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Rethinking veganism: Challenging health misconceptions and disinformation in popular discourse

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ABSTRACT

Context: The vegan diet, despite its widely recognized benefits, remains surrounded by numerous myths suggesting a potentially adverse impact on the health of specific population groups. **Objective:** This article addresses current and controversial topics related to plant-based nutrition. The aim is to broaden the knowledge of the scientifically validated benefits of plant-based diets. **Data sources:** A systematic search was conducted using PubMed and Google Scholar, covering the period since 2021 and some applicable articles outside that range. **Data extraction:** The aspects examined included the risk of osteoporosis in postmenopausal women, the impact on male sexual health, the adequacy of energy and macronutrient intake in athletes, and the effects on fetal development. **Results:** A balanced vegan diet supplemented with vitamin D and other key micronutrients supports bone health. Recent studies in male sexual health suggest potential benefits such as improved testosterone levels and reduced erectile dysfunction risk. Although research on veganism in pregnancy remains limited, professional dietary guidance can help mitigate risks related to micronutrient deficiencies. **Conclusions:** Despite existing concerns about the impact of a vegan diet in all groups examined, no clear health risks associated with following a vegan diet have been identified. A well-balanced vegan diet is considered safe for the aforementioned population groups, but it still requires further research. Educating people about the advantages and disadvantages of a plant-based diet is crucial.

Keywords: Diet, Vegan, Plant-based nutrition, Osteoporosis, Postmenopausal Women, Male Sexual Health, Pregnancy, Athletic Performance, Public Health Myths

1. INTRODUCTION

Plant-based diets are characterized by excluding selected or all animal-derived products. There are different variations of plant-based diets to choose from,

depending on one's personal values, health objectives, and moral considerations. The most restrictive is the vegan diet, which excludes animal-derived products such as eggs, dairy, meat, seafood, and honey. The pescatarian diet includes seafood, while the lacto-vegetarian diet permits dairy products, and the ovo-vegetarian diet allows for the consumption of eggs. Lacto-ovo-vegetarians consume both of these food groups. The least restrictive is the flexitarian diet, which allows for the occasional intake of meat and other animal-derived products.

Plant-based diets (particularly vegan diets) can be part of the vegan lifestyle, which is based on minimizing the harm caused to other species. This way of living advocates against exploiting animals for labor, the fashion industry, cosmetics testing, entertainment, and other areas of life while promoting animal rights and environmental sustainability (Beck and Ladwig, 2021).

The major international health organizations, including the World Health Organization (WHO), the National Heart, Lung, and Blood Institute (NHLBI), the National Heart Society (NHS), and the World Cancer Research Fund, recommend reducing the consumption of meat and animal-based products in favor of increasing plant-based foods intake. Plant-based diets have been proven safe and nutritionally adequate for individuals of all ages (Melina et al., 2016), with greater sustainability than omnivorous diets. These dietary patterns address some of the most pressing contemporary health issues, particularly non-communicable diseases, which are the leading cause of death in developed countries, as reported by the WHO in 2024. Plant-based eating is associated, among other benefits, with a reduction in the risk of obesity and diabetes, improvement in lipid profiles, and consequently, a decrease in cardiovascular risk (Melina et al., 2016; Kaiser et al., 2021; Marrone et al., 2021; Łuszczki et al., 2023; Landry and Ward, 2024).

When considering the sustainability-related consequences of dietary choices, numerous studies have shown that a more plant-based diet leads to more positive environmental outcomes. Scientists suggest that food production, especially livestock farming, is the major contributor to climate change, deforestation, and the loss of biodiversity (Machovina et al., 2015; Clark et al., 2019) and is highly insufficient by using up to 90% of agricultural land while providing less than 20% of the energy requirement. No vegetable cultivation produces as many greenhouse gas emissions as milk and meat production (Poore and Nemecek, 2018). Given the above, turning towards a plant-based diet seems to be a promising solution for the sustainability challenge, with the vegan diet having the least detrimental impact on the climate, even when considering the potentially harmful effects of the rising popularity of ultra-processed vegan foods (Chai et al., 2019; Macdiarmid, 2022).

Despite all the aforementioned advantages, the vegan diet continues to be widely associated with various misconceptions. While a well-balanced plant-based diet is recognized as health-beneficial and nutritionally adequate in most international dietary guidelines, concerns about its effects on specific health domains are being raised. This article discusses some of the most relevant and contentious topics associated with a plant-based diet: its influence on bone density and postmenopausal osteoporosis, its effects on male sexual health, and its safety during pregnancy, as well as its impact on athletes' performance. A particular emphasis is put on studies on the vegan diet, although research focused exclusively on vegan participants remains limited. To our knowledge, no previous work has compiled and addressed the prevalent misconceptions surrounding the vegan diet. Our objective is to enhance understanding of the scientifically established benefits of plant-based eating and highlight the dangers posed by the widespread dissemination of misinformation.

