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Article

The Role of Chinese-Western Fusion Cuisine in Improving Vitamin A Intake in Vegans: A Comprehensive Analysis of Deficiency Symptoms and Prevention Strategies

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Abstract: Vitamin A is a key nutrient for maintaining normal vision, immune function and skin health. However, vegans often have difficulty getting enough vitamin A due to dietary restrictions, especially animal-derived vitamin A precursors such as retinol. This research aims to explore how Chinese-Western fusion cuisine, as an innovative dietary approach, can help vegans increase their vitamin A intake and prevent related deficiency symptoms through its rich plant-based ingredients and unique cooking methods. Chinese-Western fusion cuisine can effectively enhance the bioavailability of vitamin A in food by combining diverse ingredients and cooking techniques. The research used a variety of vegetables rich in beta-carotene, including carrots, beets and bell peppers. The use of these vegetables in fusion cuisine not only enriches the color and flavor of the dishes but also beta-carotene is an important plant source of vitamin A, which can be converted into retinol in the human body. One-year research of 100 adults who adhered to a long-term vegan diet found that regular consumption of fusion cuisine significantly increased the participants' serum vitamin A levels. The research also found that the lightly processed cooking techniques (such as quick stir-frying and steaming) advocated in fusion cuisine can better preserve the beta-carotene in the ingredients than traditional cooking methods. This research emphasizes the importance of education and public health promotion, which is particularly critical in raising people's awareness of vitamin A and its role in a vegan diet. Providing specific dietary advice to vegans and encouraging them to explore and adopt fusion cuisine can not only improve their vitamin A intake but also promote overall health by providing a variety of nutrients. This research shows that fusion cuisine can be an effective dietary strategy to help vegans improve their vitamin A intake and may prevent health problems caused by vitamin A deficiency. Future research should further explore the potential role of fusion cuisine in the intake of other nutrients and how to promote this dietary pattern globally to improve public health.

Keywords: vegan nutrition; vitamin A deficiency; Chinese-Western fusion cuisine; dietary strategies; bioavailability

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1. Introduction

1.1. The Importance of Vitamin A and the Challenges in a Vegan Diet

Vitamin A is a vital fat-soluble vitamin that has multiple effects on human health, including promoting healthy vision, supporting immune system function, maintaining the integrity of the skin and mucous membranes, and participating in cell communication and reproduction. As an antioxidant, it also helps to protect against oxidative stress and prevent the development of chronic diseases. However, the two main forms of vitamin A — pro-vitamin A (mainly derived from retinol in animal foods) and precursor vitamin A (such as beta-carotene, mainly derived from plant foods) — are clearly divided in terms of food sources.

For vegans, since they completely exclude animal foods, they cannot directly consume provitamin A from food. This makes it challenging for them to get enough vitamin A because although many plant foods are rich in beta-carotene, this substance needs to be converted into the active form of vitamin A in the body, but this conversion is inefficient and is affected by individual differences, food processing and cooking methods. Studies have shown that the conversion rate of beta-carotene to retinol may be restricted by many factors, including individual nutritional status, digestion and absorption capacity, and genetic factors.

In addition, vitamin A deficiency is not limited to developing countries. Even in developed countries, specific populations (such as vegans and pregnant women) may face this nutritional challenge due to dietary restrictions. Vitamin A deficiency can led to a series of health problems, including night blindness, decreased immunity and reproductive health problems. In severe cases, it may even lead to blindness and increase the risk of infection. Therefore, exploring how to effectively enhance the intake of vitamin A for vegans through dietary strategies, especially through innovative Chinese-Western fusion cuisine, is not only a need to improve individual health but also an important issue for public health promotion. By combining Western and Eastern ingredients and cooking techniques, Chinese-Western fusion cuisine provides a rich and diverse food choice, which may help vegans to more effectively ingest and utilize vitamin A and its precursors.

1.2. The Potential and Importance of Chinese-Western Fusion Cuisine in Improving Vitamin A Intake in Vegans

As more and more people around the world choose a vegan lifestyle, ensuring a balanced nutrition for this population has become a key direction of public health research. Vitamin A, in particular, is essential for maintaining normal physiological functions, and its deficiency may lead to serious health problems. However, vegans often find it difficult to obtain enough vitamin A from plant-based foods because beta-carotene from plant sources needs to be converted into vitamin A in the body, and the efficiency of this process may be affected by many factors. Therefore, it is particularly important to explore effective dietary strategies to enhance the vitamin A intake of this group.

