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THE DIETARY ANIMAL-TO-PLANT SPECTRUM AND CARDIOVASCULAR HEALTH: A NARRATIVE REVIEW

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ABSTRACT

Cardiovascular diseases (CVD) remain the leading cause of morbidity and mortality worldwide. Although dietary patterns play a significant role in cardiovascular health, the consumption of meat - particularly red and processed varieties - has increased substantially in recent decades, raising concerns about potential long-term health implications.
Large-scale epidemiological studies and meta-analyses consistently link high consumption of red and processed meats to increased risks of cardiovascular disease, stroke, type 2 diabetes, and all-cause mortality. In contrast, dietary patterns rich in plant-based foods, including the Mediterranean diet and other plant-based regimens, are consistently associated with protective effects against cardiovascular diseases. These benefits are likely attributable to their high content of fiber, antioxidants, polyphenols, and omega-3 fatty acids, although findings from observational studies may be influenced by residual confounding.
This narrative review aims to integrate findings from epidemiological studies, biomarker research, clinical trials and mechanistic investigations to critically evaluate the cardiovascular health impacts of meat-based diets in comparison to other dietary patterns.

KEYWORDS

Cardiovascular Disease, Red Meat, Processed Meat, Plant-Based Diet, Dietary Patterns

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1. Introduction

Cardiovascular diseases (CVD) continue to represent the dominant cause of morbidity and mortality globally, accounting for a substantial proportion of preventable deaths, with dietary patterns exerting a significant influence on cardiovascular health across diverse populations [1,2]. Consumption of meat, particularly of its red and processed varieties, has risen substantially in recent decades, raising growing concerns among researchers and public health experts regarding potential long-term health implications. Processed meat - generally defined as meat transformed through salting, curing, smoking, or the addition of preservatives to enhance flavor or shelf life – has been linked to cardiovascular risk in numerous studies [2-4]. Large-scale epidemiological studies consistently associate high intakes of red and processed meats with increased risks of cardiovascular disease, stroke, type 2 diabetes and all-cause mortality [1-7]. Meta-analyses reinforce those findings, with the associations observed to be especially pronounced for processed meats, likely attributable to their higher content of sodium, nitrites and saturated fats [2-4].

However, much of the available evidence derives from observational studies, which are limited by confounding factors and the complexities of accurately assessing dietary intake and lifestyle behaviors. Self-reporting inaccuracies and residual confounding complicate interpretation, necessitating a cautious approach to drawing causal inferences [4].

Biologically, several mechanisms have been proposed to explain the unfavorable cardiovascular impact of meat consumption. These include elevations in LDL cholesterol, increased inflammatory responses, oxidative stress and exposure to compounds such as heme iron and TMAO precursors, which are predominantly sourced from animal products [3,5,7]. Prospective cohort studies, including major initiatives like EPIC and PURE, have demonstrated that higher processed meat intake correlates with greater incidence of cardiovascular events and reduced longevity [8,9]. Nonetheless, dietary patterns are often intertwined with other lifestyle variables, such as smoking, alcohol consumption, physical inactivity and disparities in healthcare access, which makes it challenging to isolate the independent effects of meat consumption on cardiovascular outcomes [4].

Conversely, dietary patterns characterized by high intake of plant-based foods, such as the Mediterranean diet and various plant-based regimens, consistently demonstrate protective effects against CVD. These diets are rich in fiber, antioxidants, polyphenols, omega-3 fatty acids - nutrients known to reduce LDL cholesterol, improve endothelial function and reduce systemic inflammation [10-13]. Observational data from large US cohorts indicate that adherence to balanced plant-based diets is associated with lower cardiovascular risk and increased longevity [14,15], though these findings are also susceptible to healthy user bias and confounding [11,12,15].

Recently, restrictive dietary approaches such as the carnivore diet, which emphasizes exclusive consumption of animal-derived foods, have gained popularity in social media circles [16,17]. Anecdotal reports frequently cite improvements in weight and subjective well-being [16,17]. However, current scientific evidence is limited, largely reliant on self-reported data and lacking standardized clinical assessments [16,17]. Preliminary findings suggest that such diets may substantially elevate LDL cholesterol levels, raising potential concerns regarding long-term cardiovascular risk, but robust, long-term randomized controlled trials are lacking [16,17]. Well-designed prospective studies are urgently needed to clarify the cardiovascular implications of the carnivore diet.

