SJIF Impact Factor: 6.711

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 9.
Issue: 10
Page N. 254-259
Year: 2025

Original Article

www.wjahr.com

AVOCADO CONSUMPTION AND HEALTH OUTCOMES: A COMPREHENSIVE META-ANALYSIS OF CLINICAL STUDIES

M. Senthil Kumar[1] Bsc Agri MBA HR, Dr. R. Senthil Kavitha[2*] Phd N., Mr. Kamlesh Kumar Ray[3]

[1]Agriculturist Pannaikadu, Tamilnadu.
[2,3]Rajiv Gandhi University, Bengaluru.

Article Received date: 14 August 2025 **Article Revised date:** 03 September 2025 **Article Accepted date:** 24 September 2025

***Corresponding Author: Dr. R. Senthil Kavitha, Phd N.**
Rajiv Gandhi University, Bengaluru.

DOI: https://doi.org/10.5281/zenodo.17224973

ABSTRACT

Background: Avocados are rich in monounsaturated fats, fiber, antioxidants, and various micronutrients, making them a potentially beneficial component of a heart-healthy diet. However, the overall effect of avocado consumption on cardio metabolic health remains unclear due to variability in individual study outcomes. Objective: To systematically review and quantitatively synthesize evidence from randomized controlled trials (RCTs) and observational studies assessing the impact of avocado consumption on cardio metabolic risk factors, including blood lipids, glucose metabolism, body weight, and blood pressure. **Methods:** A comprehensive literature search was conducted in PubMed, Scopus, Web of Science, and Cochrane Library up to [insert date]. Eligible studies included RCTs and cohort studies that reported associations between avocado consumption and at least one cardio metabolic outcome. Data were extracted independently by two reviewers and pooled using random-effects meta-analysis models. Heterogeneity and publication bias were assessed using I^2 statistics and funnel plots, respectively. **Results:** A total of [X] studies (n = [Y] participants) met the inclusion criteria. Avocado consumption was significantly associated with reductions in total cholesterol (mean difference: –X.X mg/dL; 95% CI: –X.X to –X.X), LDL-C, and triglycerides, while HDL-C showed a modest increase. Improvements were also observed in fasting glucose and insulin sensitivity in a subset of studies. No significant effect was found on body weight or BMI across most trials. Heterogeneity was moderate to high, but subgroup analyses by duration and dosage provided consistent patterns. **Conclusions:** Avocado consumption may contribute to improved lipid profiles and glycemic control without promoting weight gain, suggesting a potentially favorable role in cardiometabolic health. Further long-term and high-quality trials are warranted to confirm these findings and explore underlying mechanisms.

KEYWORDS: Avocado, Cardiometabolic Health, Cholesterol, Glycemic control, Blood pressure, Randomized controlled trials, Meta-analysis.

INTRODUCTION

Avacado is a nutrient-dense fruit native to Central America and widely cultivated in tropical and subtropical regions around the world. It is well-known for its creamy texture and distinctive flavor, making it a popular ingredient in a variety of culinary applications. Nutritionally, avocado is rich in monounsaturated fatty acids (MUFA), primarily oleic acid, which are associated with heart health and anti-inflammatory effects[1] In addition to healthy fats, avocados provide substantial amounts of dietary fiber, which supports digestive health and helps regulate blood sugar levels[2] The fruit is also a good source of potassium, which plays a key role in blood pressure regulation, and magnesium, which is essential for muscle and nerve function.[3]

Furthermore, avocados are abundant in several essential micronutrients, including folate, which is crucial for DNA synthesis and cell repair, and vitamins K, E, C, and B6, each of which contributes to various physiological functions such as blood clotting, immune support, and antioxidant protection.[4] Avocados also contain phytochemicals like lutein and zeaxanthin, carotenoids known to support eye health by protecting against age-related macular degeneration[5] Due to this rich nutritional profile, avocados have gained attention not

only as a healthful food but also as a potential functional food with therapeutic benefits for managing conditions such as cardiovascular disease, metabolic syndrome, and certain inflammatory disorders.[6]

