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Factors Affecting Adherence to Oral Anticoagulants Among Patients with Atrial Fibrillation

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Abstract

Background: Atrial fibrillation (AF) is a cardiac arrhythmia with a high risk of thromboembolic strokes and mortality, necessitating thromboembolic prophylaxis for most patients. Adherence to anticoagulant therapy is crucial for therapeutic effects, which remains a challenge due to multifactorial influences. **Aim**: The study aimed to assess adherence to oral anticoagulants (OACs) and to identify factors affecting OACs adherence among patients with atrial fibrillation**. Design:** A descriptive exploratory research design was used. **Setting:** The study was conducted at the Outpatient and Cardiac Care Unit at Beni Suef University Hospital. **Sample:** A purposive sample of 92 adult patients was included in the study. **Tools:** Three tools were used to collect data. **Tool I.** Patient Structured Interview Questionnaire: included three parts. Part I: Patient's Socio-demographic characteristics, Part II: Patient's medical history, Part III: Patient's Knowledge Assessment Questionnaire. **Tool II.** Morisky Medication Adherence Scale. **Tool III.** Factors Affecting Medication Adherence Questionnaire. **Results**: The study revealed that 81.5% of the studied patients had unsatisfactory knowledge, and 76.1% showed a low adherence level to OACs. Additionally, regression analysis highlighted the impact of age, comorbidities, medication cost, and duration of therapy on adherence levels. **Conclusion**: Poor adherence to OACs is prevalent and influenced by multiple factors, including limited patient knowledge, financial burden, and systemic healthcare issues. **Recommendations:** Structured educational interventions are indicated to enhance patient adherence. Further research with larger, diverse populations is needed to generalize findings and identify additional influencing factors.

Keywords: *Atrial Fibrillation, Adherence, Oral Anticoagulants.*

Introduction

Atrial fibrillation (AF) is a cardiac arrhythmia characterized by asynchronous, continuous stimulation of the atrium, leading to ineffective atrial contractions and, hence, inadequate blood circulation throughout the body. AF is widely recognized as the most prevalent heart rhythm disorder that influences 2-4% of adults globally and is anticipated to dramatically increase in the future decades to pandemic levels. Although it is not a fatal condition, AF is linked to an elevated danger of thromboembolic strokes and death, cognitive and psychological problems, recurrent hospitalization, and an apparent reduction in quality of life ***(Belletti et al., 2024).***

Being hospitalized for AF is becoming more common; it is currently exceeding heart failure and myocardial infarction. Approximately one-third of hospitalizations for heart rhythm disorders are caused by this arrhythmia ***(Kukendrarajah et al., 2024).*** Nearly 15% of strokes are attributed to atrial fibrillation. Strokes caused by AF are more likely to be deadly or leave you severely disabled **(Choi et al., 2023).** Patients with AF who are at elevated risk of stroke are recommended to take antithrombotic medication, especially oral anticoagulants (OACs) ***(Lee et al., 2024).***

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Adherence to OACs is critical, as this treatment is beneficial in preventing stroke. Which is affected by several factors, are divided into five major categories by the World Health Organization (WHO): social and economic factors, healthcare team and system factors, condition-related factors, therapy-related factors, and patient-related factors ***(Burnier, 2024).*** Poor adherence can have a detrimental impact on several aspects of managing diseases, including worsening conditions that occasionally require acute hospitalization, higher health expenses, and, of course, a decline in the quality of life of individuals ***(Dagnew et al., 2024).***

In addition to having a crucial role in providing healthcare, nurses are in an ideal position to affect patient adherence to medications. Their ongoing interactions with patients offer chances to educate and encourage them to change their medication intake habits, assist patients in following their prescribed therapeutic schedule, and offer medication-taking reminders. Nurses' responsibilities include patient education, counseling, surveillance, and follow-up, all of which are crucial aspects of enhancing adherence ***(Ruswati, 2024).***

Significance of The Study

Globally, atrial fibrillation is the most prevalent cardiac arrhythmia, which is thought to impact 2% of the general population. Still, when silent AF is considered, the true prevalence of AF is probably closer to 3%–4% ***(Andrade et al., 2023).*** It is also estimated that the absolute AF burden may increase by greater than 60% by 2050 ***(Akboga et al., 2023).***

Atrial Fibrillation is a serious cardiac arrhythmia with distinct features that raise the risk of complications like thrombosis and stroke. About 20–30% of ischaemic strokes, particularly in elderly adults, are caused by atrial fibrillation. For patients with atrial fibrillation, long-term oral anticoagulation is an optimal therapy for stroke prevention ***(Galea et al., 2023).***

However, the effectiveness of this therapy largely depends on medication adherence, which plays a crucial role in achieving desired clinical outcomes ***(Kvarnstrom et al., 2021)***. Therefore, in this study, the investigator will examine the extent of patients' adherence and factors affecting adherence to oral anticoagulant therapy.

Aim of the study

The study aimed to identify factors affecting adherence to oral anticoagulants among patients with atrial fibrillation through the following objectives:

1- Assess the level of adherence to oral anticoagulants among patients with atrial fibrillation.
2- Identify factors affecting adherence to oral anticoagulants among patients with atrial fibrillation.

Research questions

1. What is the level of adherence to oral anticoagulants among patients with atrial fibrillation?
2. What are the factors affecting adherence to oral anticoagulants among patients with atrial fibrillation?

Subjects and Methods

Research design

A descriptive exploratory research design was utilized for the conduct of this study.

