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EFFECT OF NURSE-GUIDED NUTRITION INTERVENTIONS ON LIPID PROFILE, DIETARY COMPLIANCE, AND CARDIOVASCULAR OUTCOMES IN CORONARY ARTERY DISEASE PATIENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Abstract

Background: Coronary artery disease (CAD) remains a leading cause of morbidity and mortality worldwide, with dyslipidemia and poor dietary adherence representing modifiable risk factors. Nurse-guided nutrition interventions have emerged as a promising strategy for secondary prevention, yet their comprehensive effects on lipid profiles, dietary compliance, and cardiovascular outcomes remain incompletely synthesized.

Methods: We conducted a systematic review and meta-analysis following PRISMA guidelines. We searched SciSpace, Google Scholar, and PubMed databases from January 2010 to September 2026 for randomized controlled trials (RCTs), meta-analyses, and observational studies evaluating nurse-guided nutrition interventions in CAD

patients. Studies were included if they reported outcomes on lipid profiles (LDL-C, HDL-C, total cholesterol, triglycerides), dietary compliance, or cardiovascular events. Two independent reviewers performed study selection, data extraction, and risk of bias assessment using the Cochrane Risk of Bias 2.0 tool and GRADE framework. Statistical analyses employed random-effects models with heterogeneity assessed via I^2 statistics.

Results: From 431 initial records, 22 studies involving over 3,000 CAD patients were included after removing 85 duplicates and screening 346 unique records. Nurse-guided nutrition interventions demonstrated significant improvements in lipid profiles: LDL cholesterol decreased by 0.47–0.76 mmol/L (weighted mean difference [WMD]: −0.61 mmol/L, 95% CI: −0.92 to −0.30, p = 0.0001), total cholesterol decreased by WMD −0.63 mmol/L (95% CI: −0.97 to −0.30, p = 0.0002), HDL cholesterol increased by WMD 0.06 mmol/L (95% CI: 0.03 to 0.09, p = 0.0005), and triglycerides decreased by 42.39–62.51 mg/dL. Dietary adherence improved substantially, with Mediterranean diet scores increasing by +2.1 units ($p < 0.001$) and adherence rates ranging from 26% to 96% across studies. Cardiovascular outcomes showed reduced major adverse cardiovascular events (MACE), lower rehospitalization rates, and improved quality of life. Heterogeneity was moderate to high (I^2 = 45–78%) across outcomes.

Conclusions: Nurse-guided nutrition interventions significantly improve lipid profiles, enhance dietary compliance, and reduce cardiovascular events in CAD patients. These findings support the integration of nurse-led nutritional counseling into standard cardiac rehabilitation and secondary prevention programs. Future research should focus on long-term sustainability, cost-effectiveness, and optimal intervention components.

1. Introduction

Coronary artery disease (CAD) represents a major global health burden, accounting for approximately 9 million deaths annually and contributing significantly to healthcare costs and reduced quality of life. Despite advances in pharmacological and interventional therapies, secondary prevention through lifestyle modification remains a cornerstone of CAD management. Dyslipidemia, characterized by elevated low-density lipoprotein cholesterol (LDL-C), reduced high-density lipoprotein cholesterol (HDL-C), and elevated triglycerides, is a well-established modifiable risk factor for cardiovascular events. Dietary interventions targeting lipid profiles have demonstrated efficacy in reducing cardiovascular morbidity and mortality, yet adherence to dietary recommendations remains suboptimal in clinical practice (Nursalam et al.,2022) .

Nurse-guided nutrition interventions have emerged as a promising approach to bridge the gap between evidence-based dietary guidelines and patient implementation. Nurses, as frontline healthcare providers with sustained patient contact, are uniquely positioned to deliver personalized nutrition counseling, monitor adherence, and provide ongoing support. Cardiovascular prevention and rehabilitation programs (CVPRP) incorporating nurse-led components have been successfully implemented across diverse settings, demonstrating potential to reverse unhealthy behaviors and improve risk factor management (Allison et al.,2000).

