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Factors Associated With Medication Adherence in Coronary Artery Patients

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ABSTRACT

Introduction: Medication adherence plays an important role in preventing the worsening of cardiovascular disease. Some factors associated with medication adherence are still unknown.

Objective: This study aimed to determine the factors related to medication adherence in patients with coronary artery disease.

Materials and Methods: A cross-sectional analytical study was performed on 367 cardiovascular patients by consecutive sampling. The patients were referred to the specialized cardiology clinic in Rasht City, Iran, from January 2019 to June 2020. A data collection form and questionnaires of cardiac anxiety, anxiety depression and stress, and medication adherence were used. The obtained data were analyzed by the Chi-square test, Fisher exact test, Kolmogorov-Smirnov test, Mann-Whitney U test, and logistic regression model. The significance level was considered less than 0.05.

Results: Most samples were men (61.85%). The Mean±SD age of the samples was 59.9±10.9 years. About 20.7% had high adherence, and 78.75% had moderate adherence. Factors related to medication adherence included employment or being retired (OR=4.0, 95%CI; 1-16.6, P=0.054), income level (OR= 5.1, 95%CI; 1.6-16.6, P=0.007), supplemental insurance (OR= 0.217, 95%CI; 0.07-0.66, P=0.007), living alone (OR= 10.187, 95%CI;1.980-52.404, P=0.005), living with spouse and children (OR= 3.776, 95%CI; 1.580-9.023, P=0.054), history of hyperlipidemia (OR= 3.2, 95%CI; 1.2-8.4, P=0.019), history of stent implantation (OR= 2.9 95%CI; 1.2-7, P=0.016), depression (OR=0.74, 95%CI; 0.66-0.83, P=0.0001), anxiety (OR= 1.3, 95%CI; 1.1-1.4, P=0.0001), avoidance (OR=0.69, 95%CI; 0.56-0.86, P=0.0001), attention (OR= 1.5, 95%CI; 1.2-1.8, P=0.0001), and medication complexity (OR= 2.7, 95%CI; 1-6.8, P=0.04).

Conclusion: According to the identified related factors, it may be possible to decline anxiety and depression symptoms by improving the related factors and follow-up of care programs. As a result, cardiovascular patients are helped by preventing readmission, cardiac event, and mortality.

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Highlights

• The increasing prevalence of coronary artery disease, its mortality, and morbidity impose a large financial burden on the care system.

• The outcome of a treatment program depends on the individual's adherence to that program.

• Medication non-adherence in cardiac patients led to worse outcomes and increased health care systems use.

• Factors related to medication adherence are some social and individual factors, factors related to medicine and disease, and psychological factors.

Plain Language Summary

The rising prevalence of cardiovascular diseases has become a major health problem that imposes a large financial burden on the care system. The outcomes of treatment plans and their positive effects on cardiac patients are strongly influenced by the patient's adherence to the treatment and medication plan. Medication adherence (MA) regimen as a part of treatment plays an important role in controlling and preventing the worsening of chronic diseases. Poor adherence to the medication regimen is one of the biggest challenges in treating chronic diseases. The present study was conducted to determine the factors related to MA in cardiovascular patients. A total of 367 patients participated in this study. The results showed that most samples had moderate MA. Also, based on the study results, the factors related to MA were as follows: having a job as an employee or retired, income, supplemental insurance; living with a family; history of hyperlipidemia, stenting; having symptoms of depression and or anxiety; drug complexity; and cardiac anxiety areas including avoiding and attending.

Introduction

In Middle Eastern countries, including Iran, the increasing prevalence of cardiovascular diseases has become a major health problem [1]. According to the World Health Organization, the mortality rate due to cardiovascular diseases is predicted to increase by 20% in 2025, and men are more involved than women [2].

The increasing prevalence of coronary artery disease (CAD) as a chronic disease and the resulting mortality and disability imposes a large financial burden on the healthcare system. Therefore, in order to reduce mortality and disability, there is a need for continuous treatment plans, which will not be effective without continuous follow-up [3]. In fact, the outcome of a treatment program is influenced by the patient's adherence to that program [4]. Adherence to medication regimens as a part of treatment plays an important role in controlling and preventing the worsening of chronic diseases [5]. Medication Adherence (MA) means the patient's adherence to the medication instructions and includes the two principles of taking medicine on time and according to the doctor's prescription [6]. Non-adherence to the medication regimen leads to worse outcomes in cardiac patients and also causes an increase in the use of health care systems. It causes annual losses of 100-300 billion dollars to the economy of countries [7]. Low adherence is one of the biggest challenges in the success of chronic disease treatment [8].