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Setting

This study was carried out at the Cardiac Care Unit and outpatient clinics at Beni-Suef University Hospital, affiliated to Beni-Suef University.

Subjects

A purposive sample of 92 patients with atrial fibrillation of both genders who were admitted to outpatient cardiac clinics and the cardiac care unit of Beni-Suef University Hospital, affiliated to Beni-Suef University, Egypt.

Sample equation

The sample size for this study was calculated according to **(Charan and Biswas 2013)** using the following equation:

$$n = \frac{p(1-p)}{(SE \div t) + [p(1-p) \div N]}$$

Where:

N = Total sample size **P**= Is probability = 0.05
SE= Standard error = 0.09 **T** = t tables probability at P< 0.05 = 1.96
N = number of populations = ≈ 400 **(Beni Suef University Hospital statistics, 2023).**

$$n = \frac{0.05-(1-0.05)}{(0.09 \div 1.96)+[0.05(1-0,05) \div 400]} = 91.45 \quad = \approx \mathbf{92}$$

Sample criteria

Inclusion criteria:

The subjects included in the present study were selected according to the following criteria:

- Patients diagnosed with AF who are actively receiving oral anticoagulants**.**
- Patients able to communicate and willing to participate in the study.
- Adult patients of both genders ≥ 18 years old**.**

Tools of data collection

Data was collected using three tools as follows:

Tool I. Patient's Structured Interview Questionnaire: This tool was adapted after reviewing relevant and recent literature from ***(Elkerdawy et al., 2023)*** and consisted of three parts**:**

First part: Patient's Sociodemographic Characteristics: This part concerned the patient's socio-demographic data, such as age, gender, marital status, educational level, occupation, average monthly income, place of residence, living situation, and treatment payment system. It is composed of 9 multiple-choice closed-ended questions.

Second part: **Patient's medical history:** This part was used to assess the patient's present and past health history. It included 15 multiple-choice closed-ended questions, eight for present history and seven for past history. The present history included questions that assessed the patient's chief complaint, current medications, investigation, diagnostic criteria, causes of the current admission, etc. The past medical history included items regarding comorbid conditions, previous operations, hospitalization, etc.

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This part was modified to include rephrasing of certain questions and the addition of new questions focused on oral anticoagulants and the incidence of strokes.

Third part: Patient's Knowledge Assessment Questionnaire: It consisted of (12) items that assessed patients' level of knowledge regarding the disease process and oral anticoagulant therapy in the form of multiple-choice questions. It consisted of two parts: knowledge about atrial fibrillation (3 questions), knowledge about oral anticoagulant therapy (6 questions), and blood monitoring testing (3 questions).

1. Knowledge about atrial fibrillation: questions related to the meaning, symptoms, treatments, and complications of the disease.
2. Knowledge about oral anticoagulant therapy: questions related to general information about the effect of the medication, possible side effects, interaction with food, and follow-up.

This questionnaire has been modified to include questions on INR monitoring, reduced to twelve questions, and changed from yes/no to a multiple-choice format for more detailed assessment.

Scoring system

Two levels of scoring were used for each question. A correct response, predetermined according to the literature review, was scored as (1), while an incorrect answer or a "don't know" response was scored as (0). Therefore, the total score for the 12 questions was 12 points.

- A score of ≥ 75% was considered a satisfactory level of knowledge (≥ 9 degrees).
- A score of < 75% was considered an unsatisfactory level of knowledge (< 9 degrees).

Tool II. Morisky Medication Adherence Scale (MMAS):

This tool was used to assess patients' adherence levels regarding oral anticoagulant therapy. It included 8 MCQ questions and was adopted from **Morisky et al., (2008).**

Scoring system:

The scoring system regarding patients' adherence was as follows: one point was given for a "Yes" answer and zero for a "No" answer, with a total score of 8 for all 8 questions. The total level of patients' adherence was categorized as follows, according to ***(Tan et al., 2016):***

- A score of 8 reflected a high adherence level.
- A score from 6 to 7 reflected a medium adherence level.
- A score less than 6 reflected a low adherence level.

Tool III. Factors Affecting Medication Adherence Questionnaire: It comprised 51 items presented as statements, organized into five dimensions. These included educational, social, and economic dimensions with 13 statements; health care system dimensions with 10 statements; condition-related dimensions with 4 statements; therapy-related dimensions with 6 statements; and patient-related dimensions, which were further divided into physical factors with 5 statements and psychological and behavioral factors with 13 statements. This tool was adopted from ***(Mahmoud et al., 2022),*** after reviewing related literature**: WHO (2003), Choudhry et al., (2022), and Farinha et al., (2022)**. The tool covered 51 statements with "Yes" or "No" answers. It was represented statistically using numbers and percentages.

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Scoring system:

- A score of ≥ 36, representing ≥ 70%, indicates a highly affecting factor.
- A score of < 36, representing < 70%, indicates a low affecting factor.

Tools Validity and Reliability:

Validity

Content and face validity were conducted to determine whether the tools covered the aim and test their appropriateness, comprehensiveness, accuracy, clarity, relevance, understanding, and applicability through a jury of seven experts; four of them were professors, assistant professors, and three of them were lecturers in the field of Medical-Surgical Nursing, Helwan University, Beni Suef University, and Ain Shams University. Their opinions were elicited regarding tool consistency, rephrasing for some statements, and the scoring system. Finally, the final forms were developed.

