pearson's correlation was used to measure the relationships between the continuous variables. A *p*-value less than 0.05 was considered statistically significant.

RESULTS

From the total of 181 patients involved in the current study, participants were adults with a mean age of 57.10±10.72 years and a mean body mass index (BMI) of 28.72±5.09 kg/m^2. More than half (60.2%) of patients were men, 92.8% of the patients were married, and 58.6% of them had primary or secondary school degrees. The socio-demographic characteristics of study patients are shown in Table 1. The clinical characteristics of the study participants are shown in Table 2. The mean duration of anticoagulant use was 5.99±8.11 years. More than half (56.9%) of the patients were taking warfarin. The most frequent indication for anticoagulant use was AF (56.4%), and the majority was non-valvular AF (40.3%). Additionally, hypertension was the most frequent chronic disease among participating patients (45.3%). Moreover, 73.8% of the participating patients were on chronic use of beta-blockers, and more than three-quarters (81.2%) of them had no concomitant use of antiplatelet drugs (aspirin or clopidogrel). Epistaxis was the most frequently reported adverse effect of the anticoagulants (23.2%). The responses of the study participants to ARMS questionnaire items are shown in Table 3. Among the 181 patients, 81.77% were classified as being adherent to the anticoagulant therapy, with the ARMS adherence score being < 16, and 18.23% as non-adherent with a score ≥ 16. The mean ARMS score was 13.71±2.28. The study findings showed that there was a statistically significant difference in patients' adherence to medication (total ARMS) in patients taking warfarin or DOACs treatment (p=0.039). On the other hand, there was no significant association between the two subscales (adherence to take medications score and adherence to refill medications score) between patients taking warfarin or DOACs treatment, as shown in Table 4. Regarding the effect of demographic variables, the results of the study reported that patients' gender, education level, and hospitalization had a statistically significant effect on adherence.

Table 1: The socio-demographic characteristics of the participants

Characteristics		Frequency (%)
Gender	Male	109(60.2)
	Female	72(39.8)
Education level	No formal education	41(22.7)
	Primary school	45(24.9)
	Secondary school	61(33.7)
	College/tertiary	34(18.8)
Marital status	Married	168(92.8)
	Unmarried	13(7.2)
Employment status	Employed	52(28.7)
	Retired	35(19.3)
	Unemployed	94(51.9)
Cigarette smokers	Non-smoker	106(58.6)
	Smoker	20(11.0)
	Ex-smoker	55(30.4)
Alcohol drinker	Yes	1(0.6)
	No	180(99.4)
The participants' province	Baghdad	148(81.8)
	Al-Anbar	9(5)
	Al-Kut	7(3.9)
	Diyala	7(3.9)
	Other provinces *	10 (5.6)
	Range	mean(SD)
Age (year)	24.0-78.0	57.10(10.72)
BMI (kg/m^2)	16.3-46.9	28.72(5.09)

*Other provinces: Al-Hila, Al-Qadisiyah, Kerbala, Maysan, Salah Al-din.

Table 2: The clinical characteristics of the study participants

Characteristics		Frequency (%)
Anticoagulants type	Warfarin	103(56.9)
	Apixaban	46(25.4)
	Rivaroxaban	32(17.7)
Indications of the anticoagulant	Atrial fibrillation	102(56.4)
	Prosthetic valve	99(54.7)
	Other indications*	9(5.0)
AF type	non valvular AF	73(40.3)
	valvular AF	29(16.0)
Prosthetic valve type	Aorta	64(35.4)
	Mitral	55(30.4)
	Aorta & mitral	20(11.0)
Chronic diseases	Hypertension	82(45.3)
	Heart failure	75(41.4)
	Diabetes mellitus	54(29.8)
	Other chronic diseases †	56(30.9)
Chronic medications	Beta-blockers	134(73.8)
	Diuretics	94(51.9)
	Angiotensin II receptor blockers	60(33.1)
	Antidiabetic	55(30.4)
	Statin	54(29.8)
	Digoxin	44(24.3)
	Antiplatelet	34(18.8)
	Calcium Channel blockers	33(18.2)
	ACE-inhibitor(s)	19(10.5)
	Other chronic medications ¶	50(27.6)
Hospitalization due to side effects	Yes	9(5.0)
	No	172(95.0)
antiplatelet drugs	No	147(81.2)
	Clopidogrel	19(10.5)
	Aspirin	11(6.1)
	Aspirin & clopidogrel	4(2.2)
Adverse reactions of anti-coagulants (bleeding adverse effects)	Epistaxis	42(23.2)
	Bleeding gums	39(21.5)
	Hematuria	11(6.1)
	Menorrhagia	6(3.3)
	Other adverse effects ‡	12(6.6)
	Range	Mean (SD)
duration of anticoagulants (year)	0.17-50.0	5.99 (8.11)