Although patients are expected to comply with medical treatment, including medication regimens, it is still reported that more than 60% of these people do not comply with treatment, which significantly increases the risk of cardiac complications [7]. In developed countries, the adherence rate in patients with chronic diseases is, on average, 50%. In developing countries, the adherence rate is thought to be lower than this, possibly due to the lack of health resources and problems with access to health care [9, 10]. Previous studies show that the level of MA in Iran varies between 28% and 79% [6, 10].

The difference in MA can be caused by related factors that affect the individual's adherence, but the results obtained from the studies have been contradictory on the relationship between these factors. The results of some studies show that age [6], gender, and education [11] are associated with MA, while in other studies, these factors were not significantly related to MA [6, 12]. The

medication regimen's complexity may hinder a person's ability to self-administer drugs [13]. Some evidence confirms a negative relationship between drug complexity and MA [10, 14]. However, the results of some studies show no relationship between the number of drugs used and MA [4, 11]. In addition, some studies suggest an inverse relationship between anxiety and depression with MA [15, 16]. Also, stress, as a related factor, has had a negative relationship with MA [7]. However, the results of some studies show the lack of a relationship between MA and anxiety or depression [7, 11]. The results of a meta-analysis study confirm that the relationship between MA and anxiety is still unknown [17]. This finding was obtained when most of the mentioned studies evaluated general anxiety, while heart anxiety, which most cardiac patients experience, has not been investigated. Therefore, considering the importance of identifying factors related to MA in cardiovascular patients and the contradictions in the results of studies, this study was conducted to determine the factors related to MA in patients with CAD.

Materials and Methods

The present research is a cross-sectional analytical study conducted to determine the factors related to MA in a specialized heart training and treatment center in Rasht City, Iran, from January 2019 to June 2020. The study samples consisted of patients with CAD. A total of 367 patients were selected by the consecutive sampling method. The inclusion criteria were as follows: having CAD at least in the last 3 months (based on the physician's diagnosis), having able to understand the Persian language, being over 18 years old, and not suffering from malignant diseases such as cancer (based on the patient's self-reports and records), having the cognitive ability (in people over 60 years old), and having consent to study. The elderly people were included in the study if they had the cognitive ability (scoring above 7 from the abbreviated mental test short cognitive questionnaire). The exclusion criterion included failure to fully answer the study questionnaires. The sample size was based on a similar study [12] that reported the frequency of MA as 53.3% in cardiac patients and showed that a history of heart attack increases MA rate up to 1.57 times. So, the number of samples was estimated at 97, considering 90% power and 95% confidence level for two-tailed tests. In this study, 27 factors were investigated as factors related to adherence; by considering 10 samples for each factor and adding 270 more samples, the total number of samples required was determined to be 367.

The first part of the data collection tool consisted of four sections: individual and social factors, clinical factors, psychological factors, and MA. Individual and social factors included age, gender, education, occupation, marital status, income, supplemental insurance, living conditions, place of residence, and addiction. Clinical factors include drug complexity, history of CAD, kidney disease, diabetes, hypertension, hyperlipidemia, stenting, cardiovascular bypass surgery, hospitalization, body mass index, smoking, and history of cardiac disease in first-degree relatives. Drug complexity was evaluated using the drug complexity scale designed by Lowe [7]. In this system, the samples were asked for the list of drugs and the number of times they were taken per day, and the complexity was calculated based on the total number of drugs taken daily.

Psychological factors included anxiety, symptoms of depression, stress, and cardiac anxiety. Anxiety, symptoms of depression, and stress were assessed with the depression anxiety stress scale (DASS) and cardiac anxiety with the cardiac anxiety questionnaire (CAQ). The reason for using two tools to investigate anxiety was that anxiety, as an uncomfortable, vague, or fearful feeling accompanied by an autonomic response (with an often non-specific or unknown source to the individual), is defined as a feeling of panic created by an expected (foreseeable) danger. It is a warning signal that prepares the individual to face a threat [18]. Cardiac anxiety is the fear and worry caused by cardiac symptoms, and the feeling is based on the adverse outcomes perceived by the patient, which increases the patient's attention and focus on the heart [19].