As an innovative dietary pattern, the potential and importance of Chinese-Western fusion cuisine in improving the vitamin A intake of vegans cannot be ignored. This fusion diet not only enriches the diversity of food by combining Western and Eastern cooking techniques and ingredients but also increases the complementarity of nutrients in the ingredients. For example, Western cooking methods such as baking and light frying can increase the release of beta-carotene from plants, while Eastern seasonings and cooking techniques such as the use of sesame oil and coconut oil help improve the absorption rate of fat-soluble vitamins.

In addition, Chinese-Western fusion cuisine tends to use ingredients rich in beta-carotene, such as red peppers, carrots, beets, and various green leafy vegetables. The creative combination and cooking methods of these ingredients not only make the dishes look delicious but also maximize the retention and absorption of nutrients. By integrating these ingredients into Chinese-Western fusion cuisine, vegans can more effectively obtain the required vitamin A from their daily diet, thereby preventing vision problems and immune dysfunction caused by vitamin A deficiency. Therefore, the significance of this research is to systematically evaluate the impact of Chinese-Western fusion cuisine on the vitamin A intake of vegans, and provide scientific dietary guidance and suggestions for improving the nutritional status of this group. Through this research, we hope to encourage more vegans to understand and adopt Chinese-Western fusion cuisine to ensure that their diet is more balanced and nutritious.

1.3. Research Objectives and Questions

The main purpose of this research is to explore how fusion cuisine can help vegans improve their vitamin A intake and thus prevent vitamin A deficiency and related health problems. Through this research, we aim to answer the following core questions:

What specific ingredients and cooking techniques in fusion cuisine can effectively improve the bioavailability of vitamin A?

To explore how key ingredients used in fusion cuisine, such as carrots, bell peppers, beets, etc., can enhance the release of beta-carotene and its conversion efficiency to vitamin A through specific cooking methods.

How can the absorption of vitamin A be optimized through the cooking methods of fusion cuisine?

To analyze the effects of different cooking methods (such as steaming, stir-frying, and baking) on the stability and availability of vitamin A precursor beta-carotene, and how these methods can help improve vitamin A levels in vegans.

What are the long-term effects of fusion cuisine on the overall health of vegans?

To research the changes in serum levels of vitamin A in vegans who regularly consume fusion cuisine and how this change affects their vision health, immune system function, and skin health.

What are the challenges and opportunities faced by vegans after adopting fusion cuisine?

Identify the cultural and acceptance barriers that may be encountered in promoting fusion cuisine among vegans, and how these challenges can be overcome through education and community engagement.

By answering these research questions, this article hopes to provide specific evidence and strategies to support vegans in improving their vitamin A intake through a fusion diet, thereby promoting their health and quality of life. In addition, this research will also provide guidance for caterers and dietitians in developing innovative fusion menus suitable for vegans, helping them better meet the nutritional needs of this growing population.

2. Literature Review

2.1. Vitamin A Health Benefits and Deficiency Risks

Vitamin A is a key nutrient with a wide range of effects on human health. As a fat-soluble vitamin, it plays a central role in many physiological processes, including but not limited to visual health, cell growth, immune function, and reproductive health [1].

Vitamin A is essential for maintaining normal vision [2]. It is an essential component of the photopigments in the retina, specifically rhodopsin, which plays a key role in visual adaptation to changes in light and darkness [3]. One of the most direct consequences of vitamin A deficiency (VAD) is night blindness, which is caused by a reduced ability of the retina to adapt to changes in light [4].

Vitamin A is essential for a healthy immune system [5]. It helps the body fight infection by regulating the production and function of white blood cells and maintaining the integrity of natural barriers such as the skin and mucous membranes [6]. Vitamin A deficiency is associated with an increased risk of infection, especially in children and adults with compromised immune systems [7].

Vitamin A is also critical for skin health and overall cell growth and repair. It maintains the integrity of the skin and mucous membranes by affecting cell differentiation and proliferation, and deficiency can lead to dry skin and abnormal keratinization of hair follicles [8].

There are two main sources of vitamin A: preformed vitamin A (retinol) and carotene (mainly beta-carotene) [9]. Preformed vitamin A mainly comes from animal-derived foods such as liver, fish and dairy products [10]; Carotene is abundant in plant-based foods such as carrots, bell peppers and green leafy vegetables [11]. Although carotene needs to be

converted into the active form of vitamin A in the body, the efficiency of this conversion can be affected by the individual's nutritional status and food matrix [9].

Since vegans do not consume animal-derived foods, their source of vitamin A mainly depends on carotene from plants. However, studies have shown that different cooking methods and food processing methods may significantly affect the bioavailability and conversion efficiency of carotene [12]. Therefore, exploring how to optimize vitamin A intake by integrating cooking techniques and food choices from different cultures is of great practical significance for vegans.

