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Review Article

Current trends in dietary management of cardiovascular diseases

OPEN ACCESS

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ABSTRACT

Cardiovascular diseases (CVDs) remain a leading cause of mortality and morbidity worldwide, making effective prevention and management strategies crucial. This systematic review aimed to synthesize the current evidence on dietary management strategies for CVDs. A comprehensive literature search was conducted to identify relevant studies published between January 2017 and March 2024, focusing on dietary interventions, patterns, and components related to CVDs prevention and management. Three main themes emerged: 1) dietary patterns, 2) specific dietary components, and 3) emerging dietary interventions. The Mediterranean and Dietary Approaches to Stop Hypertension diets, rich in plant-based foods, whole grains, lean proteins, and healthy fats, were consistently associated with reduced CVDs risk and improved cardiovascular health outcomes. Specific dietary components, such as whole grains, fiber, plant-based proteins, and omega-3 fatty acids, exhibited protective effects against CVDs, while high consumption of saturated and trans fats, added sugars, and sodium increased the risk. Emerging interventions, including time-restricted feeding, intermittent fasting, and the incorporation of nutraceuticals and functional foods, showed promising results in improving cardiovascular risk factors, although further research is needed to establish their long-term efficacy and mechanisms of action. This review highlights the importance of adopting healthy dietary patterns and emphasizing nutrient-dense foods in the prevention and management of CVDs. Future research should focus on investigating the potential synergistic effects of combining dietary interventions with other lifestyle modifications and exploring personalized approaches to optimize cardiovascular health outcomes.

K E Y W O R D S : *Cardiovascular disease, Dietary management, Dietary pattern, Mediterranean diet, DASH, Plant-based diet.*

INTRODUCTION

Cardiovascular diseases (CVDs) remain the leading cause of death globally, accounting for an estimated 17.9 million deaths per year, which is approximately 31% of all deaths worldwide (World Health Organization [WHO], 2022). CVDs encompass a range of conditions affecting the heart and blood vessels, including coronary heart disease, cerebrovascular disease, rheumatic heart disease, and other conditions (Benjamin et al., 2019). The primary risk factors for CVDs are well-established and include unhealthy diet, physical inactivity, tobacco use, and harmful use of alcohol (Arnett et al., 2019). Despite advances in prevention and treatment strategies, the burden of CVDs continues to rise, particularly in low- and middle-income countries (Roth et al., 2020).

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Dietary factors play a crucial role in the development and progression of CVDs (Sacks et al., 2017). A growing body of evidence suggests that appropriate dietary modifications can significantly reduce the risk of CVDs and improve cardiovascular health outcomes (Satija & Hu, 2018). However, there is a need for comprehensive and up-to-date information on the latest trends and advancements in dietary management strategies for CVDs. This study aims to address this gap by providing a comprehensive review of current dietary recommendations and interventions for the prevention and management of CVDs.

RESEARCH QUESTION

Specifically, the research seeks to address the following questions:

What are the latest dietary recommendations for the prevention and management of CVDs?

How effective are various dietary interventions in reducing the risk of CVDs and improving cardiovascular health outcomes?

What are the emerging trends and future directions in the dietary management of CVDs?

LITERATURE REVIEW

Overview of Cardiovascular Diseases

Cardiovascular diseases (CVDs) are a group of disorders affecting the heart and blood vessels, including coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, and deep vein thrombosis (Benjamin et al., 2019). These conditions are characterized by the buildup of plaque in the arteries, leading to reduced blood flow and oxygen supply to vital organs (Virani et al., 2021). The most common types of CVDs are ischemic heart disease and stroke, which account for the majority of CVD-related deaths worldwide (Roth et al., 2020).

Risk Factors for Cardiovascular Diseases

CVDs are influenced by a combination of modifiable and non-modifiable risk factors. Non-modifiable risk factors include age, gender, and family history, while modifiable risk factors encompass lifestyle behaviours and environmental factors (Arnett et al., 2019). The major modifiable risk factors for CVDs are presented in Table 1

Table 1: Modifiable risk factors associated with lifestyle behaviours and environmental factors.

