

Article **Open Access**

Exploring Calcium Sources in Vegan Diet from the Perspective of Chinese-Western Fusion Cuisine: The Intersection of Innovation and Nutrition

Donghui Li ^{1,*}



¹ University of Gloucestershire, Gloucestershire, United Kingdom

* Correspondence: Donghui Li, University of Gloucestershire, Gloucestershire, United Kingdom

Abstract: Calcium is a key mineral for maintaining human health, especially for bone health and neuro-transmission function. However, vegans often face the problem of insufficient calcium intake due to not consuming any animal-derived foods. Calcium from traditional vegan sources is often less bio-available due to the phytic acid and oxalic acid in the food. This paper explores how fusion cuisine can provide vegans with innovative and nutritious calcium sources through literature review and case studies, while increasing calcium bioavailability through specific cooking techniques. In fusion cuisine, the total calcium intake can be effectively increased by carefully selecting and processing calcium-rich ingredients such as tofu, green leafy vegetables, nuts and seaweed. For example, combining tofu with calcium-rich green leafy vegetables such as spinach can not only create a nutritious fusion dish but also reduce the impact of phytic acid through acid-base adjustment during cooking, thereby improving calcium absorption. In addition, by applying Western cooking methods such as baking and stewing to traditional Eastern ingredients, the bioavailability of calcium in these ingredients can be further increased. The case analysis of this study shows that vegans can not only increase their calcium intake in their daily diet by incorporating Chinese and Western cooking techniques and ingredient choices but also improve their quality of life through food experience. Through innovative Chinese-Western fusion cuisine, vegans can enjoy nutrition-ally balanced and delicious meals without obstacles while meeting their health and nutritional needs. In short, Chinese-Western fusion cuisine shows great potential in solving the problem of insufficient calcium intake common in vegan diets around the world. Through continued exploration and innovation, this cooking trend can not only improve the nutritional intake of vegans but also contribute to the diversity and sustainable development of global food culture.

Keywords: vegan; calcium intake; fusion cuisine; bioavailability of ingredients; cooking techniques; nutritional innovation

Received: 19 February 2025

Revised: 24 February 2025

Accepted: 17 March 2025

Published: 22 March 2025



Copyright: © 2025 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

1.1. The Importance of Calcium and Its Effects on Human Health

Calcium is one of the most abundant minerals in the human body and is essential for maintaining a variety of physiological functions. It is not only the main component of bones and teeth but also plays a key role in blood coagulation, nerve transmission, muscle

contraction, and many other cellular functions. Adequate calcium intake plays an important preventive role in preventing a variety of diseases, such as osteoporosis and hypertension [1].

However, one challenge facing vegans is ensuring adequate calcium intake. Due to the exclusion of dairy products and other animal-derived foods, vegans must rely on plant-based foods to meet their calcium needs. However, calcium from plant sources is often less bio-available due to the presence of phytic acid and oxalic acid. These substances can bind to calcium to form difficult-to-absorb complexes, thereby reducing the efficiency of calcium obtained from food.

Globally, as more and more people adopt a vegan lifestyle, how to ensure adequate calcium intake through daily diet has become an important public health issue. Although calcium-fortified plant milks and other alternatives are available on the market, these products are not always available or acceptable to all populations. Therefore, it is particularly important to explore more sources of calcium in natural ingredients, especially the use of innovative ingredients rich in calcium in Chinese-Western fusion cuisine.

This article will analyze the calcium-rich ingredients and cooking methods in Chinese-Western fusion cuisine, and explore how to increase vegans' calcium intake and bioavailability by integrating cooking techniques from different cultures. In addition, specific case studies will be used to illustrate the practical application of these cooking strategies and how they can help vegans meet their daily calcium needs more effectively.

1.2. Vegans' Challenges in Getting Calcium

Vegans completely exclude all animal-derived foods, including dairy products, which are one of the most common sources of calcium in traditional diets [2]. As a result, they face particular challenges in ensuring adequate calcium intake. Plant-based foods also contain calcium, but in forms that are much less bio-available than animal-based foods due to the presence of natural anti-nutrients such as phytic acid and oxalic acid [3].

Phytic acid and oxalic acid are found in many vegan foods, such as spinach, beetroot, and certain nuts. These compounds can bind to calcium, forming calcium salts that are difficult to absorb, thereby reducing the bioavailability of calcium. For example, while spinach is a good source of calcium, it is also high in oxalic acid, which limits the absorption of the calcium in it.

Vegans rely on limited food sources for calcium, such as nuts, seeds, legumes, and fortified plant milks. Although these foods can provide calcium, getting enough calcium from them requires careful dietary planning and possible food pairing.

According to nutrition guidelines in various countries, the recommended calcium intake for adults is generally between 1000mg and 1200mg [4]. For vegans, it is more difficult to reach this recommended amount, especially without the use of calcium supplements.

In some regions, calcium-rich plant-based foods may not be readily available or costly, which poses an additional challenge for vegans. In addition, cultural and geographical differences may also limit vegans' access to and use of certain calcium-rich foods.

To address these challenges, not only is a deep understanding of individual food choices and careful planning required but also broader food industry support is needed, such as developing and providing more calcium-rich plant-based foods and their products. In addition, the innovative use of Chinese-Western fusion cuisine and the exploration of cooking methods provide vegans with new sources and absorption pathways of calcium, showing the potential to address this nutritional challenge.

1.3. Potential of Chinese-Western Fusion Cuisine as a Calcium Source for Vegan Diets

Fusion cuisine provides vegans with a rich and innovative source of calcium by combining Eastern and Western cooking techniques and ingredients. This fusion not only

breaks the boundaries of traditional vegan cuisine but also enhances the bioavailability of calcium through diverse ingredients and cooking methods.

1.3.1. Innovative use of Ingredients

Fusion dishes make use of calcium-rich ingredients such as tofu, leafy greens, nuts, seeds and seaweed. For example, combining traditional Eastern tofu with Western leafy greens such as kale not only creates a novel dish but also provides calcium from both ingredients. In addition, by adding seaweed to Western salads or soups, the calcium content of the dish can be seamlessly increased.

1.3.2. Innovation in Cooking Technology

The cooking techniques of Chinese-Western fusion cuisine, such as stir-frying, stewing, and steaming, can help maintain the integrity of calcium in ingredients and improve its bioavailability. For example, using low-temperature cooking techniques can reduce the loss of calcium during processing. At the same time, baking and roasting methods commonly used in Western cooking can increase the taste and nutritional value of dishes without affecting calcium absorption.

1.3.3. Optimization of Seasonings and Auxiliary Materials

Fusion dishes often use natural acidic ingredients such as lemon juice, vinegar or tomatoes, which can help reduce the content of plant acid in food and increase the bioavailability of calcium. For example, a tofu salad seasoned with lemon juice is not only delicious but also helps improve the absorption rate of calcium.

1.3.4. Innovation Brought by Cultural Integration

Chinese-Western fusion cuisine is not only a combination of ingredients and techniques but also a fusion of cultures. This innovation allows vegans to explore new food combinations, making it easier to integrate and accept calcium-rich foods. For example, combining Western nut milk with Eastern tea ceremony can create new drinks that are both nutritious and in line with modern tastes.

Through these innovative combinations of ingredients and cooking methods, Chinese-Western fusion cuisine greatly enriches the dietary choices of vegans and improves the total calcium intake and bioavailability in the diet. This not only helps vegans meet their daily nutritional needs but also provides a useful example for the global catering industry on how to solve nutritional challenges through food innovation.

