

The Impact of Psychosomatic Factors on Treatment Adherence of Acute Myocardial Infarction Survivors; A Two-Year Follow-Up Study

Hamidreza Roohafza¹, Yasaman Shojaei², Sana Azizian³, Zeinab Zamani⁴, Mohammadreza Shafiei⁵, Gholamreza Masoumi⁶, Masoumeh Sadeghi¹

¹Cardiac Rehabilitation Research Center, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran, ²Hypertension Research Center, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran, ³Pediatric Cardiovascular Research Center, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran, ⁴Heart Failure Research Center, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran, ⁵Isfahan Cardiovascular Research Center, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran, ⁶Interventional Cardiology Research Center, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran

Abstract

Background: Because of the important role of adhering to treatment to reduce major adverse cardiovascular events and mortality, studying the factors affecting treatment adherence (TA) is warranted. This study aimed to identify the impact of psychosomatic factors on adhering to treatment among patients with acute myocardial infarction.

Materials and Methods: This is a cohort study as a part of the Isfahan ST-segment-elevated Myocardial Infarction Cohort Study. Psychosomatic factors such as health anxiety, illness denial, irritable mood, and demoralization were assessed among 867 patients at the first visit. The patients were followed for 2 years; TA and major adverse cardiovascular events were checked annually in survivors.

Results: The results from binary logistic regression applied to find the association between TA and psychosomatic factors showed that the patients with health anxiety, irritable mood, and demoralization were significantly poor adherent to treatment (odds ratio [95% confidence interval]: 1.39 [1.02, 2.73], 1.51 [1.02, 2.37], and 1.66 [1.02, 2.91]), respectively. The associations remained the same when adjusted for various potential confounders.

Conclusions: Psychosomatic factors played an essential role in adhering to treatment among patients with acute myocardial infarction. As a result, appropriate psychological interventions may help the patients adhere to their treatment better.

Keywords: Demoralization, health anxiety, irritable mood, psychosomatic, treatment adherence

Address for correspondence: Prof. Masoumeh Sadeghi, Cardiac Rehabilitation Research Center, Cardiovascular Research Institute, Rahmani Alley, Third Moshtagh Ave, Isfahan, Iran.

E-mail: sadeghimasoumeh@gmail.com

Submitted: 11-May-2022; **Revised:** 02-May-2023; **Accepted:** 09-Jul-2023; **Published:** 29-Nov-2023

INTRODUCTION

Coronary heart disease (CHD) is the most common form of cardiovascular disease and a major leading cause of morbidity and premature death worldwide.^[1,2] Medications for chronic diseases such as CHD, usually prescribed lifelong, can reduce major adverse cardiovascular events (MACE) and mortality. Due to CHD's chronicity, treatment adherence (TA) has a vital role in health outcomes.^[1,3]

As defined by the World Health Organization, TA is the extent to which a person's behavior—taking medication, following a diet, and/or executing lifestyle changes—corresponds with agreed recommendations from a healthcare provider.^[4] It has been shown that only 50% of patients with chronic illnesses are adherent to their treatment properly in developed countries and probably less in developing countries.^[5] Hence, improvements

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Roohafza H, Shojaei Y, Azizian S, Zamani Z, Shafiei M, Masoumi G, *et al.* The impact of psychosomatic factors on treatment adherence of acute myocardial infarction survivors; A two-year follow-up study. *Adv Biomed Res* 2023;12:251.

Access this article online

Quick Response Code:



Website:
www.advbiores.net

DOI:
10.4103/abr.abr_155_22

in TA could save healthcare resources, reduce healthcare system costs,^[4] and significantly affect health outcomes even more than therapeutic advances.^[5,6]

Like many other chronic illnesses, poor TA is common among patients with CHD; according to a meta-analysis conducted on more than one million participants, about 40% of cardiovascular diseases patients have poor adherence to their medications.^[7]

