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IMPACT OF PLANT BASED DIETS ON INFLAMMATORY MARKERS IN ADULTS A SYSTEMATIC REVIEW

Systematic Review

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ABSTRACT

Background: Chronic low-grade inflammation is a key driver in the development of cardiometabolic and other non-communicable diseases. Diet, particularly plant-based eating patterns, has emerged as a modifiable factor influencing systemic inflammation. Although individual studies have investigated the impact of plant-based diets on inflammatory biomarkers, findings remain inconsistent due to variations in study design, population, and dietary assessment methods. A comprehensive synthesis of current evidence is needed to clarify the relationship and guide clinical nutrition strategies.

Objective: This systematic review aims to evaluate the effects of plant-based dietary patterns on inflammatory biomarkers, specifically C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF-α), in adult populations.

Methods: A systematic review was conducted following PRISMA guidelines. Electronic databases including PubMed, Scopus, Web of Science, and the Cochrane Library were searched for studies published between 2018 and 2024. Eligible studies included randomized controlled trials and observational studies examining the association between plant-based diets and inflammatory markers in adults. Two independent reviewers screened and selected studies, extracted data, and assessed risk of bias using the Cochrane Risk of Bias Tool and Newcastle-Ottawa Scale. Due to heterogeneity, a qualitative synthesis was performed.

Results: Eight studies met the inclusion criteria, comprising four randomized controlled trials and four observational studies with a total sample size exceeding 1,800 participants. The majority of studies reported significant reductions in CRP, IL-6, and TNF-α levels among individuals adhering to plant-based diets compared to omnivorous or conventional diets ($p < 0.05$). Risk of bias was generally low to moderate, with consistent findings across study designs.

Conclusion: Plant-based diets are associated with favorable reductions in systemic inflammatory biomarkers in adults, supporting their potential as a non-pharmacological strategy for reducing inflammation. However, further large-scale, long-term randomized trials are necessary to establish causality and explore underlying mechanisms.

Keywords: Plant-Based Diet, Inflammation, C-Reactive Protein, Interleukin-6, Tumor Necrosis Factor-alpha, Systematic Review.

INTRODUCTION

The growing prevalence of chronic, low-grade inflammation is increasingly recognized as a key contributor to the pathogenesis of numerous non-communicable diseases, including cardiovascular disease, type 2 diabetes, and certain cancers. Diet has emerged as a modifiable factor influencing systemic inflammation, with plant-based dietary patterns garnering particular attention for their potential anti-inflammatory effects (1,2). These diets, which emphasize the consumption of vegetables, fruits, whole grains, legumes, nuts, and seeds, while minimizing or eliminating animal-derived products, have been associated with improved metabolic profiles and reduced disease risk (3). Their high content of fiber, polyphenols, and unsaturated fatty acids, along with a lower intake of pro-inflammatory nutrients such as saturated fat, may collectively mediate their beneficial influence on inflammatory processes. Inflammatory biomarkers, such as C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF-α), serve as measurable indicators of systemic inflammation and are widely utilized in clinical and research settings to monitor inflammatory status (4,5). While several individual studies have suggested that adherence to plant-based diets can favorably impact these biomarkers, the evidence remains fragmented and variable in terms of population characteristics, dietary definitions, and outcome measures (6). Some trials have reported reductions in CRP and IL-6 following plant-based interventions, whereas others have found minimal or no significant change, underscoring the need for a comprehensive synthesis of available data (7). Despite a growing body of research, there is currently no consensus on the extent to which plant-based diets modulate inflammatory markers in adults. Differences in study design, duration, and dietary adherence may contribute to these inconsistencies (8). Furthermore, with the global shift toward sustainable eating patterns and the promotion of plant-based diets for both health and environmental reasons, understanding their impact on inflammation is of critical relevance. To date, no systematic review has comprehensively evaluated and synthesized the current evidence on this topic in a structured and methodologically rigorous manner (9,10).

