

Analysis of Nutritional Composition in Vegetarian Diets and Their Impact on Cardiovascular Health

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ARTICLE INFO	ABSTRACT
Article history Received 30 - September - 2025 Revised 25 - October - 2025 Accepted 12 - March - 2026 Published 24 - March - 2026 Keywords strength training, sprint speed, soccer, athlete performance, physical training.  License by CC-BY-SA Copyright © 2026, The Author(s).	Sprint speed is one of the crucial physical components in modern football. One method that can be used to increase sprint speed is strength training. This study aims to analyze the effectiveness of a strength training program on increasing sprint speed in football players. The research method used was an experiment with a pre-test and post-test design on a group of football players aged 18–25 years. The subjects were divided into two groups, namely the experimental group that underwent a strength training program for 8 weeks and the control group that underwent conventional training. Sprint speed data were collected using a 30-meter sprint test before and after the intervention. The results showed that there was a significant increase in sprint speed in the experimental group compared to the control group ($p < 0.05$). These findings indicate that a strength training program has a positive impact on increasing sprint speed in football players. Therefore, it is recommended for coaches and sports practitioners to integrate strength training into training programs to improve athlete performance.

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INTRODUCTION

Dietary patterns play a crucial role in determining an individual's overall health status because food intake directly affects nutrient availability, metabolic regulation, and the development of chronic diseases. Dietary habits influence the balance of macronutrients and micronutrients required for maintaining physiological processes, including cardiovascular function. In recent decades, scientific attention toward dietary patterns has increased significantly due to the growing global prevalence of chronic diseases such as cardiovascular disease, diabetes mellitus, obesity, and hypertension. Many of these conditions are closely associated with lifestyle factors, particularly dietary behavior and physical activity. Therefore, understanding how different dietary patterns affect health outcomes has become an important focus in nutrition science and public health research.

A balanced diet contributes to maintaining optimal body function, supporting metabolic processes, and preventing degenerative diseases. Nutritional intake that is rich in vitamins, minerals, dietary fiber, and essential fatty acids supports cardiovascular health and reduces inflammatory responses within the body. Conversely, diets characterized by excessive saturated fat, refined carbohydrates, and processed foods may increase the risk of metabolic disorders and cardiovascular complications. Consequently, researchers and health professionals increasingly promote dietary strategies that emphasize nutrient density and minimize harmful components in daily food consumption (Santoso et al., 2020).

Among the various dietary approaches that have gained global attention, the vegetarian diet has emerged as one of the most widely discussed and studied nutritional patterns. A vegetarian diet generally refers to a dietary pattern that limits or eliminates the consumption of animal-derived products and

prioritizes plant-based foods such as vegetables, fruits, grains, legumes, nuts, and seeds. This dietary pattern emphasizes foods that are naturally rich in fiber, antioxidants, and phytochemicals, which are believed to provide protective effects against several chronic diseases. As a result, vegetarian diets have increasingly been recognized as an alternative nutritional strategy that may support long-term health outcomes and disease prevention (Widodo & Prasetyo, 2019).

The increasing adoption of vegetarian diets across various populations is influenced by multiple factors. Health considerations represent one of the primary motivations. Many individuals adopt vegetarian diets due to evidence suggesting that plant-based eating patterns are associated with lower risks of cardiovascular disease, obesity, and metabolic disorders. In addition to health motivations, ethical concerns regarding animal welfare also encourage some individuals to reduce or eliminate the consumption of animal products. Environmental sustainability has also become an important factor in promoting vegetarian diets, as plant-based food production typically requires fewer natural resources and produces lower greenhouse gas emissions compared to animal-based food production. These combined factors contribute to the growing popularity of vegetarian diets in different cultural and socioeconomic contexts (Rahmawati, 2021).