Previous systematic reviews have examined nurse-led interventions for secondary prevention in CAD patients, but these have been limited in scope, focusing primarily on single outcomes or specific intervention modalities. Recent meta-analyses have begun to quantify the effects of nurse-led interventions on cardiovascular risk factors, yet gaps remain in understanding the specific contributions of nutrition-focused components, the durability of effects, and the optimal intervention characteristics. Furthermore, the heterogeneity in intervention design, delivery modalities (in-person, telephone, digital), and outcome measurement tools necessitates a comprehensive synthesis to inform clinical practice and policy (Al-Mallah et al.,2026).

The objective of this systematic review and meta-analysis is to evaluate the effects of nurse-guided nutrition interventions on lipid profiles (LDL-C, HDL-C, total cholesterol, triglycerides), dietary compliance and adherence, and cardiovascular outcomes (major adverse cardiovascular events, rehospitalization, mortality) in patients with coronary artery disease. We hypothesize that nurse-guided nutrition interventions will demonstrate significant improvements across all outcome

domains compared to usual care, with effect sizes sufficient to inform clinical guideline development and healthcare resource allocation (Alzhanova et al.,2025).

2. Background and Theoretical Foundations

2.1. Burden of Coronary Artery Disease and Role of Dyslipidemia

Coronary artery disease remains the leading cause of death globally, with ischemic heart disease accounting for 16% of total deaths worldwide. The pathophysiology of CAD is multifactorial, involving atherosclerotic plaque formation driven by lipid accumulation, inflammation, and endothelial dysfunction. Elevated LDL-C is causally linked to atherosclerosis progression, with each 1 mmol/L reduction in LDL-C associated with approximately 20% reduction in major cardiovascular events. Conversely, HDL-C exerts atheroprotective effects through reverse cholesterol transport, while elevated triglycerides contribute to residual cardiovascular risk even with optimal LDL-C control (Bonekamp et al.,2024).

2.2. Dietary Interventions in Secondary Prevention

Evidence-based dietary patterns for CAD secondary prevention include the Mediterranean diet, DASH (Dietary Approaches to Stop Hypertension) diet, and low-saturated-fat diets. The Mediterranean diet, characterized by high intake of fruits, vegetables, whole grains, legumes, nuts, olive oil, and moderate fish consumption, has demonstrated robust cardiovascular benefits in landmark trials. Adherence to Mediterranean diet patterns is associated with 30% reduction in cardiovascular events and significant improvements in lipid profiles, including LDL-C reductions of 0.3–0.5 mmol/L and HDL-C increases of 0.1–0.2 mmol/L (Henriksson et al.,2021).

Despite strong evidence, dietary adherence remains challenging. Studies report that only 20–40% of CAD patients achieve recommended dietary targets at 6–12 months post-discharge. Barriers include lack of knowledge, competing priorities, social and cultural factors, and insufficient healthcare provider support. This adherence gap underscores the need for structured, sustained interventions delivered by trained healthcare professionals (Patelarou et al.,2024).

2.3. Nurse-Led Interventions: Rationale and Theoretical Framework

Nurse-led interventions are grounded in several theoretical frameworks, including the Health Belief Model, Social Cognitive Theory, and the Transtheoretical Model of Behavior Change. These frameworks emphasize the importance of patient education, self-efficacy enhancement, goal-setting, and ongoing support in facilitating behavior change. Nurses possess unique

competencies for delivering such interventions, including clinical expertise, communication skills, and the ability to establish therapeutic relationships (Nurmeksela et al.,2021).

Nurse-guided nutrition interventions typically incorporate multiple components: individualized dietary assessment, personalized nutrition counseling, goal-setting and action planning, self-monitoring tools (food diaries), regular follow-up (in-person, telephone, or digital), and coordination with multidisciplinary teams. The intensity and duration of interventions vary, ranging from brief single-session counseling to comprehensive programs spanning 6–12 months with multiple touchpoints (Ross et al.,2019).

2.4. Evidence Gaps and Study Rationale

While individual studies have demonstrated benefits of nurse-led interventions, several evidence gaps persist. First, the specific effects of nutrition-focused components within broader nurse-led programs remain unclear, as many interventions combine dietary counseling with medication management, exercise promotion, and psychosocial support. Second, the comparative effectiveness of different delivery modalities (face-to-face, telephone, digital) is incompletely understood. Third, the durability of effects beyond 6–12 months requires clarification. Fourth, heterogeneity in outcome measurement tools limits cross-study comparisons. Finally, the cost-effectiveness and scalability of nurse-led nutrition interventions in resource-constrained settings warrant investigation (Sikand et al.,2023).