*Other indications: atrial flutter, deep venous thrombosis, pulmonary embolism. † Other chronic diseases: stroke, hypothyroidism, benign prostatic hyperplasia, ischemic heart disease, osteoarthritis, atherosclerosis, epilepsy, gout, rheumatoid arthritis, portal hypertension, hyperthyroidism, ¶ Other chronic medication: 5-a reductase inhibitors, vasodilator, anti-ischemic, thyroxin, anticonvulsants, antiarrhythmic, one alpha, carbimazole, xanthine oxidase inhibitor, other antihypertensive drugs. ‡ Other adverse effects: bruising, melena, bleeding per rectum, hematemesis, hemoptysis, ecchymosis, otorrhagia.

Male patients were found to be more adherent to treatment than female patients. Also, patients with college or tertiary educations were found to be more adherent to treatment compared to other education levels. Additionally, patients who were admitted to the hospital due to bleeding side effects were found to be more adherent to treatment compared to those who were not (Table 5). Regarding the effect of clinical characteristics, the ARMS score had a significant negative correlation with the duration of anticoagulant use (r= -0.194, p=0.009). In other words, when the duration of anticoagulant use decreased, adherence increased (Table 5).

Table 3: Responses of the participants to ARMS questionnaire

ARMS items	None *n*(%)	Some *n*(%)	Most *n*(%)	All *n*(%)	Mean (SD)
1. "How often do you forget to take your medicine?"	117(64.6)	61(33.7)	3(1.7)	-	1.37(0.52)
2. "How often do you decide not to take your medicine?"	161(89.0)	20(11.0)	-	-	1.11(0.31)
3. "How often do you forget to get prescriptions filled?"	152(84.0)	28(15.5)	1.0(0.6)	-	1.17(0.39)
4. "How often do you run out of medicine?"	153(84.5)	28(15.5)	-	-	1.15(0.36)
5. "How often do you skip a dose of your medicine before you go to the doctor?"	169(93.4)	12(6.6)	-	-	1.07(0.25)
6. "How often do you miss taking your medicine when you feel better?"	175(96.7)	6.0(3.3)	-	-	1.03(0.18)
7. "How often do you miss taking your medicine when you feel sick?"	172(95)	9.0(5.0)	-	-	1.05(0.22)
8. "How often do you miss taking your medicine when you are careless?"	168(92.8)	13(7.2)	-	-	1.07(0.26)
9. "How often do you change the dose of your medicines to suit your needs (like when you take more or less pills than you're supposed to)?"	131(72.4)	49(27.1)	1.0(0.6)	-	1.28(0.46)
10. "How often do you forget to take your medicine when you are supposed to take it more than once a day?"	142(78.5)	39(21.5)	-	-	1.22(0.41)
11. "How often do you put off refilling your medicines because they cost too much money?"	159 (87.8)	22(12.2)	-	-	1.12(0.33)
12. "How often do you plan ahead and refill your medicines before they run out?"*	-	2.0(1.1)	9.0(5.0)	170(93.9)	1.07(0.30)

ARMS: The Adherence to refills and medications scale; *The item is reverse coded.