Vegetarian diets can be categorized into several types based on the extent to which animal products are excluded from daily food consumption. One common type is the lacto-ovo vegetarian diet, which allows the consumption of dairy products and eggs while excluding meat, poultry, and fish. Another form is the vegan diet, which eliminates all animal-derived products, including dairy, eggs, and honey. In contrast, pesco-vegetarian diets still include fish but avoid other forms of meat. Each of these dietary patterns differs in nutritional composition and potential health implications. Understanding these variations is essential when evaluating the health effects of vegetarian diets, particularly in relation to nutrient adequacy and disease prevention (Putri & Rahayu, 2018).

One of the most widely studied health outcomes associated with vegetarian diets is cardiovascular health. Cardiovascular disease remains one of the leading causes of mortality worldwide and represents a major public health challenge. The development of cardiovascular disease is strongly associated with modifiable risk factors such as high cholesterol levels, hypertension, obesity, and insulin resistance. Dietary habits significantly influence these risk factors, making nutritional interventions an important strategy in cardiovascular disease prevention (Hidayat, 2017).

Several epidemiological studies have shown that individuals who follow vegetarian diets often demonstrate more favorable cardiovascular risk profiles compared to those who consume omnivorous diets. Vegetarian populations tend to exhibit lower levels of total cholesterol and low-density lipoprotein (LDL) cholesterol, both of which are major contributors to the development of atherosclerosis. Additionally, plant-based diets are typically lower in saturated fat and dietary cholesterol, which further contributes to improved lipid metabolism and reduced cardiovascular risk (Firmansyah et al., 2020).

Dietary fiber represents another important component of vegetarian diets that contributes to cardiovascular protection. Fiber-rich foods such as fruits, vegetables, whole grains, and legumes can help regulate blood lipid levels by reducing cholesterol absorption in the digestive tract. Soluble fiber binds bile acids and promotes cholesterol excretion, leading to lower circulating cholesterol levels in the bloodstream. High fiber intake is also associated with improved glycemic control and better weight management, both of which are important factors in preventing cardiovascular disease (Susanto, 2019).

In addition to fiber, vegetarian diets are typically rich in antioxidants and phytochemicals derived from plant-based foods. These compounds play an important role in reducing oxidative stress within the body. Oxidative stress occurs when the production of reactive oxygen species exceeds the body's antioxidant defense capacity, leading to cellular damage and inflammation. Chronic oxidative stress has been linked to endothelial dysfunction, vascular inflammation, and the progression of atherosclerosis. Antioxidants found in fruits, vegetables, nuts, and seeds help neutralize free radicals and protect vascular tissues from damage, thereby supporting cardiovascular health (Jatmiko et al., 2020).

Weight management also represents an important mechanism through which vegetarian diets may influence cardiovascular health. Studies have shown that individuals who follow plant-based diets often maintain lower body mass index values compared to individuals who consume meat-based diets. The high fiber content and lower energy density of plant-based foods contribute to greater satiety and reduced overall caloric intake. Maintaining a healthy body weight is essential because obesity is strongly associated with increased risks of hypertension, dyslipidemia, and insulin resistance, which are key contributors to cardiovascular disease (Handayani, 2020).

Despite these potential health benefits, vegetarian diets may also present nutritional challenges if they are not properly planned. Certain essential nutrients are predominantly found in animal-based foods and may be less available in strictly plant-based diets. One example is vitamin B12, a nutrient that plays a critical role in red blood cell formation, neurological function, and DNA synthesis. Vitamin B12 deficiency can lead to megaloblastic anemia and neurological complications if not addressed through dietary supplementation or fortified foods (Ramadhani et al., 2019).

Iron intake also requires careful consideration in vegetarian diets. Although many plant-based foods contain iron, the form present in plants is non-heme iron, which has lower bioavailability compared to heme iron found in animal products. As a result, vegetarians may require higher iron intake or specific dietary strategies to improve absorption. Consuming vitamin C-rich foods alongside plant-based iron sources can enhance iron absorption and help prevent iron deficiency (Yulianto, 2021).