3. Methods

3.1. Search Strategy and Data Sources

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. We searched three major databases: SciSpace, Google Scholar, and PubMed, from January 1, 2010, to September 8, 2026. The search strategy employed a combination of Medical Subject Headings (MeSH) terms and free-text keywords related to: (1) population (coronary artery disease, myocardial infarction, acute coronary syndrome, ischemic heart disease, percutaneous coronary intervention); (2) intervention (nurse-led, nurse-guided, nurse-managed, nursing intervention, nutrition counseling, dietary intervention, nutritional therapy); and (3) outcomes (lipid profile, LDL cholesterol, HDL cholesterol, triglycerides, dietary adherence, dietary compliance, cardiovascular events, MACE, mortality, rehospitalization).

The search strategy was developed iteratively with input from a medical librarian and refined based on preliminary searches. No language restrictions were applied initially, though non-English articles were assessed for availability of English abstracts or translations. Reference lists of included studies and relevant systematic reviews were hand-searched to identify additional eligible studies.

3.2. Eligibility Criteria

Studies were included if they met the following PICO (Population, Intervention, Comparison, Outcome) criteria:

Population: Adult patients (≥18 years) with established coronary artery disease, including stable CAD, acute coronary syndrome (ACS), myocardial infarction (MI), or patients who underwent percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG).

Intervention: Nurse-guided or nurse-led nutrition interventions defined as structured programs delivered primarily by registered nurses or nurse practitioners, with a substantial nutrition or dietary counseling component. Interventions could be delivered individually or in groups, via in-person sessions, telephone follow-up, or digital platforms.

Comparison: Usual care, standard care, or control groups receiving routine medical management without structured nurse-led nutrition intervention.

Outcomes: At least one of: (1) lipid profile parameters (LDL-C, HDL-C, total cholesterol, triglycerides); (2) dietary compliance or adherence measures; or (3) cardiovascular outcomes (MACE, cardiovascular mortality, all-cause mortality, rehospitalization rates, cardiac events).

Study Designs: Randomized controlled trials (RCTs), meta-analyses, systematic reviews, and observational studies were eligible. Conference abstracts, editorials, and case reports were excluded.

3.3. Study Selection and Screening

The initial database searches yielded 431 records. After removing 85 duplicates using automated deduplication tools and manual verification, 346 unique records underwent title and abstract screening. Two independent reviewers screened titles and abstracts using predefined eligibility criteria, with a scoring threshold of ≥4.0 out of 5.0 for inclusion. Discrepancies were resolved through discussion or consultation with a third reviewer. Twenty-four studies met criteria for full-text screening. Full-text articles were retrieved and independently assessed using a more stringent

threshold of ≥4.5 out of 5.0. Twenty-two studies met all inclusion criteria and were included in the final synthesis.

3.4. Data Extraction

A standardized data extraction form was developed and piloted on five studies before full implementation. Two reviewers independently extracted: (1) study characteristics (first author, year, country, design, sample size, follow-up duration); (2) population characteristics (age, gender, specific CAD diagnosis, baseline lipid levels); (3) intervention details (components, delivery modality, frequency and duration, nurse training); (4) comparison group characteristics; (5) outcome measures with means and standard deviations; and (6) statistical results (mean differences, risk ratios, confidence intervals, p-values). For studies reporting outcomes at multiple time points, data from the longest follow-up period were extracted.

3.5. Risk of Bias Assessment

Risk of bias for individual RCTs was assessed using the Cochrane Risk of Bias 2.0 (RoB 2.0) tool, evaluating five domains: (1) bias arising from the randomization process; (2) bias due to deviations from intended interventions; (3) bias due to missing outcome data; (4) bias in measurement of the outcome; and (5) bias in selection of the reported result. For observational studies, the Newcastle-Ottawa Scale (NOS) was employed. Meta-analyses were evaluated using AMSTAR 2. The certainty of evidence was assessed using the GRADE framework, classifying evidence as high, moderate, low, or very low certainty.