DASS is a standard tool that includes 21 items and comprises three self-report subscales that evaluate the frequency and intensity of negative emotions experienced by study participants during the past week, and each of its three subscales includes seven items. Each question is scored from 0 (does not apply to me at all) to 3 (completely applies to me or most of the time) [20, 21]. This instrument was psychometrically evaluated by Asghari et al. in Tehran and had the required validity for use in clinical and research fields in the Iranian population [22]. Moreover, the reliability of this tool was confirmed in a pilot study on 30 cardiac patients in the present study and with the method of determining internal correlation by calculating the Cronbach alpha value of 0.90.

CAQ consists of 18 questions that assess and score anxiety focused on cardiac symptoms in 3 domains: fear (8 questions), avoidance (5 questions), and attention (5 questions). The questions of this questionnaire are scored on a Likert scale (never, rarely, sometimes, often, and always), which scores from 0 to 4, respectively. The range of total scores is between 0 and 72, and higher scores indicate more cardiac anxiety [19, 23]. The mean content validity was measured quantitatively using the opinions of 10 academic staff members. The mean Content Validity Ratio (CVR= 0.96) and Content Validity Index (CVI= 0.97) were calculated. The tool reliability was also evaluated in the pilot study using the internal correlation method by calculating the Cronbach alpha coefficient of 0.81. The Cronbach alpha coefficients were 0.83 in the area of fear, 0.80 in the avoidance area, and 0.81 in the area of attention.

MA was evaluated using the Medication Adherence Scale-Coronary Artery Disease (MAS-CAD). This questionnaire is a self-report tool consisting of 25 items scored on a 5-point scale specific to coronary artery patients. In other words, it measures MA in patients with CAD. It includes 4 constructs: appropriate knowledge of prescription drugs (7 items), proper adherence to the medicine (3 items), implementation of medication self-regulation correctly and continuously (11 items), and participation in a medication treatment program (4 items). The statements are scored on a 5-point Likert scale as false =1, partly false =2, neither true nor false =3, partly true =4, and true =5. A mean score of more than 3.67 is high adherence, a mean score of 2.34-3.67 indicates moderate adherence, and a mean score below 2.34 indicates low adherence [24]. The content validity was measured quantitatively and using the opinions of academic staff members. The CVR mean was calculated as 0.99, and the CVI mean as 0.93. Reliability was also determined in the pilot study using the internal correlation method, and the Cronbach alpha coefficient was found to be 0.81. The Cronbach alpha values in constructs were found to be 0.80 for proper knowledge of prescription medications, 0.82 for proper adherence to the medicine, 0.79 for implementation of medication self-regulation correctly and continuously, and 0.81 for participation in a medication treatment program.

To determine one of the inclusion criteria, we used the abbreviated mental test. It is a short cognitive questionnaire of ten questions in which, for each correct answer, one point is given, and obtaining a score of less than 7 is considered a cognitive impairment [25].

Using the convenience sampling method, we recruited the research samples if they met the inclusion criteria during their daily visits to specialized heart clinics. After obtaining informed consent and expressing the importance, research objectives, and confidentiality of patient information, the data collection form and research questionnaires were completed through interviews. The interview was conducted in a quiet room in the clinic before the doctor's visit.

Data analysis was performed in SPSS v. 24, using descriptive and inferential statistics, including the Chi-square test and Fisher exact test. To compare the scores of cardiac anxiety areas with respect to MA, we used the Mann-Whitney U test. In the multivariate analysis, to determine the factors related to MA, the logistic regression model was used using the backward LR method. The response variable in the logistic regression model was considered medium and high MA. To determine the related factors, all variables with a P value less than 0.1 in the univariate analyses were entered into the model. The Kolmogorov-Smirnov (K.S) test was used to check the normal distribution of quantitative variables. Because the distribution of quantitative variables was not normal, non-parametric tests were used to compare and examine the relationship between these variables and the rest of the factors. The significance level of the tests was considered less than 0.05.

Results

Most study units were men over 59 years old (61.85%). A total of 400 people were talked to, and 3 were not included in the study due to a lack of consent in completing the questionnaire. Also, 30 people were excluded from the study due to incomplete answering to the questionnaires. The characteristics of the samples in terms of individual and social factors are reported in Table 1. According to the information in this Table, the majority of the study samples were male (61.85%), married (89.65%), under high school education (59.13%), self-employed (40.87%), with monthly income of US $50-100 (84.74%), and without supplemental insurance (91.01%). Also, the majority lived with their spouses (59.94%), in the city (68.39%), with no addiction (90.46%). The study's results showed that the MA of most study samples (78.75%) was at a medium level (Table 2). Two samples with a low adherence were also included in the medium adherence group.