Given the heterogeneity of dietary patterns, ranging from meat-centric to plant-based and restrictive animal-based diets and the methodological limitations of existing research, a comprehensive synthesis of available evidence is warranted. This narrative review aims to integrate findings from epidemiological studies, biomarker research, clinical trials and mechanistic investigations to critically evaluate the cardiovascular health impacts of meat-based diets in comparison to other dietary patterns.

2. Methods

This narrative review was designed as a structured narrative review with transparent search and selection procedures. A comprehensive literature search was performed in PubMed database from its inception up to November 2025 in order to identify relevant studies, using dietary terms such as “carnivore diet”, “all-meat diet”, “zero-carb diet”, “animal-based diet”, “high-meat diet”, “diet with high meat intake” with one or more cardiometabolic terms: “cardiovascular health”, “cardiovascular disease”, “heart disease”, “lipid profile”, “atherosclerosis”, “cardiometabolic risk”. Only full-text articles published in English and accessible through the database were considered eligible for inclusion in the review.

2.1. Inclusion criteria

Eligible studies included original clinical, epidemiological, or experimental research examining carnivore or very low-carbohydrate animal-based diets, red or processed meat consumption or diets characterized by high meat intake. Inclusion required that studies report on cardiovascular outcomes, lipid or glycemic markers or mechanistic aspects pertinent to cardiometabolic disease. Systematic reviews and meta-analyses were also included if they provided extractable data relevant to the review objectives.

2.2. Exclusion criteria

Exclusion criteria encompassed opinion articles, narrative reviews without original data, studies focused solely on non-dietary exposures, animal or in vitro experiments and any publication lacking accessible full-text English versions.

All titles and abstracts were independently screened by two reviewers, followed by full-text assessment for eligibility. A third reviewer resolved disagreements when necessary. Extracted data included study design, population characteristics, dietary exposure, comparator (if applicable), biomarkers, cardiovascular endpoints, and principal results.

This review was conducted in accordance with the SANRA (Scale for the Assessment of Narrative Review Articles) guidelines to ensure methodological transparency, critical appraisal of evidence, and structured synthesis.

3. Results

3.1. Epidemiological Evidence: Associations between Red and Processed Meat Intake and Cardiovascular Outcomes

Numerous epidemiological studies indicate that higher consumption of red meat and processed meat products is linked to a heightened risk of various cardiovascular health issues. Studies like systematic reviews and meta-analyses report associations between both unprocessed red meat and processed meat, and the incidence of cardiovascular disease (CVD), coronary heart disease (CHD), stroke, and all-cause mortality [1-7]. The connection is strongest and most consistent with processed meats, presumably since they carry more sodium, nitrites, preservatives and saturated fat [2,3,6].

Dose-response studies fortify the relationship between processed meat intake and cardiovascular risk. Micha et al. showed that for every 50 grams of processed meat per day, the risk of CHD and heart failure rise in large prospective cohorts [5]. More recent research evaluating cardiometabolic and mortality outcomes demonstrates the same pattern [1,4].

Large prospective cohort studies reinforce these findings. According to the European Prospective Investigation into Cancer and Nutrition (EPIC), a study enrolling more than 448,000 adults from 10 European countries, higher processed-meat intake was linked to elevated all-cause mortality and increased cardiovascular risk, after adjusting for other factors, while unprocessed red meat consumption was not as strongly linked [8]. Moreover, the Prospective Urban Rural Epidemiology (PURE) study, spanning multiple countries of various income levels, showed that processed meat intake was associated with higher risk of major cardiovascular events and all-cause mortality, whereas unprocessed red meat consumption shows weaker or inconsistent links [9].

The research is further enhanced by substitution analyses. Several large cohort studies demonstrate that replacing red or processed meat with plant-based proteins, fish or foods rich in unsaturated fats lowers CVD and mortality risk [18-20].

Randomized controlled trials (RCT) provide additional context. A meta-analysis of 36 RCTs compared diets richer in red meat with diets focusing on alternative sources of protein and found no significant differences in LDL cholesterol, HDL cholesterol, triglycerides, total cholesterol and blood pressure when total energy and macronutrients intake were kept equal [21]. These trials were short and did not cover cardiovascular endpoints, their findings suggest that short-term effects of red meat may depend on the overall diet, not just meat consumption itself.

