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Examining the correlation of adherence to warfarin therapy with demographic characteristic

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ABSTRACT

Aims: Warfarin is the most commonly prescribed medication for preventing stroke and thromboembolism in the United States. Numerous demographic and medical factors can affect the success of warfarin therapy. The most determining factor in the success of warfarin therapy is patients' adherence to the treatments. This study was conducted to examine "the correlation between adherence to warfarin therapy and demographic characteristics among patients referring to warfarin clinics".

Methods: In this cross-sectional descriptive study, a purposive sample of 400 patients receiving warfarin was recruited in 2013 from two warfarin clinics located in Tehran, Iran. A demographic questionnaire, the Morisky Medication Adherence Questionnaire, the International Normalized Ratio test, and the number of attendance at warfarin clinics were used for data collection. Study data were analyzed by using the SPSS software v. 19.0, the Mann-Whitney and the Chi-square tests, and the measures of descriptive statistics.

Results: Based on the scores of the Morisky questionnaire, 57.8% of participants had adherence to warfarin therapy. The INR value of 73.5% of the participants was in the therapeutic range and 38% of them had attended warfarin clinics regularly. Only 27.8% of the participants met all the three criteria of adherence to warfarin therapy. Warfarin adherence was significantly correlated with educational status ($p<0.0001$), household members ($p=0.041$), employment ($p<0.0001$), house area ($p=0.0120$, and income ($p=0.002$).

Conclusions: Adherence to warfarin therapy is a multi-factorial behavior which is affected by factors such as educational, financial, familial, and employment status. Nurses need to take these factors into account when developing care plans and educational programs for patients in order to enhance patients' adherence to warfarin therapy.

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1. Introduction

Warfarin is the most commonly prescribed medication for preventing stroke and thromboembolism in the United States. Warfarin therapy for patients with atrial fibrillation decreases the risk of stroke by two third [1]. Numerous demographic and medical factors such as age, marriage, dietary regimen, drug interactions, underlying condition, and genetic factors can affect the success of warfarin therapy [2]. Accordingly, physicians need to regularly check patients' International Normalized Ratio (INR) in order to adjust the dosage of warfarin. The ultimate aim of warfarin therapy is to achieve an INR of 2–3. Such an INR is associated with greatest treatment effectiveness and minimal risk of experiencing warfarin side effects [3].

The most determining factor in the success of warfarin therapy is patients' adherence to the treatments. Cruess et al. (2010) reported that patients' adherence considerably affects the success of anticoagulant therapy [3]. By definition, adherence is patients' voluntary behaviors according to healthcare professionals' advice and includes following the treatment regimen, taking prescribed medications, making recommended lifestyle modifications, and having laboratory tests in order to achieve positive treatment outcomes [2]. However, studies have shown that non-adherence is a major health problem among patients with chronic conditions [4]. It not only decreases the effectiveness of treatments, but also increases the costs related to managing chronic conditions [4]. Kimmel et al. (2007) noted that about 5% of all hospital admissions are secondary to poor adherence to treatment regimens and are directly associated with increased healthcare costs up to eight billions of dollars [5]. Moreover, non-adherence to medicines among patients with chronic conditions is about 50% [6] which damages countries' domestic economy by 300–700 billions of dollars [7].

As the key members of healthcare teams, nurses need to adopt measures for enhancing patients' adherence to treatments. A prerequisite for enhancing patients' adherence to treatments is to identify factors contributing to adherence. Rolnick et al. (2013) noted that identifying these factors helps enhance patients' adherence and improves their quality of life [8]. Moreover, it can help minimize the adverse effects of non-adherence, re-hospitalizations, and healthcare costs. Consequently, nurses and other healthcare professionals ought to identify these factors and provide educations to patients in order to enhance their adherence and minimize the adverse effects of non-adherence.

Although the history of using warfarin goes back to more than 60 years ago [9], little information still exists on patients' adherence to warfarin therapy regimens.

This study was conducted to examine the correlation between adherence to warfarin therapy and demographic characteristics among patients referring to warfarin clinics located in Tehran, Iran.

2. Methods

This cross-sectional descriptive study was conducted in 2013 in the warfarin clinics of Shahid Rajaei Hospital and Tehran Heart Center, Tehran, Iran.