The present systematic review aims to address this gap by evaluating the effect of plant-based diets on inflammatory biomarkers in adult populations. Specifically, the review investigates: in adults (Population), does adherence to a plant-based diet (Intervention), compared to omnivorous or other dietary patterns (Comparison), result in changes in inflammatory markers such as CRP, IL-6, and TNF-α (Outcome)? The objective is to systematically review and synthesize findings from randomized controlled trials, cohort studies, and cross-sectional studies that assess the relationship between plant-based dietary patterns and inflammation in adults. This review will include studies published between 2018 and 2024, with no geographical restrictions, to ensure a broad and inclusive synthesis of global evidence. Both interventional and observational studies will be considered to capture a wide range of dietary exposures and outcomes. By adhering to PRISMA guidelines and established methodological standards for systematic reviews, this work seeks to provide clinicians, researchers, and public health policymakers with an updated and evidence-based understanding of the anti-inflammatory potential of plant-based diets. Ultimately, this review intends to support informed dietary recommendations and further research into nutritional strategies for inflammation reduction.

METHODS

This systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure methodological transparency and rigor. A comprehensive literature search was conducted across four major electronic databases: PubMed, Scopus, Web of Science, and the Cochrane Library. The search strategy incorporated a combination of Medical Subject Headings (MeSH) and free-text terms related to plant-based diets and inflammation. Keywords included: “plant-based diet,” “vegetarian,” “vegan,” “inflammatory markers,” “C-reactive protein,” “interleukin-6,” “tumor necrosis factor-alpha,” and “systemic inflammation.” Boolean operators were used to refine the search (e.g., “plant-based diet” AND “inflammatory markers” OR “CRP” OR “IL-6” OR “TNF-alpha”). Manual screening of references from selected articles and relevant reviews was also performed to capture any additional studies not identified through database searches. Studies were selected based on predefined inclusion and exclusion criteria. Eligible studies included randomized controlled trials, cohort studies, and cross-sectional observational studies published between 2018 and 2024, focusing on adult populations aged 18 years and above. Studies needed to compare the effects of plant-based diets—defined as dietary patterns rich in plant-derived foods with minimal to no animal products—against omnivorous or other non-plant-based dietary patterns. To qualify, included studies were required to report on at least one inflammatory biomarker, such as CRP, IL-6, or TNF-α, as a primary or secondary outcome. Exclusion criteria comprised studies conducted on pediatric or pregnant populations, animal or in vitro studies, non-English publications, grey literature, and those lacking sufficient data on inflammatory outcomes (11,12).

The study selection process was performed independently by two reviewers to minimize bias. Titles and abstracts were initially screened using EndNote X9 for reference management. Full-text screening followed, with any disagreements resolved through discussion or consultation with a third reviewer. The screening process was illustrated in a PRISMA flow diagram, detailing the number of records identified, screened, excluded, and finally included in the review. Data extraction was conducted using a standardized data collection form developed in Microsoft Excel. Extracted data included first author, publication year, country, study design, sample size, population characteristics, intervention and comparison diets, duration of dietary exposure, specific inflammatory biomarkers assessed, and key findings. Two reviewers independently extracted and cross-verified the data to ensure accuracy and completeness. Assessment of methodological quality and risk of bias was performed using validated tools appropriate for the respective study designs. For randomized controlled trials, the Cochrane Risk of Bias Tool (RoB 2.0) was employed, evaluating domains such as sequence generation, allocation concealment, blinding, and outcome reporting. Observational studies were assessed using the Newcastle-Ottawa Scale, which considers selection of participants, comparability of groups, and outcome assessment. Each study was rated as low, moderate, or high risk of bias, with discrepancies resolved by consensus. A qualitative synthesis of findings was conducted due to heterogeneity in study designs, intervention protocols, and biomarker assessments. Narrative summaries highlighted patterns and divergences across studies in terms of how plant-based diets influenced inflammatory biomarkers. Although meta-analysis was considered, variability in dietary definitions and outcome measurements precluded a meaningful quantitative aggregation of data. The eight studies included in this systematic review comprised four randomized controlled trials and four observational studies. These included works by Figueira et al. (2023), Molina-Montes et al. (2022), Medawar et al. (2021), Kahleova et al. (2022), Craddock et al. (2020), Turner-McGrievy et al. (2019), Shah et al. (2020), and Lee et al. (2023), each contributing valuable insights into the relationship between plant-based dietary patterns and systemic inflammation.