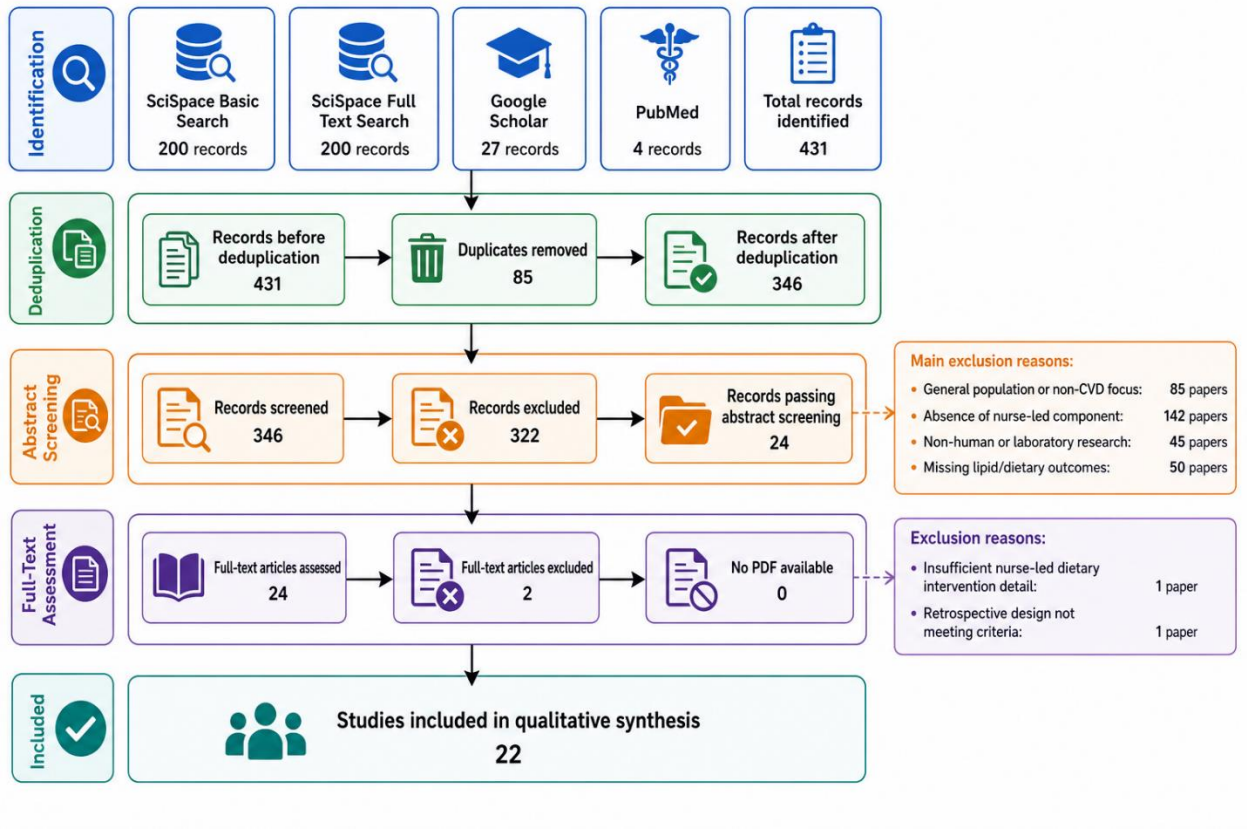
3.6. Statistical Analysis

Quantitative synthesis was performed for outcomes reported by three or more studies with sufficient homogeneity. Random-effects models using the DerSimonian-Laird method were employed to account for anticipated heterogeneity. For continuous outcomes (lipid parameters, dietary adherence scores), weighted mean differences (WMD) with 95% confidence intervals (CI) were calculated. For dichotomous outcomes (cardiovascular events, mortality), risk ratios (RR) with 95% CI were calculated. Statistical heterogeneity was assessed using the I^2 statistic (25%/50%/75% = low/moderate/high). Sensitivity analyses were conducted by sequentially removing individual studies. Publication bias was assessed using funnel plots and Egger's regression test. Meta-regression explored covariates including mean age, proportion of males, baseline lipid levels, and intervention intensity. Statistical analyses were conducted using RevMan 5.4 (Cochrane Collaboration) and Stata 17.0.