SN	Risk factor	Definition	References
1	Unhealthy diet	Diets high in saturated and trans fats, sodium, and refined carbohydrates, and low in fruits, vegetables, and whole grains, contribute to the development of CVDs	Sacks et al., 2017
2	Physical inactivity	Lack of regular physical activity increases the risk of obesity, hypertension, dyslipidemia, and insulin resistance, all of which are risk factors for CVDs	Piercy et al., 2018
3	Tobacco use	Smoking and exposure to secondhand smoke are significant risk factors for CVDs, as they damage the cardiovascular system and promote atherosclerosis	Benjamin et al., 2019
4	Harmful use of alcohol	Excessive alcohol consumption is associated with an increased risk of hypertension, cardiomyopathy, and stroke	Rehm et al., 2017

Dietary Management of Cardiovascular Diseases

Dietary interventions play a crucial role in the prevention and management of CVDs. Several dietary patterns and recommendations have been proposed to promote cardiovascular health, as shown on Table 2.

Recent Advancements and Trends in Dietary Management

Recent research has explored novel dietary interventions and strategies for the prevention and management of CVDs, including:

1. Personalized nutrition: Tailoring dietary recommendations based on individual genetic, metabolic, and lifestyle factors may improve the effectiveness of dietary interventions for CVD management (Gibney& Allison, 2021).
2. Nutraceuticals and functional foods: Incorporation of bioactive compounds, such as plant-based antioxidants, omega-3 fatty acids, and probiotics, into the diet may have cardioprotective effects (Behzad et al., 2019; Cicero et al., 2017).
3. Intermittent fasting and time-restricted feeding: These dietary patterns involve periods of fasting or

restricting food intake to specific time windows, which may have beneficial effects on cardiovascular health through mechanisms such as improved glucose and lipid metabolism (Allaf et al., 2021; Mattson et al., 2017).

4. Dietary supplements: While dietary supplements are not recommended as a substitute for a healthy diet, certain supplements, such as omega-3 fatty acids, fiber, and plant sterols, may aid in CVD risk reduction when used in conjunction with dietary and lifestyle modifications (Maki et al., 2022; Rimm et al., 2018).

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Table 1: Dietary interventions for prevention and management of CVDs.

SN	Dietary intervention	Definition	References
1	Mediterranean diet	This diet emphasizes the consumption of fruits, vegetables, whole grains, legumes, nuts, and olive oil, while limiting the intake of red meat, processed foods, and saturated fats	Dinu et al., 2018
2	Dietary Approaches to Stop Hypertension (DASH)	The DASH diet is rich in fruits, vegetables, whole grains, low-fat dairy products, and lean protein sources, and is designed to lower blood pressure and reduce the risk of CVDs	Siervo et al., 2015
3	Plant-based diets	Diets that emphasize plant-based foods, such as fruits, vegetables, whole grains, legumes, nuts, and seeds, have been associated with a lower risk of CVDs	Satija & Hu, 2018
4	Dietary recommendations	Guidelines from organizations such as the American Heart Association and the World Health Organization emphasize limiting the intake of saturated and trans fats, sodium, and added sugars, while increasing the consumption of fruits, vegetables, whole grains, and lean protein sources	Arnett et al., 2019; WHO, 2022

METHODOLOGY

Research Design

This study employed a qualitative approach, utilizing a systematic review of literature to synthesize the available evidence on dietary management strategies for cardiovascular diseases (CVDs). The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021) to ensure transparency and reproducibility.

Data Collection Methods

An extensive literature search was conducted in several electronic databases, including PubMed, Embase, Cochrane Library, and Web of Science, to identify relevant studies published between January 2017 and March 2024. The search strategy combined keywords and Medical Subject Headings (MeSH) terms related to "cardiovascular diseases," "dietary interventions," "nutrition," and "dietary patterns."

Eligible studies were original research articles, systematic reviews, and meta-analyses that investigated the effects of dietary interventions or patterns on the prevention, management, or risk reduction of CVDs. Studies focusing on specific population groups, such as individuals with diabetes or obesity, were also included if they reported cardiovascular outcomes.

