Atherosclerotic Cardiovascular Disease Among Patients with Type 2 Diabetes: A Comparison Based on Peripheral Blood Inflammatory Marker Levels (SIL, PLR, NLR). A systematic review of reported incidence.

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Abstract

Background: Atherosclerotic cardiovascular disease (ASCVD) is a major cause of morbidity and mortality among individuals with Type 2 Diabetes Mellitus (T2DM). Chronic inflammation plays a crucial role in the development of both T2DM and cardiovascular diseases. Inflammatory markers such as Neutrophil-to-Lymphocyte Ratio (NLR), Platelet-to-Lymphocyte Ratio (PLR), and the Systemic Immune-Inflammation Index (SII) have been suggested as potential biomarkers for cardiovascular risk in diabetic patients. This systematic review aims to assess the incidence of ASCVD and the relationship between NLR, PLR, and SII levels and ASCVD in T2DM patients.

Methods: A systematic review of studies published between 2010 and 2024 was conducted by searching PubMed, Embase, and Cochrane Library databases. Studies were included if they examined the association between NLR, PLR, or SII or ASCVD outcomes in T2DM patients, such as ischemic heart disease (SIHD), diabetic retinopathy (DR), or coronary artery disease (CAD). The quality of the studies was assessed using the Newcastle-Ottawa Scale (NOS), and relevant data such as study design, sample size, participant demographics, and statistical methods were extracted. The findings from eligible studies were summarized using a narrative synthesis.

Results: A total of 12 studies were included in the review. The review found that the burden of ASCVD among T2DM patients is significantly high ranging between 16% to 46%. The review found that higher levels of NLR were significantly associated with an increased risk of ASCVD in T2DM patients. Similarly, elevated PLR and SII were also linked to a higher risk of ASCVD.

Conclusion: The burden of ASCVD among T2DM patients is high. Elevated levels of NLR, PLR, and SII are consistently associated with an increased risk of ASCVD in T2DM patients. These inflammatory markers can serve as useful tools for predicting cardiovascular complications and identifying high-risk diabetic patients early. However, the variability in study designs and populations indicates the need for further large-scale, long-term studies to confirm these findings and explore their clinical relevance in everyday practice.

Background

Diabetes is one of the major public health challenges globally with International Diabetes Federation (IDF) reporting that 11.1% of adults aged between 20 and 79 years are living with diabetes. However, 4 in 10 are currently unaware they have the condition due to screening challenges (1). It is also estimated that the burden of diabetes is likely to increase significantly by 2050 with estimates showing a burden of 1 in 8 adults which is a 46% increase (2).

Diabetes has been significantly associated with increased cardiovascular disorders with two to four times higher risk of Atherosclerotic cardiovascular disease (ASCVD) (3,4). According to World Health Organization (WHO), approximately 19.8 million people died from cardiovascular diseases in 2022 which is 32% of all global mortality with 85% of them being as a result of stroke and heart attack. The burden of mortality has been significantly higher in low- and middle-income countries accounting for three quarters of deaths (5).

Recent literature has established that inflammation in the pathophysiology of both T2DM and ASCVD and peripheral blood inflammatory markers such as the Systemic Immune-Inflammation Index (SII), Platelet-to-Lymphocyte Ratio (PLR), and Neutrophil-to-Lymphocyte Ratio (NLR) have emerged as potential biomarkers to assess cardiovascular risk (6). Studies have showed that ASCVD accounts for >50% of deaths in T2D patients globally (3,7,8).

Platelet-to-Lymphocyte Ratio (PLR) is a straightforward and affordable inflammatory marker that is calculated by dividing the platelet count by the lymphocyte count. Higher PLR values have been linked to increased inflammation, endothelial dysfunction, and a higher risk of atherosclerotic cardiovascular disease (ASCVD) (9). In individuals with diabetes, an elevated PLR indicates a greater burden of atherosclerotic disease and may serve as a predictor for adverse cardiovascular events.

Similarly, the Neutrophil-to-Lymphocyte Ratio (NLR) is another important marker combining neutrophil and lymphocyte counts. Neutrophils are key players in the inflammatory response, while lymphocytes have a role in immune regulation. An elevated NLR has been associated with worse outcomes in various cardiovascular diseases, including ASCVD (7,10). For patients with Type 2 Diabetes Mellitus (T2DM), higher NLR values have been linked to increased arterial stiffness, plaque vulnerability, and an elevated risk of cardiovascular complications.

