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FACTORS ASSOCIATED WITH LOW MEDICATION ADHERENCE IN PATIENTS WITH CHRONIC CORONARY ARTERY DISEASE

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Abstract

Objective: This cross-sectional study aims to assess the prevalence of low medication adherence and identify factors associated with low adherence among patients with chronic coronary artery disease (CCAD). Methods: A total of 53 adults with established (CCAD) receiving at least two long-term cardioprotective medications (antiplatelets, statins, beta-blockers, ACE inhibitors/ARBs) will be consecutively recruited from a cardiology department. Medication adherence will be evaluated using the 8-item Morisky Medication Adherence Scale (MMAS-8) and categorized as high, medium, or low adherence. Clinical (diagnosis, disease duration, comorbidities, number of medications), socio-demographic (age, sex, education), and selected psychosocial data (forgetfulness, cost concerns, beliefs about medicines) will be collected via structured interviews and medical record review. Logistic regression will be used to determine independent predictors of low adherence. *Results:* It is expected that a considerable proportion of patients will have medium or low adherence, with low adherence observed in roughly one-third of participants, consistent with previous cardiovascular studies. Factors such as lower education, higher pill burden, and negative beliefs about medications are anticipated to be significantly associated with low adherence. *Conclusion:* The study provided real-world data on determinants of low adherence in CCAD and inform targeted adherence-improving strategies in cardiology practice.

Key words

chronic coronary artery disease, medication adherence, low compliance, Morisky scale, secondary prevention, cardiovascular pharmacotherapy.

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Drug therapy is a key component of secondary prevention of chronic coronary heart disease, but a significant proportion of patients do not achieve sufficient adherence to cardiovascular medications . According to meta- -analyses and large cohort studies, a 20% improvement in cardiovascular medication adherence is associated with a reduction in the risk of cardiovascular events by approximately 8% and overall mortality by 12% in patients with coronary heart disease. Furthermore, persistently poor adherence is associated with a 30–70% increase in the risk of death and major cardiovascular events (MACE), as well as increased hospitalization rates and an economic burden on the healthcare system. Systematic reviews highlight that non-adherence is a common problem across all groups of -cardiovascular medications (statins, antihypertensives, antiplatelet agents, ACE inhibitors/ARBs), and that poor adherence contributes to up to 9% of all cardiovascular events in Europe. Against this background, the study of the frequency of low adherence and the factors that determine it in patients with chronic coronary heart disease is of high clinical and social significance, as it allows us to identify modifiable targets for targeted interventions to increase the effectiveness of secondary prevention [1–4] .

The aim of this study was to assess the prevalence of low adherence to drug therapy and to identify clinical and -social factors associated with low adherence in patients with chronic coronary heart disease .

Materials and methods. The study was conducted at the Tashkent State Medical University Clinic from July to October 2025. All participants provided written informed consent prior to inclusion in the study.

The study was a prospective, controlled, open-label clinical trial conducted over 12 weeks. Patients were selected from among those hospitalized in the Endocrinology Department of the TSMU Clinic using a sequential inclusion method based on their meeting the eligibility criteria. The study consecutively included patients over 18 years of age with confirmed chronic coronary heart disease (angina, post-infarction cardiosclerosis, previous PCI/CABG) receiving at least two long-term cardioprotective drugs (antiplatelet agents, statins, beta -- blockers, ACE inhibitors/angiotensin II receptor blockers) for ≥3 months. Exclusion criteria included severe cognitive impairment, decompensation preventing interviews, and refusal to participate. The final sample size was 53 patients (Fig. 1).

Commitment assessment. Adherence to drug therapy was assessed using the 8- item -Morisky scale . Medication Adherence The MMAS 8 -scale , validated for assessing cardiovascular medication use, was used. According to the questionnaire author's recommendations, patients were classified as having high (8 points), moderate (6 to < 8 points), or low (<6 points) adherence.