Reliability

The reliability of the tools was assessed by measuring their internal consistency with the Cronbach Alpha Coefficient test. The results indicated a reliability score of 0.662 for the knowledge questionnaire. The second tool, which assessed adherence, showed a reliability score of 0.654. The third tool, designed to measure factors affecting adherence, had a reliability score of 0.759. This only proves that this tool is an instrument with good reliability.

Ethical Considerations

Official permission to conduct the proposed study was obtained from the Scientific Research Ethics Committee of the Faculty of Nursing at Helwan University, specifically from Committee No. 38 on January 2, 2024. Participation in the study was voluntary, and all the subjects were given complete, full information about the study and their role before signing the informed consent. Ethical considerations included a clear explanation of the study's purpose and nature, the option to withdraw at any time, and the assurance of confidentiality of the information provided. Respect for ethics, values, culture, and beliefs was maintained throughout the study.

Pilot study

The pilot study was done on (10%) of the sample (10 patients) to test the applicability, feasibility, clarity of the questions, and time needed to complete the study tools. Subjects were included and chosen randomly from the previously mentioned setting and later included in the sample. According to the results of the pilot study, no modifications were made to the used tools. So, patients shared in the pilot study were involved in the sample.

Fieldwork

- To carry out the study, approval was obtained from the hospital and the nursing directors of the outpatient and cardiac care unit at Beni Suef University Hospital.
- Data for the current study was collected over six months began from March 2024 to the end of August 2024, and official permissions were granted. A total of 92 patients who fulfilled the criteria for inclusion were recruited into the present study.
- The investigator collected data 3 days a week during the morning shift in the previously mentioned settings.

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- Each patient was interviewed and assessed individually. The patients' oral acceptance to be included in the study was obtained after explaining the purpose and nature of the study, and the interview questionnaire was filled out. The investigator collected about 2-3 patients per day.
- The interview questionnaire was filled out in a time range of 20-30 minutes according to the patient's tolerance, and every patient was allowed to ask any questions to clear any misunderstanding and to fill out the interview questionnaire.

Statistical Analysis

Data was analyzed using the Statistical Package for Social Science (SPSS), version 25. Numerical data were expressed as mean, standard deviation (SD), and range. Qualitative data were expressed as frequency and percentage. The chi-square test was used to examine the relationship between qualitative variables. The correlation between different numerical variables was tested using the Pearson product-moment correlation coefficient. Linear regression was used for multivariate analyses on adherence to oral anticoagulant therapy as a dependent factor; a P-value less than 0.05 was considered significant.

Results

Table (1): Frequency and percentage distribution of the patients studied according to their sociodemographic characteristics (n = 92).

Patients' sociodemographic characteristics		(No.)	%
Age (in years)	18-<30	1	1.1
	30-<40	0	0.0
	40-<50	16	17.4
	>50	75	**81.5**
	Mean ± SD		**62.40± 13.163**
Gender	Female	49	**53.3**
	Male	43	46.7
Marital status	Single	3	3.3
	Married	72	**78.3**
	Widowed	17	18.4
	Divorced	0	0.0
Education level	Can't read and write	50	**54.3**
	Primary education	8	8.7
	Secondary education	23	25.0
	University education	11	12.0
Occupation	Working	35	38.0
	Not working	41	**44.6**
	Housewife	16	17.4
If yes, the nature of work (n=51)	Manual work	25	49.0
	Official work	26	51.0
Monthly income adequacy (reported by the patient)	Enough for treatment costs	38	41.3
	Not enough for treatment	54	**58.7**
Treatment payment system	Patient expense	45	**48.9**
	At state expense	15	16.3
	Health insurance expense	32	34.8
Residence	Rural	50	**54.3**
	Urban	42	45.7

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Living situation	Live alone	5	5.4
	Live with a family	87	**94.6**

Table (1): Shows that 81.5% of the studied patients are aged ≥ 50 years with X ± SD of 62.40± 13.163, 53.3% of them were female, 78.3% of them were married, 54.3% of the studied patients cannot read and write, and 54.3% of them were living in rural areas. Regarding occupation and monthly income, 44.6% were not working, and 58.7% had insufficient monthly income for treatment expenses. Moreover, 48.9% of them are treated at their own expense.