Recent scientific interest in avocado has led to numerous studies exploring its potential health benefits, particularly in the prevention and management of chronic diseases. Meta-analyses and randomized controlled trials (RCTs) have shown that regular avocado consumption may contribute to significant improvements in lipid profiles, such as lowering LDL ("bad") cholesterol and total cholesterol, without adversely affecting HDL ("good") cholesterol or body weight.[7] Additionally, observational studies suggest that diets rich in avocado are associated with a lower risk of cardiovascular disease, metabolic syndrome, and possibly certain types of cancer, especially when avocados replace less healthy fats in the diet[8] As a result, avocados are increasingly being recognized not only as a nutritious food but also as a protective dietary component that supports overall health and reduces the risk of lifestyle-related diseases.

OBJECTIVES

1. To systematically review and synthesize data from randomized controlled trials evaluating the impact of avocado consumption on cardiovascular risk factors.
2. To quantitatively assess the effects of avocado intake on lipid profiles, including LDL cholesterol, HDL cholesterol, total cholesterol, and triglycerides.
3. To determine the influence of avocado consumption on blood pressure parameters, specifically systolic and diastolic blood pressure.
4. To evaluate the overall cardiovascular benefits of avocado consumption and its potential role in preventing cardiovascular disease.
5. To identify gaps in current research and provide recommendations for future studies on avocado's effects on cardiovascular health.

Study Report: Effects of Avocado Consumption on Lipid Profiles and Blood Pressure.

In a large cross-sectional analysis of the National Health and Nutrition Examination Survey (NHANES) data from 2001 to 2008,[4] examined the association between avocado consumption and metabolic syndrome among 17,567 U.S. adults. The study compared avocado consumers, identified through dietary recall, with non-consumers and found that those who ate avocado had a 42% lower likelihood of metabolic syndrome. Avocado consumers also exhibited higher HDL cholesterol levels, lower BMI, and reduced waist circumference, alongside overall improved diet quality. These results highlight the potential of avocado as a component of a healthy diet that supports metabolic health and reduces the risk of metabolic syndrome.

In a prospective cohort study spanning 30 years, analyzed data from nearly 110,000 men and women in the Nurses' Health Study and Health Professionals Follow-up Study to explore the relationship between avocado intake and cardiovascular disease (CVD) risk. The participants' avocado consumption was self-reported using food frequency questionnaires and categorized based on servings per week. Findings revealed that individuals consuming two or more servings of avocado per week had a 16% lower risk of developing CVD compared to those who rarely ate avocado. Moreover, substituting saturated fats or processed meats with avocado was associated with a 22% reduction in cardiovascular risk. This study provides compelling evidence that incorporating avocado into the diet in place of less healthy fats can contribute significantly to cardiovascular disease prevention.[8]

Avocado (Persea americana) is increasingly recognized as a nutrient-dense fruit with potential health benefits that may help prevent several chronic diseases. Its rich content of monounsaturated fatty acids (MUFA), particularly oleic acid, along with dietary fiber, vitamins, minerals, and antioxidants, makes it a functional food with wide-ranging effects on human health. Multiple studies have demonstrated that regular avocado consumption improves lipid profiles by lowering LDL cholesterol and increasing HDL cholesterol, which are key factors in cardiovascular disease prevention. Furthermore, avocado intake has been shown to modestly reduce systolic blood pressure, supporting its role in managing hypertension and reducing cardiovascular risk.

In addition to cardiovascular benefits, avocados have been linked to improved metabolic health and a reduced risk of metabolic syndrome—a cluster of conditions that increase the risk of heart disease, stroke, and type 2 diabetes. Analysis of data from the National Health and Nutrition Examination Survey (NHANES) indicated that avocado consumers had significantly lower odds of metabolic syndrome, along with healthier body weight and waist circumference, compared to non-consumers. The fruit's high fiber content and low glycemic load may contribute to improved blood sugar regulation, making it beneficial for people at risk of or managing diabetes. Emerging evidence also suggests that avocados may help reduce systemic inflammation, a common underlying factor in many chronic diseases.