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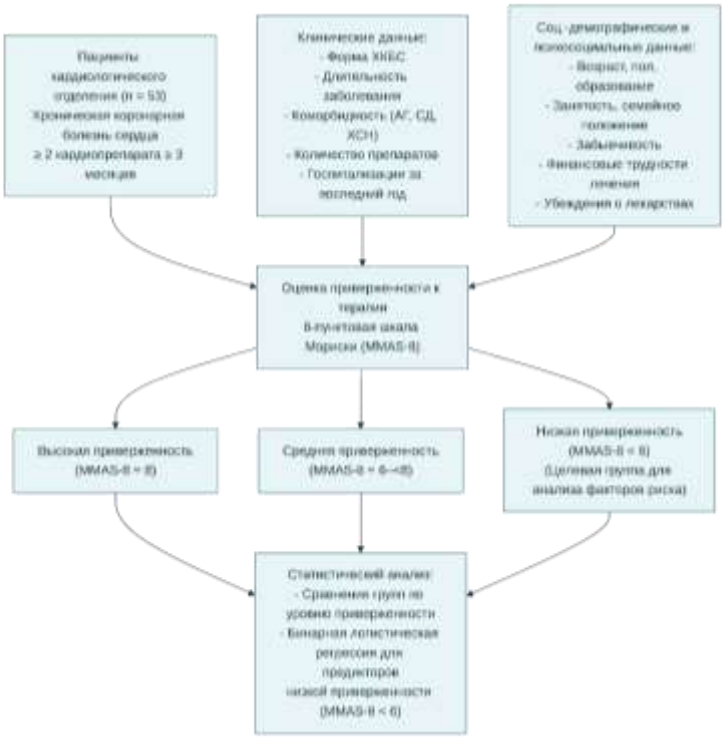

Fig. 1. Schematic representation of materials and research methods

Collection of clinical and socio- -demographic data. Using a standardized questionnaire and medical record analysis, the following were recorded: age, gender, education level, marital status, employment status; clinical characteristics (cholelithiasis type, disease duration, concomitant arterial hypertension, diabetes mellitus, chronic heart failure, number of hospitalizations in the past year); and the number of concomitant medications. Psychosocial factors included self-reported forgetfulness, difficulties associated with treatment costs, and beliefs about the necessity and safety of long-term pharmacotherapy (simple closed-ended yes/no questions or a Likert scale).

Statistical analysis. Statistical data processing was performed using the standard SPSS version 26 package . For quantitative variables, the mean and standard deviation or median and interquartile range (depending on the distribution) were calculated; for categorical variables, absolute and relative frequencies were calculated. Comparison of groups by adherence level (high/medium/low) was performed using the χ^2 -test or Fisher's exact test for categorical variables and the Student's t-test or Mann–Whitney U-test for quantitative variables. To identify independent factors associated with low adherence (MMAS8 <6 points), binary logistic regression was used with the inclusion of clinical demographic and psychosocial variables significant at the p<

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0.10 level in univariate analysis. Differences were considered statistically significant at $p < 0.05$.

Research results

Study sample characteristics. The study included 50 patients with a confirmed diagnosis of chronic coronary heart disease. Demographic and clinical characteristics of the groups at baseline are presented in Table 1.

Table 1.

Baseline demographic and clinical characteristics of patients

Indicator	n (%) / M±SD / Me [IQR]
Age, years	62.3 ± 9.8
Men	32 (60.4)
Women	21 (39.6)
Body mass index, kg/m²	28.1 ± 4.2
Duration of CHD, years	7 [3–12]
Previous myocardial infarction	29 (54.7)
Post-operative PCI/CABG	18 (34.0)
Arterial hypertension	44 (83.0)
Type 2 diabetes mellitus	17 (32.1)
Chronic heart failure	26 (49.1)
Number of comorbidities ≥2	31 (58.5)
Total number of prescribed drugs	6.2 ± 2.1
Polypharmacy (≥5 drugs), n (%)	38 (71.7)
Hospitalizations in the last year ≥1	24 (45.3)
Education level (secondary and below)	30 (56.6)
Works (has employment)	19 (35.8)

Note: M±SD / Me [IQR] depending on the type of data distribution in the sample.