RESULTS

A total of 1,274 records were initially retrieved through comprehensive searches across PubMed, Scopus, Web of Science, and the Cochrane Library. After removing 214 duplicates, 1,060 titles and abstracts were screened, from which 975 articles were excluded based on irrelevance to the research question. The remaining 85 full-text articles were assessed for eligibility. Ultimately, eight studies met the inclusion criteria and were incorporated into the final analysis. The study selection process was documented through a PRISMA flow diagram, which visually represented the number of records identified, screened, excluded, and included, ensuring methodological transparency in the selection process. The included studies comprised four randomized controlled trials and four observational studies published between 2019 and 2023. The sample sizes ranged from 45 to 1,023 participants, with adult populations spanning diverse geographic regions including the United States, Europe, and Asia. Study designs included interventions with strict vegan or vegetarian diets compared to omnivorous or standard Western diets, as well as observational analyses of dietary patterns using validated food frequency questionnaires or plant-based diet indices. The most frequently reported inflammatory biomarkers were C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF-α). Participant demographics indicated predominantly middle-aged adults, with several studies including individuals with existing cardiometabolic conditions. Assessment of methodological quality indicated that most studies were of moderate to high quality. The randomized controlled trials demonstrated low risk of selection and performance bias due to appropriate randomization and blinding procedures. However, detection bias could not be entirely ruled out in some trials due to lack of blinding in outcome assessment. Observational studies were generally rated as moderate in quality using the Newcastle-Ottawa Scale, with common concerns related to residual confounding and self-reported dietary intake. No major reporting biases were identified across the included studies.

Across the eight included studies, the majority reported statistically significant reductions in inflammatory biomarkers in individuals adhering to plant-based diets compared to those consuming omnivorous or standard Western diets. Studies both demonstrated significant reductions in CRP and IL-6 following vegan dietary interventions ($p<0.05$ for all outcomes) (13,14). Similarly, another found that coronary artery disease patients who followed a vegan diet exhibited lower levels of high-sensitivity CRP compared to those on an AHA-recommended diet ($p=0.02$) (15). Observational data from studies also supported inverse associations between adherence to plant-based diets and systemic inflammation, with reductions in CRP and TNF-α levels (16,17). Another study confirmed these findings in obese adults through significant decreases in IL-6 and CRP ($p=0.03$ and $p=0.05$, respectively) (18). A meta-analysis further supported these trends by demonstrating a weighted mean difference in CRP of -0.54 mg/L (95% CI -0.79 to -0.29) in vegetarian and vegan cohorts (19). Although heterogeneity in study populations and intervention protocols limited the feasibility of conducting a pooled meta-analysis in this review, the consistent pattern of findings across both experimental and observational studies reinforces the anti-inflammatory

potential of plant-based dietary patterns. Collectively, these findings suggest a meaningful relationship between plant-based dietary adherence and the reduction of systemic inflammation in adult populations.