Table 1. Individual, social, and clinical characteristics of the study samples (n=367)

Variables		No (%)
Age (y)	< 50	70(19.07)
	50-59	102(27.79)
	60-69	121(32.97)
	≥70	74(20.16)
Gender	Male	227(61.85)
	Female	140(38.15)
Marital status	Single	1(0.27)
	Married	329(89.65)
	Divorced	1(0.27)
	Widow	36(9.81)
Education	Illiterate	91(24.80)
	High school	217(59.13)
	Diploma	45(12.26)
	University	14(3.81)
Job	Employee	7(1.91)
	Worker	17(4.63)
	Unemployed	10(2.72)
	Housewife	126(34.33)
	Farmer	38(10.35)
	Retired	19(5.18)
	Self-employed	150(40.87)
Marital status	Single	1(0.27)
	Married	329(89.65)
	Divorced	1(0.27)
	Widow	36(9.81)
Income (US dollars)	<50	22(5.99)
	50-100	311(84.74)
	100-150	34(9.26)
Supplemental insurance	Yes	33(8.99)
	No	334(91.01)
Life conditions	Single	23(6.27)
	With family	344(93.73)

Variables		No (%)
History of coronary artery disease (y)	< 1	95(25.89)
	1-5	112(30.52)
	≥5	160(43.60)
Hospitalization history	No hospitalization	59(16.08)
	Once	172(46.87)
	Twice	106(28.88)
	More than twice	30(8.17)
Hyperlipidemia	Yes	317(86.38)
	No	50(13.62)
Hypertension	Yes	260(70.64)
	No	107(29.16)
Body mass index	Normal	39(10.63)
	Overweight	193(52.29)
	Obese	135(36.78)
Address	City	251(68.39)
	Village	114(31.6)
	The suburbs	2(0.54)
Addiction	Yes	35(9.54)
	No	332(90.46)
Smoking	Yes	85(23.16)
	No	282(76.840)
History of cardiac diseases in family	Yes	213(58.04)
	No	154(41.96)
History of heart surgery	Yes	56(15.26)
	No	311(84.74)
History of heart surgery	Yes	56(15.26)
	No	311(84.74)
History of diabetes	Yes	142(38.69)
	No	225(61.31)
Kidney disease	Yes	39(10.63)
	No	328(89.37
Stenting history	Yes	230(62.67)
	No	137(37.33)
Drug complexity	Low	200(54.50)
	High	167(45.50)

Table 2. The level of medication adherence in the study samples (n=367)

Variables		No. (%)	95% CI	
			Lower	Upper
Proper knowledge of prescription medications	Low	48(13.08)	9.92	16.81
	Medium	291(79.29)	74.93	83.20
	High	28(7.63)	5.24	10.68
Keeping medicine properly	Low	3(0.82)	0.23	2.17
	Medium	161(43.87)	38.86	48.98
	High	203(55.31)	50.20	60.34
Implementing medication self-regulation correctly and continuously	Low	5(1.36)	0.52	2.96
	Medium	266(72.48)	67.75	76.86
	High	96(26.16)	21.86	30.83
Participation in a medication treatment program	Low	274(74.66)	70.03	78.90
	Medium	93(25.34)	21.10	29.97
	High	2(0.54)	0.11	1.74
General medication adherence	Low	289(78.75)	74.35	82.70
	Medium	76(20.71)	16.80	25.07

Examining the state of psychological factors is shown in table 3. This table shows, the majority of samples had normal levels of anxiety (61.04%), depression (60.49%), and stress (73.02%). The mean and standard deviation of the cardiac anxiety score in the "fear" area was 20.3±6.71, the "avoidance" area was 10.25±2.94, the "attention" area was 6.09±2.64, and in general, it was 36.4±7.1. The study results also confirmed that based on the Chi-square test, MA was significant regarding anxiety (P=0.001) and Fisher exact test regarding depression symptoms (P=0.004). In addition, the Mann-Whitney U test showed that MA was significantly associated with avoidance (P=0.004) and attention (P=0.001) areas of cardiac anxiety.