Level of adherence to drug therapy

The average MMAS 8 score -in the overall sample was 6.3 ± 1.6. Low adherence (MMAS8 < 6 points) was detected in 17 (32.1%) patients, moderate (6–8 points) in 21 (39.6%), and high (< 8 points) in 15 (28.3%) patients with CHD. These indicators are comparable with data from foreign studies, where the proportion of patients with low adherence to cardiovascular -therapy for coronary heart disease ranges from 25 to 40% [1,5,6].

Association of adherence with demographic and clinical characteristics

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Patients with low adherence were statistically significantly more likely to have a lower level of education and a higher pill burden. Thus, the proportion of individuals with no more than secondary education was 70.6% in the low adherence group versus 48.6% among patients with moderate/high adherence (p=0.048). The average number of concomitant medications was higher in patients with low adherence (7.1 ± 2.3 versus 5.8 ± 1.8; p=0.02). The incidence of concomitant type 2 diabetes mellitus and chronic heart failure was higher in the low adherence group (41.2% and 58.8%, respectively) compared to 27.0% and 43.2% in the moderate/high adherence group, but the differences did not reach statistical significance (p>0.05). Similar trends in the association of polypharmacy and comorbidity with non-adherence have been described in large studies in patients with coronary heart disease [3,5,6].

Psychosocial factors and barriers

Forgetfulness as the main reason for missing medication doses was noted in 70.6% of patients with low adherence and in 35.1% of patients with moderate/high adherence (p=0.01). Financial difficulties associated with regularly purchasing medications were indicated by 52.9% of patients with low adherence versus 24.3% in the other groups (p=0.02). Expressed concerns about side effects and medication "overload" were also more often recorded with low adherence (47.1% versus 21.6%; p=0.03). These data are consistent with the results of studies demonstrating the leading role of forgetfulness, cost of therapy, and negative beliefs in the structure of barriers to adherence in cardiovascular -diseases [6–8].

Independent predictors of low adherence

In the multiple logistic regression model (dependent variable — low adherence, MMAS -8 <6), the following were independent predictors of low adherence: education no higher than secondary (OR 3.0; 95% CI 1.1–8.5; p=0.03), taking ≥7 medications (OR 2.7; 95% CI 1.0–7.4; p=0.04), and the presence of negative beliefs about the necessity and safety of long-term drug therapy (OR 3.6; 95% CI 1.2–11.0; p=0.02). Forgetfulness and financial difficulties continued to be associated with low adherence, but in the multivariable model, the significance was borderline (p≈0.06–0.08). A similar contribution of low education, polypharmacy, and negative beliefs about treatment to the risk of non-adherence has been previously shown in studies among patients with coronary heart disease and other cardiovascular -diseases [3,5,9].

Discussion of results. In the present study, poor adherence to drug therapy was found in approximately one-third of the sample of patients with chronic coronary heart disease (32.1%), while another 40% demonstrated moderate adherence. These figures are close to those of international studies, in which the

proportion of patients with insufficient adherence to cardioprotective therapy for coronary heart disease ranges from 30% to 50%, depending on the assessment methodology and population. Given that meta- -analyses show an association between good adherence and a reduction in the risk of cardiovascular events by approximately 8% and total mortality by 12% with a 20% increase in adherence, the identified level of non-adherence has significant clinical significance [1,3-6].