Altogether, population-based studies show that regular consumption of red and particularly processed meats links to heightened cardiovascular and all-cause mortality risk, while diets focusing on plant or fish-based foods are consistent with more favorable cardiometabolic outcomes. These reports constitute the base for examining biomarkers, mechanisms, and broader dietary patterns in following sections.

3.2. Laboratory and Biomarker Outcomes

In this section, we aimed to synthesize the available evidence regarding laboratory biomarkers and mechanistic pathways that link dietary patterns to cardiovascular risk. The included studies range from exploratory investigations of individuals following a carnivore diet to randomized controlled trials comparing red meat with alternative protein sources, as well as large cohort studies examining the long-term biochemical effects of meat-based versus plant-based dietary patterns. A summary of laboratory biomarker findings is presented in Table 1.

Table 1. Laboratory and Biomarker Findings Across Dietary Patterns

PMID	Study Design / Population	Biomarkers	Key Findings
40385902	Exploratory carnivore diet study (Germany)	TC, LDL-C, HDL-C, TG, glucose, HbA1c	↑LDL-C, ↑TC, HDL↑; TG variable; improved glycemia in some
34934897	Survey of adults on carnivore diet	Self-reported lipids, TG, HbA1c	↑LDL-C in ~25%, ↑HDL-C, ↓TG, ↓HbA1c (self-reported)
30958719	Meta-analysis of 36 RCTs (red meat vs alternatives)	TC, LDL-C, HDL-C, TG, BP	No pooled lipid differences; ↑LDL-C vs plant protein
33268459	Prospective cohort (US men)	LDL-C, CRP	↑LDL-C & inflammation with higher red meat intake
32011623	Prospective cohort	TC, LDL-C, HDL-C, TG	↑LDL-C, ↑TG with red/processed meat; ↑CVD risk
37264855	Systematic review & meta-analysis	Multiple CV markers	Red/processed meat associated with adverse biomarkers
35291893	Umbrella review	Multiple	Consistent association with adverse cardiometabolic profile
26780279	Review of epidemiologic studies	Multiple	Summarizes link between meat intake & ↑LDL/inflammation
34229346	Atherosclerosis prevention guidelines	Lipids, inflammation	High meat intake increases LDL-C & inflammatory markers
31569213	Systematic review & meta-analysis of cohorts	Lipids, glycemia	Red/processed meat ↑LDL-C & TC long-term
33801247	RCT: ketogenic low-carb high-fat diet	LDL-C, apoB, LDL particles	LCHF diet increased LDL-C, apoB & LDL particles
36545687	Umbrella review of non-cancer outcomes	TMAO, oxidative stress, lipids	Red/processed meat intake → ↑TMAO & oxidative stress
9925120	Meta-analysis of soluble fiber RCTs	LDL-C, TC	Soluble fiber lowers LDL-C & TC
40385902	RCT: ketogenic vs low–glycemic index diet	HbA1c, glucose, TG	Keto diet ↓HbA1c, ↓glucose, med reduction
19419563	Low-carb intervention in severe T2DM	HbA1c, glucose	Low-carb diet ↓HbA1c from 10.9% → 7.4%
39834467	Meta-analysis of low-carb diets (T2DM)	FPG, HbA1c, lipids	Low-carb diets ↓glucose & HbA1c; mixed lipid changes

1. Carnivore Diet

Data on laboratory findings in individuals following a carnivore diet are extremely limited, and in our review only two studies providing systematic data could be included. Small sample sizes and dependence only on self-reported laboratory biomarkers severely limit the credibility of these findings. Therefore, these observations should be interpreted with caution. Further studies are essential to establish the true cardiometabolic effects of this dietary pattern.

Reiner J. Klement et al. investigated changes in blood parameters in a German exploratory cohort (n = 24) [16]. Participants following a carnivore diet for at least one month provided laboratory results from both before and after adopting the diet. The researchers found a marked increase in total and LDL cholesterol, while HDL cholesterol levels were higher and both triglycerides and HbA1c showed slight reductions. Most laboratory parameters remained within reference ranges. However, the study relied exclusively on self-reported laboratory values and lacked standardized protocols, limiting the strength of its interpretation.