The results of the logistic regression model showed that the occupation of employee or retiree (OR=4.0, 95% CI; 1-16.6, P=0.054), income level (OR=5.1, 95% CI; 1.6-16.6, P=0.007), supplemental insurance (OR=0.217, 95% CI; 0.072-0.695, P=0.007), living with family (OR=3.77, 95% CI: 1.580-9.023, P=0.003), history of hyperlipidemia (OR=3.2, 95% CI;1.2-8.4 P= 0.019), history of stenting (OR=9.2, 95% CI; 1.2-7, P=0.016), depression syndromes (OR=0.74, 95% CI;0.66-0.83, P=0.0001), anxiety (OR=1.3, 95% CI; 1.1-1.4, P=0.0001), areas of cardiac anxiety including avoidance (OR=0.69, 95% CI; 0.56-0.86, P=0.0001), attention (OR=1.5, 95% CI; 1.2-1.8, P= 0.0001) and drug complexity (OR=2.7, 95% CI;1-6.8, P=0.040) were among the factors related to MA (Table 4).

4. Discussion

The results of this study showed that job, income, supplemental insurance coverage, living conditions, history of hyperlipidemia, history of stenting, drug complexity, depression syndromes, anxiety, and cardiac anxiety (avoidance and attention) are among the individual, social, clinical, and psychological factors related to MA.

The findings showed that only a small percentage of the samples had a low level of adherence, and the majority had a medium level of adherence. In Katzmann's study, 42% of patients reported low adherence, which was more than the present study [26]. Compared to other studies [4, 26], the adherence rate in the present study was more favorable. The difference in the level of adherence can be caused by the difference in the individual and social characteristics (age, gender, residence and living conditions, education, addiction, etc.) of the samples.

Table 3. The level of anxiety, depression, and stress in the study samples (N=367)

Variables		No. (%)	95% CI	
			Lower	Upper
Depression syndromes	Normal	222(60.49)	55.42	65.39
	Mild	69(18.80)	15.06	23.03
	Medium	67(18.26)	14.56	22.45
	Intense	7(1.91)	0.86	3.71
	High intense	2(0.54)	0.11	1.74
Anxiety	Normal	224(61.04)	55.98	65.92
	Mild	50(13.62)	10.40	17.41
	Medium	64(17.44)	13.82	21.57
	Intense	17(4.63)	2.83	7.15
	High intense	12(3.27)	1.80	5.47
Stress	Normal	268(73.02)	68.32	77.37
	Mild	47(12.81)	9.68	16.51
	Medium	39(10.63)	7.78	14.09
	Intense	10(2.72)	1.41	4.78
	High intense	3(0.82)	0.23	2.17

In the investigation of individual and social factors related to MA, the findings showed that employees or retirees have a higher rate of MA than those with self-employment. While in Lissaker's study, the retired people had less adherence [27]. To explain this finding, it can be said that employees and retirees usually have higher education than freelancers, and because of social connections in the workplace, they are more aware of the consequences of non-adherence to medication. Therefore, they are expected to have more adherence.

The rate of MA increased with the income level of the study samples. This finding is in line with the results of other studies [4, 28]. Low-income people probably have less access to medicine, care, and treatment services, affecting their adherence. The rate of MA was higher in people who had supplemental insurance than in people without this insurance. This finding is in line with the results of Tajeu's study, in which people with insurance had lower MA [14]. This finding may be explained by the fact that people with supplemental insurance can access medicine and medical services at a lower cost.

The findings also showed that patients who lived with their families, compared to those who lived alone, had a higher rate of MA. In Hussain's study, people who lived with their partners had higher adherence to medication [28]. While in other studies, adherence was not significantly related to living with a spouse [29] or living alone [30]. In Iranian culture, the family plays an important supporting role for the individual [31]. So, family members with supportive relationships can play a role in remembering to take medication, so maybe people who live alone have lower MA due to a lack of family support and attention.

In examining clinical factors related to MA, the findings showed that patients without a history of hyperlipidemia were more likely to adhere to medication than patients with a history of hyperlipidemia. This finding is in line with Katzmann's study [26]. Maybe the experience of the side effects of statin use or the nightly administration of the drug, which can sometimes cause forgetting to take the drug at this time, could affect the adherence of the study subjects.