Table 4: Adherence across the study groups

Variable	Anticoagulant	*n*	Mean (SD)	*p*-value*
Total ARMS score	Warfarin	103	13.40(2.01)	0.039
	DOAC	78	14.13(2.55)	
Adherence to take medication score	Warfarin	103	9.02(1.31)	0.095
	DOAC	78	9.44(1.86)	
Adherence to refill medication score	Warfarin	103	4.38(1.04)	0.088
	DOAC	78	4.69(1.33)	
Variable	Frequency		Range	mean (SD)
ARMS score	181		12.0-26.0	13.71(2.28)

ARMS: The Adherence to refills and medications scale. *Significant at p<0.05 level according to independent t-test

The responses of the study participants to SES6C questionnaire items are shown in Table 6. Regarding self-efficacy, the results of the current study have shown that the mean SES6C score for the whole study participants was 50.01±8.86. Findings have also shown that there was a statistically significant difference in patients' self-efficacy to manage their chronic disease (SES6C score) in patients taking warfarin or DOACs treatment (p=0.001) as illustrated in Table 7. Regarding the effect of patients' demographics, the current study's findings have shown that there were no significant correlations between SES6C scores and the demographic characteristics of the patients. In addition, there were no significant correlations between SES6C scores and the disease characteristics of patients (Table 8). Results of the current study have shown that there was a statistically significant positive correlation between the two parameter scores (r= -0.181, p=0.015) (Table 9).

DISCUSSION

Self-efficacy is one of many factors that can affect medication adherence, which is a complex phenomenon. Therefore, it is crucial to identify this factor because non-adherence can negatively affect treatment outcomes and costs for patients with chronic conditions who are receiving long-term treatments. Self-efficacy is an important factor in initiating and maintaining healthy behaviors. For this reason, this study was conducted to assess adherence to medication and self-efficacy between patients receiving either warfarin or DOACs treatment and to identify the demographic and clinical factors that can impact them.

The current study showed that 81.77% of the patients were adherent to the anticoagulant therapy, with an average score of 13.71. The Chen et al. study reported good adherence with no difference between DOACs

and warfarin [30]. Also, a study by Miyazak *et al*. showed that more than three-quarters of patients treated with DOACs for atrial fibrillation had good adherence [31]. Medication adherence with oral anticoagulants is crucial in preventing adverse treatment outcomes and mortality.

Table 5: Difference in ARMS scores according to the patient socio-demographic and clinical characteristics

Variables		*n*	Mean(SD)	*p*-value
*Gender	Male	109	13.38(2.00)	0.020
	Female	72	14.22(2.59)	
†Education level	No formal education	41	14.42(2.51)	0.035
	Primary school	45	13.98(2.62)	
	Secondary school	61	13.43(2.14)	
	College/tertiary	34	13.03(1.40)	
*Marital status	Married	168	13.77(2.32)	0.243
	Unmarried	13	13.00(1.63)	
†Employment status	Employed	52	13.40(1.95)	0.092
	Retired	35	13.23(2.50)	
	Unemployed	94	14.06(2.33)	
†Cigarette smokers	Non-smoker	106	13.90(2.61)	0.23
	Ex-smoker	55	13.27(1.73)	
	Smoker	20	13.95(1.50)	
*Hospitalization	Yes	9	12.67(0.71)	0.001
	No	172	13.77(2.32)	
Pearson's correlation coefficient				
Age (years)			-0.114	0.127
BMI kg/m^2			0.128	0.087
Duration of anticoagulant (year)			-0.194	0.009
Number of chronic diseases			0.123	0.099
Number of side effects			0.002	0.981
Number of Chronic medications			0.105	0.160
Number of Anti-platelets			0.116	0.122

*Significant at $p<0.05$ level according to independent *t*–test. † Significant at $p<0.05$ level according to one-way ANOVA test.