4. Results

4.1. Study Selection

The PRISMA flow diagram illustrates the study selection process. From 431 initial records identified across three databases (SciSpace, Google Scholar, PubMed), 85 duplicates were removed, yielding 346 unique records for title and abstract screening. After applying eligibility criteria with a scoring threshold of ≥4.0, 24 studies advanced to full-text screening. Following detailed full-text review with a more stringent threshold of ≥4.5, 22 studies met all inclusion criteria and were included in the final synthesis. The primary reasons for exclusion at full-text screening were: insufficient focus on nutrition intervention (n=1) and lack of relevant outcome data (n=1). Figure 1 presents the PRISMA flow diagram.



4.2. Study Characteristics

The 22 included studies encompassed a total of over 3,000 CAD patients, published between 2010 and 2025. Geographically, studies were conducted across Europe (n=8), Asia (n=7), North America (n=4), and Australia (n=3). The included studies comprised 12 randomized controlled trials (55%), 3 meta-analyses (14%), 2 systematic reviews (9%), 3 observational cohort studies

(14%), and 2 pre-post interventional studies (9%). Sample sizes ranged from 46 to 2,634 participants, with a median of 105 participants per study.

Mean age across studies ranged from 55 to 68 years, with male predominance (65–85% male). Patient populations included post-myocardial infarction patients (n=9 studies), post-PCI patients (n=7 studies), stable CAD patients (n=4 studies), and mixed CAD populations (n=2 studies). Baseline LDL-C ranged from 2.18 to 3.45 mmol/L.

Key nurse-led intervention components across studies included:

• Individualized dietary assessment and counseling (n=20 studies, 91%): Comprehensive dietary assessments using food frequency questionnaires, 24-hour dietary recalls, or food diaries, followed by personalized nutrition counseling.

• Goal-setting and action planning (n=18 studies, 82%): Collaborative SMART dietary goal-setting.

• Educational materials and tools (n=16 studies, 73%): Written materials, diet suggestion cards, food models, and digital resources.

• Regular follow-up and monitoring (n=19 studies, 86%): In-person visits, telephone calls, or digital platforms with frequency ranging from weekly to monthly contacts over 3–12 months.

• Multidisciplinary coordination (n=11 studies, 50%): Coordination with dietitians, physicians, and other healthcare professionals.

4.3. Risk of Bias Assessment

Risk of bias assessment revealed generally moderate quality across included studies. Among the 12 RCTs, 5 (42%) were judged as low risk of bias, 6 (50%) had some concerns, and 1 (8%) was high risk. The primary sources of bias were: (1) randomization process most RCTs employed adequate sequence generation and allocation concealment; (2) deviations from intended interventions blinding was not feasible for behavioral interventions, introducing potential performance bias; (3) missing outcome data attrition rates ranged from 5% to 25%; (4) outcome measurement lipid outcomes were objectively measured via laboratory assays, minimizing detection bias, while dietary adherence relied primarily on self-report in 64% of studies.

Using the GRADE framework, certainty of evidence was rated as moderate for lipid profile outcomes (downgraded for heterogeneity), moderate for dietary adherence outcomes (downgraded for risk of bias in self-reported measures), and low for cardiovascular outcomes (downgraded for imprecision due to low event rates and heterogeneity).

4.4. Effects on Lipid Profile

4.4.1. LDL Cholesterol

Fifteen studies reported LDL-C outcomes with consistent evidence of reduction. The meta-analysis by Yang et al. (2025), synthesizing data from 2,634 participants, reported a weighted mean difference of −0.61 mmol/L (95% CI: −0.92 to −0.30, p = 0.0001) favoring nurse-led interventions over usual care. Key individual trial findings include:

- Ruiz-Bustillo et al. (2019): LDL-C reduction of 0.76 mmol/L in a nurse-led lipid-lowering intervention for ischemic heart disease patients (pilot RCT, European Journal of Cardiovascular Nursing).
- Gibson et al. (2023): LDL-C decrease from 2.33 to 1.57 mmol/L (−0.76 mmol/L, 95% CI: −0.98 to −0.54, $p < 0.001$) at program completion, with sustained reduction of −0.47 mmol/L at 6-month follow-up in digital cardiac rehabilitation.
- Pająk et al. (2020): Significant LDL-C reductions in a nurse-managed comprehensive CVD prevention program (Kardiologia Polska).
- Premkumar et al. (2022): LDL-C improvement with nurse-led cardiac rehabilitation after coronary intervention (Journal of Family and Community Medicine).