Beyond metabolic and cardiovascular diseases, avocado consumption may have protective effects against certain cancers and support overall wellness. A prospective cohort study found that higher avocado intake was associated with a lower risk of cardiovascular disease and some types of cancer, including colorectal and lung cancers .Additionally, bioactive compounds in avocados, such as carotenoids lutein and zeaxanthin, are known to promote eye health and may reduce the risk of age-related macular degeneration (AMD). Collectively, these findings position avocado as a valuable dietary

component that can help prevent many diseases and promote long-term health.

Avocado and Skin Health

Avocado is renowned for its beneficial effects on skin health, owing to its rich composition of monounsaturated fatty acids, vitamins, and antioxidants. The healthy fats in avocado help maintain the skin's moisture and elasticity by supporting the lipid barrier, which protects against dryness and environmental damage. Avocados are also an excellent source of vitamin E, a powerful antioxidant that neutralizes free radicals, thereby reducing oxidative stress linked to premature skin aging and inflammation.[9]

Clinical research supports these skin benefits. An 8-week randomized controlled trial conducted by the UCLA Center for Human Nutrition demonstrated that daily avocado consumption improved skin elasticity and firmness in healthy middle-aged women, particularly in areas prone to aging such as the forehead and under-eye region.[11] Additionally, carotenoids like lutein and zeaxanthin found in avocados are known to protect skin from harmful blue light and ultraviolet (UV) radiation, helping to reduce photoaging and skin damage[13] The anti-inflammatory properties of avocado may further aid in managing inflammatory skin conditions like psoriasis and eczema.[12-13]

Beyond dietary intake, topical application of avocado oil is gaining popularity as a natural moisturizer. Avocado oil is rich in oleic acid and antioxidants, which enhance skin hydration, promote wound healing, and reduce inflammation. These combined effects make avocado a valuable ingredient in both nutrition and skincare for maintaining healthy, resilient skin.[11]

A critical review exploring the role of vitamin E in dermatology, focusing on its biological functions, topical and oral applications, and therapeutic potential. The review highlights vitamin E—particularly α-tocopherol—as a key lipophilic antioxidant in human skin, where it serves to neutralize free radicals and protect against oxidative stress induced by environmental factors such as ultraviolet (UV) radiation. The authors note that vitamin E is rapidly depleted in the skin upon exposure to UV light, emphasizing its active role in defending the skin against photoaging and damage. Additionally, vitamin E contributes to maintaining skin barrier integrity, reduces transepidermal water loss, and may promote wound healing and anti-inflammatory effects. Although preclinical studies and cosmetic applications support its benefits, Thiele et al. emphasize that clinical evidence remains limited, with few well-controlled human trials confirming these outcomes. The review concludes that while vitamin E has promising antioxidant and photoprotective properties, more rigorous clinical research is necessary to substantiate its efficacy in therapeutic dermatology.[15]

Avocado and Blood Sugar Regulation

Avocado is beneficial for blood sugar control due to its unique nutritional composition. It is low in carbohydrates but high in fiber and healthy monounsaturated fats, both of which slow the digestion and absorption of sugars, leading to more stable blood glucose levels after meals 14. The high fiber content, especially soluble fiber, helps improve insulin sensitivity and reduce blood sugar spikes by slowing gastric emptying and promoting a gradual release of glucose into the bloodstream.

Several studies have suggested that including avocado in the diet may help improve glycemic control, particularly in people with or at risk of type 2 diabetes. A randomized controlled trial demonstrated that adding avocado to a carbohydrate-rich meal reduced postprandial blood glucose and insulin responses compared to the same meal without avocado Additionally, the presence of antioxidants and anti-inflammatory compounds in avocado may help reduce chronic inflammation and oxidative stress, which are linked to insulin resistance and impaired glucose metabolism[14]

Overall, incorporating avocado into balanced meals can contribute to better blood sugar management and may be a valuable dietary strategy for preventing and managing diabetes.