2. Literature Review

2.1. *The Sources and Content of Calcium in Vegan Foods*

In a literature review of the sources and amounts of calcium in vegan foods, studies showed that vegans generally have lower calcium intakes than non-vegans and other types of vegans [5]. To meet their calcium needs, vegans often rely on fortified foods and supplements, such as fortified plant milks and soy yogurts. These foods provide calcium levels similar to those in cow's milk [6].

Natural plant foods are also important sources of calcium, including leafy greens such as cabbage, Bok choy, and kale, which are good sources of calcium. Soy products such as tofu and tempeh are often fortified with calcium and provide a good source of calcium. Nuts and seeds such as almonds, chia seeds, and sesame seeds (including tahini) are good sources of calcium. Lentils and chickpeas also contribute to calcium intake. However, the oxalic acid and phytic acid in some plant foods may inhibit calcium absorption [7]. For example, while spinach is high in calcium, it is also high in oxalate, which can limit calcium absorption. Therefore, consuming a variety of calcium-containing foods can help mitigate this effect.

In addition, vitamin D plays a vital role in calcium absorption. Vegans should ensure adequate vitamin D intake through fortified foods, supplements, or adequate sun exposure to promote calcium absorption and support bone health [8].

With proper dietary planning, vegans can meet their daily calcium needs through food and supplements while maintaining good bone health.

2.2. Calcium Bioavailability and Its Effects on Vegan Health

In a vegan diet, the bioavailability of calcium and its impact on health are key factors, especially considering that vegans often rely on plant sources for calcium. However, calcium from plant sources is affected by a variety of factors that may limit its effective absorption and utilization.

Certain components of plants, such as oxalic acid and phytic acid, can form complexes with calcium that are not easily absorbed by the body [9]. For example, while spinach and beets are high in calcium, they also contain high amounts of oxalic acid, which limits calcium absorption. Therefore, although these foods are rich in calcium, they are not ideal sources of calcium.

Increasing the intake of certain nutrients can help improve calcium absorption. For example, vitamin D is a key factor in calcium absorption, and the right amount of vitamin D can significantly increase calcium absorption. Vegans can get vitamin D by eating vitamin D-fortified foods, taking supplements, or getting enough sun exposure [10].

Proper calcium intake is essential for maintaining bone health, and a lack of calcium may lead to bone problems such as osteoporosis. Studies have shown that by planning their diet properly, vegans can meet the recommended calcium intake and maintain good bone health [11].

In conclusion, although vegans face challenges in obtaining adequate calcium, by choosing appropriate food sources and paying attention to dietary balance, they can effectively increase calcium bioavailability and support overall health. Selecting calcium-rich foods while being aware of the effects of oxalate and phytic acid, as well as ensuring adequate vitamin D intake, are key strategies.

2.3. Introduction to Innovative Ingredients for Chinese-Western Fusion Cuisine

2.3.1. Calcium-Rich Green Leafy Vegetables

In fusion cuisine, green leafy vegetables such as kale, spinach, and kale are widely used not only for their nutritional value but also because they are an important plant source of calcium [12]. The innovative application of these vegetables in Chinese and Western diets shows their potential in enhancing the appeal and nutritional value of the plate.

Kale is a nutritious leafy green vegetable rich in calcium and other vitamins such as vitamin K and C. In Western cuisine, kale is often used to make salads, bake crisps or add to soups. In Chinese cuisine, kale can be used to make stir-fries or added to hot soups, providing a double enjoyment of taste and nutrition.

Although spinach contains more oxalic acid, which may affect calcium absorption, it is still a good source of calcium, especially when combined with other ingredients. In the West, spinach is often used to make salads, wraps or as an ingredient for pizza and pasta. In Chinese cuisine, spinach can be stir-fried or cooked with tofu to provide a rich source of calcium [13].

Kailan is a bitter leafy green vegetable that is also relatively high in calcium [14]. It is very common in Chinese cuisine and is usually simply cooked with garlic or soy sauce. In fusion cuisine, kale can be used as part of a stew or as a side dish for Western barbecue. Its unique taste and nutrients make it a great choice to enhance the dish.

By incorporating these calcium-rich green leafy vegetables into fusion cuisine, it not only provides essential nutrients but also creates a delicious and flavorful food experience.

This fusion method shows the infinite possibilities of Chinese and Western cooking techniques and ingredient choices, providing more healthy options for vegans.

2.3.2. Innovative Use of Beans in Chinese-Western Fusion Cuisine and Their Calcium Content

Beans are one of the important sources of calcium in a vegan diet, including black beans, white beans and tofu. The use of these ingredients in fusion cuisine not only enriches the taste and nutrition of the dishes but also provides a valuable source of calcium for vegans.

Black beans are a good source of calcium, providing about 123mg of calcium per 100g [15]. In Chinese cuisine, black beans are often used to stew soups or make desserts, such as black bean paste. In Western cuisine, black beans can be used to make black bean burgers or as part of salads. In fusion cuisine, black beans can be used as innovative taco fillings or mixed into vegan burritos, providing rich protein and calcium.

White beans, especially large white beans, are also high in calcium, containing about 240mg of calcium per 100g, one of the highest calcium contents among all beans. In Chinese cuisine, white beans are often used in stews and soups, while in Western cuisine, they are often used to make bean purees or as a base for pasta soups. In fusion cuisine, white beans can be used to make innovative bean stews that combine Chinese herbs with Western herbs to enhance flavor and nutritional value.

Tofu is a very versatile ingredient, and the calcium content varies depending on how it is processed. Tofu that has been coagulated with gypsum (calcium sulfate) is particularly rich in calcium [16]. In Chinese cuisine, tofu can be boiled, fried, steamed, or used as a main ingredient in soups. In Western cuisine, tofu is often used as a vegan meat substitute, such as tofu grill or tofu cheese. In fusion cuisine, innovative uses of tofu include using it as a pizza topping or as a dairy substitute in desserts, such as vegan cheesecake made with tofu.

By incorporating these beans into fusion dishes, they not only provide a rich source of calcium but also add variety and innovation to the dishes, bringing healthy and delicious dietary options to vegans. The versatility and high nutritional value of these beans make them an indispensable ingredient in fusion dishes.

2.3.3. Nuts and Seeds as Nutritional and Flavor-Enhancing Ingredients in Chinese-Western Fusion Cuisine

Nuts and seeds are excellent ingredients for adding nutrition and flavor to Chinese-Western fusion cuisine. Among them, almonds, sesame seeds, and poppy seeds not only provide essential nutrients such as protein, healthy fats, and minerals, but are also widely used in various dishes due to their unique taste and flavor.

Almonds are an excellent source of calcium, containing about 264mg of calcium per 100g. In Western cuisine, almonds are often used to make almond milk, baked snacks, or as part of salads. In Chinese cuisine, almonds can be used to garnish stir-fried dishes or desserts to add a layer of taste to the dishes. In Chinese-Western fusion cuisine, almonds can be used as an element to add crunch and nutrition to vegan dishes, such as using almond slices to garnish vegan sushi or incorporating them into vegan desserts.

Sesame is an ancient ingredient that is common in many Asian dishes, especially in seasonings and garnishes. Sesame is rich in calcium, containing about 975mg of calcium per 100g [17]. Sesame seeds are used in a wide range of applications, from sprinkling on noodles and salads to topping burgers and bread. In fusion cuisine, sesame seeds can add a crispy texture and aroma, enhancing the taste of dishes, such as adding toasted sesame seeds to Western salads or adding sesame oil and sesame seeds to Chinese stir-fries.