After removing duplicates, two independent reviewers screened the titles and abstracts of the identified studies based on predefined inclusion and exclusion criteria. One thousand and fifty (1050) full-text articles were then retrieved for potentially eligible studies and assessed for final inclusion. Any disagreements between the reviewers were resolved through discussion or consultation with a third reviewer.

Data Analysis Techniques

The analysis of the included studies followed a thematic analysis approach, as described by Braun and Clarke (2006). This method involves identifying, analyzing, and reporting patterns or themes within the data.

The analysis process involved the following steps:

1. Familiarization with the data: The research team thoroughly read and re-read the included studies to become immersed in the data and gain a comprehensive understanding of the content.

2. Coding: Initial codes were generated by systematically identifying and labeling relevant features of the data, such as key findings, concepts, or recurring patterns related to dietary management strategies for CVDs.

3. Searching for themes: The initial codes were then collated and organized into potential themes, representing broader patterns or meaning within the data.

4. Reviewing themes: The identified themes were reviewed and refined, ensuring that they accurately captured the essence of the data and addressed the research objectives.

5. Defining and naming themes: The themes were clearly defined and named, ensuring that each theme had a concise and informative label that accurately reflected its content.

6. Producing the report: The analysis was synthesized into a coherent narrative, using representative quotes and examples from the included studies to illustrate and support the identified themes.

The thematic analysis process was conducted by two independent researchers, and any discrepancies or disagreements were resolved through discussion and consultation with a third researcher to ensure consistency and reliability of the findings.

RESULTS AND DISCUSSION

Presentation of Findings

The thematic analysis of the included studies revealed three main themes related to dietary management strategies for cardiovascular diseases (CVDs): 1) dietary patterns, 2) specific dietary components, and 3) emerging dietary interventions.

1. Dietary Patterns: Several dietary patterns were consistently associated with a reduced risk of CVDs and improved cardiovascular health outcomes. The Mediterranean diet, characterized by a high intake of fruits, vegetables, whole grains, legumes, nuts, and olive oil, was found to be beneficial in multiple studies (Dinu et al., 2018; Rinott et al., 2022; Papadaki et al., 2018). Similarly, the DASH (Dietary Approaches to Stop Hypertension) diet, rich in fruits, vegetables, low-fat dairy, and low in saturated fats and sodium, showed promising results in lowering blood pressure and reducing CVD risk factors (Siervo et al., 2015; Schwingshackl et al., 2018).

2. Specific Dietary Components: Several dietary components were identified as playing a significant role in the prevention and management of CVDs. A high intake of whole grains, fiber, and plant-based proteins was associated with a lower risk of CVDs (Aune et al., 2017; Bechthold et al., 2019; Kim et al., 2020). Conversely, a high consumption of saturated and trans fats, added sugars, and sodium was linked to an increased risk of CVDs (Sacks et al., 2017; Bhupathiraju et al., 2011).

3. Emerging Dietary Interventions: The included studies also explored novel dietary interventions and strategies for CVD management. Time-restricted feeding and intermittent fasting regimens showed promising effects for a variety of conditions, such as body weight, blood pressure, and lipid profiles (Allaf et al., 2021; de Cabo & Mattson, 2019). Additionally, the incorporation of nutraceuticals and functional foods, such as plant-based antioxidants, probiotics, and omega-3 fatty acids, demonstrated potential cardioprotective benefits (Cicero et al., 2017; Moss et al., 2018; Papakonstantinou et al., 2022).

INTERPRETATION OF RESULTS

The findings of this systematic review highlight the importance of adopting healthy dietary patterns and emphasizing specific nutrient-dense foods in the prevention and management of CVDs. The Mediterranean and DASH diets, characterized by a high intake of plant-based foods, lean protein sources, and healthy fats, emerge as effective strategies for reducing CVD risk and improving overall cardiovascular health.

Furthermore, the results underscore the detrimental effects of diets high in saturated and trans fats, added sugars, and excessive sodium on cardiovascular health. These findings align with current dietary guidelines and recommendations from major health organizations, emphasizing the importance of limiting the consumption of these potentially harmful dietary components (Arnett et al., 2019; WHO, 2022).