Factors affecting TA can be divided into four main groups: patient-related, treatment-related, disease-related, and physician-related. Among these, patient-related factors significantly affect the patient’s adherence to treatment. Demographic, socioeconomic, emotional, and psychological factors are the most critical patient-related factors.^[8] The impact of psychological factors such as depression and anxiety on medication adherence has been considered in many studies and appraised different results.^[9-13] For instance, depression has been associated with poor medication adherence following ACS,^[9] poor adherence to treatment among 4,117 diabetic patients,^[9] and poor medication adherence status among patients with multiple sclerosis as a chronic disease.^[10] However, a systematic review showed that this association between depression and patients’ compliance is still unpredictable.^[13]

Despite the above associations, treating depression in CHD is insufficient to enhance patients’ TA.^[10] It seems that other psychosomatic factors can significantly affect TA.^[14-17] Psychosomatic factors significantly affect treatment compliance and patients’ therapeutic behavior. These factors include, for instance, the ways patients’ experience and respond to their health statuses like health anxiety and illness denial and psychological features that have been frequently and consistently found in chronic disease patients, such as irritable mood and demoralization.^[16]

Limited studies showed that demoralization correlates with the occurrence of medical disease. Although, just one study carried out in CHD patients has not enough patients for a reliable result.^[18]

As believed by some other studies, illness denial undermine medication adherence.^[14,17] Although all these studies were conducted among patients with other chronic disease, only a few of those were among CHD patients. Therefore, this present study becomes essential.

Despite psychosomatic factors influencing TA, just a few studies work toward some of these factors’ effect on CHD patients. So there is still a need to conduct a cohort study, which we did, to assess these factors on CHD medication adherence. This present study was carried out as a prospective cohort with 2 years of follow-up to determine the impact of psychological factors on adherence to cardiovascular treatments.

MATERIALS AND METHODS

This investigation as a part of the Isfahan ST-elevated Myocardial Infarction Cohort (SEMI-CI)^[19] which was

conducted in a cardiology referral hospital affiliated to Isfahan University of Medical Sciences. All the patients with acute myocardial infarction (MI) referred to this hospital from September 2015 to October 2016, meet the eligibility criteria were included [Figure 1]. The Ethics Committee of Isfahan University of Medical Sciences approved the study proposal with the number of IR.MUI. Rec. 1396.2.018. The inclusion criteria were age more than 18 years, hemodynamic stability, ST segment elevation myocardial infarction (STEMI), or new-onset left bundle branch block. Patients with MI occurrence during angioplasty procedure, presence of other major chronic diseases, and major psychiatric disorders were excluded. During hospitalization, the study protocol was explained for the eligible patients and a written consent was obtained from patients who tended to participate in the study. Then, a trained nurse interviewed with the patients and filled out related questionnaires and at discharge extracted patients’ medical and demographic information.

The follow-up of the patients has been carried out for 2 years. Patients were called and invited to have a visit with a cardiologist. The intended data, including physical examination and echocardiography, were collected at the appointment. In addition, a trained nurse gathered data on medication adherence and MACE occurrence. The term “MACE” uses for atherosclerotic cardiovascular disease (CVD) in coronary