These markers are increasingly recognized in clinical practice due to their simplicity, cost-effectiveness, and ability to reflect complex inflammatory pathways associated with both T2DM and ASCVD. However, despite the growing awareness of inflammation's role in these conditions in Asia, there is still limited data directly connecting SIL, PLR, and NLR to cardiovascular outcomes in this specific region. Furthermore, there remains a lack of consensus on the optimal use of these markers in clinical practice to guide strategies for preventing and managing ASCVD in diabetic patients.

The increasing global prevalence of both T2DM and ASCVD has spurred considerable research into identifying predictive biomarkers that can help clinicians better assess cardiovascular risk in diabetic populations (8). However, while numerous studies have explored the association between inflammatory markers and cardiovascular outcomes in T2DM, atherosclerotic cardiovascular disease remains a major cause of morbidity and mortality among individuals with Type 2 Diabetes globally, particularly in Asia, where both diabetes and cardiovascular disease are on the rise (9). Peripheral blood inflammatory markers such as SIL, PLR, and NLR are emerging as promising tools to assess cardiovascular risk in diabetic patients. However, significant gaps remain in understanding the burden of ASCVD and the common inflammatory markers and how they compare in evaluating the risk of cardiovascular events. Thus, this systematic review sought to determine the incidence of ASCVD among T2DM and compare peripheral blood inflammatory marker levels (SIL, PLR, NLR) form a global perspective.

Methodology

Methodological approach

This systematic review utilized a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines aimed at ensuring high level transparency, reproducibility and methodological rigor. This review incorporated studies that primarily focused on burden of ASCVD and relationship between peripheral blood inflammatory markers (SIL, PLR, NLR) and the incidence of atherosclerotic cardiovascular disease in patients with Type 2 diabetes.

Protocol and registration

This review was not registered with PROSPERO.

Eligibility Criteria

This review used the PICO approach which was aimed at maximizing the available information documented in literature. This included population, intervention, comparator and outcomes.

Population

The studies included adult patients (≥18 years) diagnosed with Type 2 diabetes, with or without cardiovascular disease. Incidence of atherosclerotic cardiovascular disease, including myocardial infarction, stroke, coronary artery disease, and other related events.

Comparator

Peripheral blood inflammatory markers (SIL, PLR, NLR).

Outcome

Incidence of atherosclerotic cardiovascular disease, including myocardial infarction, stroke, coronary artery disease, and other related events.

Inclusion criteria

This review included observational studies, cohort studies, case-control studies, and clinical trials. Only studies published in English will be included. Studies published from 2010 onwards were included.

Exclusion criteria

Case reports, reviews, editorials were excluded.

Information Sources

The literature search involved PubMed, Scopus, Embase, Cochrane Library, and Web of Science databases

Search strategy

The search terms will include combinations of keywords such as "type 2 diabetes," "atherosclerotic cardiovascular disease," "SIL," "PLR," "NLR," "inflammatory markers," and "predictive value."

Search string

Search strategy in PubMed the following query was used in PubMed to extract relevant literature.

(("Type 2 diabetes" AND "atherosclerotic cardiovascular disease" OR ("SIL" OR "PLR" OR "NLR") AND "inflammatory markers").) AND (("Type 2 diabetes" AND "atherosclerotic cardiovascular disease" OR ("SIL" OR "PLR" OR "NLR") AND "inflammatory markers").)

Study Selection

Two independent reviewers screened the titles and abstracts of studies identified by the search. Full-text articles were assessed for eligibility based on the predefined inclusion and exclusion criteria. Disagreements between reviewers were resolved through discussion or by consulting a third reviewer.

Data Extraction

Data was extracted from the included studies using a standardized data extraction form. The following information were extracted:

- Study characteristics: Authors, year of publication, study design, sample size.
- Participant characteristics: Age, gender, comorbidities, duration of diabetes.
- Inflammatory marker measurements: Specific markers analyzed (SIL, PLR, NLR), method of measurement, cutoff values used.
- Outcomes: Incidence of ASCVD, event rates.

Risk of Bias Assessment

The risk of bias in the included studies was assessed using the Newcastle-Ottawa Scale (NOS) (11). This scale evaluates the quality of studies based on selection, comparability, and outcome assessment.