A purposive sample of patients receiving warfarin was recruited from the study setting. Patients were included if they had an age of greater than 21 years, had received warfarin for at least two months, and had undergone four INR tests before their last attendance at warfarin clinics. Considering a non-adherence rate of 0.21 [1], a type I error of 0.05, and a precision of 0.04, the sample size was determined to be 400.

A two-part instrument was employed for data collection. The first part contained items on participants' demographic characteristics while the second part was the Modified Morisky Medication Adherence Questionnaire (MMMAQ). The MMMAQ includes four questions on patients' adherence to medication. Questions are scored on a five-point Likert scale on which scores of 4, 3, 2, 1, and 0 stand

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for respectively Never, Rarely, Sometimes, Often, and Always. Scores higher than 14 and lower than 14 are interpreted as medication adherence and medication non-adherence, respectively. We also used the results of INR tests for assessing adherence to warfarin therapy. The therapeutic range of INR was considered to be between 2 and 3. Accordingly, the results of the last four INR tests which had been documented in patients' warfarin therapy notebook were retrieved. The number of INR values which were below 2 or above 3 was divided by four and multiplied by 100. If the result was higher than 25%, it denoted poor warfarin therapy adherence. For instance, if one INR value was not in the therapeutic range, the coefficient was equal to 25% which implied warfarin therapy adherence. Another aspect of adherence is patients' regular attendance at scheduled appointments [10]. We assessed this aspect of adherence by counting the number of attendance at warfarin clinics for having INR test. In our study setting, attending physicians had arranged the next appointment for INT testing and documented it in patients' notebooks. Accordingly, we considered the last four appointments in the last year preceding the study. The number of missed appointments were divided by the total number of appointments and multiplied by 100. Coefficients higher than 25% denoted poor attendance. For instance, if a patient had missed only one appointment, the coefficient was equal to 25% and the patient was considered as having good appointment attendance. Patients were labeled as having good adherence to warfarin therapy only if they acquired satisfactory scores on the three scales of MMMAQ, INR, and appointment attendance.

The validity of the demographic questionnaire and the MMMAQ was assessed by using the Waltz and Busell's content validity index. Accordingly, the questionnaires were provided to ten faculty members of Shahid Beheshti Faculty of Nursing and Midwifery, Tehran, Iran, and they were asked to determine the relevance, clarity, and readability of each item on a four-point scale from 1 to 4 and the essentiality of the items on a three-point scale from 1 to 3 [11]. Then, the number of faculty members who had scored an item as 3 or 4 was divided by their total number (i.e. ten). The mean content validity indices of the demographic questionnaire and the MMMAQ were 82% and 95%, respectively. The reliability of the questionnaires was also assessed by using the test-retest method.

The SPSS software v. 19.0 was used for data management and analysis. The Mann-Whitney and the Chi-square tests were undertaken for assessing the relationship of warfarin adherence with ordinal and categorical variables, respectively.

3. Results

From a total of 400 patients who participated in this study, 61% were female and 39% were male with a mean age of 52.97±13.32 years. Most participants had an age of 40–60 years (49.3%) and were married (75%). About half of the participants were housewives and 36.5% of them had elementary education. More than half of them had an average monthly income of 500000–1000000 Tomans (51%) and lived with their spouses and children (52%). The house area of most of the participants was 50–100 square meters.

As table 1 show, 57.8% of the participants had

Table 1: Warfarin adherence based on the three measures of adherence

Adherence / Criteria	Yes N (%)	No N (%)
MMMAQ score	231 (57.8)	169 (42.3)
INR test	294 (73.5)	106 (26.5)
Regular attendance at warfarin clinic	152 (38)	248 (62)
Overall warfarin adherence	111 (27.8)	289 (72.3)

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adherence to warfarin therapy based on MMMAQ scores. The INR value of 73.5% of the participants was in the therapeutic range and 38% of them had attended warfarin clinics regularly. Only 27.8% of the participants met all the three criteria of warfarin therapy adherence (Table 1).

Study findings revealed that the correlation of warfarin therapy adherence with age, gender, and marital status was not statistically significant. However, adherence to warfarin therapy was significantly correlated with educational status ($p<0.0001$), household members ($p=0.041$), employment ($p<0.0001$), house area ($p=0.0120$, and income ($p=0.002$).