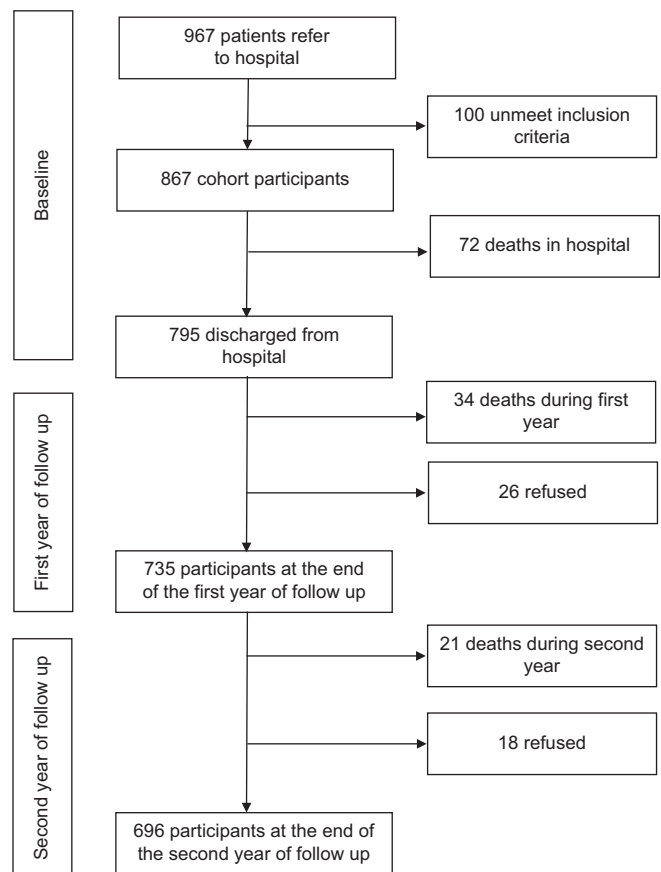


Figure 1: The diagram of the studied population within the 2 years of follow-up in SEMI-CI study

and cerebral vessels: fatal and nonfatal MI, fatal and nonfatal stroke, and sudden cardiac death. Data of patients who died or had cardiovascular events were reconsidered by their documents in a medical panel composed of two cardiologists and one neurologist.

In this study, nonfatal MI and nonfatal stroke patients who were alive at the end of the second year of follow-up and filled out medication adherence questionnaire were considered as MACE.

Measurement

Medication adherence measurement^[20]:

Medication adherence was evaluated by the four-item Morisky medication adherence scale (MMAS-4).^[21-23] This questionnaire is a self-reported, medication-taking behavior scale. The MMAS-4 consists of four items with a scoring scheme of “Yes” = 0 and “No” = 1. In this study, “no” response to all four questions demonstrated good adherence and “yes” response to any one of four questions was defined as poor adherence.

Diagnostic Criteria for Psychosomatic Research^[24]:

To evaluate psychosomatic factors, the Diagnostic Criteria for Psychosomatic Research (DCPR) questionnaire was performed.^[25] The DCPR is used for clinical and research purposes which also is a classification for illness behavior^[26]; it evaluates perceived patient’s response to their health status. DCPR questionnaire is a 12-cluster yes/no question evaluating different categories of psychosomatic symptom. Four clusters of responding to health status, four ones assess the concept of somatization, and the last four are related to the consistent and frequent psychosomatic dimensions. In this study, we evaluate four clusters which have illustrated health anxiety (four questions about a generic worry about illness, concern about pain, and bodily preoccupations), illness denial (three questions about denial of having a physical complaint and the need for treatment), irritable mood (four questions around an increased struggle about control over temper or results in irascible verbal or behavioral outbursts), and demoralization (five questions about inability to handle some problem; the patient experiences of helplessness, hopelessness, or giving up). The results were taken qualitatively, if a symptom is present or not.

Other:

Demographic information: Demographic information including gender, age, and marital status (unmarried [single, widowed, and divorced]/married) was collected from patient’s hospital documents.

Medical history: The clinical history of the patients, such as the past medical history of MI, diabetes mellitus, hypertension, hyperlipidemia, body mass index (weight [kg]/height [m]²), smoking status, and the type of intervention was collected from the hospital medical documents.

Additionally, the data of involved epicardial territory (s) (stenosis in more than 75% of the vessels) based on the coronary

angiography and ejection fraction (EF) based on echocardiography and atrial fibrillation based on electrocardiography at discharge were gathered from the hospital documents as severity of acute myocardial infarction (AMI).

Also, the patient’s blood pressure and EF were measured annually and considered as clinical follow-up assessment.

Statistical analysis

Data were analyzed using SPSS software (version 15.0, SPSS Inc., Chicago, IL, USA). All *P* values < .05 were considered significant. Continuous variables were expressed as mean and standard deviation and differences between groups were analyzed using *t*-test. Qualitative variables were expressed as frequency and Chi-squared test was used to compare frequencies between groups.