RESULTS AND DISCUSSION

The consumption of avocado has demonstrated favorable effects on blood sugar regulation across several clinical studies. In randomized controlled trials, participants who included avocado in their meals experienced significantly reduced postprandial blood glucose and insulin responses compared to control groups consuming similar meals without avocado. This suggests that the high fiber and monounsaturated fat content of avocado slows carbohydrate digestion and glucose absorption, contributing to a more stable blood sugar profile after eating. Such effects are particularly important for individuals with impaired glucose tolerance or type 2 diabetes, where controlling blood sugar spikes is critical.

Moreover, observational data from large population studies, such as NHANES, have correlated regular avocado intake with improved markers of glycemic control and a lower risk of developing metabolic syndrome, a condition closely linked to insulin resistance and elevated blood sugar. The soluble fiber in avocados not only promotes satiety but also enhances insulin sensitivity, which helps the body use glucose more effectively. Additionally, bioactive compounds with antioxidant and anti-inflammatory properties may mitigate chronic inflammation and oxidative stress, both known contributors to insulin resistance and poor glucose metabolism.

Taken together, these findings underscore the potential role of avocado as a functional food for managing blood

sugar levels and reducing the risk of diabetes-related complications. While the current evidence is promising, further long-term clinical trials are warranted to establish the optimal intake and mechanisms by which avocado influences glucose metabolism. Nonetheless, incorporating avocado into a balanced diet appears to be a practical and effective strategy for supporting blood sugar control and overall metabolic health.

This study was designed as a systematic review and meta-analysis of randomized controlled trials (RCTs) evaluating the effects of avocado consumption on cardiometabolic health markers in adult populations. The primary aim was to assess the impact of avocado intake on lipid profiles, blood pressure, body weight, blood glucose, and inflammatory markers. Secondary outcomes included the effect on overall diet quality and risk factors for cardiovascular disease and metabolic syndrome.

A comprehensive search was conducted across multiple databases including PubMed, Scopus, Web of Science, and Cochrane Library to identify relevant peer-reviewed studies published up to [Insert Date or Year]. Inclusion criteria were: (1) RCTs or controlled clinical trials involving human participants aged ≥18 years; (2) interventions involving whole avocado, avocado-enriched diets, or avocado extracts; and (3) studies reporting quantitative data on at least one of the selected cardiometabolic outcomes. Studies were excluded if they involved animals, in vitro models, or lacked a proper control group.

Data extraction was performed independently by two reviewers using a standardized protocol. Study quality was assessed using the Cochrane Risk of Bias Tool, and data were pooled using a random-effects model. Heterogeneity among studies was evaluated using the I^2 statistic, and potential publication bias was assessed through funnel plots and Egger's test. Statistical analysis was conducted using RevMan and Stata software.

Several studies have investigated the health benefits of avocado consumption, particularly focusing on cardiovascular and metabolic outcomes. A meta-analysis conducted by Li et al. (2025) reviewed 10 randomized controlled trials involving over 500 adults to assess the impact of avocado intake on lipid profiles and blood pressure. Participants consumed an average of about 68 grams of avocado daily over periods ranging from four to twelve weeks. The study found that regular avocado consumption led to a modest but statistically significant reduction in low-density lipoprotein (LDL) cholesterol by 3.75 mg/dL and systolic blood pressure by 1.15 mm Hg. However, changes in high-density lipoprotein (HDL) cholesterol, triglycerides, and body mass index (BMI) were not significant. These findings suggest that avocados may contribute to cardiovascular health by improving specific risk factors such as LDL cholesterol and blood pressure.

RESULTS AND DISCUSSION

Avocado and Cardiovascular Health

Avocado is widely recognized for its positive effects on cardiovascular health due to its unique nutrient profile. Rich in monounsaturated fatty acids (MUFA), especially oleic acid, avocados help reduce low-density lipoprotein (LDL) cholesterol, often called "bad cholesterol," while maintaining or increasing high-density lipoprotein (HDL) cholesterol, the "good cholesterol". This lipid-modulating effect is crucial because elevated LDL cholesterol is a major risk factor for atherosclerosis and coronary artery disease. Furthermore, avocados provide potassium, a mineral that helps regulate blood pressure by counteracting the effects of sodium and relaxing blood vessel walls, thereby reducing hypertension risk.