Belinda S. Lennerz et al. conducted an online survey that included 2,029 adults consuming a carnivore diet [17]. The authors reported similar patterns, including higher LDL-C levels, whereas triglyceride and HDL cholesterol levels were generally within reference ranges. In addition, participants frequently reported subjective health improvements and reductions in BMI and HbA1c. Nevertheless, all laboratory data were cross-sectional, self-reported, and subject to substantial selection bias.

Taken together, these observations indicate marked increases in LDL-C and total cholesterol, alongside possible improvements in glycemic markers. Given the short duration of observation, small sample sizes, and non-standardized data collection, the long-term cardiovascular implications of these findings remain uncertain [16,17].

2. Red and Processed Meat Consumption

Multiple studies demonstrate a connection between higher consumption of red and processed meat and increased CVD, CHD, and all-cause mortality [1-4]. Large-scale epidemiological evidence shows that meat-based dietary patterns are linked with adverse cardiovascular outcomes, with more consistent associations observed for high processed meat intake [1–4].

Bechthold et al., in their meta-analysis investigating dose–response relationships across 12 different food groups, reported a positive association between red and processed meat intake and the risk of coronary artery disease, stroke, and heart failure [5]. The authors found that each incremental increase of 50 g of red meat and 100 g of processed meat per day was associated with a higher risk of these conditions.

Prospective cohort data likewise support the association between high meat consumption and cardiovascular risk. Al-Shaar et al. conducted a large study including 43,272 men and reported that total, unprocessed, and processed red meat intake were linked with an increased risk of coronary heart disease [22]. A similar analysis in a multinational cohort - the PURE study - reported that higher consumption of processed or unprocessed red meat was associated with increased cardiovascular disease incidence and all-cause mortality [9].

On the other hand, a recent meta-analysis of cohort studies by Zeraatkar et al. reported only very small associations between red and processed meat intake and cardiometabolic outcomes, with the overall certainty of evidence rated as low [4]. The authors suggested that multiple limitations inherent to nutritional epidemiology - such as residual confounding and measurement imprecision - may partly account for the observed relationships [4].

Randomized controlled trials provide additional insight into short-term metabolic effects. A meta-analysis of 36 studies by Guasch-Ferré et al. compared red meat with different alternative protein sources and found no significant differences in LDL-C, HDL-C, triglycerides, or blood pressure [21]. Nevertheless, when the analyses were stratified by comparator, replacing red meat with plant-based protein sources produced greater reductions in total cholesterol and LDL-C, whereas substitutions with poultry, fish, or refined carbohydrates brought inconsistent differences [21].

Taken together, evidence indicates that long-term, habitual consumption of red and especially processed meat is persistently associated with adverse cardiovascular outcomes [1-6, 21,22]. In contrast, metabolic responses observed in short-term feeding trials depend significantly on the dietary context, especially the nutrient composition of foods replacing red meat, highlighting the importance of evaluating overall dietary patterns rather than individual food items alone [3,21].

3. Mechanistic Biomarker Considerations

To complement the laboratory findings described above, in this section we aimed to outline the main biological mechanisms implicated in the cardiometabolic effects of meat-based dietary patterns. A general overview of these mechanisms is provided in Table 2.

Table 2. Mechanistic Pathways

Mechanistic Domain	Mechanistic Findings
Atherogenic Lipid Changes	High saturated fat increases LDL-C, apoB, and atherogenic LDL particles.
TMAO Pathway (Gut Microbiome)	Red meat provides L-carnitine → TMA → TMAO, promoting atherosclerosis.
Oxidative Stress & Heme Iron	Heme iron increases lipid oxidation and endothelial injury.
Loss of Fiber-Mediated LDL Reduction	Soluble fiber lowers LDL-C; absence increases cholesterol burden.
Loss of Antioxidants / Polyphenols	Polyphenols reduce inflammation; absence increases oxidative stress.
Glycemic Responses to Low-Carbohydrate Diets	Low-carbohydrate diets improve HbA1c and fasting glucose; lipid effects vary.
Inflammation and Endothelial Dysfunction	Red/processed meat intake associated with increased CRP and endothelial dysfunction.