Binary logistic regression analysis was applied to find the association between medication adherence and psychosomatic symptoms (health anxiety, illness denial, irritable mood, and demoralization) in crude (model 1) and adjusted models. A dependent variable was considered as a dichotomous variable defined by the good or bad medication adherence. In model 2, the confounding effects of demographic characteristics (sex, age, and marital status) were controlled. In model 3, additional adjustment was made for current medical status (previous myocardial infarction, diabetes mellitus, hypertension, hyperlipidemia, body mass index, and smoking status). Further controlled for the confounding impacts of demographic characteristics and severity of disease (number of epicardial territories, atrial fibrillation, and EF at discharge) were used in model 4. Demographic characteristics and follow-up data including presence of MACE, systolic blood pressure, and EF were considered for adjustment in model 5. Full adjusted model based on all above variables performed in model 6. Odds ratios (ORs) were reported with the corresponding 95% confidence intervals (95% CIs).

RESULTS

Of all 696 patients who were alive at the end of second year of follow-up, the completed data of 685 individuals were existed and analyzed. Four hundred sixteen (60.7%) had good medication adherence. As proclaimed in Table 1, male gender had significantly poor adherence to medication (*P* = .001). However, the mean age of participants in both good and poor medication adherence groups were almost the same. Also, all participants were married.

In the field of patients’ clinical history, presence of hypertension and diabetes mellitus had meaningfully differed in good and poor medication adherence groups (*P* < .05). Among psychosomatic factors, health anxiety (*P* = .01), irritable mood (*P* = .03), and demoralization (*P* = .007) were significantly different in both groups. However, illness denial was not statistically differed among two groups. Among those participants who remained in the study, good medication adhering participants had lower

MACE, 35 (8.4%), which is statistically different from poor medication adherence group.

As manifested in Table 2, binary logistic analysis shown based on (OR; 95% CI) in crude model (model 1), health anxiety (1.39; 1.02, 2.73), irritable mood (1.51; 1.02, 2.43), and demoralization (1.66; 1.02, 2.91) were risk factors of TA. However, there were no association between TA and illness denial (1.42; 0.83, 2.43).

As the same, in model 2 which is adjusted based on demographic characteristics, in model 3 which is additionally controlled by past history of disease, in model 4 that is adjusted by demographic and severity of disease, and in model 5 that is controlled by follow-up data additional to demographic characteristics. In model 6 that is adjusted by demographic characteristics, past history of diseases, severity of disease and follow-up data (full adjusted), health anxiety, irritable mood,

Table 1: Demographic and clinical factors and the incidence of major cardiovascular events based on Medication Adherence level

	Good Medication Adherence	Bad Medication Adherence	P
<i>n</i> (%)	416 (60.7)	269 (39.3)	
Demographic factors			
Male, <i>n</i> (%)	350 (84.1)	253 (94.0)	0.001
Married, <i>n</i> (%)	416 (100.0)	269 (100.0)	1.00
Age, mean (SD)	59.4 (11.9)	59.2 (13.2)	0.93
Medical history			
Current smoking, <i>n</i> (%)	155 (37.2)	134 (49.8)	0.001
Body mass index, <i>n</i> (%)	26.6 (3.8)	26.3 (4.1)	0.37
PCI intended, <i>n</i> (%)	398 (95.7)	255 (94.8)	0.60
CABG intended, <i>n</i> (%)	2 (0.5)	2 (0.7)	0.34
Previous Myocardial Infarction, <i>n</i> (%)	71 (7.1)	41 (15.2)	0.33
Diabetes mellitus, <i>n</i> (%)	123 (29.6)	48 (17.8)	0.001
Hyperlipidemia, <i>n</i> (%)	138 (33.1)	71 (26.3)	0.67
Hypertension, <i>n</i> (%)	188 (45.2)	68 (25.3)	0.0001
Number of involved epicardial territories, <i>n</i> (%)			
1	183 (44.0)	141 (52.4)	0.16
2	163 (39.2)	66 (24.5)	
3	70 (16.8)	62 (23.0)	
Ejection fraction at discharge, mean (SD)	37.4 (12.6)	36.0 (10.9)	0.51
Atrial fibrillation at discharge, <i>n</i> (%)	6 (1.4)	2 (0.7)	0.12
Clinical follow-up assessment			
Systolic blood pressure after 2 years of follow-up (mean±SD)	123.3±16.5	123.1±16.2	0.94
Ejection fraction after 2 years of follow-up (mean±SD)	47.3±10.6	41.5±10.8	0.06
Psychosomatic factors			
Health Anxiety, <i>n</i> (%)	13 (3.1)	20 (7.4)	0.01
Illness Denial, <i>n</i> (%)	35 (8.1)	32 (11.9)	0.13
Irritable Mood, <i>n</i> (%)	39 (9.4)	40 (14.9)	0.03
Demoralization, <i>n</i> (%)	5 (1.2)	12 (4.5)	0.007
Major cardiovascular events			
Major Cardiovascular Events, <i>n</i> (%)	35 (8.4)	36 (13.4)	0.037