COMPARISON WITH PREVIOUS STUDIES

The findings of this systematic review are consistent with previous meta-analyses and systematic reviews that have examined the relationship between dietary patterns and CVD risk. For instance, a meta-analysis by Galbete et al. (2018) reported a significant reduction in CVD risk associated with adherence to the Mediterranean diet. Similarly, a systematic review by Siervo et al. (2015) found that the DASH diet effectively lowered blood pressure and improved other CVD risk factors.

However, this review also highlights emerging dietary interventions, such as time-restricted feeding and the incorporation of nutraceuticals and functional foods, which have received less attention in previous studies. These novel strategies show promise in enhancing cardiovascular health and warrant further investigation in larger, well-designed clinical trials.

IMPLICATIONS OF THE STUDY

The findings of this systematic review have several implications for clinical practice, public health policies, and future research directions:

1. Clinical Practice: Healthcare professionals should prioritize dietary counseling and encourage patients to adopt healthy dietary patterns, such as the Mediterranean or DASH diets, as part of a comprehensive strategy for CVD prevention and management.

2. Public Health Policies: Public health initiatives should focus on promoting awareness and education about the benefits of healthy dietary choices, particularly emphasizing the importance of increasing the consumption of whole plant-based foods and limiting the intake of saturated fats, added sugars, and sodium.

3. Future Research: Further research is needed to explore the potential synergistic effects of combining dietary interventions with other lifestyle modifications, such as physical activity and stress management, on CVD risk reduction. Additionally, more studies are warranted to investigate the long-term effects and potential mechanisms of emerging dietary interventions, such as time-restricted feeding and the use of nutraceuticals and functional foods.

LIMITATIONS OF THE STUDY

While this systematic review provides valuable insights into dietary management strategies for CVDs, it is important to acknowledge some of the limitations of the review:

1. The included studies varied in study designs, populations, and outcome measures, which may have contributed to heterogeneity in the findings.

2. The review focused primarily on dietary interventions and may have overlooked the potential synergistic effects of combining dietary modifications with other lifestyle factors, such as physical activity and stress management.

3. The quality assessment of the included studies was not explicitly reported, which could potentially affect the reliability of the findings.

4. Publication bias may have been present, as studies with null or negative results are less likely to be published, potentially leading to an overestimation of the observed effects.

CONCLUSION

This systematic review has synthesized the current evidence on dietary management strategies for cardiovascular diseases (CVDs). The key findings are summarized as follows:

1. Dietary patterns such as the Mediterranean and DASH diets, characterized by a high intake of plant-based foods, whole grains, lean protein sources, and healthy fats, have been consistently associated with a reduced risk of CVDs and improved cardiovascular health outcomes.

2. Specific dietary components, including whole grains, fiber, plant-based proteins, and omega-3 fatty acids, have been identified as protective against CVDs, while high consumption of saturated and trans fats, added sugars, and sodium has been linked to an increased risk.

3. Emerging dietary interventions, such as time-restricted feeding, intermittent fasting, and the incorporation of nutraceuticals and functional foods, have shown promising results in improving cardiovascular risk factors and potentially reducing CVD risk, although further research is needed to establish their long-term effects and mechanisms of action.

RECOMMENDATIONS FOR FUTURE RESEARCH

Based on the findings and limitations of this systematic review, several recommendations for future research can be made:

1. Large-scale, well-designed randomized controlled trials are needed to further investigate the efficacy and long-term effects of emerging dietary interventions, such as time-restricted feeding, intermittent fasting, and the use of nutraceuticals and functional foods, in the prevention and management of CVDs.

2. Research is needed to elucidate the underlying mechanisms and biological pathways through which specific dietary patterns and components exert their protective effects against CVDs, which could inform the development of targeted nutritional interventions.

3. Studies should examine the potential influence of individual factors, such as genetics, age, sex, and socioeconomic status, on the effectiveness of dietary interventions for CVD prevention and management.

4. Cost-effectiveness analyses and implementation studies are warranted to evaluate the feasibility and scalability of dietary interventions in various healthcare settings and populations.

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Authors 'contribution

Author PNN, JCM and HOA managed data collection, interpretation of data, data analysis and writing of the manuscript, all authors managed the development of methodology and reviewed the manuscript.

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