Atherogenic potential and loss of protective mechanisms

Diets high in animal-based products and red meat are usually high in both cholesterol and saturated fat, which can lead to adverse changes in the lipid profile and promote atherogenic shifts [3,7]. Burén et al. showed that a ketogenic, high-fat diet significantly increased LDL-C, apoB, and LDL subfractions [23]. Moreover, red meat provides TMAO precursors, a metabolite believed to be linked to atherosclerosis and vascular inflammation [7]. Heme iron and saturated fat can also contribute to endothelial dysfunction and oxidative stress [3]. Furthermore, the elimination of plant-derived nutrients excludes health-promoting components such as fiber, polyphenols, antioxidants, and omega-3 fatty acids, which collectively decrease LDL cholesterol, improve endothelial function, and reduce systemic inflammation [19,21]

Glycemic Effects of Low-Carbohydrate / Carnivore-Like Diets

Low-carbohydrate diets have consistently been shown to improve glycemic control. Westman et al. reported substantial reductions in HbA1c among outpatients with severe type 2 diabetes following carbohydrate restriction [24]. A meta-analysis of randomized controlled trials further supports these findings, demonstrating meaningful decreases in both fasting glucose and HbA1c [25]. These improvements reflect reduced carbohydrate intake and lower postprandial glucose exposure, although they may occur alongside less favorable lipid changes when saturated fat intake is high [23].

3.3. Comparative Dietary Patterns and Cardiovascular Health

Different dietary patterns are associated with substantial differences in cardiovascular outcomes. Accumulated research points to the conclusion that diets including plants, particularly the Mediterranean diet and broader plant-based approaches, tend to lead to more favorable cardiometabolic outcomes than diets rich in red or processed meat or diets based solely on animal foods.

The Mediterranean Diet

The Mediterranean diet is described as one with significant consumption of vegetables, fruits, whole grains, nuts, fish and olive oil. It has been one of the most researched dietary patterns for cardiovascular health. Studies demonstrate that long-chain ω-3 fatty acids, polyphenols, antioxidants, and probiotic-rich present in this diet help reduce stroke, atherosclerotic progression and age-related vascular decline risk [10,13]. Randomized trials and prospective observational studies show that the Mediterranean diet enhances blood lipids parameters, improves endothelial function, lowers inflammation, and reduces the risk of primary and secondary cardiovascular events. Overall, this data suggests cardioprotective effects through various mechanisms - metabolic, anti-inflammatory, antioxidant and vascular.

Plant-Based Diets

Plant-based diets range from vegetarian to plant-forward omnivorous patterns. They are persistently linked to lower cardiovascular and all-cause mortality. Systematic reviews, umbrella reviews, and clinical guidelines report that these patterns lower LDL cholesterol, triglycerides and inflammatory biomarkers and also improve insulin sensitivity and body weight [11,12]. Mechanistically, plant-based diets supply dietary fiber, polyphenols, antioxidants, vitamins, and phytonutrients that support endothelial function, reduce oxidative stress and atherogenic lipoproteins. Such features support lower CVD risk and improve cardiometabolic outcomes.

Mechanistic Contrast Across Dietary Patterns

Comparing extreme approaches to dieting reveals distinct metabolic and vascular effects. Diets based on animal products, such as the carnivore diet, are rich in saturated fats, cholesterol and heme iron, but they lack fiber and plant-derived antioxidants. Short-term observational and exploratory studies show an improvement in glycemia or triglycerides in some of the participants, but also demonstrate significant rise in LDL cholesterol, total cholesterol, and apolipoprotein B concentration in numerous participants [16,17]. Such changes are linked to an atherogenic effect, while the lack of fiber, omega-3 fatty acids and polyphenols remove distinct cardioprotective factors.

In opposition to animal-based diets, Mediterranean and plant-based diets persistently demonstrate anti-inflammatory effects, enhancement of endothelial function and reductions in LDL-C and other atherogenic lipoproteins concentration [10-12]. Substitution analyses show that switching from red or processed meat to plant-derived proteins and unsaturated fats leads to a reduction in cardiovascular and all-cause mortality [18-20].

Summary Interpretation

Cumulative evidence suggests that dietary patterns based on plant-derived produce, particularly the Mediterranean and plant-based diets, contribute to broad cardioprotective effects, while the carnivore diet and other red-meat-rich patterns lack these factors and provide consumers with a more atherogenic features. Such mechanistic, metabolic and clinical differences underline the role of diet composition in prophylaxis of CVD.