Table 2: The correlation between medication adherence with psychosomatic factors

	Health Anxiety	Illness Denial	Irritable Mood	Demoralization
Model 1	1.39 (1.02, 2.73)	1.42 (0.83, 2.43)	1.51 (1.02, 2.37)	1.66 (1.02, 2.91)
Model 2	1.40 (1.02, 2.82)	1.25 (0.71, 2.19)	1.42 (1.02, 2.29)	1.69 (1.03, 3.10)
Model 3	1.51 (1.03, 3.40)	1.62 (0.86, 3.03)	1.60 (1.03, 2.67)	1.72 (1.04, 3.36)
Model 4	1.35 (1.01, 2.75)	1.24 (0.70, 2.18)	1.41 (1.02, 2.28)	1.57 (1.05, 2.90)
Model 5	1.42 (1.02, 2.82)	1.25 (0.71, 2.19)	1.45 (1.02, 2.33)	1.70 (1.07, 3.12)
Model 6	1.38 (1.01, 2.85)	1.22 (0.69, 2.11)	1.41 (1.02, 2.30)	1.68 (1.06, 3.02)

Model 1: Crude. Model 2: Adjusted by demographic characteristics (sex, age, and marital status). Model 3: Adjusted by demographic characteristics and past history of diseases (Myocardial Infarction, Diabetes mellitus, Hypertension, body mass index, and smoking status). Model 4: Adjusted by demographic characteristics and severity of disease (Number of epicardial territories, atrial fibrillation, and EF at discharge). Model 5: Adjusted by demographic characteristics and follow-up data (MACE, Systolic blood pressure after 2 years of follow-up, and EF after 2 years of follow-up). Model 6: Adjusted by demographic characteristics, past history of diseases, severity of disease, and follow-up data (full adjusted)

and demoralization has remained significantly associated with TA.

DISCUSSION

Present study revealed the impact of psychosomatic factors (health anxiety, illness denial, irritable mood, and demoralization) on TA. Our results described all those factors have effective influence on treatment adhering in CHD patients except illness denial. Also, better medication adherence can reduce the risk of MACE happening among CHD patients.

As previous studies have demonstrated, poor adherence to drug regimens in cardiac patients has been associated with increased rates of hospitalization due to cardiovascular complications. Poor adherence to treatment reduces the control of disease recurrence risk factors, including blood pressure, coagulation status, fat profile, etc., and consequently increases the risk of MACE happening in patients.^[27]

In this study, demographic factors like male gender were showed to be effective factors that influence TA. There are still different views around which gender is more adherent to treatment; in a study on hypertensive patients, females were more adherent to their treatment than males. It is prescribed as an effect of men are busier and less attentive to their health status than women.^[28] Also, a study on patients with chronic kidney disease showed poor TA in males.^[29] Whereas a study on patients with ST-segment elevation MI or non-ST-segment elevation MI indicated that males have more TA than females.^[30] While a meta-analysis of 102 studies about TA demonstrated no significant gender difference among adult patients.^[31] In this study, men have worse TA than women. According to these conflicts, more studies are needed to verify the relation of gender and TA and also the causes of this relation to help improving adherence among poor adherent patients.

Comorbidities also can improve TA status among patients in this study. This could be explained by the fact that patients with comorbidities are more accustomed to use their medicine so they adhere to their treatment more. A study on 148,654 patients in America showed hypertension and hyperlipidemia, as comorbidities of acute MI patients, can make their adherence better.^[32] Authors believe the reason could be some similarities in the medication process of these comorbidities and cardiac rehabilitation, for example, the same medicines.