Although small in size, poppy seeds have high nutritional value, especially their calcium content, which can contain 1438mg of calcium per 100g. Poppy seeds are commonly found in Western baked goods, such as poppy seed bread and pastries. In fusion cuisine,

poppy seeds can be used to increase the taste and nutrition of food, such as sprinkling on vegan desserts or incorporating them into steamed cakes and biscuits, bringing new flavors to traditional foods.

By cleverly using these nuts and seeds in fusion dishes, you can not only significantly increase the calcium content of the dish but also enrich the taste and layering of the food, making the dish more diverse and attractive. The versatility of these ingredients makes them an ideal choice for adding nutrition and deliciousness.

2.3.4. The Role of Figs and Oranges in Beautifying Dishes

Figs and oranges are not only admired for their calcium content but also for their unique flavor and color that can greatly enhance and improve the overall presentation of dishes.

Figs are a good source of calcium, with about 162mg of calcium per 100g of dried figs [18]. The sweet and juicy nature of figs makes them ideal for adding natural sweetness and richness to the taste. In fusion cuisine, figs can be used as the main ingredient in desserts or added as a color accent to salads and cheese platters. For example, combining fresh or dried figs with feta cheese, honey and walnuts not only provides rich calcium but also brings a layered taste and visual enjoyment.

Oranges are also an important source of calcium, with about 40mg of calcium per 100g of oranges [19]. The bright sweet and sour taste and bright orange hue of oranges can add vivid colors and fresh flavors to any dish. In Chinese-Western fusion cuisine, oranges can be used to make fresh fruit salads or as part of seasonings and sauces, such as orange juice fat-reduced sauce, which can be paired with dishes such as roast duck or roast chicken to increase the layering and nutritional value of the dishes.

By incorporating fruits such as figs and oranges into Chinese-Western fusion cuisine, it can not only effectively provide calcium but also add to the appeal of the dishes through its unique flavor and color. Such ingredient selection not only meets the needs of healthy eating but also satisfies the pursuit of the appearance and taste of gourmet food, making each dish a double feast for the eyes and taste.

2.3.5. Fortified Cereals as Calcium Source for Breakfast

Fortified cereals are an important way to add calcium to the modern diet, especially for vegans and those with dairy intolerance, as they provide a convenient source of calcium. These cereals are specially processed to be enriched with a variety of vitamins and minerals, especially calcium.

Many breakfast cereals are fortified with the mineral calcium, which can help meet daily nutritional requirements. Fortified calcium is usually added in the form of calcium carbonate or calcium phosphate, both of which are well absorbed by the body [20].

Fortified cereals are commonly found in breakfast cereals, ready-to-eat cereal bars and cereal flakes. These cereal products are popular with many families because of their convenience and nutritional value. For example, a bowl of calcium-fortified cereal, combined with a glass of plant-based milk (such as fortified soy milk or almond milk), can provide a rich source of calcium to help strengthen bone health.

When choosing fortified calcium cereals, you should check the nutrition facts label to ensure that they are not only rich in calcium but also low in sugar and high in fiber. In addition, pairing with foods rich in vitamin D or sun exposure can further improve the efficiency of calcium absorption.

By introducing fortified cereals into your daily diet, especially at breakfast, you can effectively increase your calcium intake, which is also convenient and quick. This simple dietary adjustment is ideal for maintaining nutritional balance in busy modern life.

2.3.6. Application of Seaweed in Chinese-Western Fusion Cuisine

Seaweed, especially kombu and kelp, are increasingly used in fusion cuisine due to their unique taste and rich nutritional value, especially high calcium and iodine content.

Kombu is a seaweed widely used in Japanese cuisine, its unique marine taste and rich flavor make it a good choice for flavor enhancement. In Chinese cuisine, kombu can be used to stew soups to add umami flavor, while in Western cuisine, kombu can be used as a soup base or added to seafood stews to provide a subtle marine flavor. In fusion cuisine, kombu can be used to make calcium-rich soups or as a side dish, combined with ingredients such as seafood or tofu to enhance the nutritional value and taste [21].

Kelp is a nutrient-rich seaweed that contains a lot of calcium, iodine and natural monosodium glutamate [22]. In Chinese cuisine, kelp is often used in salads or soups; in Western cuisine, kelp may be added to seafood salads or as a side dish. Chinese-Western fusion cuisine attempts to introduce kelp in innovative ways, such as adding it to pasta or stews, or using it as part of sushi, which not only enriches the nutrition of the dishes but also adds flavor diversity.

The use of these seaweeds can not only increase the calcium content in the dishes but also bring the unique flavor of the ocean, making the creativity and taste of Chinese-Western fusion cuisine even better. Through such a fusion, seaweed has become a bridge connecting Chinese and Western food cultures, while also satisfying the dual pursuit of health and deliciousness in modern diets.

3. Bioavailability of Calcium in Chinese-Western Fusion Cuisine

3.1. Effects of Food Preparation and Cooking Methods on Calcium Absorption

In fusion cuisine, preparation and cooking methods can have significant effects on calcium bioavailability. Understanding these effects can help optimize calcium intake and ensure maximum nutrition.

The way ingredients are processed, such as soaking, fermenting, and cutting, can affect calcium bioavailability. For example, soaking and fermenting can reduce the content of anti-nutrients (such as phytic acid) in legumes and grains, which bind to calcium and reduce its absorption. With proper soaking and fermentation processing, the bioavailability of calcium in these ingredients can be improved.

High temperatures and moisture during cooking can affect calcium stability and bioavailability. For example, prolonged boiling can cause calcium to dissolve into the cooking water, which may lead to calcium loss if the water is not used. In contrast, steaming and quick stir-frying can reduce calcium loss and maintain the calcium content of the ingredients. In addition, adding acidic ingredients (such as lemon juice or vinegar) can help release bound calcium, making it more easily absorbed by the body.

Certain combinations of ingredients can optimize calcium absorption. For example, vitamin D aids in calcium absorption, so adding vitamin D-rich ingredients, such as fortified soy milk or fortified orange juice, to dishes can improve calcium bioavailability. Additionally, avoiding large amounts of high-oxalate foods, such as spinach, in the same meal can prevent them from inhibiting calcium absorption.

By understanding and applying these principles of cooking and food preparation, fusion cuisine can be an effective way to increase calcium bioavailability. This not only helps vegans and those with dairy intolerance meet their calcium needs but also provides more options for people who are looking to eat healthier. In this way, fusion cuisine not only provides a delicious food experience but also helps maintain and promote overall health.

3.2. How Cooking Techniques Used in Chinese-Western Fusion Cuisine Can Help Increase Calcium Bioavailability

In the preparation of Chinese-Western fusion dishes, the choice of cooking technique has a significant impact on the bioavailability of calcium. These techniques not only affect

the taste and nutrition of the dishes but also optimize the absorption of nutrients, especially calcium.

Low-temperature cooking methods such as slow cooking or steaming can reduce nutrient losses. These methods keep the moisture and nutrients inside the ingredients, which helps retain calcium. For example, steaming rather than boiling water when preparing vegetables or soy products can minimize the dissolution of calcium.

Quick stir-frying or fast cooking techniques such as stir-frying can complete the cooking in a very short time, thereby reducing the impact of high temperatures on calcium content. This method is suitable for processing beans and leafy greens such as kale and collards, preserving their calcium and other trace elements.

Adding acidic ingredients such as lemon juice or vinegar during cooking can help release the calcium in the ingredients, making it easier for the body to absorb. This technique is common in the seasoning of salads and seafood dishes, which not only improves the flavor but also enhances the bioavailability of calcium.