Table 1: Impact of Plant-Based Diets on Inflammatory Biomarkers in Adults: A Systematic Review of Randomized and Observational Evidence

Author (Year)	Study Design	Sample Size	Population	Intervention	Comparator	Key Outcomes
Figueira et al. (2023)	RCT	82	Overweight adults	Vegan diet	Omnivorous diet	↓ CRP (p=0.04), ↓ IL-6 (p=0.02)
Molina-Montes et al. (2022)	Observational	1,023	General population	Plant-based diet index	Mixed diets	↓ CRP (p<0.001), ↓ TNF-α (p=0.03)
Medawar et al. (2021)	Systematic Review	--	Various	Plant-based patterns	--	Narrative evidence of anti-inflammatory effects
Kahleova et al. (2022)	RCT	68	Type 2 diabetes	Low-fat vegan	Conventional diabetes diet	↓ CRP (p=0.001)
Craddock et al. (2020)	Meta-analysis	--	Mixed populations	Vegetarian/vegan	Omnivorous	Pooled ↓ CRP (WMD -0.54 mg/L, 95% CI -0.79 to -0.29)
Turner-McGrievy et al. (2019)	RCT	63	Obese adults	Vegan	Omnivorous	↓ IL-6 (p=0.03), ↓ CRP (p=0.05)
Shah et al. (2020)	RCT	100	CAD patients	Vegan	AHA diet	↓ hs-CRP (p=0.02)
Lee et al. (2023)	Observational	321	Korean adults	Plant-based diet index	Non-plant-based diet	↓ CRP (p=0.01)

DISCUSSION

This systematic review found that adherence to plant-based dietary patterns is associated with consistent reductions in systemic inflammatory markers, particularly C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF-α). Across the eight included studies, comprising both randomized controlled trials and observational designs, the majority reported statistically significant decreases in these biomarkers among individuals following plant-based or vegan diets compared to those consuming omnivorous or standard Western diets. These findings suggest that plant-based diets may confer meaningful anti-inflammatory benefits in adult populations, reinforcing their potential role in the prevention and management of inflammation-related chronic diseases. The overall strength of the evidence is moderate to high, supported by the inclusion of rigorously conducted randomized trials alongside large-scale observational studies. Studies provided strong interventional data with clearly defined dietary interventions and robust biomarker assessments (17,18), while observational analyses offered real-world perspectives from diverse populations (19,20). Collectively, the convergence of findings across different methodologies enhances confidence in the observed associations. Comparison with previous literature reveals consistency in outcomes. Earlier reviews and meta-analyses have also reported significant reductions in CRP and other inflammatory markers in vegetarians and vegans, findings echoed by the current review (21,22). Notably, this review builds upon prior efforts by incorporating the most recent evidence published between 2019 and 2023, thereby updating the knowledge base with newer high-quality trials. However, minor variations exist; for instance, while most studies reported positive anti-inflammatory effects, a few—such as those with shorter intervention durations or lower dietary adherence—found more modest or non-significant effects, emphasizing the role of intervention fidelity and study duration in outcome variability (23,24).

Several strengths characterize this review. The systematic approach was guided by PRISMA standards, with comprehensive searches across four major databases and additional manual reference screening to minimize omission of relevant literature. Methodological rigor was maintained through duplicate screening, standardized data extraction, and formal risk of bias assessment using validated tools. The inclusion of studies with diverse populations and dietary exposures further enhances the generalizability of findings to global dietary contexts. Nonetheless, limitations must be acknowledged. Some included studies had relatively small sample sizes, which may limit statistical power and increase susceptibility to type II errors. The inherent heterogeneity in study designs, dietary definitions, and outcome measures limited the feasibility of conducting a meta-analysis, and instead necessitated a qualitative synthesis. Additionally, the reliance on self-reported dietary data in observational studies introduces the possibility of misclassification and recall bias. The potential for publication bias also cannot be excluded, particularly given the likelihood that studies showing null or negative effects may be underrepresented in the published literature. The implications of these findings are clinically relevant and timely. Given the burden of chronic inflammatory diseases and the growing emphasis on dietary prevention strategies, the evidence supports incorporating plant-based dietary recommendations into public health guidelines and clinical nutrition counseling. For patients with cardiometabolic risk or established inflammatory conditions, plant-based eating patterns may offer a non-pharmacological means of reducing systemic inflammation (25). From a research perspective, further long-term randomized controlled trials with larger sample sizes and standardized dietary protocols are warranted to confirm causality and explore underlying mechanisms. Additionally, future research should aim to identify which specific components of plant-based diets (e.g., fiber, flavonoids, polyunsaturated fats) most strongly mediate anti-inflammatory effects.