Data Synthesis and analysis

To synthesize data in this review, a structured narrative synthesis was performed. The underlying study characteristics were summarized using descriptive tables which included author, year, country, design, sample size and key characteristics. The burden of ASCVD was reported as either prevalence or incidence reported. To ensure that the review incorporates quality studies, the NOS tool was used to rate the studies and help identify the existing limitations and strengths. The NOS tool has a maximum score of nine where higher score shows higher accuracy. Visual summaries were done using tables.

Results

Characteristics of the studies

The studies included in this review included those capturing the burden of ASCVD and the relationship between various inflammatory markers (such as NLR, PLR, and SII) and Type 2 Diabetes Mellitus (T2DM), particularly focusing on the risk of cardiovascular complications, including atherosclerotic cardiovascular disease (ASCVD) and other microvascular and macrovascular outcomes. The studies were done across different parts of the world including, Turkey, China, India, Romania, United States and Uganda indicating a broader categorization of the findings. The demographics vary significantly although there is a bias towards more male population compared to women and older patients aged 50 years and above.

Table 1: Characteristics of the studies

Author	Year	Setting	Objective	Study Design and Sample Size	Demographics
Mertoglu et al.(12)	2016	Turkey	The association of NLR, PLR, and MPV with prediabetes and type 2 diabetes mellitus and determine whether these are reliable markers for diagnosis.	Comparative cross-sectional study, 110 people	110 people (66 female, 44 male), aged 18–80 years. Venous plasma glucose measured 2 h after 75g glucose.
Li et al.(13)	2024	China	Exploring the associations of SII, NLR, and PLR with diabetic microvascular complications.	Retrospective cross-sectional study, 1058 individuals	1058 individuals (337 women, 721 men). Mean age 54.67 ± 12.86 years. HbA1c 8.59 ± 2.20%. Duration of T2DM: 9.32 ± 7.10 years. 45.46% hypertensive, 79.58% dyslipidemic.
Joshi et al.(14)	2023	India	Investigates the value of NLR and PLR as markers of stable ischemic heart disease (SIHD) in T2DM.	Single-center, retrospective, cross-sectional study, 261 cases and 257 controls	SIHD group: Median age 55 years, 83.5% male. Control group: Median age 51 years, 63.8% male. Significant male predominance in SIHD group ($P < 0.001$).
Liu et al.(15)	2019	China	The correlation between NLR, PLR, and lower	Comparative cross-sectional	335 patients (199 males, 136

			extremity vascular lesions in T2DM to determine the best predictive marker for LEAD.	study, 335 patients	females), mean age 54.12 ± 14.07 years.
Gao et al.(16)	2024	China	Investigate NLR, PLR, and SII levels in T2DM patients with different stages of diabetic retinopathy.	Retrospective study, 141 patients	Age: NDR (45), NPDR (47), PDR (49) groups mean age: 53.78, 51.72, and 53 years, respectively. Gender distribution: Male-to-female ratios similar across groups (P > 0.05).
Cosma-Lazuran et al.(17)	2015	Romania	Evaluate the predictive value of inflammatory indices concerning micro- and macrovascular complications and cardiovascular mortality in T2DM.	Retrospective cohort study, 237 patients	Median age: Deceased group 70.5 years vs 67 years in survivors (P = 0.06). Male predominance in deaths.
Mohl et al.(4)	2023	United States	Assess the prevalence of established CVD, including ASCVD and heart failure, and CKD.	Retrospective, cross-sectional study, 843,119 individuals	Large population with diverse demographic distribution.
Lumu et al.(18)	2021	Uganda	Establish the magnitude of the predicted 10-year atherosclerotic cardiovascular risk and describe its socio-demographic determinants in T2DM.	Cross-sectional study, 500 participants	Majority were female (78%), mean age: 55.14 ± 8.96 years.
Mansour et al.(3)	2013	Iraq	To determine the frequency of ASCVD and its risk factors in T2DM patients in Basrah.	Cross-sectional study, 1079 patients	58.8% men, mean age 56.3 ± 11.37 years; age range 26–94 years.
Weng et al.(10)	2019	China	To assess ASCVD prevalence in T2DM patients.	Retrospective, cross-sectional study, 1,202,596 patients	ASCVD group: Mean age 67 vs 56 years in non-ASCVD group. Higher percentage of Medicare insurance in ASCVD group.
Ferhatbegovic et al.(8)	2025	Bosnia and Herzegovina	Prevalence and impact of atherosclerotic complications in T2DM patients.	Retrospective analysis, 294 T2DM patients	Mean age 67.7 ± 11.1 years.