Combining multiple cooking techniques, such as steaming first and then frying, can make full use of the advantages of various techniques to maximize calcium retention and absorption. For example, steaming tofu first and then frying it can soften the tofu so that it can absorb the acidic components of the seasoning more easily, further promoting calcium absorption.

Through these Chinese-Western fusion cooking techniques, not only can delicious dishes that meet the needs of modern healthy diets be created but also the bioavailability of calcium can be effectively improved, which helps to improve bone health and overall nutritional status. The application of this technique demonstrates the unique value and importance of Chinese-Western fusion dishes in modern food culture.

4. Case Study

4.1. Innovative Display of Chinese-Western Fusion Vegan Dishes

Sesame Kale Roll combine Chinese steaming techniques with Western raw food concepts, using calcium-rich kale leaves as wraps and filling them with high-calcium black beans and sesame rice. Kale and black beans are both excellent sources of calcium, while sesame provides additional calcium and essential minerals such as iron and zinc. Each serving provides about 200mg of calcium.

Tofu and Kelp Soup combines kelp and tofu to make a warm soup. Kelp adds a subtle marine flavor to the dish, while tofu provides rich calcium. Tofu is a soy product coagulated with calcium salts (such as gypsum) and is an excellent source of calcium. Kelp provides iodine and calcium. Each serving of soup provides about 150 mg of calcium.

Almond Milk Multigrain Pasta uses fortified almond milk and calcium-rich multigrain pasta, combining the concepts of traditional Italian pasta and healthy vegan food. Fortified almond milk not only provides calcium but also adds vitamin D to help calcium absorption. Multigrain pasta provides complex carbohydrates and dietary fiber. Each serving contains about 250mg of calcium.

Fig and Orange Salad combine sweet figs with sweet and sour oranges, served with homemade lemon mustard dressing, making it a dish with rich colors and flavors. Figs and oranges are both natural sources of calcium, while lemon juice not only enhances the flavor but also enhances calcium absorption. Each salad provides about 100mg of calcium.

These dishes are not only rich in calcium but also combine the cooking methods and ingredient selection of Chinese and Western cuisines, making them healthy and delicious. Through these case studies, we can see how Chinese-Western fusion cuisine can enhance the bioavailability of calcium through innovative ingredient combinations and cooking techniques, while meeting the needs of modern people for healthy diets.

4.2. How a Vegan Fusion Menu Can Help Meet Daily Calcium Needs

These fusion vegan dishes are designed not only for flavor and innovation but also to take into account the daily nutritional needs of vegans, especially calcium intake. By cleverly combining diverse ingredients and cooking techniques, these dishes provide vegans with a good source of calcium, which helps strengthen bone health and prevent diseases related to calcium deficiency.

4.2.1. Nutritious Food Choices

Sesame Kale Roll and Tofu and Kelp Soup use high-calcium ingredients such as kale, black beans, tofu and kelp. These ingredients not only provide calcium but also contain other important nutrients such as protein and essential trace elements, which help to meet nutritional needs comprehensively.

4.2.2. Innovative Fusion and Processing of Ingredients

Almond Milk Multigrain Pasta increases calcium intake by combining calcium-rich plant milk and whole grains, while maximizing calcium nutrition through proper cooking methods (such as low-temperature cooking). In addition, by adding acidic ingredients such as lemon juice, the calcium in the fig and orange salad is more easily absorbed by the human body.

4.2.3. Meeting Recommended Calcium Intake

Each dish is designed with calcium content in mind, ensuring that each serving provides a significant portion of the recommended daily calcium intake (approximately 1000mg for adults). For example, the almond milk multigrain pasta provides 25% of the recommended daily calcium intake for adults per serving.

4.2.4. Promotes Healthy Eating Habits

By providing delicious and nutritionally balanced dishes, these fusion dishes encourage vegans to explore new food combinations and cooking techniques, increase the diversity of their diets, and meet the needs of calcium and other nutrients to support overall health.

Through the above analysis, these fusion vegan dishes not only meet the daily calcium needs of vegans but also enrich their dietary choices, providing healthy, nutritious and delicious meal options, effectively combining healthy eating with gourmet food experience. This dietary innovation is a model for promoting the development of modern healthy dietary culture.

5. Discussion

5.1. Long-term Effects of Chinese-Western Fusion Cuisine on Increasing Calcium Levels in Vegan Diet

The rise of Chinese-Western fusion cuisine not only enriches the vegan dining table but also plays an important role in improving nutritional balance, especially calcium intake. In the long run, Chinese-Western fusion cuisine may have the following positive effects on the calcium content in vegan diets.

5.1.1. Improving Calcium Intake for Vegans

Traditional vegan diets may lead to insufficient calcium intake due to the lack of dairy products, but fusion Chinese and Western cuisine can significantly increase calcium intake by scientifically combining high-calcium ingredients. For example, the use of calcium-rich ingredients such as tofu, sesame, nuts, seaweed, and fortified grains not only increases the calcium content but also improves the diversity of the diet, making it easier for vegans to get enough calcium.

5.1.2. Promotes Calcium Bioavailability

Compared with simply consuming high-calcium foods, the cooking techniques of Chinese-Western fusion cuisine can optimize calcium absorption. Using acidic ingredients (such as lemon, vinegar, and orange) helps dissolve phytic acid and oxalic acid, improving calcium absorbability; low-temperature cooking (such as steamed tofu and stewed kelp) reduces calcium loss; ingredients rich in vitamin D (such as mushrooms and fortified foods) improve calcium utilization efficiency. These scientific cooking methods help vegans maximize their calcium absorption, thereby improving bone health.

5.1.3. Promote Healthy Eating Habits

With the popularity of Chinese-Western fusion cuisine, people are paying more and more attention to balanced nutrition. More and more vegan restaurants and home cookbooks are beginning to introduce calcium-rich fusion dishes, such as combining kale with sesame seeds to make calcium-rich salads or sushi; using tofu instead of cheese to make Western pasta sauce or cream of mushroom soup; and adding kelp to soups or staple foods to increase calcium intake. These dishes not only conform to the trend of modern healthy eating but also allow vegans to obtain more comprehensive nutritional supplements while maintaining dietary principles.

5.1.4. Influencing the Development of The Food Industry and Promoting Innovation in Healthy Food

The development trend of Chinese-Western fusion cuisine has prompted the food industry to pay attention to the calcium needs of vegans, which may lead to the following innovations: launching more calcium-fortified vegan foods, such as fortified tofu, fortified plant milk, and vegan foods containing seaweed ingredients; improving processing technology, such as reducing oxalic acid and phytic acid content to increase the bioavailability of calcium; promoting calcium nutrition education, and labeling calcium content on menus to make it easier for consumers to make healthy choices. The development of these food industries will further increase the calcium intake level in vegan diets and expand the market demand for high-calcium vegan products.

5.1.5. Promoting Global Vegan Culture

The promotion of Chinese-Western fusion cuisine can not only help vegans get better calcium but also promote the exchange and integration of vegan culture. For example: the Western market's acceptance of Asian high-calcium ingredients (such as kelp, black sesame, tofu); the modernization of Eastern cooking methods (such as combining Western fortified foods to optimize calcium intake); vegans have more dietary choices, which helps to increase the appeal of a vegan lifestyle.

In the long run, Chinese-Western fusion cuisine provides vegans with an innovative and effective way to increase their calcium intake. Whether through scientific ingredient matching, optimized cooking methods, or promoting the development of the food industry and the spread of global vegan culture, this trend will continue to promote the development of healthy eating and provide a more complete nutritional solution for future vegan diet patterns.