Psychological factors also are determinant factors of TA. For instance, in a prospective follow-up study on MI patients, depression and anxiety are prescribed as a barrier to medication adherence and determinant risk factors for MACE happening in CHD patients.^[33] Also in Rutledge's *et al.*^[34] meta-analysis, depression is a preventable factor against TA in cardiac rehabilitation. A cohort study suggested that treatment of depression and anxiety in CHD patients can reduce the risk of not completing their treatment.^[35]

Based on our searches, there are many studies on the relation of psychological factors such as depression and anxiety

and TA and plenty of papers, meta-analysis, and systematic reviews have been published in this field. However, it has been observed that there are not many studies about the association of psychosomatic factors such as health anxiety, illness denial, irritable mood, demoralization, and TA. Health anxiety used for being obsessive and irrational worry about having a serious medical condition. Illness denial is considered as an adaptive coping mechanism in the early stage after diagnosis or in the final phase of a life-threatening disease because it may facilitate psychological distress. Irritable mood defined as easily annoyed and provoked to anger and demoralization is the awareness of being unable to cope with a pressing problem or of having failed to meet one's own or others' expectations.^[36]

Meanwhile, the core symptoms of demoralization and irritable mood such as poor motivation, impaired concentration, and low energy and symptoms of health anxiety including nervousness and restlessness may reduce the positive impact of the adherence.^[37] Also, one of the most important components of demoralization is hopelessness which may compromise any confidence in the benefits of therapy.^[36] About illness denial in psychiatric patients like schizophrenic ones, a poor insight and ignoring the illness are important factors that lead to nonadherence. For example, schizophrenic patients who ignore their illness do not believe their symptoms can be handled so they do not try ways to solve them like medication adherence.^[14] But CHD patients have required an insight about their disease and have not psychotic performance so illness denial cannot be an effective factor for TA. However, considered mechanisms could not cover all the psychosomatic aspects of cardiovascular disease, the particular mechanism of how each of these psychosomatic factors can affect TA is still unknown and needs profound studies.

The first limitation of present study is that in studies involving questionnaires, there is always a risk of self-reporting questionnaire for TA and also social desirability bias, where participants answer questions they feel are good rather than what they accurately are. However, there is no way to study TA without the patient's assessment. Second, other factors of disease, personality traits, and psychological such as social support have not been fully considered for the study. Despite lots of cohort studies, the main strength of this study is its sample size which is adequate for cohort studies.

CONCLUSION

As was prescribed, psychosomatic factors are determinant in the patient's TA. According to the chronicity of CVD, these factors should be considered at the beginning of the illness and be followed during the treatment process. Better medication adherence can reduce the risk of MACE happening among CHD patients. So, it would be effective to have appropriate interventions and recognizing mechanisms to help us to modify psychosomatic factors and improve TA.

Ethics approval and consent to participate

The Ethics Committee of Isfahan University of Medical Sciences approved the study proposal with the number of IR.MUI.Rec.1396.2.018.

Consent for publication

The written consent was obtained from patients who tended to participate in the study.