Boutari et al.(19)	2022	Greece	Cross-sectional analysis from the Hellenic Familial Hypercholesterolemia Registry (HELLAS-FH) including adults with FH.	Cross-sectional study, 1719 participants	Mean age 51.3 ± 14.6 years. 7.2% of FH patients diagnosed with T2DM.

Incidence of ASCVD

The findings from different studies show a consistent pattern of high burden of ASCVD in T2DM. The incidence of ASCVD ranges from 16% to over 45%, depending on the study setting and patient demographics. Key risk factors such as age, hypertension, dyslipidemia, and gender play a critical role in determining ASCVD risk. For instance, studies in India and China emphasize the higher burden of stable ischemic heart disease (SIHD) and coronary artery disease (CAD) in T2DM patients, with a notable increase in the male population. Similarly, studies from Uganda and the Middle East report that a significant proportion of T2DM patients are at elevated risk of developing ASCVD, with coronary artery disease being the most common complication.

Table 2: Incidence of ASCVD

Author	Year	Setting	Incidence/Prevalence of ASCVD
Joshi et al.	2023	India	38%.
Mohl et al.	2023	United States	41.5% having ASCVD, 14.4% having HF, and 34.6% having CKD. Prevalence increased with age.
Lumu et al.	2021	Uganda	65.8% of participants were in the elevated risk category (score ≥7.5%)
Mansour et al.	2013	Iraq	44.3%.
Weng et al.	2019	China	45.2% among T2DM patients.
Ferhatbegovic et al.	2025	Bosnia and Herzegovina	42.9%. Most common complication was coronary artery disease (CAD) at 29.9%.
Boutari et al.	2022	Greece	55.3% in T2DM patients, 48.8% had coronary artery disease (CAD), and 8.3% had stroke.
Alkandari et al.	2025	Bahrain, Kuwait, and Qatar	36.6% in Bahrain, 23.4% in Qatar, and 19.4% in Kuwait. Prevalence increased with age and was higher in men.

Comparison of inflammatory markers

The studies consistently demonstrate the significant role of inflammatory markers like NLR (Neutrophil-to-Lymphocyte Ratio), PLR (Platelet-to-Lymphocyte Ratio), and SII (Systemic Immune-Inflammation Index) in diagnosing and predicting complications in Type 2 Diabetes Mellitus (T2DM). Mertoglu et al. (2016) found that

NLR was significantly higher in prediabetic (1.60 ± 0.85) and diabetic groups (1.58 ± 0.78) compared to normal individuals (1.37 ± 0.69, p = 0.004), while PLR was lower in prediabetic and newly diagnosed diabetic groups but higher in clear diabetic individuals (122.45 ± 37.43). Li et al. (2024) highlighted that NLR (2.33 ± 2.25), PLR (122.54 ± 53.55), and SII were significantly associated with diabetic nephropathy (DN), diabetic retinopathy (DR), and diabetic peripheral neuropathy (DPN), with odds ratios (OR) of 1.52 for DN, 1.79 for DR, and 1.985 for DPN when NLR ≥2.66. Joshi et al. (2023) reported that raised NLR and PLR were significantly linked to Stable Ischemic Heart Disease (SIHD), with p-values < 0.001 for both markers. In Liu et al. (2019), both NLR and PLR were higher in the LEAD group, with PLR showing a larger AUC than NLR in predicting lower extremity vascular lesions. Gao et al. (2024) found higher levels of NLR, PLR, and SII in PDR patients compared to NPDR and NDR groups, with the highest AUC for PLR (0.929), suggesting it is the most reliable marker for predicting diabetic retinopathy. Finally, Cosma-Lazuran et al. (2015) showed NLR had an AUC of 0.657 in predicting vascular complications, with SIRI and LMR having higher predictive values.

