Supplementary material

Pruc M, Kubica J, Banach M, et al. Prognostic value of the monocyte-to-high-density lipoprotein-cholesterol ratio in acute coronary syndrome patients: A systematic review and meta-analysis. Pol Heart J. 2024.

Table S1. PRISMA checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	3,4
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	5,6
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	6
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	8
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	7
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	7
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	8
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	8

Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	8
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	8
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	9
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	9
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	9
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	9-10
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	9-10
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	9-10
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	9-10
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	9-10
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	9
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	9
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	10-12
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	10
Study characteristics	17	Cite each included study and present its characteristics.	10
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	11

Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	11-12
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	11-12
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	11-12
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	11-12
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	11-12
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	11-12
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	11-12
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	12 - 14
	23b	Discuss any limitations of the evidence included in the review.	14
	23c	Discuss any limitations of the review processes used.	14
	23d	Discuss implications of the results for practice, policy, and future research.	14
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	7
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	7
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	-
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	-
Competing interests	26	Declare any competing interests of review authors.	2
Availability of data, code and	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	2

other materials			

Table S2. MACE definition across included trials

Study	Major adverse cardiovascular events definition							
	All cause death	**CV death**	**stroke**	**TVR**	**Stent thrombosis**	**Non-fatal Reinfarction**	**Congestive heart failure**	**Ventricular arrhythmia (VF, VT)**
Açıkgöz et al., 2016	■		■	■				
Cetin et al., 2016		■			■	■		
Çiçek et al., 2015	■			■		■	■	
El-Shall et al., 2019	■			■		■	■	
Ghanem et al., 2023		■				■		
Karataş et al., 2015	■			■		■		■
Li et al., 2021	■		■	■		■		
Sokmen et al., 2019		■						

Abbreviations: CV: cardiovascular; MACE: major adverse cardiovascular events; TVR: target vessel revascularization; VF: ventricular fibrillation; VT: ventricular tachycardia

Table S3. Methodology characteristics of included trials

Study	Inclusion criteria	Exclusion criteria	LMHR and HMHR definition	Outcomes	Follow-up	Primary findings
Açıkgöz et al., 2016	Patients with STEMI who were admit- ted to the Emergency Department and underwent urgent cardiac catheterization.	Patients with acute infection, hematological diseases, malignancy, and chronic systemic disease.	Based on MHR tertiles	Mortality due to any cause during 60 month follow up and MACE	In-hospital, 60-months	MHR is an independent predictor of in-hospital and long term mortality and MACE in STEMI.
Cetin et al., 2016	Patients who were admitted to our tertiary, heart-specialist hospital with ACS and underwent primary percutaneous coronary intervention (pPCI).	Patients who had a previous history of coronary revascularisation either CABG or PCI, active infection, haematological (including anaemia), oncological or inflammatory disease, renal or hepatic insufficiency, severe valvular disease, hypo- and hyperthyroidism, treatment with fibrinolytic agents (only or before referral for pPCI).	LMHR: <121.6 HMHR: >158.4	MACE including stent thrombosis, non-fatal MI, cardiovascular mortality during in-hospital and long-term follow-up period.	12-months 31.6 months	MHR as a novel inflammation-based marker seemed to be an independent predictor of severity of coronary artery disease and future cardiovascular events in patients with ACS. MHR may utilise the identification of patients who are at higher risk for MACE and individualisation of targeted therapy.

Çiçek et al., 2015	ECG indicating STEMI, which was defined as greater than 30min of continuous typical chest pain and ST-segment elevation of at least 2 mm in two contiguous ECG leads within 12 h of symptom onset or for up to 24 h if there was evidence of hemodynamic instability or continuing ischemia.	Patients who did not fulfill the inclusion criteria: PCI was not performed or no follow-up was documented after primary PCI.	LMHR: <1.60 HMHR: ≥ 1.60	Long-term all-cause mortality and major adverse cardiovascular events (MACE) during hospitalization and at the 3-year clinical follow-up.	3-yr	The results of this study have indicated that admission MHR is associated independently and significantly with short-term and long-term mortality in STEMI patients who undergo successful
El-Shall et al., 2019	All patients were subjected to detailed history taking, full clinical examination, 12 lead electro-cardiogram, echocardiography and primary PCI strategy.	Patients with prior myocardial infarction, patients who previously underwent coronary artery bypass graft (CABG) or PCI, patients with end stage renal failure (cre-atinine clearance <15mL/min), patients with he- matological disorders, patients with active hepato- biliary disease, patients with active infections, patients with neoplastic diseases, patients with recent major surgical procedure or trauma	LMHR: <10 HMHR: >20	All-cause mortality and major adverse cardiovascular events (MACE) during hospitalization and during the 3-months clinical follow-up.	3-mo	Monocyte to high-density lipoprotein cholesterol ratio is an independent prognostic factor for both in-hospital adverse outcomes, as well as, short-term adverse outcomes among STEMI patients who underwent primary PCI.