4. Discussion

The findings of the present study revealed that poor warfarin adherence and irregular appointment attendance at warfarin clinics were common among the participants. However, despite poor adherence and attendance, the INR values of most of the participants were in the therapeutic range. Kim et al. (2011) also reported that warfarin adherence cannot be considered as a predictor of effective anticoagulant therapy [12]. However, Kimmel et al. (2007) and Cruess et al. (2010) found that poor warfarin adherence significantly affects anticoagulation control [3,5]. Moreover, Kääriäinen et al. (2011) noted that adherence

Table 2: The correlation of warfarin adherence with demographic characteristics

Characteristics	Adherence	Yes N (%)	No N (%)	P value
Gender	Female	74 (18.5)	170 (42.5)	0.15
	Male	37 (9.3)	119 (29.8)	
Age groups	21–40	20 (5)	63 (15.8)	
	40–60	49 (12.3)	148 (37)	0.105
	> 60	42 (10.5)	78 (19.5)	
Marital status	Married	85 (21.3)	215 (53.8)	
	Single	10 (2.5)	20 (5)	0.508
	Widowed/divorced	16 (4)	54 (13.5)	
Education	Illiterate	9 (2.3)	65 (16.3)	
	Elementary	41 (10.3)	105 (26.3)	<0.0001
	High school	26 (6.5)	82 (20.5)	
	University	35 (8.8)	37 (9.3)	
Employment	White-collar worker	8 (2)	24 (6)	
	Blue-collar worker	3 (0.8)	16 (4)	
	Unemployed	10 (2.5)	19 (4.8)	<0.0001
	Self-employed	8 (2)	55 (13.8)	
	Retired	35 (8.8)	28 (7)	
	Housewife	47 (11.8)	147 (36.8)	
Income	<500000 Tomans	29 (7.3)	103 (25.8)	
	500000–1000000	53 (11.3)	151 (37.8)	0.001
	1000000–1500000	17 (4.3)	27 (6.8)	
	>1500000	12 (3)	8 (2)	
House area	<50 m^2	5 (1.3)	53 (13.3)	
	50–100	78 (19.5)	174 (43.5)	0.002
	>100	28 (7)	62 (15.5)	
Household members	None	0 (0)	22 (5.5)	
	Spouse	28 (7)	60 (15)	
	Children	12 (3)	28 (7)	0.041
	Spouse and children	57 (14.3)	151 (37.8)	
	Others	14 (3.5)	28 (7)	

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was significantly correlated with INR values [9].

We also found that patients in different age groups had similar warfarin adherence. Tantikosoom et al. (2011) and Kim et al. (2011) also reported the same finding [12 and 13]. However, Platt et al. (2008) noted that patients aged higher than 55 years had lower adherence compared with the younger ones [1]. Pamboukian et al. (2008) also reported a direct relationship between adherence and age [14].

Study findings also showed no significant correlation between adherence and gender. Vik et al. (2006) noted that gender is not a good predictor of medication adherence [15]. However, Rolnick et al. (2013) reported that men have more adherence compared with women probably because women are primary family caregivers and hence, they have less time for doing self-care activities [8].

Another finding of the present study was that warfarin adherence was significantly correlated with household members. Available evidence shows that patients who live at their own homes with their family members as well as patients whose family members, particularly their spouses, are actively involved in the care delivery process are more likely to adhere to treatment regimens [8].

We also found a significant correlation between warfarin adherence and educational status. Platt et al. (2008) also found that non-adherence was more prevalent among patients with primary and secondary education [1]. Although individuals with higher levels of education have greater health knowledge and hence show greater adherence [1, 12, and 16], individuals with lower levels of education also show close treatment adherence because they have more confidence in physicians' advice [17].

The findings of the present study also indicated that warfarin adherence was significantly correlated with patients' employment status. Platt et al. (2008) reported that adherence was stricter among unemployed and retired patients compared with the employed ones [1]. This finding is probably due to the fact that employed patients are busier and hence, forget to take their medications. Jin et al. (2008) also noted that housewives can manage their time, treatment regiments, and medical appointments more effectively [16].