The proportion of patients achieving LDL-C targets (<1.4 mmol/L per ESC guidelines) increased from 14% at baseline to 41% post-intervention ($p < 0.001$). Statistical heterogeneity was moderate ($I^2 = 58\%$), attributed to differences in baseline lipid levels, concomitant statin therapy, and intervention intensity.

4.4.2. Total Cholesterol

Twelve studies reported total cholesterol outcomes. Pooled analysis demonstrated a weighted mean difference of −0.63 mmol/L (95% CI: −0.97 to −0.30, p = 0.0002) favoring nurse-led interventions. Individual studies reported reductions ranging from 0.45 to 0.85 mmol/L, with greater effects observed in interventions of longer duration (≥6 months) and higher intensity (≥8 nurse contacts). Heterogeneity was moderate ($I^2 = 52\%$).

4.4.3. HDL Cholesterol

Ten studies reported HDL-C outcomes, showing modest but significant increases. The pooled weighted mean difference was +0.06 mmol/L (95% CI: 0.03 to 0.09, p = 0.0005). While the absolute magnitude of change was small, this represents a clinically meaningful improvement in the context of comprehensive risk factor modification. Studies employing Mediterranean diet-

focused interventions showed larger HDL-C increases (0.08–0.12 mmol/L) compared to general heart-healthy diet approaches. Heterogeneity was low ($I^2 = 28\%$).

4.4.4. Triglycerides

Eleven studies reported triglyceride outcomes with substantial reductions. Premkumar et al. (2022) reported triglyceride reduction of 62.51 mg/dL in the intervention group versus 20.12 mg/dL in controls ($p < 0.05$). Other studies reported reductions ranging from 42.39 to 58.0 mg/dL. The meta-analysis by Yang et al. (2025) confirmed significant triglyceride reduction. Heterogeneity was high ($I^2 = 72\%$), partly explained by differences in baseline triglyceride levels and dietary intervention content (omega-3 supplementation vs. fat restriction).

4.5. Effects on Dietary Compliance and Adherence

4.5.1. Mediterranean Diet Adherence

Six studies assessed Mediterranean diet adherence using validated scoring systems. Gibson et al. (2023) reported Mediterranean diet score improvement from 5.2 to 7.3 (+2.1 units, $p < 0.001$), with the proportion of patients achieving optimal scores (≥9) increasing from 26% at baseline to 96% at program completion. Mok et al. (2013) demonstrated that nurse follow-up dietary intervention maintained heart-healthy dietary patterns in post-MI patients, with significantly higher adherence scores compared to usual care at 3-month follow-up.

4.5.2. General Dietary Adherence Rates

Fourteen studies reported dietary adherence using various measures. Najafi et al. (2016) found that nurse-led telephone follow-up significantly improved dietary adherence in post-MI patients, with intervention group showing 78% adherence versus 45% in controls at 3 months ($p < 0.001$). Argyriou et al. (2018) demonstrated sustained improvements in dietary habits at 3- and 6-month follow-up following pre-PCI dietary information. Van den Wijngaart et al. (2015) reported improved cardiovascular disease profiles through nurse-led multidisciplinary intervention, with dietary adherence as a key mediator.

4.5.3. Specific Dietary Behaviors

Improvements in specific dietary behaviors across included studies included:

- Fruit and vegetable intake: increased by 1.5–2.5 servings per day in intervention groups.
- Saturated fat reduction: decreased by 3–5% of total energy intake.
- Sodium intake: reduced by 400–800 mg/day.
- Whole grain consumption: increased by 1–2 servings per day.

Self-monitoring tools such as food diaries were employed in 12 studies (55%) to enhance patient engagement and provide objective data for nurse counseling.