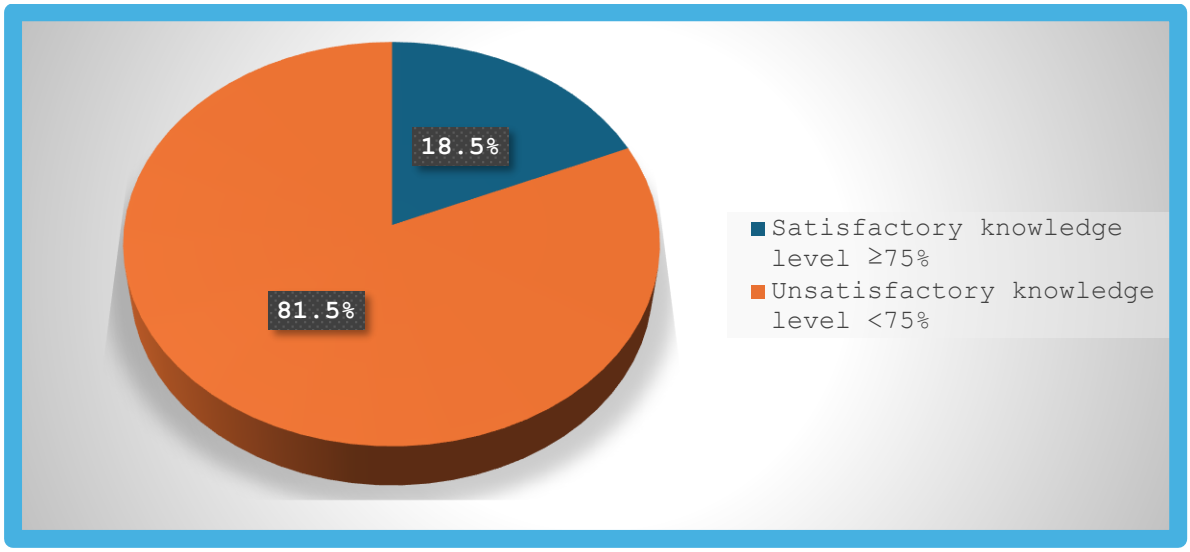

Figure (1): Distribution of the patients studied according to their total knowledge level regarding atrial fibrillation and oral anticoagulant therapy (n= 92).

Fig (1): Illustrates that 81.5% of the patients studied had an unsatisfactory total knowledge level regarding atrial fibrillation and oral anticoagulant therapy, while 18.5% had a satisfactory knowledge level.

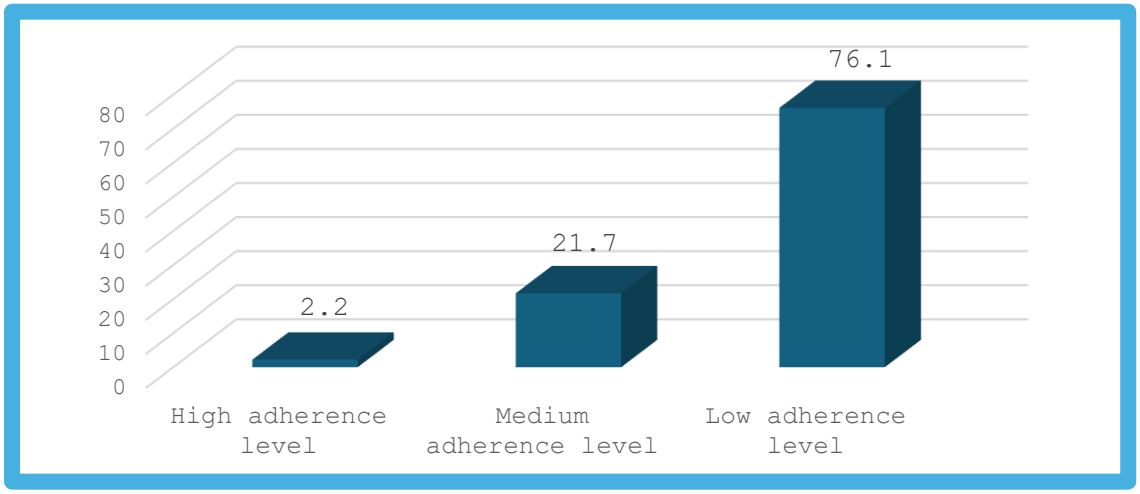

Figure (2): Distribution of the patients studied according to their total adherence level to oral anticoagulant therapy (n= 92)

Fig (2): Clarifies that 76.1% of the patients studied had low adherence levels, while only 2.2% had high adherence levels to oral anticoagulants.

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Table (2): Frequency and percentage distribution of the patients studied according to factors affecting their medication adherence (n = 92).

Table 2.1:

Educational, social, and economic Factors	Yes		No	
	No.	%	No.	%
The medical terminology that the doctor uses during treatment prescription is not understood.	54	**58.7**	38	41.3
Can read and understand the medical guidelines for treatment.	42	**45.7**	50	54.3
The doctor provides treatment instructions and advice to family members, but not directly to the patient.	28	30.4	64	69.6
Family members help to take medication regularly.	75	**81.5**	17	18.5
Currently facing family problems that may affect medication adherence.	24	26.1	68	73.9
The list of treatments in a day is so full that people can forget some names.	35	38.0	57	62.0
The pharmacy's location is sometimes too difficult to reach for purchasing medicine.	33	35.9	59	64.1
Healthcare institutions are far away from home.	41	44.6	51	55.4
Having health insurance ensures access to prescribed medication.	38	41.3	54	58.7
The medications are sometimes too expensive to buy.	78	**84.8**	14	15.2
Have no desire to take medicine because of some thoughts.	25	27.2	67	72.8
Increase, decrease, or stop the dose without the doctor's advice.	30	32.6	62	67.4
The medication may not be available in pharmacies sometimes	26	**28.3**	66	71.7

Table 2.1: **Regarding Educational, and socioeconomic factors,** it reveals that 58.7% of the studied patients couldn't understand the medical terminologies used by the doctors, ٥٤.٣% of the studied patients couldn't understand the medical guidelines for treatment, and 81.5% of them had family support on adhering to medicines. Additionally, 58.7% of the studied patients had no health insurance to dispense the drugs for free, 84.8% suffered from the high cost of medicine, and 28.3% reported that the medication was sometimes unavailable in pharmacies.