Our results on the proportion of patients with low adherence (approximately 30%) are comparable to data from studies conducted in patients with stable coronary artery disease and after acute coronary syndromes. In one multicenter study, the rate of pharmacological non-adherence in coronary artery disease was 36%, with non-adherence associated with an increased risk of recurrent events and hospitalizations. Our observed association of low education, polypharmacy, and negative beliefs about drug therapy with low adherence is consistent with studies that also identify these factors as key predictors of non-adherence in patients with coronary artery disease and other cardiovascular -diseases. A number of studies emphasize that both objective (cost, regimen complexity) and cognitive/emotional factors (fear of side effects, doubts about the need for therapy) form a set of barriers to adherence [5, 6, 9].

Clinical significance of the identified factors. The identification of low education as an independent predictor of poor adherence highlights the importance of tailored educational strategies that take into account -patient health literacy. Studies on coronary artery disease and chronic heart failure have shown that low educational attainment and limited health literacy are associated with poorer understanding of treatment regimens, less awareness of medication benefits, and a higher rate of missed doses. Polypharmacy in our study was also associated with poor adherence, consistent with data showing that an increased number of prescribed medications increases the likelihood of both unintentional (forgetfulness, confusion) and intentional nonadherence (feeling like "too many pills"). Finally, negative beliefs about the safety and necessity of long-term pharmacotherapy emerged as an independent risk factor for low adherence, which is consistent with the concept that low belief in the necessity of treatment and high concerns about the risk of harm increase the tendency to skip and voluntarily discontinue medications [5,6,10,11].

The practical implications of the study's findings relate to the need for targeted interventions aimed specifically at the identified modifiable factors. International data demonstrate the effectiveness of comprehensive programs that include structured educational counseling, telephone follow-up, clinical pharmacologist involvement, and the use of digital technologies (reminders, mobile apps) to

improve adherence in chronic kidney disease. Interventions aimed at simplifying the dosing regimen (reduced dosing frequency, fixed-dose combinations) have been shown to reduce the proportion of non-adherent patients and improve secondary prevention rates. Given the role of negative beliefs, the use of questionnaires such as Beliefs is particularly important. about Medicines Questionnaire and targeted correction of patient perceptions regarding the benefits and risks of therapy. For the inpatient cardiology department of a multidisciplinary center, it seems appropriate to implement a short adherence screening (MMAS -8 or equivalent) and barriers upon discharge, followed by the provision of personalized recommendations and the transfer of information to outpatient care .

Our study is notable for its focus on real-life clinical practice in a cardiology hospital, the use of a validated instrument for assessing adherence (MMAS -8), and a comprehensive approach to collecting potential predictors, including both clinical demographic and psychosocial characteristics. A similar multivariate approach is recommended in modern reviews devoted to adherence research, as it allows for the simultaneous identification of several modifiable targets for interventions. In addition, the analysis of independent predictors using logistic regression meets methodological standards for such cross-sectional studies. However, a number of limitations must be considered when interpreting the results. Firstly -, the single-point cross-sectional design does not allow for conclusions to be drawn about causal -relationships between the identified factors and reduced adherence; only associations can be discussed. Secondly, adherence was assessed by self-report using the MMAS 8, which is potentially associated with the risk of information bias (recall Bias (socially desirable responses) and, as a rule, leads to an overestimation of actual adherence. -Third, the small sample size of a single center limits the statistical power of the analysis and the generalizability of the results to a wider population of patients with coronary heart disease, especially in other regions and types of medical institutions.

Given the obtained results, multidisciplinary interventional studies involving cardiologists, clinical pharmacologists, and medical psychologists aimed at addressing adherence barriers in patients with coronary heart disease (CHD) appear promising. Further studies would expand the sample size, include multiple centers, and combine self-report scales with objective adherence assessment methods, as recommended in current reviews on this topic. A separate area of research is assessing the impact of improved adherence on "hard" clinical outcomes (recurrent heart attacks, hospitalizations, mortality) in real-world settings, based on data showing that improved adherence to secondary prevention is associated with a significant reduction in the risk of events in patients with coronary heart disease.