5.2. Future Research Directions and Potential Role of Chinese-Western Fusion Cuisine in the Global Vegan Trend

With the rise of the global trend of healthy eating, the demand for balanced nutrition for vegans is growing, and Chinese-Western fusion cuisine shows great potential in this area. Future research should focus on how to further optimize Chinese-Western fusion cuisine so that it not only meets the calcium intake needs but also meets the requirements of modern food science, sustainable development and cultural adaptability.

5.2.1. Future Research Direction

1) How to Optimize Calcium Absorption Efficiency in Chinese-Western Fusion Cuisine

Although there are many calcium-rich plant-based ingredients, how to improve their bioavailability remains a key research area. Future research can focus on the effects of different cooking methods on calcium absorption, such as low-temperature cooking, fermentation, acidification, etc. Explore which ingredient combinations are most conducive to calcium absorption, such as the combination of vitamin D-rich mushrooms, fortified soy milk and high-calcium ingredients. Analyze how to reduce the impact of anti-nutritional factors such as phytic acid and oxalic acid, such as reducing phytic acid in whole grains through fermentation technology to improve calcium availability.

2) Develop More High-Calcium Chinese-Western Fusion Vegan Dishes

Although this study has provided four calcium-rich Chinese-Western fusion vegan dishes, it is still necessary to explore the possibility of integration under multiple dietary patterns in a more systematic way in the future, such as combining traditional vegan dishes from different regions, such as Indian bean stews with East Asian seaweed, or olives in the Mediterranean diet with Asian soy products, to create higher calcium and delicious fusion dishes. Study how to combine traditional ingredients with modern food science, such as using food fortification technology to increase the calcium content in vegan foods while maintaining natural flavor and nutritional integrity.

3) The Role of Chinese-Western Fusion Vegan Diet in the Prevention of Chronic Diseases

More and more studies have shown that vegan diets have a positive effect on the prevention of chronic diseases (such as osteoporosis and cardiovascular disease), but calcium deficiency may become a potential health risk. Therefore, in the future, we can study how Chinese-Western fusion vegan diets can increase calcium intake and reduce the incidence of osteoporosis in the elderly population. We can also study nutrition optimization programs for different age groups, such as high-calcium vegan diet design for children, pregnant women and the elderly.

4) Combination of Sustainable Development and High-Calcium Vegan Diet

Future research should further explore how to promote Chinese-Western fusion vegan diet within the framework of sustainable development. For example: Use of sustainable ingredients: such as seaweed, beans, and nuts, these high-calcium ingredients are not only nutritious but also more environmentally friendly than dairy production. Reduce food waste and optimize the utilization of calcium-rich ingredients, such as developing by-products such as kelp stems and bean dregs into high-calcium vegan foods. Promote energy-saving cooking methods, such as slow cooking and steaming, to reduce carbon emissions while maintaining the nutrients in the ingredients.

5.2.2. Potential Role of Chinese-Western Fusion Cuisine in the Global Vegan Trend

1) Promote the Integration of Global Food Culture

With the increase of vegan population in the world, Chinese-Western fusion vegan food can overcome cultural barriers and provide more abundant dietary choices. Combining Chinese and Western ingredients and cooking techniques, the dishes are more in line with the dietary habits of different regions to attract more vegans and flexible vegans. Enhance the diversity of diets and integrate Chinese kelp and tofu into Western stews or salads to make vegan diets more attractive.

2) Promote the Development of the Vegan Market

With the growth of global health trends, the vegan industry is expanding rapidly. Chinese-Western fusion cuisine can promote market development in the following ways: Fusion cuisine can become a special highlight of vegan restaurants, increasing customer interest and loyalty. With the accelerated pace of modern people's lives, high-calcium vegan foods (such as tofu pasta and kelp soup dumplings) can enter supermarkets or e-

commerce markets to meet consumers' demand for convenient and healthy foods. Promote Chinese-Western fusion vegan food through cooking courses, online communities, social media and other channels to let more people know how to obtain calcium in a vegan diet.

3) Shaping a Sustainable and Healthy Diet Model

Chinese-Western fusion vegan food can not only improve individual health but also contribute to a sustainable global diet system. Reduce dependence on animal-derived foods, promote high-calcium plant-based foods, and reduce dairy consumption, thereby reducing greenhouse gas emissions. Improve resource utilization, use local ingredients, reduce food transportation and food waste, and improve global food security.

Future research directions should continue to deepen the optimization of calcium intake by Chinese-Western fusion veganism, combining food science, nutrition and sustainable development to provide healthier and more efficient nutritional solutions. At the same time, Chinese-Western fusion cuisine will play an increasingly important role in the global vegan trend, not only promoting the spread of vegan culture but also promoting the popularization of healthy eating patterns and innovation in the food industry. Through continuous exploration and improvement, Chinese-Western fusion veganism will become a highlight of healthy eating in the future, providing more balanced nutritional choices for vegans around the world.

6. Conclusion

6.1. *The contribution of Chinese-Western Fusion Cuisine in Providing Innovative and Nutritious Calcium Sources*

This study explored how Chinese-Western fusion cuisine can provide vegans with an innovative and nutritious calcium source through ingredient selection, cooking techniques, food industry development, and cultural integration. The results showed that Chinese-Western fusion cuisine can not only increase calcium intake in vegan diets but also optimize the nutritional structure, making vegan diets more balanced and sustainable, and promoting the development of global vegan culture.

6.1.1. *The contribution of Chinese-Western Fusion Cuisine in Providing High-Calcium Vegan Food*

1) *Innovative Combination of High-Calcium Ingredients*

The core advantage of Chinese-Western fusion cuisine lies in the combination of high-calcium plant-based ingredients from different food cultures, such as Asian ingredients, tofu, tempeh, kelp, sesame, black fungus, fermented soy products; Western ingredients, almonds, nut milk, fortified plant milk, dark green leafy vegetables, quinoa, and whole grain fortified foods. Combining Western fortified plant milk with Eastern tofu and sesame, or incorporating seaweed into Western salads and soups, can increase dietary calcium content while enhancing flavor and texture.

2) *Scientific Cooking Methods Improve Calcium Absorption*

This study emphasizes the impact of cooking techniques on calcium bioavailability and proposes key strategies to optimize calcium absorption, such as: fermentation (such as tempeh, sauerkraut, fermented nut milk) can reduce the effects of phytic acid and oxalic acid and improve calcium absorption; acidification cooking (such as seasoning with lemon juice and vinegar) can help dissolve calcium in plant foods, making them easier to absorb; low-temperature cooking (such as steaming vegetables and tofu) can reduce calcium loss and improve overall nutritional value; optimizing food combinations (such as combining vitamin D-rich mushrooms and fortified foods with high-calcium ingredients) promotes calcium absorption.

3) *Promoting the Industrialization of High-Calcium Vegan Food*

With the promotion of Chinese-Western fusion cuisine, the food industry and catering industry are developing more high-calcium vegan foods, such as: calcium-fortified

plant milk (such as fortified almond milk, fortified soy milk) to provide a calcium source that can replace dairy products, high-calcium vegan pre-prepared dishes (such as fortified tofu, nut milk products, algae foods) to meet market demand, and vegan restaurant menu innovations (such as high-calcium vegan burgers, fortified grain pasta) to attract a wider range of consumer groups.

6.1.2. Future Outlook

As the global vegan market continues to expand, the impact of Chinese-Western fusion cuisine will not only be limited to calcium nutrition supplementation, but will also promote the development of healthy diets at multiple levels.