Acknowledgments

The authors would like to thank all patients who participated to the study. The MMAS-8 Scale, content, name, and trademarks are protected by US copyright and trademark laws. Permission for use of the scale and its coding is required. A license agreement is available from MMAR, LLC., www.moriskyscale.com.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Lincoff AM. Managing acute coronary syndromes: Decades of progress. *Cleve Clin J Med* 2014;81:233-42.
2. Tsao CW, Aday AW, Almarazooq ZI, Anderson CAM, Arora P, Avery CL, *et al.* Heart disease and stroke statistics-2023 update: A report from the American Heart Association. *Circulation* 2023;147:e93-621.
3. Naderi SH, Bestwick JP, Wald DS. Adherence to drugs that prevent cardiovascular disease: Meta-analysis on 376,162 patients. *Am J Med* 2012;125:882-7.e1.
4. Kennedy-Martin T, Boye KS, Peng X. Cost of medication adherence and persistence in type 2 diabetes mellitus: A literature review. *Patient Prefer Adherence* 2017;11:1103-17.
5. Chaudri NA. Adherence to long-term therapies evidence for action. *Ann Saudi Med* 2004;24:221-2.
6. Pedretti RFE, Hansen D, Ambrosetti M, Back M, Berger T, Ferreira MC, *et al.* How to optimize the adherence to a guideline-directed medical therapy in the secondary prevention of cardiovascular diseases: A clinical consensus statement from the European Association of Preventive Cardiology. *Eur J Prev Cardiol* 2023;30:149-66.
7. Chowdhury R, Khan H, Heydon E, Shroufi A, Fahimi S, Moore C, *et al.* Adherence to cardiovascular therapy: A meta-analysis of prevalence and clinical consequences. *Eur Heart J* 2013;34:2940-8.
8. Eicher L, Knop M, Aszodi N, Senner S, French LE, Wollenberg A. A systematic review of factors influencing treatment adherence in chronic inflammatory skin disease-strategies for optimizing treatment outcome. *J Eur Acad Dermatol Venereol* 2019;33:2253-63.
9. Crawshaw J, Auyeung V, Norton S, Weinman J. Identifying psychosocial predictors of medication non-adherence following acute coronary syndrome: A systematic review and meta-analysis. *J Psychosom Res* 2016;90:10-32.
10. Goldstein CM, Gathright EC, Garcia S. Relationship between depression and medication adherence in cardiovascular disease: The perfect challenge for the integrated care team. *Patient Prefer Adherence* 2017;11:547-59.
11. Escobar Florez OE, Aquilera G, De la Roca-Chiapas JM, Macías Cervantes MH, Garay-Sevilla ME. The relationship between psychosocial factors and adherence to treatment in men, premenopausal and menopausal women with Type 2 diabetes mellitus. *Psychol Res Behav Manag* 2021;14:1993-2000.
12. Koltuniuk A, Rosinczuk J. The levels of depression, anxiety, acceptance of illness, and medication adherence in patients with multiple sclerosis-descriptive and correlational study. *Int J Med Sci* 2021;18:216-25.
13. Rasmussen AA, Wiggers H, Jensen M, Berg SK, Rasmussen TB, Borregaard B, *et al.* Patient-reported outcomes and medication adherence in patients with heart failure. *Eur Heart J Cardiovasc Pharmacother* 2021;7:287-95.
14. Kim J, Ozzoude M, Nakajima S, Shah P, Caravaggio F, Iwata Y, *et al.* Insight and medication adherence in schizophrenia: An analysis of the CATIE trial. *Neuropharmacology* 2020;168:107634.
15. Kamei K, Terao T, Katayama Y, Hoaki N. Affective temperaments and psychotropic adherence. *J Affect Disord* 2013;150:1142-7.
16. Bahraini L, Damak R, Cheour M. The role of the affective temperament in the treatment adherence in psychiatry. *Pan Afr Med J* 2016;25:2.
17. Youn H, Lee MS, Jeong HG, Kim SH. Evaluation of factors associated with medication adherence in patients with bipolar disorder using a medication event monitoring system: A 6-month follow-up prospective study. *Ann Gen Psychiatry* 2022;21:33.
18. Murri MB, Caruso R, Ounalli H, Zerbinati L, Berretti E, Costa S, *et al.* The relationship between demoralization and depressive symptoms among patients from the general hospital: Network and exploratory graph analysis. *J Affect Disord* 2020;276:137-46.
19. Sadeghi M, Soleimani A, Sarrafzadegan N, Askari M, Nouri F, Masoumi G, *et al.* Background and design of a 5-year ST elevation myocardial infarction cohort in Isfahan, Iran: SEMI-CI study. *Arya Atheroscler* 2021;17:1-7.
20. Ghanei Gheshlagh R, Ebadi A, Veisi Raygani AK, Nourozi Tabrizi K, Dalvandi A, Mahmoodi H. Determining concurrent validity of the morisky medication adherence scale in patients with Type 2 diabetes. *Iran J Rehabil Res Nurs* 2015;1:24-32.
21. Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Predictive validity of a medication adherence measure in an outpatient setting. *J Clin Hypertens* 2008;10:348-54.
22. Berlowitz DR, Foy CG, Kazis LE, Bolin L, Lonroy LB, Fitzpatrick P, *et al.* for the SPRINT Study Research Group. Impact of Intensive Blood Pressure Therapy on Patient-Reported Outcomes: Outcomes Results from the SPRINT Study. *N Engl J Med* 2017; 377:733-44.
23. Bress AP, Bellows BK, King J, Hess R, Beddhu S, Zhang Z, *et al.*, for the SPRINT Research Group and the SPRINT Economics and Health Related Quality of Life Subcommittee. Cost- Effectiveness of Intensive versus Standard Blood Pressure Control. *N Engl J Med* 2017; 377:745-55.
24. Akbar H, Foth C, Kahloon RA, Mountfort S. Acute ST-Elevation Myocardial Infarction. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK532281>.
25. Fava GA, Freyberger HJ, Bech P, Christodoulou G, Sensky T, Theorell T, *et al.* Diagnostic criteria for use in psychosomatic research. *Psychother Psychosom* 1995;63:1-8.
26. Guidi J, Piolanti A, Berrocal C, Gostoli S, Carrozzino D. Incremental validity of the diagnostic criteria for psychosomatic research – revised (DCPR-R) to clinical assessment in primary care. *Psychiatry Res* 2020;291:113233.
27. Murad H, Basheikh M, Zayed M, Albeladi R, Alsayed Y. The association between medication non-adherence and early and late readmission rates for patients with acute coronary syndrome. *Int J Gen Med* 2022;15:6791-9.
28. Pan J, Wu L, Wang H, Lei T, Hu B, Xue X, *et al.* Determinants of hypertension treatment adherence among a Chinese population using the therapeutic adherence scale for hypertensive patients. *Medicine (Baltimore)* 2019;98:e16116.
29. Vélez-Vélez E, Bosch RJ. Illness perception, coping and adherence to treatment among patients with chronic kidney disease. *J Adv Nurs* 2016;72:849-63.
30. Eindhoven DC, Hilt AD, Zwaan TC, Schalij MJ, Borleffs CJW. Age and gender differences in medical adherence after myocardial infarction: Women do not receive optimal treatment-The Netherlands claims database. *Eur J Prev Cardiol* 2018;25:181-9.
31. DiMatteo MR, Lepper HS, Croghan TW. Depression is a risk factor for noncompliance with medical treatment: Meta-analysis of the effects of anxiety and depression on patient adherence. *Arch Intern Med* 2000;160:2101-7.