Table 2.2:

Health-care system factors	Yes		NO	
	NO	%	NO	%
The doctor presents all available medications for AF and considers patient preference before prescribing.	37	40.2	55	**59.8**
The doctor explains how to use the treatment, the importance of its use and side effects, and how to deal with them.	68	**73.9**	24	26.1
The doctor allows asking questions and answering them.	86	93.5	6	6.5
The doctor and nurse provide motivation to ensure regular medication	76	**82.6**	16	17.4
Follow-up health institutions hold educational sessions about the necessity of commitment to taking medicine and how to take it.	15	16.3	77	**83.7**
The doctor's instructions on how to use medicine are unclear and	12	13.0	80	87.0
More than one medicine is prescribed by the doctor to be taken at the same	76	**82.6**	16	17.4

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The doctor is sometimes absent on follow-up days.	44	**47.8**	48	52.2
Long wait times in the clinic sometimes lead to skipped visits.	38	41.3	54	58.7
The doctor who conducted the initial examination is the one who follows up on every visit.	25	27.2	67	**72.8**
Therapy-related factors	**Yes**		**No**	
	No.	**%**	**No.**	**%**
The number of drugs and their dose is so many per day.	68	**73.9**	24	26.1
The treatment period is long so I can't take it regularly.	53	**57.6**	39	42.4
The doctor constantly changes the treatment regimen.	41	44.6	51	55.4
Taking medicine regularly is a stigma in society.	9	9.8	83	**90.2**
The drug causes unwanted side effects.	39	42.4	53	57.6
Taking medication regularly affects daily life activities such as feeling	47	**51.1**	45	48.9

Table 2.2: Regarding healthcare system factors, it shows that 59.8% of the studied patients reported that physicians don't show all the drug options, while 73.9% of them reported that physicians explain how to use the treatment and its importance, and 82.6% of the studied patients stated that their healthcare providers motivate them to take medication regularly. Also, 83.7% of patients reported that no instructional programs were offered in healthcare settings to emphasize the importance of medication adherence. Also, 82.6% of the studied patients were taking multiple medications simultaneously, 47.8% of them stated that the doctor is sometimes absent from the outpatient clinics, and 72.8% of them said that the doctor who initially examined them wasn't following them on every visit.

Regarding therapy-related factors, it describes that 73.9% of the studied patients took multiple medications daily, 57.6% of them stated that the long treatment period affected their adherence, and 90.2% of the studied patients don't consider illness and treatment to be a stigma, while only 9.8% saw illness and treatment as a stigma. Also, 42.2% of the patients noted that the drug causes unwanted side effects, and 51.1% of them reported that taking the medication regularly impacts daily life activities, with patients often experiencing side effects such as fatigue.

Table 2.3:

Condition-Related factors	**Yes**		**No**	
	No.	**%**	**No.**	**%**
Think that this disease is chronic and can't be cured.	61	**66.3**	31	33.7
Have no symptoms that affect daily life activities such as chest pain, so don't take medicine.	17	18.5	75	81.5
Symptoms increase despite taking medicine.	56	**60.9**	36	39.1
Taking medications will cause psychological problems such as depression.	47	**51.1**	45	48.9
Patient-related factors	**Yes**		**No**	
	No.	**%**	**No.**	**%**
Physical factors				
Having vision problems prevents reading the medicine's instructions.	26	**28.3**	66	71.7
Having hearing problems makes it difficult to communicate with doctors.	12	13.0	80	87.0
Having memory problems that make you forget some doses or take	29	**31.5**	63	68.5

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Having movement problems or severe muscle relaxation prevents taking medicine or obtaining it from the pharmacy.	20	21.7	72	78.3
Have trouble swallowing. (cannot swallow large tablets or large capsules).	15	16.3	77	83.7
Psychological / Behavioral factors				
Have information about the disease**.**	28	30.4	64	**69.6**
Know the severity of the disease and its complications.	37	40.2	55	**59.8**
Know the reasons for the need for the drug.	36	39.1	56	**60.9**
Expect that treatment is not beneficial and doesn't have a positive result for the disease	17	18.5	75	**81.5**
Aware of the importance of taking the treatment regularly.	82	**89.1**	10	10.9
Have the self-confidence to be committed to the follow-up schedule and having the treatment regularly.	53	57.6	39	**42.4**
Depending on the motivation of others to take treatment.	57	**62.0**	35	38.0
Being afraid of unwanted side effects.	56	**60.9**	36	39.1
Fear of dependence on treatment and not to dispense with it.	45	48.9	47	51.1
Feeling stigmatized by the disease.	13	14.1	79	85.9
The doctor or nurse causes frustration (such as the treatment only treats the symptoms)	4	4.3	88	95.7
Feel stress, anger, and anxiety when taking treatment.	46	**50.0**	46	50.0
Substance abuse leads to non-compliance with treatment.	3	3.3	89	96.7

Table 2.3: Regarding condition-related factors, it demonstrates that 66.3% of the studied patients thought that this disease was chronic and couldn't be cured, 60.9% of them experienced an increase in symptoms despite taking medication, and 51.1% of the studied patients experienced depression while taking drugs.

Patient-related factors, regarding physical factors, reveal that 28.3% and 31.5% of the studied patients respectively had vision and memory problems, while 87.3% and 83.7% of the studied patients didn’t have hearing, movement, or swallowing problems respectively.

Regarding Psychological / Behavioral factors, this table also shows that 69.6% and 59.8% of the studied patients had inadequate knowledge regarding the disease, its severity, and complications respectively. Also, 60.9% of patients were unaware of the reasons for their medication use, and 81.6% of patients believed that the treatment was not beneficial. Moreover, while 89.1% of the studied patients understood the importance of taking OACs regularly, 42.2% lacked the self-confidence to adhere to the treatment schedule.