Conclusion

Based on the obtained results, a significant proportion of patients with chronic coronary heart disease exhibited low and moderate adherence to medication therapy, comparable to data from international studies. Low adherence is primarily associated with lower education levels, polypharmacy, and negative beliefs about long-term medication use, reflecting a combination of educational and therapeutic barriers. These factors are potentially modifiable, so simplifying treatment regimens, targeted education, and addressing beliefs about the benefits and safety of therapy appear to be promising approaches for increasing adherence and improving prognosis in this patient population.

REFERENCES:

1. Leslie KH, McCowan C, Pell JP. Adherence to cardiovascular medication: a review of systematic reviews. *J Public Health*. 2019;41(1):e84-e94. doi:10.1093/pubmed/fdy088
2. Hou Q, Zhao Y, Wu Y. Medication adherence trajectories and clinical outcomes in patients with cardiovascular disease: a systematic review and meta-analysis. *J Glob Health*. 2025;15:04145. doi:10.7189/jogh.15.04145
3. Chowdhury R, Khan H, Heydon E, et al. Adherence to cardiovascular therapy: a meta-analysis of prevalence and clinical consequences. *Eur Heart J*. 2013;34(38):2940-2948. doi:10.1093/eurheartj/eht295
4. Chen C, Li X, Su Y, You Z, Wan R, Hong K. Adherence with cardiovascular medications and the outcomes in patients with coronary arterial disease: "Real-world" evidence. *Clin Cardiol*. 2022;45(12):1220-1228. doi:10.1002/clc.23898
5. Padilha JC, Santos VB, Lopes CT, Lopes JDL. Prevalence of pharmacological adherence in patients with coronary artery disease and associated factors. *Rev Lat Am Enfermagem*. 2021;29:e3464. doi:10.1590/1518-8345.4554.3464
6. Khatib R, Marshall K, Silcock J, Forrest C, Hall AS. Adherence to coronary artery disease secondary prevention medicines: exploring modifiable barriers. *Open Heart*. 2019;6(2):e000997. doi:10.1136/openhrt-2018-000997
7. Lima JGD, Barros ALBLD, Lopes JDL. Factors associated with medication non-adherence among patients with heart failure. *Rev Lat Am Enfermagem*. 2024;32:e4302. doi:10.1590/1518-8345.6756.4302
8. Kalantarzadeh M, Yousefi H, Alavi M, Maghsoudi J. Adherence Barriers to Treatment of Patients with Cardiovascular Diseases: A Qualitative

Study. *Iran J Nurs Midwifery Res*. 2022;27(4):317-324. doi:10.4103/ijnmr.ijnmr_307_21

9. Almarwani AM, Almarwani BM. Factors predicting medication adherence among coronary artery disease patients in Saudi Arabia: A descriptive study. *Saudi Med J*. 2023;44(9):904-911. doi:10.15537/smj.2023.44.9.20230293

10. Khoiry QA, Alfian SD, Van Boven JFM, Abdulah R. Self-reported medication adherence instruments and their applicability in low-middle income countries: a scoping review. *Front Public Health*. 2023;11:1104510. doi:10.3389/fpubh.2023.1104510

11. Dugunchi F, Mudgal SK, Marznaki ZH, et al. Levels of adherence to treatment, illness perception and acceptance of illness in patients with coronary artery disease - descriptive and correlational study. *BMC Cardiovasc Disord*. 2024;24(1):171. doi:10.1186/s12872-024-03827-w

12. Marselin A, Amalia L, Dinarti LK. The interventions to improve medication adherence in coronary heart disease patient: A systematic review. *J Saudi Heart Assoc*. 2023;35(4). doi:10.37616/2212-5043.1356

13. Pedretti RFE, Hansen D, Ambrosetti M, 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(2):149-166. doi:10.1093/eurjpc/zwac204

14. Improving Medication Adherence among Patients with Coronary Heart Disease. *Fam Med Prim Care Open Access*. 2019;3(2). doi:10.29011/2688-7460.100033