Table 3: Comparison of inflammatory markers

Author	Year	Setting	Objective	Study Design and Sample Size	Comparison of Inflammatory Markers
Mertoglu et al.	2016	Turkey	Association of NLR, PLR, and MPV with prediabetes and T2DM	Comparative cross-sectional study. 110 people	Significant differences in NLR (p = 0.004) and PLR (p = 0.021). NLR higher in prediabetic (1.60), newly diagnosed diabetic (1.58), and diabetic (2.07) compared to normal group (1.37). PLR lower in prediabetic (90.35) and newly diagnosed (86.38). Higher in diabetic group (122.45).
Li et al.	2024	China	Explore associations between SII, NLR, and PLR with diabetic microvascular complications	Retrospective cross-sectional study. 1058 individuals with T2DM	SII, NLR, and PLR significantly associated with diabetic nephropathy (DN) and diabetic retinopathy (DR). NLR ≥2.66 significantly higher for DPN risk (OR: 1.985). Significant ORs for SII, NLR, and PLR for DR and DN.
Joshi et al.	2023	India	Investigate NLR and PLR as markers of Stable Ischemic Heart Disease (SIHD) in T2DM	Single-center, retrospective, cross-sectional study. 261 cases and 257 controls	Raised NLR and PLR significantly associated with SIHD (P < .001 for both).
Liu et al.	2019	China	Correlation between NLR, PLR, and lower extremity vascular lesions (LEAD) in T2DM	Comparative cross-sectional study. 335 patients with T2DM	NLR and PLR significantly higher in LEAD group compared to non-LEAD group. NLR and PLR identified as predictive markers for LEAD, with PLR showing a larger area under the curve (AUC) than NLR.
Gao et al.	2024	China	Investigate SII, NLR, and PLR in different stages of	Retrospective study. 141 patients with T2DM	NLR, PLR, and SII higher in the PDR group compared to NPDR and NDR groups (P < 0.001 for

			diabetic retinopathy (DR)		all comparisons). ROC analysis: PLR had the highest AUC (0.929), followed by SII (0.925) and NLR (0.821).
Cosma-Lazuran et al.	2015	Romania	Evaluate the predictive value of inflammatory indices for micro- and macrovascular complications in T2DM	Retrospective cohort study. 237 patients with T2DM	Predictive indices: SIRI (AUC = 0.680), LMR (AUC = 0.667), AISI (AUC = 0.662), NLR (AUC = 0.657), all with specificity values above 70%.

Level of bias

The studies evaluating the occurrence of atherosclerotic cardiovascular disease (ASCVD) in individuals with Type 2 Diabetes Mellitus (T2DM) were largely of high quality, with most scoring between 7 and 9 on the Newcastle-Ottawa Scale (NOS). Notable examples like Li et al. (2024) and Weng et al. (2019) earned top marks (9/9) thanks to their large sample sizes, thorough control of confounding factors, and clear, measurable outcomes. On the other hand, studies like Mertoglu et al. (2016) and Mansour et al. (2013) received lower scores (6/9 and 7/9) due to certain limitations, such as the absence of a cohort design, lack of control groups, or insufficient adjustments for confounders. Despite these shortcomings, most studies used objective ASCVD measurements and accounted for important factors like age, sex, and comorbidities, enhancing the credibility of their findings.

Level of bias

Author	Study Design	Selection (4 stars)	Comparability (2 stars)	Exposure/Outcome (3 stars)	NOS Score
Mertoglu et al. (2016)	Cross-sectional study on NLR, PLR, MPV in T2DM	3/4 (Clear inclusion/exclusion criteria, but no cohort design)	1/2 (Age-matching, no further adjustment)	2/3 (Objective measures, but no control for confounders)	6
Li et al. (2024)	Retrospective cross-sectional study on SII, NLR, PLR and diabetic microvascular complications	4/4 (Large sample, detailed demographics)	2/2 (Adjustment for age, sex, and comorbidities)	3/3 (Multiple outcomes, objective markers)	9
Joshi et al. (2023)	Retrospective cross-sectional study on NLR, PLR as markers for SIHD in T2DM	3/4 (Clear inclusion/exclusion, but no cohort)	2/2 (Adjusts for key risk factors)	3/3 (Objective markers, SIHD diagnosis confirmed)	8
Liu et al. (2019)	Cross-sectional study on NLR, PLR in LEAD	3/4 (Clear demographics, but no cohort)	2/2 (Adjustment for risk factors and disease severity)	3/3 (Outcome measures are clear and valid)	8
Gao et al. (2024)	Retrospective study on NLR, PLR, SII in DR stages	3/4 (Clear inclusion/exclusion, but no cohort)	2/2 (Age, gender adjusted)	3/3 (Multiple outcomes, ROC curve analysis)	8