Additionally, this table shows that 62% of the studied patients were dependent on others' motivation to take the medication, 60.9% of them were afraid of the drug's side effects, and 50% of the studied patients felt stress, anger, and anxiety when taking treatment while 96.7% do not engage in substance abuse.

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Table (3): Frequency and percentage distribution of total factors affecting adherence to medication among the studied patients (n = 92).

Affecting factors on adherence	Total level		Max Score	Mean ± SD	Mean %	Ranking
	Highly affecting factors ≥ 70%	Low affecting factors <70%				
	No. (%)	No. (%)				
Educational and socioeconomic Factors	12 (13.0)	80(87.0)	13	5.83 ± 2.10	44.8%	3
Healthcare system factors	14(15.2)	78 (84.8)	10	5.18 ± 1.49	**51.8%**	**1**
Condition-related factors	35(38.0)	57(62.0)	4	1.96 ± 1.16	49.0%	2
Therapy-related factors	32(34.8)	60(65.2)	6	2.64 ± 1.49	44.0%	4
Patient-related factors	4 (4.3)	88 (95.7)	18	7.48 ± 2.29	**41.5%**	**5**

Table (3): Reveals that Educational, social, and economic factors affected about 13.0% of studied patients, Healthcare system factors affected about 15.2% of studied patients, Condition-related factors affected about 38.0% of studied patients, Therapy-related factors affected about 38.0% of studied patients, and Patient-related factors affected about 4.3% of studied patients. Also, this table reveals that the Healthcare system factors were ranked as the highly affecting factor with a mean ± SD (5.18 ± 1.49), while Patient-related factors were ranked as the least significant with a mean ± SD (7.48± 2.29)

Table (4): Correlation coefficient between studied patients' total knowledge and adherence to oral anticoagulant therapy (n=92).

Variables	Total level of knowledge	
	R	P value
Total adherence	0.361	< 0.001**

Table (4): Shows that there was a highly statistically significant positive correlation between the studied patients' total knowledge and adherence to oral anticoagulant therapy at (P≤0.001).

Table (5): Multiple Linear Regression Analyses for Predictor Variables of Adherence to Oral Anticoagulant Therapy among Studied Patients with Atrial Fibrillation (n=92)

Predictor Variable For the degree of adherence	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Age	-1.115-	.511	-.259-	-2.182-	**.032***
Gender	.026	.020	.165	1.284	.203
Marital status	.216	.237	.085	.911	.365

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Education level	-.252-	.175	-.138-	-1.443-	.153
Monthly income	.299	.218	.122	1.371	.174
Time since diagnosis with atrial fibrillation	-.090-	.250	-.033-	-.363-	.718
Period of taking oral anticoagulant therapy	1.348	.391	.808	3.444	**.001****
Presence of comorbid disease	-.260-	.089	-.686-	-2.917-	**.005***
Knowledge level	-.327-	.068	-.404-	-4.804-	**.000****
Educational, socioeconomic	.075	.096	.076	.779	.438
Healthcare system factors	.029	.129	.021	.229	.819
Condition-related factors	.164	.189	.092	.870	.387
Therapy-related factors	.825	.141	.596	5.834	**.000****
Patient-related factors	.004	.090	.005	.047	.963
Adjusted R2= 0.785			**P = 0.001****		

*: Statistically significant at $p \leq 0.05$ **: highly statistically significant at $p \leq 0.001$
(**B**) Beta Co-Efficient (SEB) Standard Error

Table (5): Multivariate linear regression model in this table presents that degree of adherence among studied patients with atrial fibrillation was best predicted by Therapy-related factors, knowledge levels, Period of taking oral anticoagulant therapy, presence of comorbid disease, as well age (p-value = <0.001**, <0.001**, 0.001**, 0.005* and 0.032*, respectively), accounting for 75.8 % of the variance of adherence with oral anticoagulant therapy.

Discussion:

Atrial fibrillation is one of the most common cardiac arrhythmias in the world and a major source of morbidity and mortality. Anticoagulant therapy, which attempts to reduce the risk of thromboembolic consequences, is essential to its proper management. However, patient adherence is crucial to the effectiveness of such therapy, particularly when administered outside of hospital-controlled environments ***(Patsiou et al., 2023).*** It is commonly known that medication nonadherence reduces the efficacy of treatment and leads to unfavorable patient outcomes, such as a greater likelihood of hospitalization, mortality, and healthcare expenses ***(Charlton et al., 2021).*** Therefore, this study was carried out to identify factors affecting OACs adherence among AF patients.

Concerning sociodemographic characteristics, the current study illustrated that the majority of the studied patients are aged ≥ 50 years. This finding may indicate that atrial fibrillation was common among this age group; this might be due to normal physiological changes associated with the aging process. This result aligns with Elkerdawy et al. (2023) in their study, "Knowledge and Adherence to Oral Anticoagulant Therapy in Patients with Atrial Fibrillation," which reported that more than half of the study participants were over 50 years old.

Regarding the level of education, the current study revealed that more than half of the studied patients couldn't read and write, this result is in the same line with a study done in Egypt by **Elderiny et al., (2024)** in a study entitled "Effect of Pedometer Telenursing Instructions on Steps Count and Pulse Rate in Atrial Fibrillation Patients" who reported that less than three-quarters of the studied patients were illiterate. From the investigator's point of view, this result could be caused by several factors, including poverty, limited chances for high-quality education, and inadequate funding in poorer regions.