2. REVIEW METHODS

This review was based on selected studies from PubMed and Google Scholar. The search was conducted using PRISMA 2020 criteria (figure 1), Medical Subject Headings and keywords: vegan bone health, vegan osteoporosis, postmenopausal women osteoporosis, calcium vegan, vegan erectile dysfunction, vegan testosterone, vegan gynecomastia, vegan male reproductive hormones, vegan semen quality, dietary guidelines, vegan climate impact, plant-based diet for climate, protein deficiency vegans, protein vegans, bodybuilders vegan, vegan athletic, protein recommendation, protein sources in a vegan diet, pregnancy outcome in vegan, vegan diet during pregnancy. The search included articles written between January 2021 and May 2025 and some applicable articles outside that range. We have included articles that were applicable based on the scope of the review and were written in English.

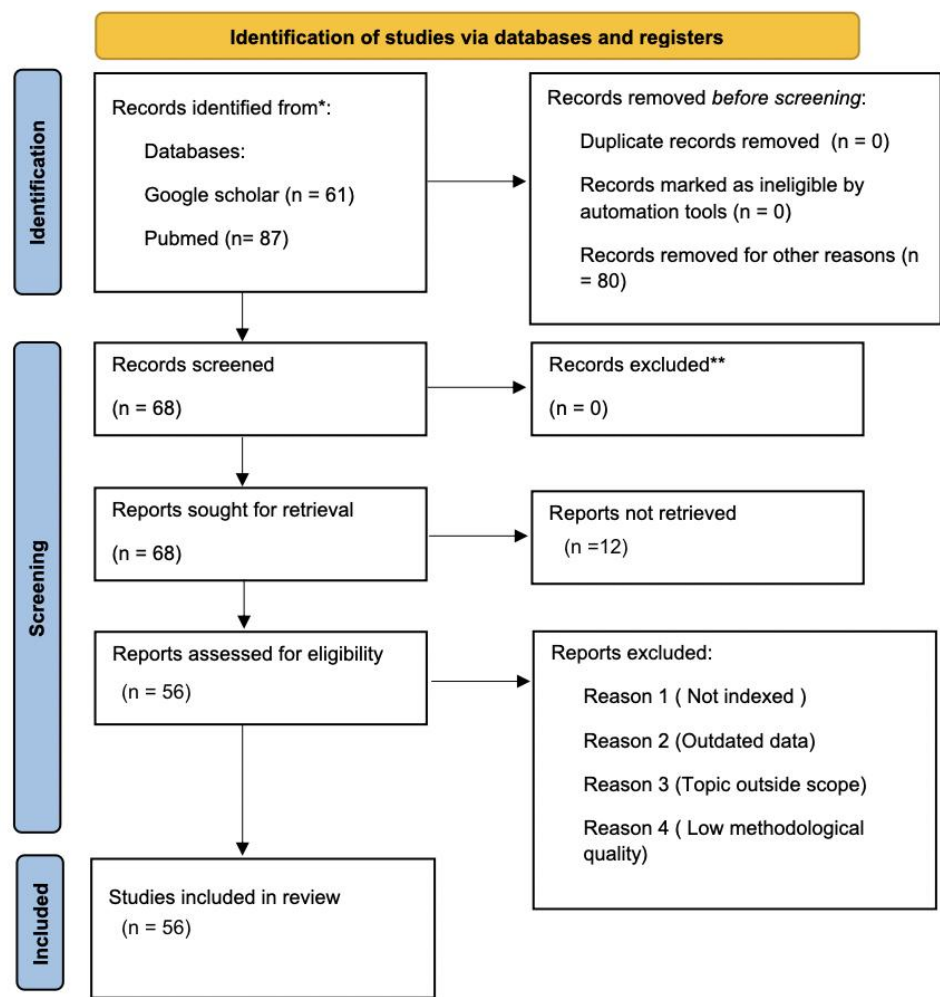


Figure 1. PRISMA 2020 flow diagram for searches of databases and registers only

3. RESULTS AND DISCUSSION

Misconception 1: A vegan diet leads to an increased risk of osteoporosis in postmenopausal women

Osteoporosis is far more common in women than in men, and its prevalence increases markedly after menopause. Around 30% of all postmenopausal women have osteoporosis in the United States and Europe. Osteoporosis is influenced by diet, especially calcium intake. Deficiency of calcium is a significant health problem among postmenopausal women because this period is connected with increased bone decline and a higher risk of osteoporosis. Dairy products are a good source of calcium, but plant-based products may serve as an equally effective alternative (Table 1); (Park et al., 2011; Vannucci et al., 2018).