1) Precision Nutrition Vegan Diet Empowered by Technology

In the future, intelligent nutrition analysis technology can help individuals calculate their daily calcium intake needs and recommend personalized Chinese-Western fusion vegan diets. AI recipe recommendation: Based on personal health data, intelligently generate the optimal high-calcium vegan menu. Smart kitchen equipment, such as low-temperature fermentation machines and cooking equipment with precise nutrition measurement, help optimize vegan cooking and improve calcium absorption efficiency.

2) The Role of Chinese-Western Fusion Vegan Diet in Chronic Disease Prevention

Long-term insufficient calcium intake may lead to osteoporosis, increased risk of fractures, decreased dental health and other problems. Therefore, future research can explore: the long-term effects of high-calcium vegan diets on the bone health of the elderly; develop more scientific vegan nutrition guidance programs; high-calcium vegan diets for pregnant women and children to help different groups get enough calcium in a vegan diet; high-calcium diets for vegan athletes to optimize athletic performance and bone strength.

3) Global Integration of Vegan Culture

Chinese-Western fusion veganism is not only a dietary method that provides calcium but also a bridge for global food culture exchanges. Possible future development directions include: localized vegan innovation. Different regions can combine local specialty ingredients to develop high-calcium fusion dishes with regional characteristics, such as Mediterranean-East Asian fusion dishes (quinoa kelp salad) and Nordic-Southeast Asian fusion dishes (nut milk stewed tofu). Vegan tourism and catering market expansion. More and more countries and cities are beginning to promote high-calcium vegan-friendly restaurants, allowing vegans to get adequate nutrition when traveling around the world.

4) Sustainable Vegan Model and Environmental Impact

Sustainable veganism is set to become a key aspect of the global healthy diet. Chinese-Western fusion veganism can help reduce reliance on dairy products, lower carbon emissions, promote plant-based calcium sources such as seaweed, nuts, and fortified foods while alleviating the environmental burden of animal husbandry. Reduce food waste and explore how to use more localized and low-carbon emission high-calcium ingredients, such as fermented seaweed foods and nut residue reuse.

This study shows that Chinese-Western fusion dishes show great potential in improving calcium intake in vegan diets. By rationally matching high-calcium ingredients, optimizing cooking methods, and promoting the development of the food industry, the calcium intake of vegans can be increased while maintaining the diversity and deliciousness of the diet.

In the future, the integration of Chinese and Western veganism will further rely on science and technology, cultural exchanges, and sustainable development to promote a more scientific and healthier vegan diet. This will not only help improve the nutritional status of vegans around the world, but will also play an important role in the prevention of chronic diseases, food industry innovation and environmental protection.

6.2. *Emphasize the Importance of Continued Exploration and Innovation*

Chinese-Western fusion cuisine has shown great potential in increasing calcium intake for vegans, but to fully realize its role, continuous exploration and innovation are still needed. Only by continuous improvement in scientific research, cooking techniques, food industry, and food culture promotion can we further optimize the nutritional balance of vegan diets and promote the global vegan trend in a healthier and more sustainable direction.

6.2.1. In-Depth Scientific Research

Although a variety of high-calcium plant-based ingredients have been discovered and cooking techniques to improve calcium absorption have been explored, there are still many aspects that deserve further study.

Study different combinations of ingredients, fermentation methods, and processing methods to improve calcium absorption efficiency in vegan diets. For example, study the effects of acidification (lemon juice, fermented foods) on different plant calcium sources.

Through long-term follow-up studies, analyze the effects of different calcium intake levels on vegans' bone density, muscle health, and cardiovascular system, and develop more scientific vegan calcium intake recommendations.

Look for more sustainable and accessible high-calcium plant-based ingredients, such as exploring locally grown seaweed and fortified grains, to reduce dependence on imported ingredients.

6.2.2. Promoting Innovation in Cooking Technology

The core of Chinese-fusion cuisine lies in the innovation of ingredients and cooking techniques to optimize nutrient absorption and enhance flavor.

Apply calcium-retaining techniques such as low-temperature cooking, steaming, and fermentation to prevent calcium loss during cooking.

Explore new fusion dishes, such as using fermented nut milk to make vegan cheese, paired with tofu or seaweed to improve taste and calcium content.

Promote smart cooking equipment, such as low-temperature steamers and fermenters, to optimize calcium absorption in a more scientific way and improve the convenience of vegan cooking.

6.2.3. Promoting Innovation in the Food Industry

Innovation in the food industry is crucial to promoting the popularity of high-calcium vegan foods:

Develop more calcium-fortified vegan products, such as calcium-fortified tofu, fortified plant milk, and calcium-rich plant protein foods (such as tempeh).

Improve food processing technology, such as reducing phytic acid in whole grains through natural fermentation processes to increase calcium availability.

Strengthen food labeling and nutrition education, improve consumers' awareness of calcium nutrition, and help vegans choose high-calcium foods more scientifically.

6.2.4. Promoting the Spread and Education of Vegan Culture

The promotion of food culture and public education has a long-term impact on the development of vegan trends

- 1) Promote high-calcium vegan dishes through social media, cooking courses, vegan festivals and other activities to enhance public awareness of the role of Chinese-Western fusion cuisine in calcium intake.
- 2) Promote international vegan cultural exchanges, such as promoting Asian soy products in the West and Western nut milk and high-calcium cereals in the East, to enhance the diversity of the vegan market.

- 3) Strengthen public policy support for healthy veganism and encourage the government to formulate relevant regulations, such as encouraging schools and hospitals to provide high-calcium vegan options to improve the overall social awareness of nutritional balance.

6.2.5. Future Outlook

In the future, Chinese-Western fusion vegan food will occupy a more important position in the global vegan market. Through continuous exploration and innovation, the following development trends are worth looking forward to

- 1) Intelligent personalized nutrition plan, combined with big data and artificial intelligence, provides personalized high-calcium diet suggestions for vegans and improves the scientific nature of the diet structure.
- 2) More sustainable high-calcium vegan food, using locally grown seaweed, nuts, etc. to reduce carbon footprint and promote environmentally friendly vegan diet patterns.
- 3) The formation of a global vegan community, through online platforms, vegan recipe sharing, international vegan forums and other means, promotes the global exchange of vegan culture and scientific research.

Continued exploration and innovation are the key to ensuring the healthy development of vegan diets. The coordinated development of scientific research, cooking technology, food industry and cultural promotion will promote the popularization of high-calcium Chinese-Western fusion vegan food, improve the nutritional status of vegans, and promote the sustainable development of global healthy diets. With the advancement of science and technology and nutrition, we have reason to believe that the future vegan diet will be more balanced, diverse, and healthy, and will have a positive impact on society and the environment.

6.3. Chinese-Western Fusion Vegan Dishes: A Bridge Between Health and the Future

With the growth of the global vegan trend, the nutritional balance of vegans, especially calcium intake, has become an urgent issue to be addressed. This paper explores how to improve the calcium intake of vegan diets through the innovation of Chinese-Western fusion cuisine, and analyzes the role of cooking techniques, food matching and food industry in this process. Studies have shown that by scientifically selecting calcium-rich ingredients, optimizing cooking methods, developing high-calcium vegan foods, and combining cultural promotion with technological innovation, the calcium intake of vegans can be effectively increased while maintaining the diversity and deliciousness of the diet.

In the future, with the continuous advancement of food science, health nutrition and sustainable development, Chinese-Western fusion cuisine will continue to play a key role in the dissemination of vegan culture, healthy diet innovation and food industry transformation. It not only provides a delicious and scientific nutritional solution for vegans but also promotes the exchange and integration of global food culture.