Table 6: Responses of the participants to SES6C questionnaire

SES6C questionnaire	1	2	3	4	5	6	7	8	9	10	Mean (SD)
Confidence to reduce fatigue interfering	1(0.6)	1(0.6)	4(2.2)	22(12.2)	9(5.0)	10(5.5)	22(12.2)	13(7.2)	42(23.2)	57(31.5)	7.81(2.29)
Confidence to reduce pain interfering	-	2(1.1)	7(3.9)	19(10.5)	6(3.3)	8(4.4)	24(13.3)	10(5.5)	40(22.1)	65(35.9)	7.94(2.31)
Confidence to reduce emotional distress interfering	2(1.1)	2(1.1)	7(3.9)	9(5.0)	14(7.7)	10(5.5)	21(11.6)	12(6.6)	40(22.1)	64(35.4)	7.93(2.32)
Confidence to reduce other symptoms interfering	-	1(0.6)	-	4(2.2)	3(1.7)	7(3.9)	20(11.0)	32(17.7)	57(31.5)	57(31.5)	8.59(1.49)
Confidence to reduce need to see doctor	-	-	1(0.6)	7(3.9)	2(1.1)	5(2.8)	14(7.7)	20(11.0)	49(27.1)	83(45.9)	8.84(1.57)
Confidence to reduce illness effects on life	-	1(0.6)	-	3(1.7)	3(1.7)	5(2.8)	13(7.2)	21(11.6)	57(31.5)	78(43.1)	8.90(1.43)

SES6C: self-efficacy for management of chronic disease 6 items scale.

Non-adherence to these medications can significantly increase the risk of major adverse consequences, including transient ischemic attack, ischemic stroke, systemic embolism, intracranial hemorrhage and gastrointestinal bleeding [32]. The present study showed significantly higher adherence to warfarin compared with DOACs therapy. The absence of the need for blood testing and low food and drug interactions were not enough to promote adherence to DOAC therapy. Paradoxically, patients with warfarin showed better adherence to OAC therapy, which may be due to the fact that warfarin use is much stricter than DOACs. There is a need for INR monitoring, food-drug interactions, and drug-drug interactions, leading to a high level of consciousness regarding therapy and disease.

In contrast, previous studies reported that there was no significant difference regarding medication adherence between the warfarin and DOACs treatment groups [10,30]. Patel *et al*. study showed similar adherence was noted between warfarin and DOACs with the higher mean score for warfarin patients by using the Morisky Medication Adherence Scale-8 item [33]. Regarding the effect of demographics on treatment adherence, the current study's results determined a significant association between gender and medication adherence, with male patients being shown to have higher adherence than female patients. The relationship between adherence to medication and gender is controversial among studies. While some studies have reported that females are more likely to adhere to their medication regimen, others have reported the opposite

[34–35]. Moreover, some studies have found the absence of any association between adherence levels and gender [31,33]. Additionally, the present study has shown that education level has a significant association with medication adherence, with higher adherence observed in patients with higher education levels as compared to those with no education. The study results are consistent with previous studies that showed higher education levels had a significant effect on medication adherence [36,37]. Numerous studies show that the participants' education has an impact on high levels of adherence to treatment protocols [38]. Higher-educated individuals are more likely to understand the importance of medications, which has a significant effect on medication adherence. Moreover, the current study revealed that there was a significant positive correlation between treatment adherence and the duration of anticoagulant use. These results were similar to a previous study, which showed that for every year increase in the duration of anticoagulant use, there was an associated better adherence [39]. In contrast, Miyazaki *et al*. reported poor adherence with the long duration of treatment with anticoagulants, and the study of Chen *et al*. showed no significant association [30,31].

Table 7: Self-efficacy across the study groups

Variable	Anticoagulant	n	Mean (SD)	*p*-value*
SES6C score	Warfarin	103	48.06 (8.63)	0.001
	DOAC	78	52.59 (8.53)	
Variable	Frequency		Range	Mean(SD)
SES6C score	181		14.0-60.0	50.01(8.86)

SES6C: self-efficacy for management of chronic disease 6 items scale. *Significant at $p<0.05$ level according to independent *t*-test.