Table 1. Verification of health misconceptions about vegan diet in popular discourse.

Conception	Truthfulness	References
A vegan diet leads to an increased risk of osteoporosis in postmenopausal women	False, but well-balanced diet is required	Park et al., 2011; Vannucci et al., 2018; Muleya et al., 2024; Rizzoli, 2022; Pabich and Materska, 2019;

A vegan diet has a negative impact on men's sexual health	False	La et al., 2017; Cassidy et al., 2016; Loeb et al., 2025; Carto et al., 2022; Dušková, 2023; Kuchakulla et al., 2021; Reed et al., 2021; Samimisedeh et al., 2024; Juan, 2019; Siepmann et al., 2011; Imai et al., 2022; Widjajahakim et al., 2025.
A vegan diet is not recommended for athletes	False, but well-balanced diet is required	Nebl et al., 2019; Hernández-Lougedo et al., 2023; Pohl et al., 2021; López-Moreno and Kraselnik, 2025; Oral et al., 2022; Rogerson, 2017; Śliż et al., 2021.
A vegan diet is dangerous during pregnancy	Not enough research to declare, a well-balanced diet is required.	<i>True:</i> Hess et al., 2025; Kesary et al., 2020; Avnon et al., 2021; <i>False:</i> Meulenbroeks et al., 2024; Ebinghaus et al., 2024; Jaeger et al., 2022.

Sources of calcium

Many plant-based products have a very high calcium content, equal to or even higher than milk. However, when considering bioaccessibility and recommended serving sizes, only 3 out of 25 products could provide bioaccessible calcium equivalent to that found in milk. The best plant-based source of calcium was kale, which provided 5 times more bioaccessible calcium than milk. White bread fortified with calcium carbonate was amongst the best sources of Ca identified, indicating the potential of mandatory widespread Ca fortification in meeting recommended Ca intakes (Muleya et al., 2024). Calcium-rich mineral waters can play a significant role in osteoporosis prevention as part of a balanced diet and a healthy lifestyle (Vannucci et al., 2018).

The impact of a plant-based diet on bone health

One study analyzed the association between plant-based diet indices and bone mineral density in 131 postmenopausal women with osteoporosis or osteopenia and 131 healthy controls. Three plant-based diet indices were used: plant-based diet index (PDI), healthy plant-based diet index (hPDI), and unhealthy plant-based diet index (uPDI). The results showed that higher healthy plant-based diet index (hPDI) scores were associated with a lower risk of abnormal bone mineral density (BMD) in the femoral neck and lumbar spine.

The importance of vitamin D

Studies emphasize that adequate vitamin D intake is crucial, and supplementation may be necessary in cases of deficiency (Rizzoli, 2022). A traditional diet alone is not sufficient to meet the fundamental requirements. Therefore, supplementation is essential for vegans and individuals following a traditional diet.

Postmenopausal hormonal changes

Osteoporosis among postmenopausal women is also associated with hormonal changes, especially a decline in levels of estrogen. Estrogen deficiency induces osteoporosis by increasing bone turnover and bone loss. Hormone replacement therapy (HRT) is used to slow down the process of bone loss in women with estrogen deficiency, but it has numerous side effects, such as stroke or breast cancer. Therefore, soy isoflavones have found use as an alternative source of estrogens in postmenopausal women due to their estrogen-like effects. Research findings indicate that isoflavone supplementation increases bone mineral density (BMD) and reduces bone resorption biomarkers, such as urinary deoxypyridinoline (Pabich and Materska, 2019).

Misconception 2: A vegan diet has a negative impact on men's sexual health

Sexual health is one of the fundamental components of the World Health Organization's (WHO). It is known that lifestyle factors, including dietary ones, significantly influence men's and women's sexual functioning, reproductive health, and hormonal balance (Mollaioli et al., 2020; Peng et al., 2023).