32. Kumbhani DJ, Fonarow GC, Cannon CP, Hernandez AF, Peterson ED, Peacock WF, *et al.* Predictors of adherence to performance measures in patients with acute myocardial infarction. *Am J Med* 2013;126:74.e1-9.
33. Alavi SM, Montazeri SM, Taheri Kharameh Z. Adherence to treatment and its relationship with anxiety and depression in patients with cardiovascular disease. *J vessel circ* 2020;1:26-30.
34. Rutledge T, Redwine LS, Linke SE, Mills PJ. A meta-analysis of mental health treatments and cardiac rehabilitation for improving clinical outcomes and depression among patients with coronary heart disease. *Psychosom Med* 2013;75:335-49.
35. Rao A, Zecchin R, Newton PJ, Phillips JL, DiGiacomo M, Denniss AR, *et al.* The prevalence and impact of depression and anxiety in cardiac rehabilitation: A longitudinal cohort study. *Eur J Prev Cardiol* 2020;27:478-89.
36. Porcelli P, Rafanelli C. Criteria for psychosomatic research (DCPR) in the medical setting. *Curr Psychiatry Rep* 2010;12:246-54.
37. Bauer LK, Caro MA, Beach SR, Mastromauro CA, Lenihan E, Januzzi JL, *et al.* Effects of depression and anxiety improvement on adherence to medication and health behaviors in recently hospitalized cardiac patients. *Am J Cardiol* 2012;109:1266-71.