Chinese-Western fusion veganism is not only a way of eating but also a life attitude – it emphasizes balance, health, innovation and sustainable development. Through continuous research and exploration, we can provide more scientific and reasonable nutritional solutions for future diets, so that more people around the world can benefit from this healthy, environmentally friendly and delicious vegan model. Ultimately, this is not only an improvement in individual health but also a major contribution to global food sustainability and human nutrition and health.

Appendix A. Details of Chinese-Western Fusion Vegan Dishes

	Sesame Kale Roll	Tofu Kelp Soup	Almond Milk Multigrain Pasta	Fig and Orange Salad
Ingredients	100g of kale, 50g of black beans, 10g of sesame, 10ml of olive oil	200g of tofu, 50g of kelp, 10ml of soy sauce, 5g of ginger	100g of multi-grain pasta, 200ml of almond milk, 5ml of olive oil, 2g of salt	100g of figs, 100g of oranges, 5ml of lemon juice, 5ml of honey
Preparation Method	Soak and cook black beans; steam kale until soft, sprinkle with sesame and black beans, then roll up.	Soak kelp and slice; cube tofu and cook together with kelp, add soy sauce and ginger for flavor.	Cook pasta and toss with almond milk and olive oil, season with salt.	Slice figs and oranges, drizzle with lemon juice and honey, mix well.
Taste Profile	Rich texture with the aroma of sesame and freshness of kale.	Delicious taste with a perfect combination of kelp's ocean flavor and tofu's smoothness.	Slight sweetness and milky flavor of almond milk complementing the texture of multigrain pasta.	Rich fruity flavor with a sweet and sour refreshing taste.
Nutritional Content	200mg of calcium, 10g of protein, 5g of fat	150mg of calcium, 15g of protein, 10g of fat	250mg of calcium, 8g of protein, 15g of fat	100mg of calcium, 2g of protein
Calories	150 kcal	180 kcal	350 kcal	120 kcal
Allergens	Sesame	None	Nuts (Almond)	None

Appendix B. Questionnaire: The Impact of Chinese-Western Fusion Vegan Dishes on Calcium Intake

Dear Respondent

This questionnaire aims to understand the level of awareness among vegans regarding calcium intake and their perception of Chinese-Western fusion cuisine as a source of calcium. Your responses will help improve vegan dietary structures and promote healthier eating habits. All responses will be kept confidential and used for research purposes only.

General Information

What is your age group?

Under 18 18-30 31-45 46-60 Above 60

What is your dietary preference?

Vegan (strictly no animal-based products)

Plant-based (mainly vegan but occasionally consume animal products)

Other (please specify): _____

How much calcium do you consume daily? (If unsure, select the statement that best describes your diet)

Less than 500mg (rarely consume calcium-rich foods)

500-800mg (occasionally consume beans, leafy greens, etc.)

800-1000mg (intentionally consume tofu, nuts, etc.)

More than 1000mg (actively include calcium-rich foods and supplements)

Dietary Habits and Calcium Intake

What are your primary sources of calcium? (Select all that apply)

Leafy greens (e.g., kale, Chinese broccoli) Soy products (e.g., tofu, tempeh)

Nuts and seeds (e.g., almonds, sesame seeds) Fortified foods (e.g., almond milk, fortified cereals)

Seaweed (e.g., kelp, kombu) Other (please specify): _____

Are you aware that certain foods (e.g., spinach) contain calcium but also have oxalates that limit calcium absorption?

Yes No

Do you intentionally consume vitamin D-rich foods (e.g., fortified orange juice, mushrooms) to enhance calcium absorption?

Yes No Not sure

Do you take calcium or vitamin D supplements?

Yes, regularly Occasionally No

Perception of Chinese-Western Fusion Vegan Dishes

Are you interested in trying Chinese-Western fusion vegan dishes?

Yes, I am very interested Maybe, but it is not my first choice

No, I prefer traditional vegan dishes

If the following four Chinese-Western fusion vegan dishes were available, which would you be most interested in? (Select all that apply)

Sesame Kale Roll (a combination of calcium-rich kale, black beans, and sesame)

Tofu Kelp Soup (a fusion of tofu and kelp, rich in calcium and iodine)

Almond Milk Multigrain Pasta (a Western-inspired dish using fortified almond milk and whole grain pasta)

Fig and Orange Salad (a fruit-based dish with calcium-rich figs and vitamin C to enhance calcium absorption)

If you wanted to improve your calcium intake, which elements of Chinese-Western fusion cuisine would you be interested in incorporating? (Select all that apply)

Leafy greens Soy products Nuts and seeds Seaweed-based foods Fortified foods

Other (please specify): _____

Your Suggestions

What are your expectations or suggestions regarding Chinese-Western fusion vegan dishes? (Please write your response)

Would you be interested in participating in activities or online seminars about vegan nutrition and calcium intake?

Yes No

Thank you for your participation! Your feedback will help promote healthier vegan diets through innovative Chinese-Western fusion dishes while enhancing calcium intake. Please click submit. We appreciate your time!

Appendix C. Questionnaire Results

General Information

What is your age group?

Under 18: 5.2% 18-30: 32.4% 31-45: 40.1% 46-60: 15.7% Above 60: 6.6%

What is your dietary preference?

Vegan (strictly no animal-based products): 78.5%

Plant-based (mainly vegan but occasionally consume animal products): 18.3%

Other: 3.2%

How much calcium do you consume daily? (If unsure, select the statement that best describes your diet)

Less than 500mg (rarely consume calcium-rich foods): 21.5%

500-800mg (occasionally consume beans, leafy greens, etc.): 37.8%

800-1000mg (intentionally consume tofu, nuts, etc.): 29.3%

More than 1000mg (actively include calcium-rich foods and supplements): 11.4%

Dietary Habits and Calcium Intake

What are your primary sources of calcium? (Select all that apply)

Leafy greens (e.g., kale, Chinese broccoli): 65.7% Soy products (e.g., tofu, tempeh): 72.8%

Nuts and seeds (e.g., almonds, sesame seeds): 48.9%

Fortified foods (e.g., almond milk, fortified cereals): 56.4%

Seaweed (e.g., kelp, kombu): 33.5% Other: 8.7%

Are you aware that certain foods (e.g., spinach) contain calcium but also have oxalates that limit calcium absorption?

Yes: 67.4% No: 32.6%

Do you intentionally consume vitamin D-rich foods (e.g., fortified orange juice, mushrooms) to enhance calcium absorption?

Yes: 58.9% No: 29.6% Not sure: 11.5%

Do you take calcium or vitamin D supplements?

Yes, regularly: 35.2% Occasionally: 42.7% No: 22.1%

Perception of Chinese-Western Fusion Vegan Dishes

Are you interested in trying Chinese-Western fusion vegan dishes?

Yes, I am very interested: 54.6% Maybe, but it is not my first choice: 35.2%

No, I prefer traditional vegan dishes: 10.2%

If the following four Chinese-Western fusion vegan dishes were available, which would you be most interested in? (Select all that apply)

Sesame Kale Roll (a combination of calcium-rich kale, black beans, and sesame): 43.8%

Tofu Kelp Soup (a fusion of tofu and kelp, rich in calcium and iodine): 51.3%

Almond Milk Multigrain Pasta (a Western-inspired dish using fortified almond milk and whole grain pasta): 60.7%

Fig and Orange Salad (a fruit-based dish with calcium-rich figs and vitamin C to enhance calcium absorption): 47.9%

If you wanted to improve your calcium intake, which elements of Chinese-Western fusion cuisine would you be interested in incorporating? (Select all that apply)

Leafy greens: 67.2% Soy products: 74.5% Nuts and seeds: 53.6%

Seaweed-based foods: 39.8% Fortified foods: 60.3% Other: 7.9%

Your Suggestions

What are your expectations or suggestions regarding Chinese-Western fusion vegan dishes?