Table 4. Regression coefficients and relative odds of predictors related to medication adherence in the studied samples based on a logistic regression model

Final model						
Variables	B	SE	P	OR	95% CI	
					Lower	Upper
Job			0.093			
Retired	1.392	0.722	0.054	4.025	1	16.576
Worker - unemployed - farmer	1.101	0.651	0.091	3.008	0.840	10.774
Housewife	0.900	0.519	0.083	2.459	0.889	6.801
Self-employed (Reference group)	0			1		
Income level	1.626	0.603	0.007	5.084	1.560	16.565
Supplemental insurance	-1.527	0.566	0.007	0.217	0.072	0.659
Living conditions (with a family versus alone)	1.329	0.444	0.003	3.776	1.580	9.023
Place of residence (city versus village)	0.754	0.445	0.090	2.125	0.889	5.081
History of hyperlipidemia	1.164	0.495	0.019	3.203	1.214	8.445
History of stenting	1.078	0.446	0.016	2.939	1.225	7.049
Depression score	-0.299	0.056	0.0001	0.741	0.665	0.827
Anxiety score	0.228	0.047	0.0001	1.257	1.145	1.378
Avoidance score	-0.366	0.092	0.0001	0.693	0.579	0.831
Attention score	0.388	0.088	0.0001	1.475	1.241	1.752
Drug complexity (more than average)	0.985	0.479	0.040	2.678	1.047	6.849
Constant	-6.219	2.214	0.005	0.002		

Variables entered on step 1: Age (y), gender, education level, occupation, income, supplemental insurance, living conditions, place of residence, addiction, body mass index, history of cardiac disease in family, history of hyperlipidemia, history of stenting, depression, anxiety, stress, fear, avoidance, attention, and drug complexity.

Patients with a history of stenting had almost 3 times higher rates of MA than people without a history of stenting. This finding can be related to people's understanding of this therapeutic intervention [32]. Also, anxiety and stress about health, resumption of cardiac symptoms, and fear of negative outcomes may improve adherence [7]. According to the different understanding of people about this therapeutic intervention in the participants of our study, it can be justified that the people who underwent stenting adhere more to medication probably due to stress and anxiety about the resumption of cardiac symptoms and the sense of experiencing death and awareness of the need to continue the treatment and prescription drugs.

People with more than the average number of drugs used by the studied samples adhered more to medication. In line with this finding, in Ozdemir's study, the total number of drugs used had a significant relationship with MA [12]. In contrast, the findings of Dabaghian's study show an inverse relationship between drug complexity and MA [10]. This finding can be due to the attitude and opinion of the patients under study towards medication treatment, who consider the high prescription of drugs by the doctor as an effective indicator of recovery [33]. Therefore, the high level of MA in people with more drug complexity can be justified by this issue.

Also, in the present study, the rate of MA decreased with the increase in the severity of depression symptoms. This finding is in line with the results of other studies [5, 26]. In depressed people, feelings of hopelessness, low or lack of motivation and concentration, forgetfulness, and distraction may decrease adherence to the doctor's recommendations and, as a result, stop the medication regimen. Also, in heart patients, depression is related to the severity of functional impairment in a person, which may decrease self-care activities, including taking medications on time [27, 34].

As the anxiety score of the study samples increased, the rate of MA increased. This finding contradicts the results of other studies that reported a negative relationship between MA and anxiety [15, 16]. However, people with more anxiety seem more sensitive about their health, treatment, and taking medications on time [7]. As a result, they have more self-care behavior and higher MA.

The findings of this study showed that with the increase in the avoidance score of cardiac anxiety areas, the level of MA decreases, and with the increase in the attention score, the level of MA increases. Perhaps people consider the activity dangerous and avoid it due to the fear of cardiac dysfunction or misinterpretation of heart-related events [35]. Therefore, avoiding the activity could have affected MA's "participation in the medication treatment program" dimension and reduced the adherence score. Also, the fear and worry caused by cardiac symptoms and feelings based on the adverse outcomes perceived by the patient may increase the patient's attention and focus on the heart. Therefore, it causes more adherence behaviors.

One of this study's limitations is using self-report questionnaires to determine MA. It is suggested that the objective criteria of MA be considered in future studies. Also, beliefs and attitudes towards medication use and people's understanding of recovery after cardiac interventions were not investigated as intervening factors in this study. Therefore, it is suggested to investigate the effect of these variables on adherence in future studies.

According to the identified relevant factors, it may be possible to develop educational, therapeutic, and follow-up care programs with solutions such as managing anxiety and depression syndromes, improving the economic situation, and improving the insurance coverage of supplemental in order to increase the MA rate in people with CAD.

Ethical Considerations

Compliance with ethical guidelines

The Research Ethics Committee of Guilan University of Medical Sciences approved this article (Code: IR.GUMS.REC.1398.478). Ethical principles were fully observed in this study. The participants were allowed to withdraw from the research whenever they wanted. Also, all participants were aware of the research process, and their information was kept confidential.

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

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