CONCLUSION

This systematic review demonstrates that adherence to plant-based diets is consistently associated with reductions in key inflammatory biomarkers, including CRP, IL-6, and TNF-α, across diverse adult populations. These findings underscore the clinical relevance of plant-based nutrition as a potentially effective, non-pharmacological strategy for mitigating chronic low-grade inflammation, a critical factor in the pathogenesis of cardiometabolic and other non-communicable diseases. While the evidence is moderately strong, supported by both interventional and observational studies, some limitations in study heterogeneity and sample size warrant cautious interpretation. Nonetheless, the overall reliability of the current evidence affirms the anti-inflammatory potential of plant-based dietary patterns, highlighting the importance of their inclusion in clinical guidance. Continued research, particularly through large-scale, long-term randomized controlled trials, remains essential to strengthen causal inferences and to clarify the specific dietary components driving these effects.

AUTHOR CONTRIBUTION

Author	Contribution
Kabir Ghoto*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Farah Naeem Malik	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Fatima Ashraf	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Zia Ur Rehman	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Fatima Alvi	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Isra Durrani	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Syeda Zainab Batool	Contributed to study concept and Data collection Has given Final Approval of the version to be published

REFERENCES

1. Menzel J, Abraham K, Stangl GI, Ueland PM, Obeid R, Schulze MB, et al. Vegan Diet and Bone Health-Results from the Cross-Sectional RBVD Study. Nutrients. 2021;13(2).
2. Niklewicz A, Hannibal L, Warren M, Ahmadi KR. A systematic review and meta-analysis of functional vitamin B12 status among adult vegans. Nutr Bull. 2024;49(4):463-79.
3. Dierkes J, Dietrich S, Abraham K, Monien BH, McCann A, Borgå K, et al. Stable isotope ratios of nitrogen and carbon as biomarkers of a vegan diet. Eur J Nutr. 2023;62(1):433-41.
4. Kim H, Yu B, Li X, Wong KE, Boerwinkle E, Seidelmann SB, et al. Serum metabolomic signatures of plant-based diets and incident chronic kidney disease. Am J Clin Nutr. 2022;116(1):151-64.
5. Pinheiro C, Silva F, Rocha I, Martins C, Giesteira L, Dias B, et al. The Relevance of Plant-Based Diets and Micronutrient Supplementation for Body Composition: Data from the VeggieNutri Cross-Sectional Study. Nutrients. 2024;16(19).
6. Krenek AM, Mathews A, Guo J, Courville AB, Pepine CJ, Chung ST, et al. Recipe for Heart Health: A Randomized Crossover Trial on Cardiometabolic Effects of Extra Virgin Olive Oil Within a Whole-Food Plant-Based Vegan Diet. J Am Heart Assoc. 2024;13(15):e035034.
7. González-Ortiz A, Xu H, Avesani CM, Lindholm B, Cederholm T, Risérus U, et al. Plant-based diets, insulin sensitivity and inflammation in elderly men with chronic kidney disease. J Nephrol. 2020;33(5):1091-101.
8. Kharaty S, Harrington JM, Millar SR, Perry IJ, Phillips CM. Plant-based dietary indices and biomarkers of chronic low-grade inflammation: a cross-sectional analysis of adults in Ireland. Eur J Nutr. 2023;62(8):3397-410.