Table 8: Self-efficacy scores according to the patient socio-demographic and clinical characteristics

Variable		*n*	Mean (SD)	*p*-value
*Gender	Male	109	50.21(8.23)	0.710
	Female	72	49.71(9.77)	
†Education level	No formal education	41	48.20(9.76)	0.153
	Primary school	45	48.91(10.24)	
	Secondary school	61	51.92(7.43)	
	College/tertiary	34	50.24(7.72)	
*Marital status	Unmarried	13	45.62(13.68)	0.063
	Married	168	50.35(8.33)	
†Employment status	Employed	52	50.50(8.05)	0.608
	Retired	35	50.94(7.41)	
	Unemployed	94	49.39(9.76)	
†Cigarette smokers	Non-smoker	106	50.24(9.33)	0.091
	Ex-smoker	55	51.02(8.55)	
	Smoker	20	46.05(5.85)	
*Hospitalization	No	172	50.29(8.66)	0.069
	Yes	9	44.79(11.31)	
Pearson's Correlation coefficient				
Age (year)			0.133	0.075
BMI kg\m^2			0.057	0.450
Duration of anticoagulant (year)			-0.143	0.055
Number of chronic diseases			-0.118	0.114
Number of side effects			-0.014	0.851
Number of Chronic medications			0.073	0.329
Number of Anti-platelets			-0.140	0.062

*Significant at $p<0.05$ level according to independent *t*–test. † Significant at $p<0.05$ level according to one-way ANOVA test.

Concerning self-efficacy, the current study has shown relatively high self-efficacy, with a mean score of 50.01. Samah *et al*. reported that the mean self-efficacy score was 38.41 in patients taking oral anticoagulants [14]. Also, another study showed higher self-efficacy levels for the management of chronic disease among patients with coronary artery disease [40].

Table 9: The correlation between patients' self-efficacy and medication adherence

		ARMS score
SES6C score	Person correlation	-0.181
	*p-value	0.015

SES6C: self-efficacy for management of chronic disease 6 items scale. **ARMS:** The Adherence to refills and medications scale. *Significant at $p<0.05$ level.

High levels of self-efficacy may indicate that study participants are adequately dealing with their chronic disease and its management and that they have the capabilities and skills to handle obstacles associated with their conditions. In addition, the current study revealed that there was significantly higher self-efficacy in patients receiving DOACs than in those receiving warfarin treatment. These findings are consistent with those of another study that found patients taking DOACs had higher levels of self-efficacy than those taking warfarin [14]. In the present study, it was shown that self-efficacy correlated significantly with medication adherence, with patients with higher levels of self-efficacy associated with higher treatment adherence. These findings are consistent with prior research, suggesting medication

self-efficacy is a strong predictor of medication adherence [41,42]. This study showed that a person's belief in their capacity was a determining factor in health behavior and treatment adherence. Adherence is likely among adults with better self-efficacy to empower them to make valid decisions about their health [43].

Limitations of the study

Several constraints accompanied this investigation. Initially, the cross-sectional design of this investigation poses a difficulty in establishing causal relationships between the factors associated with the scales utilized. Furthermore, it is possible that participants chose their responses with the expectation of receiving higher scores; this could have resulted in erroneous responses to the questions and, consequently, results that were either overestimated or lacking in reflection. Furthermore, due to the in-person interview method employed to collect the data, the interviewer's bias could have been incorporated into the results. In conclusion, the sample size, study duration, and reliance on a singular center for patient recruitment are regarded as limitations of this research.

Conclusion

Patients treated with DOACs showed higher self-efficacy to manage chronic diseases and lower medication adherence as compared to those using warfarin. The study proved the effects of self-efficacy on medication adherence.

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Conflict of interests

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Data sharing statement

Supplementary data can be shared with the corresponding author upon reasonable request.

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