		and patients with known dyslipidemia.				
Ghanem et al., 2023	All patients with NST-ACS.	1) An intolerance to contrast. 2) Factors that are well-known to affect inflammatory and immunological indicators.	LMHR: <22.25 HMHR: ≥ 22.25	Impact of MHR as an independent predictor of the complexity and severity of coronary atherosclerosis.	3-mo	MHR as a novel inflammatory marker is indicated to be an independent predictor of severity of coronary artery disease among patients presenting with NST-ACS.
Huang et al., 2020	Patients admitted with AMI within 1 month of symptom onset.	(1) Patients who were younger than 65 or older than 85 years. (2) Patients who had sepsis or trauma. (3) Patients who were diagnosed as active cancer, hematological proliferative diseases, autoimmune diseases, pulmonary arterial hypertension, end-stage liver disease or renal failure. (4) Patients who took medications including any steroid therapy or chemotherapy around the diagnosis period, thrombolytic therapy and glycoprotein IIb/IIIa inhibitors.	LMHR: <0.67 HMHR: ≥ 0.67	All-cause mortality and recurrent myocardial infarction (RMI) that hap- pened during the follow-up period.	673.85 ± 14.32 days	NHR, a novel laboratory marker, might be a predictor of the long-term clinical outcomes of elderly patients with AMI, which was superior to MHR and LDL-C/HDL-C.
Karataş et al., 2015	Patients with the diagnosis of STEMI	Patients with clinical evidence of active cancer, hematological	LHR: <13.9 HMHR: ≥ 22.9	In-hospital major adverse cardiac	In-hospital	Admission MHR values were found to be independently

	and underwent primary PCI.	proliferative disorders, active hepatobiliary diseases, chronic antihyperlipidemic treatment, active infection, chronic inflammatory disease, receiving steroid therapy for autoimmune dis- ease, and patients without a recorded measurement of admission labo- ratory parameters including cholesterol levels before primary PCI.		events (MACE) and mortality.		correlated with in-hospital MACE and mortality after primary PCI.
Li et al., 2021	Adults undergoing PCI for NSTE-ACS.	Patients were excluded because of missing monocyte or high-density lipoprotein cholesterol (HDL-C) examination on admission. Furthermore, patients with nosocomial infection, patients with intra-aortic balloon pump, and patients with PCI information incomplete were also excluded.	LHR: <0.014 HMHR: ≥ 0.020	In-hospital major adverse clinical events (MACE). Bleeding and death during follow-up.	In-hospital, 1-yr	The increased level of MHR was related to in-hospital MACE and long-term bleeding events in T2DM patients with NSTE-ACS undergoing PCI.
Ma et al., 2022	Patients with ACS undergoing PCI.	Past coronary artery bypass grafting, history of rheumatism, infectious disease,	LHR: <7.7 HMHR: ≥ 11.3	Composite of overall death, non-fatal stroke, non-fatal	6-mo	MHR was independently and significantly associated with adverse CV

		niacin intake, and lack of follow-up data.		myocardial infarction (MI), and unplanned repeat revascularization. The hard endpoint was defined as the composite of cardiovascular death, non- fatal stroke, and non-fatal MI.		outcomes in ACS patients who underwent PCI and improved the predictive ability of the GRACE risk score based prognostic models.
Oylumlu et al., 2020	Patients with ACS undergoing coronary angiography.	The hematological disease, patients with cardiogenic shock, systemic inflammatory disease or active infection, significant valvular heart disease, malignancy, severe liver or renal disease and autoimmune disease.	LHR: <10.8 ± 2.9 HMHR: > 31.2 ± 7.9	In-hospital and follow-up mortality.	5-yr	Authors shown that high MHR and low LMR were significant and independent predictors of in-hospital and long-term mortality in patients with ACS.
Sokmen et al., 2019	Patients presenting with STMI and treated with PCI.	History of a recent myocardial infarction; active infection or chronic inflammatory disease thrombolytic agent administration before PCI; severe hepatic, renal, hematological disease; and, history of neoplastic or rheumatologic disease.	LHR: <19.31 HMHR: ≥ 19.31	In-hospital and 3-month overall death	3-mo	MHR but not NLR may be utilized in the prediction of in-hospital and 3-month overall death in acute STMI patients treated with primary PCI.

Abbreviations: AMI: acute myocardial infarction; CABG: coronary artery bypass grafting; CAD: coronary artery disease; CV: cardiovascular; ECG: electrocardiogram; HDL-C: high-density lipoprotein cholesterol; HMHR: high monocyte-to-high-density lipoprotein-cholesterol ratio; LMHR: low monocyte-to-high-density lipoprotein-cholesterol ratio; LDL-C: low-density lipoprotein cholesterol; MACE: major adverse cardiovascular events; MHR: monocyte-to-high-density lipoprotein-cholesterol ratio; NST-ACS: non ST-elevation acute coronary syndrome; PCI: percutaneous coronary intervention; pPCI: primary percutaneous coronary intervention; RMI: recurrent myocardial infarction; STEMI: ST-elevation myocardial infarction