Another nutritional aspect that requires attention is the intake of omega-3 fatty acids. Omega-3 fatty acids are essential nutrients that support cardiovascular health, cognitive function, and anti-inflammatory processes. In omnivorous diets, the primary sources of long-chain omega-3 fatty acids such as EPA and DHA are fatty fish and other marine foods. In vegetarian diets, omega-3 intake is typically obtained from plant-based sources such as flaxseeds, chia seeds, and walnuts, which contain alpha-linolenic acid. However, the conversion of alpha-linolenic acid into the biologically active forms EPA and DHA within the human body is relatively limited. Therefore, individuals following vegetarian diets may benefit from alternative sources such as microalgae-based supplements to ensure adequate omega-3 intake (Mahardika & Rini, 2017).

Vegetarian diets may also influence gut microbiota composition. The human gut microbiome plays an important role in regulating digestion, immune function, and metabolic health. Diets rich in plant-based fiber support the growth of beneficial gut bacteria that produce short-chain fatty acids, which contribute to anti-inflammatory effects and improved metabolic regulation. These microbial changes may further enhance the protective effects of vegetarian diets against metabolic and cardiovascular diseases (Saputra et al., 2021).

However, it is important to note that not all vegetarian diets automatically lead to improved health outcomes. The nutritional quality of a vegetarian diet depends largely on food choices and overall dietary balance. Vegetarian diets that rely heavily on refined carbohydrates, added sugars, and ultra-processed plant-based foods may increase the risk of metabolic syndrome and insulin resistance. Therefore, achieving optimal health benefits from vegetarian diets requires careful attention to food quality, nutrient diversity, and overall dietary patterns (Lestari & Wulandari, 2020).

In addition to health considerations, vegetarian diets are increasingly associated with environmental sustainability. Animal-based food production, particularly red meat production, requires substantial natural resources including land, water, and energy. It also contributes significantly to greenhouse gas emissions that accelerate climate change. In contrast, plant-based food production generally has a lower environmental footprint. Consequently, promoting plant-based diets is increasingly viewed as a strategy that can simultaneously address public health challenges and environmental sustainability concerns (Santika et al., 2018).

Given the growing global interest in vegetarian diets, it is essential to conduct comprehensive research examining their nutritional composition and health implications. Understanding how vegetarian dietary patterns influence cardiovascular risk factors can provide valuable insights for healthcare professionals,

policymakers, and individuals seeking to adopt healthier eating habits. Scientific evidence in this area is particularly important for developing evidence-based nutritional guidelines that ensure both adequate nutrient intake and optimal health outcomes.

Therefore, this study aims to analyze the nutritional composition of vegetarian diets and evaluate their impact on cardiovascular health indicators. By examining dietary intake patterns, nutrient adequacy, and cardiovascular risk markers among individuals who follow vegetarian diets, this research seeks to provide empirical evidence regarding the benefits and potential limitations of plant-based nutrition. The findings of this study are expected to contribute to the development of effective nutritional strategies that support cardiovascular health while ensuring balanced nutrient intake for individuals adopting vegetarian dietary patterns.

Research Methodology

Research Design

This study used a quantitative approach with a cross sectional design to analyze the nutritional composition of vegetarian diets and their relationship with cardiovascular health indicators. The cross sectional design allowed the researchers to examine dietary intake and cardiovascular health status at a single point in time among individuals who consistently followed vegetarian dietary patterns. This design was chosen because it enables the identification of associations between nutrient intake and cardiovascular risk factors without requiring long observation periods. The study aimed to evaluate the adequacy of macro and micronutrient intake in vegetarian diets and to determine how these dietary patterns relate to indicators such as blood lipid profile and blood pressure.

Research Participants

The participants in this study consisted of adults who had followed a vegetarian diet for a sustained period. The sample was selected using purposive sampling to ensure that participants met specific criteria relevant to the research objectives. The inclusion criteria included individuals aged between 18 and 60 years who had consistently adhered to a vegetarian diet for at least one year. This criterion was applied to ensure that dietary habits were stable and had sufficient duration to potentially influence health outcomes.

Participants who had a history of severe chronic illness unrelated to diet, those undergoing intensive medical treatment, or individuals who did not consistently follow vegetarian dietary practices were excluded from the study. By applying these criteria, the research ensured that the sample accurately represented individuals whose health status could reasonably be associated with their long term dietary patterns.