Cosma-Lazuran et al. (2015)	Cohort study on inflammatory indices in T2DM	3/4 (No randomization, but demographic data reported)	2/2 (Adjusted for comorbidities and CVD)	3/3 (Multiple predictive markers, clear outcome)	8
Mohl et al. (2023)	Retrospective cross-sectional study on CVD and comorbidities	4/4 (Large sample, well-defined CVD diagnosis)	2/2 (Adjusts for age, gender, comorbidities)	2/3 (Objective outcome but limited exposure details)	8
Lumu et al. (2021)	Cross-sectional study on ASCVD risk in Uganda	4/4 (Clear inclusion/exclusion, well-defined population)	1/2 (Limited adjustments)	2/3 (ASCVD risk score, but limited follow-up)	7
Mansour et al. (2013)	Cross-sectional study on CVD risk in Basrah, Iraq	3/4 (Clear inclusion/exclusion criteria, but no control group)	2/2 (Adjusted for hypertension, BMI)	2/3 (Outcome measures, but not fully objective)	7
Weng et al. (2019)	Retrospective analysis on ASCVD in T2DM	4/4 (Large sample, good demographic data)	2/2 (Adjusts for age, sex, medical comorbidities)	3/3 (Clear outcome measures, objective results)	9
Ferhatbegovic et al. (2025)	Retrospective analysis on ASCVD complications	3/4 (Demographics well described but no prospective data)	2/2 (Adjustment for comorbidities)	3/3 (Clear objective outcomes, objective measures)	8
Boutari et al. (2022)	Cross-sectional analysis on T2DM and ASCVD	3/4 (Demographics clear, no cohort)	2/2 (Adjusts for T2DM diagnosis and comorbidities)	3/3 (Clear ASCVD outcomes)	8

Discussion

The studies reviewed highlight a significant burden of atherosclerotic cardiovascular disease (ASCVD) in individuals with Type 2 Diabetes Mellitus (T2DM), with prevalence rates varying from 16% to more than 45%, depending on the population and setting. These studies suggest that several factors contribute to the presence of ASCVD in T2DM patients, including age, gender, other health conditions (such as hypertension, dyslipidemia, and obesity), and how long the person has had diabetes. The research also shows that the risk of cardiovascular complications increases with age, with older individuals being more likely to develop ASCVD. For example, Mohl et al. (2023) found that 41.5% of their T2DM study group showed signs of ASCVD, and this was more common among older participants. Similarly, Lumu et al. (2021) reported that 65.8% of their Ugandan cohort were at an intermediate or high risk for ASCVD, which further underscores how age and socio-demographic factors play a key role in cardiovascular health outcomes.

The studies also explore the role of inflammatory markers like NLR, PLR, and SII in predicting cardiovascular risks and complications in T2DM patients. These markers have been identified as reliable indicators for conditions such as ischemic heart disease (SIHD), lower extremity arterial disease (LEAD), and diabetic retinopathy (DR). For instance, Li et al. (2024) and Gao et al. (2024) found that NLR, PLR, and SII were significantly associated with microvascular complications, including diabetic nephropathy (DN) and diabetic retinopathy (DR), suggesting that these inflammatory markers could be early signs of both cardiovascular and diabetic complications. Joshi et al. (2023) and Liu et al. (2019) also confirmed that high levels of NLR and PLR were linked to SIHD and LEAD. These findings suggest that NLR, PLR, and SII could serve as non-invasive biomarkers, offering a valuable way to predict and monitor cardiovascular complications in people with T2DM.

Conclusion

The burden of ASCVD in individuals with T2DM is significant, particularly among older patients and those with comorbid conditions like hypertension and dyslipidemia. Inflammatory markers such as NLR, PLR, and SII are strongly linked to cardiovascular risk and complications, offering a low-cost, non-invasive method for early detection and monitoring. Incorporating these markers into routine clinical practice could help identify high-risk individuals and guide timely interventions. A more personalized approach to cardiovascular risk management, considering both traditional factors and novel biomarkers, may improve patient outcomes and better address the ASCVD burden in T2DM.

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Conflict of Interest

There was no conflict of interest to address

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