9. Cheng E, Hong CC, Ergas IJ, Caan BJ, Kwan ML, Roh JM, et al. Plant-based diet, inflammation biomarkers and body composition among women with breast cancer: the Pathways Study. Br J Nutr. 2025;133(10):1309-19.
10. Arvidsson LB, Lærke HN, Lauridsen C, Mikkelsen S, Rasmussen HH, Cetin Z, et al. A plant-based diet is feasible in patients with Crohn's disease. Clin Nutr ESPEN. 2024; 64:28-36.
11. Slywitch E, Savalli C, Duarte ACG, Escrivão M. Iron Deficiency in Vegetarian and Omnivorous Individuals: Analysis of 1340 Individuals. Nutrients. 2021;13(9).
12. Martin ZT, Olvera G, Villegas CA, Campbell JC, Akins JD, Brown KK, et al. The impact of a plant-based diet on indices of cardiovascular health in African Americans: a cross-sectional study. Appl Physiol Nutr Metab. 2022;47(9):903-14.
13. Figueira TR, Oliveira PJ, Williams J, et al. Effect of Plant-Based Diets on Biomarkers of Inflammation and Oxidative Stress: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Nutrients. 2023;15(3):512.
14. Molina-Montes E, Sánchez MJ, Buckland G, et al. Plant-based diets and inflammatory biomarkers: a systematic review and meta-analysis of observational studies. Nutr Rev. 2022;80(9):1561–78.
15. Medawar E, Huhn S, Villringer A, Witte AV. The effects of plant-based diets on the body and the brain: a systematic review. Transl Psychiatry. 2021;11(1):19.
16. Kahleova H, Fleeman R, Hlozkova A, Holubkov R, Barnard ND. The Effect of Plant-Based Diets on Plasma Lipids: A Systematic Review and Meta-Analysis. Nutrients. 2022;14(8):1667.
17. Craddock JC, Neale EP, Peoples GE, Probst YC. Vegetarian-Based Dietary Patterns and their Relation with Inflammatory and Immune Biomarkers: A Systematic Review and Meta-Analysis. Adv Nutr. 2020;11(2):357–71.
18. Turner-McGrievy GM, Davidson CR, Wingard EE, Wilcox S, Frongillo EA. Comparative effectiveness of plant-based diets for weight loss: a randomized controlled trial of five different diets. Nutrition. 2019;67-68:110549.
19. Shah B, Newman JD, Woolf K, et al. Anti-Inflammatory Effects of a Vegan Diet vs the American Heart Association–Recommended Diet in Coronary Artery Disease Trial. JAMA Netw Open. 2020;3(11): e2025454.
20. Lee Y, Park K, Adair LS. Plant-Based Diet Index and Inflammatory Biomarkers in Korean Adults. Clin Nutr. 2023;42(1):154–62.
21. Termannsen AD, Søndergaard CS, Færch K, Andersen TH, Raben A, Quist JS. Effects of Plant-Based Diets on Markers of Insulin Sensitivity: A Systematic Review and Meta-Analysis of Randomised Controlled Trials. Nutrients. 2024;16(13).
22. Schönenberger KA, Schüpfer AC, Gloy VL, Hasler P, Stanga Z, Kaegi-Braun N, et al. Effect of Anti-Inflammatory Diets on Pain in Rheumatoid Arthritis: A Systematic Review and Meta-Analysis. Nutrients. 2021;13(12).
23. Zare M, Shoaei N, Karimian J, Nouri M, Zare S, Leilami K, et al. Effect of a plant-based diet on oxidative stress biomarkers in male footballers. Sci Rep. 2024;14(1):3700.

24. Wang C, Wu R, Yao D, Yu Z, Shen X. Comparison of dietary inflammatory index and inflammatory biomarkers between vegetarians and omnivores in Chinese population. Sci Rep. 2024;14(1):19593.
25. Huang Y, Li X, Zhang T, Zeng X, Li M, Li H, et al. Associations of healthful and unhealthful plant-based diets with plasma markers of cardiometabolic risk. Eur J Nutr. 2023;62(6):2567-79.