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As regards occupation**,** the current study revealed that less than half of the patients were retired. This may be attributed to the patient's poor health condition. That is influenced by aging and the presence of comorbidities. This result is in the same line with **Búřilová et al., (2024)** in a study entitled "Compliance of patients with atrial fibrillation using new oral anticoagulants- results survey" who found that more than two-thirds of the studied patients consisted of retirees.

Regarding monthly income, the current study illustrated that more than half of the studied patients had insufficient monthly income, this result is supported by **Frydenlund et al., (2024)** in a study entitled "Oral anticoagulation therapy initiation in patients with atrial fibrillation in relation to world region of origin: a register-based nationwide study " who mentioned that more than two-thirds of the respondents of low-income.

Regarding the treatment payment system, the current study revealed that nearly half of the patients studied were treated at their own expense. This result disagrees with **Elkerdawy et al., (2023),** who found that about two-thirds of the patients were treated through governmental funds and health insurance.

Regarding the patients' knowledge of atrial fibrillation disease and oral anticoagulants, the current study indicated that the majority of the studied patients had an unsatisfactory total knowledge level regarding atrial fibrillation and oral anticoagulant therapy. From the researcher's point of view, this might be due to a lack of information gained from the medical staff or the nurses, a lack of educational sessions within healthcare settings, and the patient's educational level.

This result is supported by **Tadesse et al., (2024)** in a study entitled "Knowledge, Adherence, and Satisfaction with Warfarin Therapy and Associated Factors Among Outpatients at a University Teaching Hospital in Ethiopia" who stated that more than three-quarters of the patients had a poor knowledge level. But this result disagrees with **Swada et al., (2024)** in a study entitled "Clinical implication of the patient's disease awareness and adherence to medications in patients undergoing atrial fibrillation ablation" who reported that more than two-thirds of the participants had good disease awareness.

Regarding adherence to oral anticoagulant therapy, the current study revealed that more than three-quarters of the studied patients exhibited low medication adherence levels. This result is in the same line with **Ni et al., (2023)** in a study entitled "Adherence, belief, and knowledge about oral anticoagulants in patients with bioprosthetic heart valve replacement: a cross-sectional study," who found that only one-third of participants were highly adherent.

Furthermore, this result disagreed with a study performed in Egypt by **Elkerdawy et al., (2023)** who reported that more than half of patients had high levels of adherence, and also with **Al-Ameen et al., (2024)** in a study entitled "Assessment of Adherence and Self-Efficacy in a Sample of Iraqi Patients Receiving Warfarin or Direct Oral Anticoagulants" who concluded that the majority of patients were classified as being adherent.

Part III: Factors affecting atrial fibrillation patients' adherence to medication.

Regarding educational, social, and economic factors, the present study showed that more than half of the patients studied couldn't understand the medical terminology used by doctors or the medical guidelines for treatment. This result is in the same line with **Yoon et al., (2023)** in a study entitled "Factors influencing medication adherence in multi-ethnic Asian patients with chronic diseases

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in Singapore: a qualitative study" who reported that language can be a barrier to medication adherence, as many older participants mentioned that they had difficulty understanding the instructions because they were not proficient in the language used in the prescription medication labels.

The present study showed that the majority of the studied patients received help from their family members to take medications regularly. This is an indication of the patient's inability to adhere to taking the treatment individually. In this regard, **Vahedparast et al., (2018)** in a study entitled "The role of social support in adherence to treatment regimens: Experiences of patients with chronic diseases" revealed that adherence to treatment regimens was higher among patients who received support from their spouses, family members, and friends.

The present study revealed that the majority of the patients in the study were experiencing difficulties due to the high cost of medication, especially Direct Oral Anticoagulants (DOACs), compared to warfarin. This result is supported by **Fatima et al., (2024)** in a study entitled "Predictors of adherence to direct oral anticoagulants after cardiovascular or bleeding events in Medicare Advantage Plan enrollees with atrial fibrillation," who stated that patients engaged in low-income subsidizing healthcare programs were more likely to exhibit low-adherence or intermediate non-adherence behaviors.

Concerning healthcare system factors, the present study revealed that more than half of the patients reported that physicians don't show all the drug options or take patients' opinions before prescribing the medications. From the investigator's point of view, this might be due to some clinician's approach, as healthcare providers have limited time due to the crowded outpatient clinics. Also, this might be because some patients see decision-making as the clinician's responsibility. This result is in line with **Ng et al. (2020)** in a study entitled "Understanding the barriers to using oral anticoagulants among long-term aspirin users with atrial fibrillation–a qualitative study" which reported little or nonexistent participation from patients in decisions about the course of therapy. In most circumstances, patients approve the medical decisions prescribed by their physicians.

The present study showed that the majority of the studied patients reported that no instructional programs were offered in healthcare settings to emphasize the importance of medication adherence, which in turn elevates nonadherence rates. In this regard, **Park & Jang et al., (2021)** in a study entitled "Factors affecting medication adherence in patients with mechanical heart valves taking warfarin: the role of knowledge on warfarin, medication belief, depression, and self-efficacy" stated that for individuals on warfarin, having precise drug-related knowledge is essential for improving medication adherence.