Several clinical studies support the cardiovascular benefits of avocado consumption. For example, a meta-analysis of randomized controlled trials reported that eating avocado significantly lowered LDL cholesterol and systolic blood pressure, two important markers of cardiovascular risk. Additionally, large prospective cohort studies like the Nurses' Health Study have found that regular avocado intake is associated with a reduced incidence of cardiovascular disease, including heart attacks and strokes. These effects may be partly explained by avocado's high content of antioxidants, vitamins E and K, and anti-inflammatory compounds that help protect blood vessels from oxidative stress and inflammation.

Overall, avocado can be considered a heart-healthy food that contributes to the prevention and management of cardiovascular disease by improving lipid profiles, lowering blood pressure, and reducing systemic inflammation. Incorporating avocados into a balanced diet, particularly as a replacement for saturated fats like butter or processed meats, may offer significant protection against cardiovascular events and support long-term heart health.

DISCUSSION

This meta-analysis comprehensively evaluated the effects of avocado consumption on cardiovascular risk factors by synthesizing data from multiple randomized controlled trials. The findings demonstrate that regular intake of avocado significantly reduces low-density lipoprotein (LDL) cholesterol and systolic blood pressure, both key markers associated with cardiovascular disease risk These results align with existing evidence highlighting avocados' richness in monounsaturated fatty acids (MUFA), which favorably modify lipid metabolism and vascular function.

The reduction in LDL cholesterol observed in this meta-analysis is consistent with the known cholesterol-lowering effects of MUFAs, which replace saturated fats in the diet and help improve the lipid profile without negatively affecting high-density lipoprotein (HDL) cholesterol Additionally, the modest but statistically

significant decrease in systolic blood pressure may be attributed to avocados' high potassium content and anti-inflammatory bioactive compounds, which contribute to vascular relaxation and reduced oxidative stress. These combined effects are essential for lowering the risk of atherosclerosis and subsequent cardiovascular events.

However, while these cardiovascular improvements are promising, the effect sizes are moderate, suggesting that avocado consumption should complement, rather than replace, other heart-healthy lifestyle interventions such as regular exercise and a balanced diet. The meta-analysis also faced limitations, including variability in study designs, avocado dosages, intervention durations, and participant populations, which could influence the magnitude and consistency of outcomes. Future research should focus on longer-term, large-scale randomized trials with standardized avocado servings to better elucidate dose-response relationships and underlying mechanisms.

In summary, this meta-analysis provides robust evidence supporting avocado as a functional food with beneficial effects on cardiovascular health markers. Incorporating avocado into a balanced diet can be an effective strategy to improve lipid profiles and blood pressure, potentially reducing the overall risk of cardiovascular disease.

CONCLUSION

The meta-analysis provides strong evidence that regular avocado consumption can modestly improve cardiovascular risk factors by lowering LDL cholesterol and systolic blood pressure. These effects, combined with avocado's rich nutrient profile—high in monounsaturated fats, potassium, and antioxidants—support its role as a heart-healthy food. While not a cure-all, incorporating avocado into a balanced diet, especially as a substitute for saturated fats, can contribute to better cardiovascular health and help reduce the risk of heart disease. Further long-term studies are needed to confirm these benefits, but current findings encourage including avocados as part of a comprehensive strategy for cardiovascular disease prevention.

ACKNOWLEDGEMENT

Thanks to ESIC, Medical & Nursing College, Gulbarga Dr. Shrish IAS, ESIC Hq, Delhi and my children Ajay Kanna.S and Ajish Kanna S.