Diverse ingredients, nutrition focus, sauce and seasoning fusion, etc.

Would you be interested in participating in activities or online seminars about vegan nutrition and calcium intake?

Yes: 59.3% No: 40.7%

Appendix D. Long-Term Effects of Chinese-Western Fusion Cuisine on Increasing Calcium Levels in Vegan Diet (Figure 1)

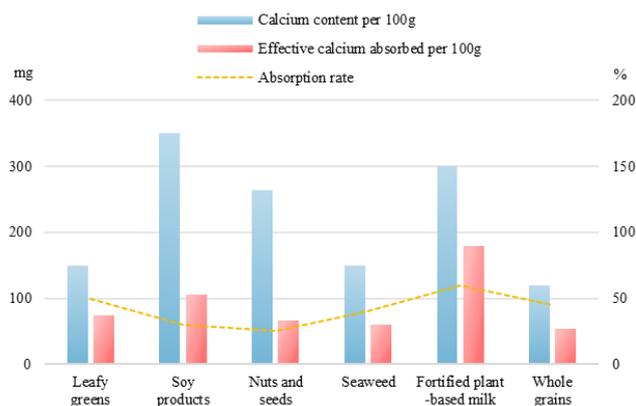


Figure 1. Long-Term Effects of Chinese-Western Fusion Cuisine on Increasing Calcium Levels in Vegan Diet.

References

1. R. Dowd, "Role of calcium, vitamin D, and other essential nutrients in the prevention and treatment of osteoporosis," *Nurs. Clin. North Am.*, vol. 36, no. 3, pp. 417-431, 2001, doi: 10.1016/S0029-6465(22)02565-8.
2. J. Gibbs and F. P. Cappuccio, "Common nutritional shortcomings in vegans and vegetarians," *Dietetics*, vol. 3, no. 2, pp. 114-128, 2024, doi: 10.3390/dietetics3020010.
3. S. Chalupa-Krebszdzak, C. J. Long, and B. M. Bohrer, "Nutrient density and nutritional value of milk and plant-based milk alternatives," *Int. Dairy J.*, vol. 87, pp. 84-92, 2018, doi: 10.1016/j.idairyj.2018.07.018.
4. G. Cormick and J. M. Belizán, "Calcium intake and health," *Nutrients*, vol. 11, no. 7, p. 1606, 2019, doi: 10.3390/nu11071606.
5. J. Gibbs and F. P. Cappuccio, "Common nutritional shortcomings in vegans and vegetarians," *Dietetics*, vol. 3, no. 2, pp. 114-128, 2024, doi: 10.3390/dietetics3020010.
6. K. E. Scholz-Ahrens, F. Ahrens, and C. A. Barth, "Nutritional and health attributes of milk and milk imitations," *Eur. J. Nutr.*, vol. 59, pp. 19-34, 2020, doi: 10.1007/s00394-019-01936-3.
7. R. Tso and C. G. Forde, "Unintended consequences: nutritional impact and potential pitfalls of switching from animal-to plant-based foods," *Nutrients*, vol. 13, no. 8, p. 2527, 2021, doi: 10.3390/nu13082527.
8. J. W. Nieves, "Skeletal effects of nutrients and nutraceuticals, beyond calcium and vitamin D," *Osteoporos. Int.*, vol. 24, pp. 771-786, 2013, doi: 10.1007/s00198-012-2214-4.
9. M. Cheryan and J. J. Rackis, "Phytic acid interactions in food systems," *Crit. Rev. Food Sci. Nutr.*, vol. 13, no. 4, pp. 297-335, 1980, doi: 10.1080/10408398009527293.
10. K. D. Cashman, "Vitamin D: dietary requirements and food fortification as a means of helping achieve adequate vitamin D status," *J. Steroid Biochem. Mol. Biol.*, vol. 148, pp. 19-26, 2015, doi: 10.1016/j.jsbmb.2015.01.023.
11. S. L. Morgan, "Nutrition and bone: it is more than calcium and vitamin D," *Women's Health*, vol. 5, no. 6, pp. 727-737, 2009, doi: 10.2217/WHE.09.64.
12. R. J. Ciju, "Brassica Vegetables: Growing Practices and Nutritional Information," *Agrihortico*, 2019. ISBN: 9781495232558.
13. N. Satheesh and S. Workneh Fanta, "Kale: Review on nutritional composition, bio-active compounds, anti-nutritional factors, health beneficial properties and value-added products," *Cogent Food Agric.*, vol. 6, no. 1, p. 1811048, 2020, doi: 10.1080/23311932.2020.1811048.
14. D. Li, "Innovating culinary health: The nutritional potential of Chinese-Western fusion cuisine," *Int. J. Appl. Sci.*, vol. 7, no. 2, pp. p61-p61, 2024, doi: 10.30560/ijas.v7n2p61.
15. M. J. Messina, "Legumes and soybeans: overview of their nutritional profiles and health effects," *Am. J. Clin. Nutr.*, vol. 70, no. 3, pp. 439S-450S, 1999, doi: 10.1093/ajcn/70.3.439s.
16. S. Rockwell, *Calcium-Rich and Dairy-Free: How to Get Your Calcium Without the Cow*, Health Research Books, 1996. ISBN: 9780916575274.
17. K. H. Joo and G. A. Cavender, "Investigation of tofu products coagulated with trimagnesium citrate as a novel alternative to nigari and gypsum: Comparison of physical properties and consumer preference," *LWT*, vol. 118, p. 108819, 2020, doi: 10.1016/j.lwt.2019.108819.
18. N. Arshad et al., "The comparative effect of lactic acid fermentation and germination on the levels of neurotoxin, anti-nutrients, and nutritional attributes of sweet blue pea (*Lathyrus sativus* L.)," *Foods*, vol. 12, no. 15, p. 2851, 2023, doi: 10.3390/foods12152851.
19. A. Bratovic, "Effect of temperature extraction on the potassium and calcium content in the lemon and orange water peel extracts," *J. Adv. Chem.*, vol. 17, 2020, pp. 35-43, doi: 10.24297/jac.v17i.8714.
20. P. Pathomrungsriyonggul, A. S. Grandison, and M. J. Lewis, "Effect of calcium carbonate, calcium citrate, tricalcium phosphate, calcium gluconate and calcium lactate on some physicochemical properties of soymilk," *Int. J. Food Sci. Technol.*, vol. 45, no. 11, pp. 2234-2240, 2010, doi: 10.1111/j.1365-2621.2010.02399.x.
21. K. Mahadevan, "Seaweeds: A sustainable food source," in *Seaweed Sustainability*, pp. 347-364, 2015. ISBN: 9780124186972.
22. I. Michalak and K. Chojnacka, "Seaweeds as a component of the human diet," in *Algae Biomass: Characteristics and Applications: Towards Algae-based Products*, pp. 57-71, 2018. ISBN: 9783319747033.

Disclaimer/Publisher's Note: The views, opinions, and data expressed in all publications are solely those of the individual author(s) and contributor(s) and do not necessarily reflect the views of PAP and/or the editor(s). PAP and/or the editor(s) disclaim any responsibility for any injury to individuals or damage to property arising from the ideas, methods, instructions, or products mentioned in the content.