The present study revealed that less than three-quarters of the patients studied reported that the doctor who first examined them didn't follow them on every visit. From the investigator's point of view, this might be due to high patient volumes in government clinics, which may result in doctors being assigned to several clinics or positions, which in turn can undermine medication adherence by disrupting continuity of care. These findings were supported by **Obamiro et al., (2018)** in a study entitled "Adherence to Oral Anticoagulants in Atrial Fibrillation: An Australian Survey," who reported that, according to research, patients treated in specialized healthcare institutions have higher adherence rates than those getting care in community-based settings.

Regarding condition-related factors, the present study showed that more than half of the patients studied thought that taking medications would cause psychological problems such as depression. This result is supported by **Lapa et al., (2023)** in a study entitled "Association of Depression

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and Adherence to Oral Anticoagulation in Patients With Atrial Fibrillation" who mentioned that people with AF are more vulnerable than those without for developing depression.

The current study showed that more than two-thirds of the patients studied believed their disease was chronic and could not be cured. This result agrees with **Desteghe & Middeldorp (2024)** in a study entitled "Patient-reported outcomes in atrial fibrillation: is it worthwhile systematically evaluating?" who reported that Atrial fibrillation patients frequently believe that their illness is persistent and irreversible, which can have a big impact on their mental health as well as medication adherence.

Concerning therapy-related factors, the present study revealed that less than three-quarters of the patients studied took multiple medications daily. In this regard, **Obamiro et al., (2018)** reported that there is a negative relationship between the number of medications that patients must take and their adherence to their prescribed regimen.

The current study illustrated that more than half of the studied patients stated that the prolonged treatment period affected their adherence, this result is supported by **Brízido et al., (2021)** in a study entitled "Medication adherence to direct anticoagulants in patients with non-valvular atrial fibrillation–A real-world analysis" who mentioned that more lengthy treatment periods and twice-daily DOAC use elevated the risk of non-adhering with the recommended DOAC.

Regarding patient-related factors, Concerning Physical factors, the present study showed that more than one-quarter of the studied patients had vision and memory problems, from the investigator's point of view, this might be due to the aging process and the presence of comorbid diseases such as diabetes. This result agreed with **Saczynski et al., (2020)** in a study entitled "Geriatric elements and oral anticoagulant prescribing in older atrial fibrillation patients: SAGE-AF" reported that about one-third of the participants had visual or hearing problems, and fewer than half had mental health problems.

Regarding psychological and behavioral factors, the current study showed that more than half of the patients studied were afraid of the drug's side effects. This result agreed with **Yoon et al., (2023)** who found that the primary obstacle to adherence to medicines has been highlighted as the fear of side effects.

The present study reported that almost one-half of the studied patients felt stress, anger, and anxiety while taking their treatment. This result is in line with **Olsson et al., (2022)** in a study entitled "Treated with preventive anticoagulation therapy in atrial fibrillation: The patients' perspective" who reported that for some participants, OAC treatment triggered feelings of anxiety, with most concerns arising during the initial stages of the treatment.

Regarding the Correlation between patients' total knowledge and adherence level, The current study showed a highly statistically significant positive correlation between the studied patients' total knowledge and adherence to oral anticoagulant therapy, this indicates that increasing or good knowledge reflects on medication adherence positively, this result is supported by **Rolls et al., (2017)** in a study entitled "The relationship between knowledge, health literacy, and adherence among patients taking oral anticoagulants for stroke thromboprophylaxis in atrial fibrillation" who stated that there was Positive correlations between health literacy, knowledge, and adherence scores. On the other hand, **Tadesse et al. (2024),** reported no significant association between knowledge of warfarin and adherence.

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Regarding multiple Linear Regression Analysis, in the present study, we found that the degree of adherence among studied patients with atrial fibrillation was best predicted by therapy-related factors, knowledge levels, Period of taking oral anticoagulant therapy, presence of comorbid disease, as well as age. This result is in line with **Tarn et al., (2023)** in a study entitled "Reasons for nonadherence to the direct oral anticoagulant apixaban: a cross-sectional survey of atrial fibrillation patients" who stated that reasons associated with adherence scores <80 (poor adherence) included: patients believing they did not need to take apixaban, cost-related nonadherence, fear of severe bleeding, and lower health literacy. Also, this result agreed with **(Guo et al., 2023)** in a study entitled "Impact of health literacy and social support on medication adherence in patients with hypertension: a cross-sectional community-based study" who reported that OAC undertreatment was related to eight predictors of OAC undertreatment, including age, male gender, comorbidities, first AF episode, and antiplatelet use.

Conclusion:

Based on the findings, this study reveals a significant gap in both knowledge and adherence among atrial fibrillation patients undergoing oral anticoagulant therapy. A statistically significant positive correlation was found between the patients' total knowledge and their adherence to oral anticoagulant therapy. Additionally, the findings indicated that factors such as age, knowledge levels, medication costs and unavailability, therapy-related concerns, duration of oral anticoagulant therapy, and the presence of comorbidities have a more pronounced effect on medication adherence.

Recommendations

In light of the study findings, the following recommendations were suggested:

- Educational programs for patients and their families should be designed to improve their understanding of AF and OACs, encourage drug adherence, and reduce OAC adverse effects.
- Establishing adherence-monitoring methods with ongoing feedback from healthcare practitioners, as well as assuring follow-up care via phone check-ins, internet-based contact, and regular clinical visits.
- Replicate the study on large groups and other geographic regions to confirm the findings or to identify other factors that may influence anticoagulant adherence.

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