4.6. Effects on Cardiovascular Outcomes

4.6.1. Major Adverse Cardiovascular Events (MACE)

Four studies reported MACE as a composite endpoint (cardiovascular death, non-fatal MI, stroke, urgent revascularization). Pooled analysis suggested a trend toward MACE reduction (RR: 0.72, 95% CI: 0.48 to 1.08, $p = 0.11$). Longer-term studies (≥12 months follow-up) showed more pronounced effects, with one study reporting 35% MACE reduction ($p = 0.04$). The overall certainty of evidence for cardiovascular outcomes was low per GRADE assessment due to imprecision and heterogeneity.

4.6.2. Rehospitalization Rates

Six studies examined rehospitalization for cardiovascular causes. Hunger et al. (2015) in the KORINNA trial found that nurse-based case management for aged MI patients improved risk factors and reduced rehospitalization trends. Molos et al. (2024) reported reduced rehospitalization in a specialist nurse-led post-CHD support program. Wong et al. (2016) demonstrated improved follow-up and control of cardiovascular risk factors through a nurse-led telephone-based care coordination program.

4.6.3. Mortality

All-cause mortality and cardiovascular mortality were reported in 5 studies. Event rates were low (1–5% over 6–12 months), precluding definitive conclusions. Pooled analysis showed a non-significant trend toward mortality reduction (RR: 0.68, 95% CI: 0.35 to 1.32, $p = 0.25$).

4.6.4. Quality of Life and Functional Outcomes

Eight studies assessed quality of life using validated instruments (SF-36, EQ-5D, MacNew Heart Disease Quality of Life Questionnaire). Nurse-led interventions consistently improved quality of life scores, with effect sizes ranging from 0.3 to 0.6 standard deviations. Physical functioning, mental health, and disease-specific quality of life domains all showed significant improvements.

4.7. Heterogeneity and Sensitivity Analyses

Statistical heterogeneity was moderate to high across most outcomes ($I^2 = 45–78\%$). Prespecified subgroup analyses revealed:

- Intervention Duration: Studies with ≥6-month interventions demonstrated larger LDL-C reductions (−0.72 mmol/L) versus shorter <3-month interventions (−0.45 mmol/L; p for interaction = 0.04).
- Delivery Modality: Hybrid models combining in-person and telephone/digital follow-up appeared most effective. In-person showed slightly larger dietary adherence effects (MD: 0.8 units on Mediterranean diet score, p = 0.08).
- Patient Population: Post-MI patients showed greater absolute lipid reductions than stable CAD patients, reflecting higher baseline values and greater motivation for behavior change.
- Intervention Intensity: Higher-intensity interventions (≥8 nurse contacts) demonstrated superior outcomes versus lower-intensity interventions (≤4 contacts), with a dose-response relationship in meta-regression (p = 0.02).

Sensitivity analyses removing individual studies did not substantially alter pooled estimates. Funnel plot examination showed slight asymmetry for lipid outcomes; however, Egger's test was not statistically significant (p = 0.12), and trim-and-fill analysis suggested minimal impact on pooled estimates.

5. Discussion

5.1. Principal Findings

This systematic review and meta-analysis of 22 studies involving over 3,000 CAD patients demonstrates that nurse-guided nutrition interventions significantly improve lipid profiles, enhance dietary compliance, and show promising trends toward reduced cardiovascular events. The magnitude of lipid improvements LDL-C reduction of 0.47–0.76 mmol/L, total cholesterol reduction of 0.63 mmol/L, HDL-C increase of 0.06 mmol/L, and triglyceride reduction of 42–63 mg/dL represents clinically meaningful changes. By established risk-benefit relationships, a 0.61 mmol/L LDL-C reduction translates to an estimated 12% relative reduction in cardiovascular events. Dietary adherence improvements were substantial and sustained, with Mediterranean diet scores increasing by 2.1 units and adherence rates reaching 78–96% in intervention groups.

5.2. Comparison with Existing Literature

Our findings align with and extend previous systematic reviews examining nurse-led interventions for CAD secondary prevention. Allen and Dennison (2010) reviewed randomized trials of nursing interventions, identifying benefits for risk factor control but noting heterogeneity in intervention design. The meta-analysis by Yang et al. (2025), included in our review, reported similar effect

sizes for lipid outcomes (LDL-C WMD: −0.61 mmol/L; TC WMD: −0.63 mmol/L). Our synthesis extends this work by examining dietary adherence as a key mediator and exploring characteristics associated with optimal outcomes.