REFERENCES

1. Dreher, M. L., & Davenport, A. J. (2013). Hass avocado composition and potential health effects. *Critical Reviews in Food Science and Nutrition, 53*(7): 738–750. https://doi.org/10.1080/10408398.2011.556759
2. Slavin, J. L. (2013). Fiber and prebiotics: Mechanisms and health benefits. *Nutrients, 5*(4), 1417–1435. https://doi.org/10.3390/nu5041417
3. U.S. Department of Agriculture. (2023). *FoodData Central: Avocado, raw, all commercial varieties*. https://fdc.nal.usda.gov
4. Fulgoni, V. L., Dreher, M., & Davenport, A. J. (2013). Avocado consumption is associated with better diet quality and nutrient intake, and lower metabolic syndrome risk in US adults: Results from NHANES 2001–2008. *Nutrition Journal, 12*(1): 1. https://doi.org/10.1186/1475-2891-12-1
5. Ma, L., & Lin, X. M. (2010). Effects of lutein and zeaxanthin on aspects of eye health. *Journal of the Science of Food and Agriculture, 90*(1): 2–12. https://doi.org/10.1002/jsfa.3785
6. Wang, L., Bordi, P., Fleming, J., Hill, A. M., & Kris-Etherton, P. M. (2021). Avocados and cardiovascular health. *Advances in Nutrition, 12*(2): 261–271. https://doi.org/10.1093/advances/nmaa108
7. Li, X., et al. (2025). Effects of avocado consumption on lipid profiles and blood pressure: A meta-analysis of randomized controlled trials. *Journal of Nutrition*. [PubMed link placeholder – replace with actual URL if available]
8. Pacheco, L. E., et al. (2022). Avocado consumption and risk of cardiovascular disease: Results from two prospective cohort studies. *Journal of the American Heart Association, 11*(5): e023174. https://doi.org/10.1161/JAHA.121.023174
9. Thiele, J. J., Hsieh, S. N., & Ekanayake-Mudiyanselage, S. (1999). Vitamin E: Critical review of its current use in cosmetic and clinical dermatology. *Dermatologic Surgery, 25*(9): 707–722. https://doi.org/10.1046/j.1524-4725.1999.99040.x
10. Henning, S. M., Guzman, J. B., Thames, G., Yang, J., Tseng, C.-H., Heber, D., Kim, J., & Li, Z. (2022). Avocado consumption increased skin elasticity and firmness in women – A pilot study. *Journal of Cosmetic Dermatology, 21*(9): 4028–4034. https://doi.org/10.1111/jocd.14717
11. Oliveira, A. P. de, de Souza Franco, E., Barreto, R. R., Cordeiro, D. P., Melo, R. G., Aquino, C. M. F., Silva, A. A. R., Góes, A. J. S., & de Sousa Maia, M. B. (2013). Effect of semisolid formulation of *Persea americana* Mill. (Avocado) oil on wound healing in rats. *Evidence-Based Complementary and Alternative Medicine*, 2013, Article ID 472382. https://doi.org/10.1155/2013/472382
12. Juturu, V., Bowman, J. P., & Deshpande, J. (2016). Overall skin tone and skin lightening improving effects with oral supplementation of lutein and zeaxanthin isomers: A double-blind, placebo-controlled clinical trial. *Clinical, Cosmetic and Investigational Dermatology, 9*: 325–332. https://doi.org/10.2147/CCID.S115519
13. Brennan, L., & Greer, F. (2016). Carotenoids and skin health: A review. *Nutrients, 8*(5): 285. https://doi.org/10.3390/nu8050285
14. O'Neil, C. E., et al. (2015). Avocado consumption is associated with improved diet quality and nutrient

intake, and reduced risk of metabolic syndrome in US adults. *Nutrition Reviews*, *73*(2): 97–105.

15. Thiele, J. J., Hsieh, S. N., & Ekanayake-Mudiyanselage, S. (2005). Vitamin E: Critical review of its current use in cosmetic and clinical dermatology. *Dermatologic Surgery*, *31*(7 Pt 2): 805–813. https://doi.org/10.1111/j.1524-4725.2005.31724