4. Discussion

In this narrative review, we synthesised evidence from epidemiological studies, clinical trials, biomarker analyses, and mechanistic research to evaluate the cardiovascular implications of carnivore diets, red and processed meat consumption, and differing plant-based diets. Reviewing the covered literature reveals a recurring pattern: dietary patterns high in red or processed meat consumption were linked to an increase in CVD incidence and all-cause mortality [1-7], while patterns including plant-derived produce, particularly the Mediterranean and plant-based diets, were linked to more favorable cardiovascular and metabolic outcomes [10-13].

Large cohort studies such as EPIC and PURE showed that consumption of processed meat is linked to higher mortality and cardiovascular events likelihood, while unprocessed red meat demonstrates weaker, nonetheless still distinct associations with worse cardiovascular outcomes [8,9]. Multiple systematic and umbrella reviews reinforce these findings. [1-4,7]. Dose-response studies add more support, showing a graded increase in CVD, stroke, and heart failure occurrence as meat, particularly processed meat intake gets higher [5].

Substitution studies add additional details: replacing meat, particularly processed, with plant-based proteins, nuts or fish was linked to lower CVD and all-cause mortality [18-20]. This suggests that the health impact of meat intake depends not only on quantity but also on the broader dietary context. Controlled feeding trials reveal more by showing that when energy and macronutrient composition are matched, red meat may provide significant alterations in blood lipids or blood pressure in the short term [21]. These findings underline that overall diet composition is a key factor in structuring metabolic features with meat consumption.

In contrast, research on carnivore diets remains more insufficient and methodologically less reliable. Available studies leaned on self-reported biomarkers and involved self-selected participants, raising substantial risk of bias [16,17]. Despite these limitations, both studies reported notable increases in LDL-C and total cholesterol concentration, while leading to moderate improvements in glycaemic markers in some of the participants [16,17]. Without controlled conditions and long-term follow-up, the cardiovascular influences of these findings remain unclear.

4.1. Mechanistic Interpretation

Mechanistic evidence adds biological context for epidemiological patterns. Diets high in red and processed meat provide saturated fat, cholesterol, heme iron, and TMAO precursors, which are factors linked to worse lipid profiles, oxidative stress, and worsening endothelial function [3,7]. Experimental studies further show that animal-based, high-fat diets based on animal products can increase LDL-C, apoB, and LDL particle subfractions, providing a profile leading to an elevated CVD risk [23]. On the contrary, Mediterranean and plant-based diets provide consumers with high fiber, polyphenols, and antioxidants intake which help reduce LDL-C and reduce oxidative stress, introducing a mechanistic explanation for their cardioprotective effects [10,13,26]. Low-carbohydrate diets may improve glycaemic control, but these benefits can accompany worse lipid responses when saturated fat intake is high [23-25,27]. A summary of these mechanisms is presented in Table 2.

4.2. Interpretation in Context

Reviewing the available evidence indicated that high consumption of red meat, particularly its processed variants, is linked to an increased risk of cardiovascular disease risk and premature mortality over time. Importantly, much of the available evidence linking meat consumption with cardiovascular outcomes originates from observational studies, which limits the ability to infer causality. In contrast, diets rich in plant-based foods have demonstrated protective effects on cardiovascular health. While carnivore diets may lead to short-term improvement in certain metabolic markers, they are also frequently associated with elevations in cholesterol and other blood lipids in many individuals. Currently, there is a lack of robust, long-term studies assessing the health impacts of exclusively animal-based diets, underscoring significant gaps in our understanding of their overall safety and efficacy.

4.3. Strengths and Limitations

This review is notable for integrating evidence from epidemiological data, clinical trials and mechanistic research. However, several limitations should be acknowledged. Definitions of "diet" vary across studies and much of the long-term evidence is derived from observational rather than randomized controlled trials [4,21]. There is also a significant shortage of rigorously designed studies examining high-meat and carnivore diets. Furthermore, large cohort studies often contend with confounding variables and inaccuracies in dietary self-reporting, as highlighted by Zeraatkar et al. [16,17].

5. Conclusions

Present research suggests that high consumption of red and processed meats is associated with a larger risk of cardiovascular disease and premature mortality. Conversely, diets rich in plant-based foods have demonstrated significant protective effects on heart health. Regarding strict carnivore diets, long-term evidence to draw definitive conclusions is scarce. Concerns have been raised about their potential impact on cholesterol levels and overall cardiovascular health. Therefore, further high-quality, longitudinal studies are necessary to fully understand the long-term effects of predominantly meat-based diets on cardiovascular and metabolic outcomes.

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