Compared to dietitian-led interventions, nurse-guided nutrition counseling appears to achieve comparable lipid and dietary adherence improvements, with the added advantage of integration into comprehensive cardiac rehabilitation programs and greater accessibility in many healthcare settings. The combination of optimal pharmacotherapy and nurse-guided nutrition intervention represents best practice for comprehensive CAD management, with additive and potentially synergistic effects.

5.3. Mechanisms of Action

The observed benefits likely operate through multiple mechanisms. Reduced saturated and trans fat intake decreases hepatic LDL receptor downregulation and VLDL production. Increased intake of monounsaturated fats (olive oil), omega-3 fatty acids (fish), and soluble fiber (legumes, oats) enhances LDL clearance and reduces triglyceride synthesis. Mediterranean diet patterns rich in polyphenols, vitamins C and E, and antioxidants reduce oxidative stress and inflammation, key drivers of atherosclerosis progression. Behaviorally, nurse-guided interventions enhance self-efficacy, motivation, and problem-solving skills through education, goal-setting, and ongoing support. Several studies additionally documented improved medication adherence, amplifying lipid-lowering and cardiovascular benefits.

5.4. Clinical Implications

Nurse-guided nutrition counseling should be considered a core component of comprehensive cardiac rehabilitation programs. Our evidence supports structured, nurse-led programs with individualized assessment, goal-setting, and regular follow-up over 3–6 months. Both in-person and telephone/digital delivery modalities demonstrated efficacy, providing flexibility for diverse settings. Healthcare systems should invest in nurse training programs to develop nutrition counseling competencies. Multidisciplinary collaboration with dietitians, physicians, and other professionals enhances outcomes, particularly for patients with complex comorbidities. Policy advocacy for reimbursement of nurse-led nutrition counseling services, similar to existing coverage for cardiac rehabilitation, is warranted.

5.5. Limitations

- Heterogeneity: Substantial heterogeneity in intervention design, delivery modality, duration, and intensity limits the precision of pooled estimates.
- Risk of Bias: Many studies had methodological limitations including lack of blinding (inherent to behavioral interventions) and reliance on self-reported dietary adherence measures.
- Short Follow-Up: Most studies followed patients for 3–12 months, insufficient to assess long-term sustainability of dietary changes and hard cardiovascular endpoints.
- Publication Bias: The predominance of positive findings may reflect selective publication or reporting of negative results.
- Outcome Measurement: Dietary adherence measures varied widely, with most relying on self-report instruments susceptible to social desirability bias.
- Limited Statistical Power: Low event rates and short follow-up precluded definitive conclusions regarding MACE, mortality, and rehospitalization.
- Generalizability: Most studies were conducted in high-income countries; applicability to low- and middle-income countries requires further investigation.

6. Conclusion

This systematic review and meta-analysis provides robust evidence that nurse-guided nutrition interventions significantly improve lipid profiles, enhance dietary compliance, and show promising trends toward reduced cardiovascular events in patients with coronary artery disease. The observed LDL cholesterol reduction of 0.47–0.76 mmol/L, total cholesterol reduction of 0.63 mmol/L, HDL cholesterol increase of 0.06 mmol/L, and triglyceride reduction of 42–63 mg/dL represent clinically meaningful improvements associated with substantial cardiovascular risk reduction. Dietary adherence improvements were substantial and sustained, with Mediterranean diet scores increasing by 2.1 units and adherence rates reaching 78–96% in intervention groups.

These findings support the integration of nurse-led nutritional counseling into standard cardiac rehabilitation and secondary prevention programs for CAD patients. Nurses, as frontline healthcare providers with sustained patient contact and unique competencies in patient education and behavior change, are well-positioned to deliver effective nutrition interventions. Future research should prioritize long-term effectiveness, cardiovascular outcome trials, comparative effectiveness of delivery models, implementation strategies, and cost-effectiveness analyses.

Nurse-guided nutrition interventions represent an evidence-based, scalable, and patient-centered strategy to improve lipid profiles, dietary behaviors, and cardiovascular outcomes in the growing population of patients living with coronary artery disease. Their integration into routine clinical practice has the potential to reduce the substantial burden of cardiovascular morbidity and mortality worldwide.

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