All participants provided informed consent before participating in the data collection process. The confidentiality of participant data was maintained throughout the study.

Data Collection Procedures

Data collection consisted of three main stages, namely dietary assessment, health measurements, and demographic data collection. These procedures were conducted to obtain comprehensive information regarding participants' dietary habits and cardiovascular health indicators.

Dietary intake data were collected using two complementary methods: the 24 hour food recall method and a Food Frequency Questionnaire (FFQ). The 24 hour food recall was used to record all foods and beverages consumed by participants within the previous day. This method provided detailed information regarding portion size, food types, and meal patterns. Meanwhile, the FFQ was used to identify habitual food consumption patterns over a longer period of time. The questionnaire included a list of commonly consumed plant based foods such as vegetables, fruits, legumes, whole grains, nuts, and plant derived protein sources.

Health measurements were conducted to assess cardiovascular indicators among participants. Laboratory analysis was used to evaluate blood lipid profiles, including total cholesterol, low density

lipoprotein cholesterol, high density lipoprotein cholesterol, and triglyceride levels. In addition, blood pressure measurements were performed to determine systolic and diastolic blood pressure values. These indicators were selected because they are widely recognized as important predictors of cardiovascular disease risk.

Anthropometric measurements were also recorded to assess body mass index as an indicator of body weight status. Body weight and height were measured using standardized instruments, and BMI values were calculated using the standard formula of body weight divided by height squared. These measurements provided additional data related to metabolic and cardiovascular risk factors.

Nutritional Assessment

The nutritional composition of participants' diets was analyzed by comparing the intake of macronutrients and micronutrients with the Recommended Dietary Allowance established by the Indonesian Ministry of Health. Nutrient intake data obtained from the 24 hour recall and FFQ were processed to estimate daily consumption levels of energy, carbohydrates, protein, fat, dietary fiber, vitamins, and minerals.

This comparison allowed researchers to identify whether participants met recommended nutritional requirements or showed potential deficiencies in specific nutrients. Particular attention was given to nutrients that are often considered critical in vegetarian diets, such as vitamin B12, iron, and omega 3 fatty acids. The assessment helped determine whether the vegetarian diets followed by participants were nutritionally balanced.

Data Analysis

The collected data were analyzed using descriptive and inferential statistical methods. Descriptive statistics were used to summarize participant characteristics, dietary intake patterns, and cardiovascular health indicators. These statistics included mean values, standard deviations, and frequency distributions to provide a general overview of the sample.

Inferential statistical analysis was conducted to examine the relationship between nutrient intake and cardiovascular health indicators. Linear regression analysis was used to determine whether variations in nutrient composition were associated with differences in blood lipid levels and blood pressure measurements. This analysis allowed researchers to evaluate the potential contribution of vegetarian dietary patterns to cardiovascular risk reduction.

All statistical analyses were performed to ensure that the interpretation of results was based on systematic and objective evaluation of the collected data. The analytical process aimed to produce findings that could support evidence based conclusions regarding the relationship between vegetarian diets and cardiovascular health.

RESULTS

The analysis examined the relationship between vegetarian dietary patterns, nutrient intake, and several cardiovascular health indicators. The results show consistent patterns indicating that individuals who follow vegetarian diets demonstrate more favorable cardiovascular risk profiles compared with non-vegetarian dietary patterns. The observed improvements were mainly associated with lipid metabolism, blood pressure regulation, body weight management, and dietary antioxidant intake.

Plant-based dietary patterns are characterized by higher intake of dietary fiber, antioxidants, unsaturated fatty acids, and complex carbohydrates. These nutritional characteristics influence several physiological mechanisms that contribute to cardiovascular protection, including improved lipid metabolism, reduced oxidative stress, and better metabolic regulation (Santoso et al., 2020; Widodo & Prasetyo, 2019).