In particular, the consumption of soy products - popular "meat substitutes" used by vegans, has acquired a controversial reputation. It has been inaccurately implicated in the development of health disorders such as erectile dysfunction (ED), lowering serum testosterone levels, gynecomastia, or even deteriorating semen quality. These misconceptions appear to be caused by limited scientific studies conducted on animals and individuals consuming exceptionally high amounts of soy-based products over long periods of time. Recent high-quality scientific studies have demonstrated that they are unfounded. A well-balanced plant-based diet is associated with various beneficial health outcomes, including improved male sexual function.

Erectile dysfunction

The risk factors for ED include conditions that impair endothelial function, such as cardiovascular disease (CVD), metabolic disorders, obesity, exposure to psychological distress, oxidative stress, and toxins like alcohol and smoking (La et al., 2018). Incorporating more plant-based foods into one's diet has been shown to reduce the severity of conditions that predispose individuals to the deterioration of male sexual function, as well as lower the risk of their onset. There is scientific evidence that higher intake of vegetables, fruits, and nuts reduces the risk of ED, likely due to the high concentration of flavonoids (Cassidy et al., 2016; La et al., 2018; Loeb et al., 2025). It served as a basis for researching the impact of a plant-based diet on ED. Although research specifically focusing on vegans is limited, two original studies have confirmed that adherence to a healthy, primarily plant-based diet reduces the risk of ED (Carto et al., 2022). Researchers also investigate whether a plant-based diet alleviates ED.

Testosterone and semen quality

Testosterone is one of the sexual hormones essential for male sexual functions. The effect of a plant-based diet on testosterone levels remains unclear and challenging to investigate due to the influence of various factors, such as participants' body weight, physical activity, and age, as well as the lack of differentiation between vegan and vegetarian participant groups (Dušková, 2023). Recent studies and meta-analyses suggest that neither a vegan nor a vegetarian diet nor isoflavone intake has a significant impact on male sex hormones, reproductive health, or semen quality (Kuchakulla et al., 2021; Reed et al., 2021; Samimisedeh et al., 2024). Moreover, a study that examined testosterone levels in blood samples from vegan and non-vegan men found that vegans exhibited higher estimated marginal mean total testosterone (TT) levels both before and after exercise. These findings suggest that a vegan diet may be associated with more favorable testosterone levels (Juan, 2019).

Gynecomastia

Evidence that the excessive consumption of soy products may lead to side effects associated with the mechanisms of isoflavonoids cannot be ignored. The literature describes cases of gynecomastia caused by large amounts of such products (Siepmann et al., 2011;

Imai et al., 2022; Widjajahakim et al., 2025). However, it must be emphasized that no studies have been found demonstrating the negative impact of soy consumed in standard amounts on male breast tissue.

Misconception 3: A vegan diet is not recommended for athletes

Plant-based diets have been increasingly popular among the sport-active population (Nebl et al., 2019; Hernández-Lougedo et al., 2023). Primarily, it should be noted that the protein requirements of athletes are higher and dependent on the discipline. Following the literature, it can be assumed that these values should oscillate around 1.4-2 g/kg in strength sports and 1-1.6 g/kg in endurance sports (Hernández-Lougedo et al., 2023). In addition, it is reported that athletes who have been injured should especially control their caloric intake to minimize the possible muscle mass loss during immobilization and reduced movement and to support the tissue healing process. The protein intake should be increased by 1.2-1.5 g/kg (Bytomski, 2018). Generally, animal-derived proteins are considered more effective than plant-derived proteins in skeletal muscle expansion and athletic performance (López-Moreno and Kraselnik, 2025). One misconception persists that vegans cannot meet sufficient protein requirements to gain training benefits such as fat reduction, body recomposition, increased skeletal muscle mass, or improved strength. This belief may stem from the ingrained fact that animal-based proteins are considered higher-quality proteins with higher concentrations of essential amino acids than plant-based proteins (Antonio et al., 2024; Rolands et al., 2025). However, there is still debate and research on the differences in protein composition between vegan, vegetarian, and omnivorous diets. According to some sources, it is reported that vegan protein sources may need an additional increase in daily protein intake due to the lower digestibility and less efficient metabolism of vegan protein sources. Some studies prove increased effects of milk compared to soy protein in terms of performance, while others have observed no difference between plant-based soy protein and milk protein, while others have shown (Pohl et al., 2021). Therefore, the issue of yield differences between plant and animal proteins remains contentious. Nevertheless, plant proteins from various sources consumed adequately can support muscle protein synthesis effectively and promote strength development (López-Moreno and Kraselnik, 2025). Similar conclusions can be found in the Academy of Nutrition and Dietetics position, saying that a well-planned vegetarian diet can be nutritionally adequate and meet an athlete's macronutrient and energy needs. In addition, it has been reported that a vegetable-based diet can improve athletes' body composition and protect against degenerative diseases and inflammation (Oral et al., 2022; Hernández-Lougedo et al., 2023). Furthermore, many reports on the potential beneficial properties for the gut microbiome of plant-based diets have been published, which may also affect long-term exercise performance (Pohl et al., 2021).