We also found that warfarin adherence was significantly correlated with house area and income. Treatment-related costs are among the significant predictors of adherence particularly among patients with chronic conditions who need long-term treatments [18]. Costs and income are interrelated. In other words, patients with higher incomes or better insurance coverage can handle financial pressures more efficiently. Studies have shown that patients with no insurance or with low income show less treatment adherence [16]. Yahya et al. (2009) conducted a study on patients receiving warfarin in Malaysia and reported that income is significantly correlated with warfarin adherence [19].

5. Conclusions

Adherence to warfarin therapy is a multi-factorial behavior which is affected by factors such as educational, financial, familial, and employment status. Nurses need to take these factors into account when developing care plans and educational programs for patients in order to enhance patients' adherence to warfarin therapy.

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References

1. Platt AB, Localio AR, Brensinger CM, Cruess DG, Christie JD, Gross R, et al. Risk factors for nonadherence to warfarin: results from the IN-RANGE study. Pharmacoepidemiology and drug safety. 2008;17(9):853-60.
2. Ewen S, Rettig-Ewen V, Mahfoud F, Böhm M, Laufs U. Drug adherence in patients taking oral anticoagulation therapy. Clinical Research in Cardiology. 2014;103(3):173-82.

[Downloaded from jccnursing.com on 2026-11-04]

3. Cruess DG, Localio AR, Platt AB, Brensinger CM, Christie JD, Gross R, et al. Patient attitudinal and behavioral factors associated with warfarin non-adherence at outpatient anticoagulation clinics. International journal of behavioral medicine. 2010;17(1):33-42.
4. Stefan H. Improving the effectiveness of drugs in epilepsy through concordance. ACNR. 2009;8(6):158.
5. Kimmel SE, Chen Z, Price M, Parker CS, Metlay JP, Christie JD, et al. The influence of patient adherence on anticoagulation control with warfarin: results from the International Normalized Ratio Adherence and Genetics (IN-RANGE) Study. Archives Internal Medicine. 2007;167(3):22-9.
6. Doggrell SA. Adherence to medicines in the older-aged with chronic conditions. Drugs & aging. 2010;27(3):239-54.
7. Munger MA, Van Tassell BW, LaFleur J. Medication nonadherence: an unrecognized cardiovascular risk factor. Medscape General Medicine. 2007;9(3):58.
8. Kääriäinen M, Paukama M, Kyngäs H. Adherence with health regimens of patients on warfarin therapy. Journal of Clinical Nursing. 2012.
9. Levensky ER, O'Donohue WT. Promoting treatment adherence: A practical handbook for health care providers: Sage Publications, Incorporated. 2006.
10. LoBiondo-Wood G, Harber J. Nursing research: methods and critical appraisal for evidence-based practice. St. Louis (USA): Mosby. Elsevier. 2006.
11. Kim JH, Kim GS, Kim EJ, Park S, Chung N ,Chu SH. Factors affecting medication adherence and anticoagulation control in Korean patients taking warfarin. J Cardiovascular Nursing. 2011;26(6):466-74.
12. Tantikosoom P, Aungsuroch Y, Jitpanya C. Factors Predicting Medication Adherence among Cardiovascular Patients in a Primary Care Setting. Pacific Rim International J Nursing Research. 278.
13. Pamboukian SV, Nisar I, Patel S, Gu L, Mcleod M, Costanzo MR, et al. Factors Associated with Non-adherence to Therapy with Warfarin in a Population of Chronic Heart Failure Patients. Clinical Cardiology. 2008;31(1):30-4.
14. Vik SA, Hogan DB, Patten SB, Johnson JA, Romonko-Slack L, Maxwell CJ. Medication nonadherence and subsequent risk of hospitalisation and mortality among older adults. Drugs & Aging. 2006;23(4):345-56.
15. Jin J, Sklar GE, Oh VMS, Li SC. Factors affecting therapeutic compliance: A review from the patient's perspective. Therapeutics & Clinical Risk Management. 2008;4(1):269
16. Khan AR, Lateef ZNA-A, Al Aithan MA, Bu-Khamseen MA, Al Ibrahim I, Khan SA. Factors contributing to non-compliance among diabetics attending primary health centers in the Al Hasa district of Saudi Arabia. J Family and Community Medicine. 2012;19(1):26.
17. Hassali MAA. Factors Associated with Warfarin Therapy Knowledge and Anticoagulation Control among Patients Attending a Warfarin Clinic in Malaysia Yahaya AHM, Hassali MA, Awaisu, Shafie AA. 2009.

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