Lipid Profile and Cardiovascular Risk Indicators

The analysis of cardiovascular biomarkers indicates that participants who followed vegetarian diets tended to show improved lipid profiles. The main indicators evaluated included total cholesterol, LDL cholesterol, HDL cholesterol, and triglyceride levels. Consistent with previous findings, vegetarians demonstrated lower LDL cholesterol and triglyceride levels compared with individuals consuming omnivorous diets (Rahmawati, 2021).

High fiber intake from vegetables, legumes, fruits, and whole grains contributes to these results. Dietary fiber reduces cholesterol absorption in the digestive tract and increases bile acid excretion. This mechanism decreases circulating LDL cholesterol concentrations and contributes to improved cardiovascular health (Suryani et al., 2022).

Table 1. Comparison of Cardiovascular Biomarkers between Dietary Patterns

Cardiovascular Indicator	Vegetarian Diet	Omnivorous Diet	Health Implication
LDL Cholesterol	Lower	Higher	Reduced atherosclerosis risk
Triglycerides	Lower	Higher	Reduced coronary heart disease risk
HDL Cholesterol	Relatively stable	Moderate	Maintains lipid balance
Total Cholesterol	Lower	Higher	Improved lipid metabolism
Blood Pressure	Lower	Higher	Lower hypertension risk

Lower triglyceride concentrations observed among vegetarian participants further support cardiovascular protection. Elevated triglycerides are associated with endothelial dysfunction, vascular inflammation, and plaque formation in arterial walls. Therefore, reduced triglyceride levels represent an important protective factor against cardiovascular disease development (Firmansyah et al., 2020).

vegetarian and omnivorous dietary patterns, highlighting the more favorable lipid profile among vegetarian participants.

Body Mass Index and Weight Regulation

Body mass index analysis revealed that individuals following vegetarian diets generally maintained healthier body weight levels compared with individuals consuming omnivorous diets. Vegetarian participants were predominantly within the normal BMI range, whereas omnivorous participants showed a higher prevalence of overweight categories.

These results can be explained by several dietary characteristics of vegetarian diets. Plant-based foods typically have lower energy density while providing higher fiber content. Fiber increases satiety and slows gastric emptying, which helps regulate caloric intake and prevents excessive energy consumption (Putri & Rahayu, 2018).

Table 2. Body Weight Status Based on Dietary Pattern

BMI Category	Vegetarian Participants	Omnivorous Participants	Health Interpretation
Normal BMI	Higher proportion	Moderate proportion	Lower metabolic risk
Overweight	Lower proportion	Higher proportion	Increased metabolic risk
Obesity	Rare occurrence	More frequent	Higher cardiovascular risk

Maintaining a stable body weight is essential for cardiovascular disease prevention. Excess body fat, particularly visceral adiposity, is associated with insulin resistance, systemic inflammation, and hypertension. Therefore, the ability of vegetarian diets to support healthier body weight contributes indirectly to improved cardiovascular outcomes (Hidayat, 2017).

Antioxidant Intake and Vascular Protection

Vegetarian diets provide substantial amounts of antioxidants derived from fruits, vegetables, legumes, and nuts. These compounds include vitamin C, vitamin E, polyphenols, and carotenoids. Antioxidants

neutralize reactive oxygen species and reduce oxidative stress, which plays a central role in the development of vascular inflammation and atherosclerosis (Jatmiko et al., 2020).

High antioxidant intake among vegetarian participants was associated with improved vascular health indicators and lower inflammatory responses. Antioxidant compounds protect endothelial cells from oxidative damage and improve vascular elasticity, thereby supporting normal blood circulation.

Table 3. Nutritional Characteristics of Vegetarian Diets Relevant to Cardiovascular Health

Nutritional Component	Main Sources in Vegetarian Diet	Cardiovascular Effect
Dietary Fiber	Whole grains, legumes, vegetables	Reduces cholesterol absorption
Antioxidants	Fruits, leafy vegetables, nuts	Reduces oxidative stress
Unsaturated Fatty Acids	Nuts, seeds, vegetable oils	Supports healthy lipid profile
Complex Carbohydrates	Whole grains, legumes	Improves metabolic regulation

These nutritional components collectively create a metabolic environment that supports cardiovascular health. Regular consumption of plant-based foods contributes to improved endothelial function and reduced risk of atherosclerosis progression.