It can be concluded that a well-planned vegetarian diet that takes into account nutritional requirements through the right combination of foods can be optimal for athletes (Rogerson, 2017; Pohl et al., 2021; Hernández-Lougedo et al., 2023; Šliž et al., 2021). Finally, at the end of this section of the article, we would like to give examples of world-class athletes who are vegetarians or vegans. A plant-based diet is used by many world-class athletes from a variety of fields. Examples include Novak Djokovic - tennis player and multiple Wimbledon champion, as well as racing champion Lewis Hamilton, sprinter Morgan Mitchell, basketball player Wilson Chandler, ultrarunner Scott Jurek, and snowboarding champion Hannah Teter (Hernández-Lougedo et al., 2023; Smith, 2024). Only a few examples of athletes who base their daily lives on vegetarian/vegan diets are presented. However, they exemplify the effectiveness of plant-based diets even in highly demanding sports, trained at the highest level.

Misconception 4: A vegan diet is dangerous during pregnancy

Maternal health and proper fetal development depend on the supply of nutrients like folic acid, vitamin D, omega-3, iron, and calcium. Providing enough of these nutrients lowers the chances of pregnancy complications like preterm birth, diabetes, and intrauterine growth restriction (Meulenbroeks et al., 2024). It is essential for proper fetal nervous system development (Jaeger et al., 2022). When following a vegan diet, pregnant women should consume diverse nutrient-dense plant-based foods and take care to meet their caloric needs—moreover, providing sufficient amounts of calcium, vitamin D, B12, and iron (Meulenbroeks et al., 2024).

Readily available information on the internet regarding nutrition and diets may lead to confusion and growing uncertainty in pregnant women. Therefore, all pregnant women should receive professional nutritional guidance (Ebinghaus et al., 2024). Only a minority of pregnant women receive dietary advice (Meulenbroeks et al., 2024). Inquiring about diet and providing information based on the patient's preferences can help improve prenatal care and minimize the risk of nutrient deficiencies (Ebinghaus et al., 2024).

However, Meulenbroeks et al. found that guidelines for vegan pregnant women have primarily been based on studies consisting of vegetarians. At the same time, there is a difference in the content of nutrients in both (Hedegaard et al., 2024). Hess et al., (2025) adapted the healthy vegetarian diet for vegans and found that it did provide enough macronutrients, but without proper

supplementation, it did not provide enough micronutrients. Therefore, due to the lack of consistent guidelines and to provide the most valuable guidance regarding nutrition, there is a need for more studies factoring in pregnant women on a vegan diet.

Some studies have found that newborns from women following a vegan diet had an increased risk of lower birth weight (Kesary et al., 2020; Avnon et al., 2021). This may be due to the lower protein intake compared to omnivorous pregnant women (Avnon et al., 2021). At the same time, pregnant women on a vegan diet had a lower weight gain than omnivorous women and a lower risk of excessive weight gain (Jaeger et al., 2022).

One case report brings to attention the risk of low riboflavin or vitamin B2 consumption in pregnant women on a vegan diet. Jaeger et al. report a newborn with severe vitamin B2 deficiency suffering from hypoglycemia and lactic acidosis (Hess et al., 2025). This report again stresses how vital it is to provide pregnant women with nutritional counseling.

Due to the limited studies on this topic, it is difficult to establish what effects the vegan diet has on maternal health and fetal development during pregnancy.

4. CONCLUSIONS

A plant-based diet has its advantages and disadvantages. However, it is important to educate people that only a well-balanced vegan diet is safe. Still, further studies are needed to dispel concerns and study the impact of a vegan diet on health more thoroughly.

Author's Contributions

Dominika Tuzminek: Conceptualization, methodology, investigation, writing

Weronika Kozak: Resources, methodology, investigation, writing

Katarzyna Cierpiszewska: Resources, investigation, data curation, writing

Michalina Wiktoria Kryścińska: Visualization, data curation, writing

Dagmara Skowrońska: Resources, visualization, writing

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Conflict of interest

The authors declare that there is no conflict of interest.

Data and materials availability

All data associated with this study will be available based on the reasonable request to corresponding author.

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