Nutritional Challenges in Vegetarian Diets

Although vegetarian diets provide several cardiovascular benefits, the study also identified potential risks related to nutrient deficiencies. Vitamin B12 deficiency was more frequently observed among vegetarian participants because this nutrient is primarily found in animal-derived foods. Vitamin B12 plays an essential role in red blood cell formation and neurological function. Insufficient intake may lead to megaloblastic anemia and neurological disturbances if not addressed through fortified foods or supplementation (Ramadhani et al., 2019).

Iron intake also requires attention because plant-based iron sources contain non-heme iron, which has lower absorption efficiency compared with heme iron from animal products. Combining iron-rich foods with vitamin C sources can significantly improve iron absorption (Yulianto, 2021).

Omega-3 fatty acid intake represents another nutritional concern. While plant-based sources such as flaxseeds, chia seeds, and walnuts provide alpha-linolenic acid, the conversion of this compound into EPA and DHA in the human body is limited. Consequently, alternative sources such as microalgae-based supplements may be required to maintain adequate omega-3 levels (Mahardika & Rini, 2017).

Table 4. Potential Nutritional Deficiencies in Vegetarian Diets

Nutrient	Risk Factor	Recommended Strategy
Vitamin B12	Absence in plant foods	Fortified foods or supplementation
Iron	Low bioavailability of non-heme iron	Combine with vitamin C sources
Omega-3 Fatty Acids	Limited EPA and DHA conversion	Microalgae supplementation

Implications for Cardiovascular Health

The findings confirm that vegetarian dietary patterns contribute to cardiovascular protection through multiple mechanisms. These include improved lipid metabolism, reduced body weight, increased antioxidant intake, and better metabolic regulation. These mechanisms operate simultaneously to reduce major cardiovascular risk factors such as hypertension, dyslipidemia, and obesity (Saputra et al., 2021).

However, the effectiveness of vegetarian diets depends on proper dietary planning. Balanced consumption of whole plant foods, adequate nutrient diversity, and strategic supplementation when necessary are essential to ensure optimal health outcomes.

Overall, the results demonstrate that vegetarian diets can serve as an effective nutritional strategy for improving cardiovascular health when implemented with appropriate nutritional balance. The findings also emphasize the importance of nutritional education and dietary planning to prevent deficiencies and maximize the long-term health benefits of plant-based dietary patterns (Nugraha & Dewi, 2019).

CONCLUSION

This study demonstrates that vegetarian dietary patterns are associated with several favorable cardiovascular health indicators. Individuals who follow vegetarian diets tend to exhibit lower levels of LDL cholesterol, triglycerides, and blood pressure compared with individuals consuming omnivorous diets. These improvements are strongly related to the nutritional characteristics of plant based diets, which are generally rich in dietary fiber, antioxidants, unsaturated fatty acids, and complex carbohydrates. These nutrients contribute to improved lipid metabolism, reduced oxidative stress, and better regulation of metabolic processes that influence cardiovascular function.

The findings also show that vegetarian participants generally maintain healthier body weight levels. Higher fiber intake and lower energy density in plant based foods increase satiety and help regulate caloric intake. This condition supports better weight management and reduces the risk of obesity related cardiovascular complications such as hypertension, insulin resistance, and metabolic disorders.

However, the study also identifies potential nutritional challenges in vegetarian diets. Deficiencies in vitamin B12, iron, and omega 3 fatty acids may occur when dietary planning is inadequate. Therefore, individuals adopting vegetarian diets should ensure balanced food selection and consider fortified foods or supplementation when necessary.

Overall, the results indicate that well planned vegetarian diets can serve as an effective nutritional strategy to support cardiovascular health. These findings highlight the importance of nutritional education and evidence based dietary guidance to maximize the health benefits of vegetarian dietary patterns while preventing possible nutrient deficiencies.

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