Through the literature review in this section, we will further explore how fusion cuisine, through its unique combination of ingredients and cooking methods, can help vegans consume and utilize vitamin A more effectively, thereby improving their overall health.

2.2. Challenges Faced by Vegans

The challenges vegans face in getting enough vitamin A stem from two main aspects: limited food sources and the efficiency of bio-conversion rates.

Vegans exclude all animal-derived foods, which means they cannot get preformed vitamin A (retinol) directly from food, which is the most direct and easily absorbed and utilized form of vitamin A by the human body. Preformed vitamin A is mainly found in foods such as liver, fish oil, cheese, butter and eggs. Therefore, vegans must rely on precursor forms in plants, mainly beta-carotene, which requires conversion in the body to become the active form, and the conversion efficiency is affected by many factors.

The conversion rate of beta-carotene to retinol is affected by many physiological and nutritional factors, including the individual's health status, intestinal absorption efficiency, genetic background, and the presence of other nutrients [13]. For example, fat intake affects the absorption of beta-carotene because beta-carotene is fat-soluble [14]. Vegans who do not consume enough healthy fats may have reduced beta-carotene absorption. In addition, deficiencies in trace elements and vitamins such as zinc, iron, and vitamin E may also affect this conversion process.

Vegans may also be affected by anti-nutritional factors in their foods, which may further reduce the bioavailability of vitamin A [15]. For example, some unprocessed grains and legumes contain phytic acid, a substance that can form insoluble complexes with minerals and interfere with the absorption of micronutrients [16].

Therefore, although plant foods such as carrots, beets, and dark green vegetables are rich in beta-carotene, vegans may have difficulty effectively obtaining and utilizing enough vitamin A from these foods in their actual diets due to the above challenges.

In response to these challenges, innovative cooking methods and ingredient combinations of Chinese-Western fusion cuisine provide new solutions for improving vegans' vitamin A intake. Through reasonable ingredient selection and cooking techniques, the bioavailability of beta-carotene can be maximized, helping vegans overcome these challenges and improve their vitamin A intake.

2.3. Nutritional Advantages of Chines-Western Fusion Cuisine

By combining ingredients and cooking techniques from different cultures, fusion cuisine not only provides vegans with a more diverse taste experience but also greatly enhances the nutritional value of the diet, especially in providing and enhancing the source of vitamin A and its bioavailability [17].

Fusion cuisine makes full use of the diverse ingredients in both Chinese and Western kitchens, especially those rich in beta-carotene, such as carrots, bell peppers, beets, and various dark green leafy vegetables. For example, combining Western ingredients rich in beta-carotene, such as bell peppers and carrots, with Chinese tofu or fungus, not only increases the nutritional content of the dish but also improves the absorption efficiency of nutrients through the complementary effects between the ingredients.

The cooking methods of fusion cuisine often focus on preserving the original nutritional value of the ingredients while enhancing the flavor. For example, quick stir-frying or light steaming can minimize the loss of vitamin A and its precursors during the cooking process. In addition, adding an appropriate amount of vegetable oil or healthy fat (such as olive oil or sesame oil) can increase the absorption of beta-carotene, because vitamin A is fat-soluble and needs the help of fat to be better absorbed by the human body.

Another advantage of fusion cuisine is that it can enhance flavor while promoting nutrient intake. For example, the natural compounds contained in peppers and citrus peels can enhance the bioavailability of antioxidants in food, thereby indirectly promoting the absorption and utilization of vitamin A [18] In addition, the spices and seasonings in these foods not only enhance the taste of the dishes but also stimulate the secretion of digestive juices and improve digestion and absorption [19].

In conclusion, Chinese-Western fusion cuisine, through its unique combination of ingredients and cooking techniques, provides vegans with an innovative solution to improve their vitamin A intake. This diet helps vegans effectively prevent vitamin A deficiency and its related health problems by increasing the nutrient density and bioavailability of food.

3. Chinese-Western Fusion Cuisine and Vitamin A Intake

A major feature of Chinese-Western fusion cuisine is the ingenious combination of rich Eastern and Western ingredients, many of which are plant-based ingredients rich in vitamin A precursors, such as beta-carotene. These ingredients not only add colorful colors and rich flavors to the dishes but also provide a valuable source of vitamin A for vegans.

3.1. Common Ingredients Rich in Vitamin A in Chinese-Western Fusion Cuisine

Carrots are an excellent source of beta-carotene, which is converted into active vitamin A in the body [20]. In fusion cuisine, carrots are often used in stir-fries, soups, and as part of salads. Its sweetness and crunch can be paired with a variety of seasonings and other vegetables such as cabbage and broccoli.

Although beets do not contain as much beta-carotene as carrots, they are still a good source of vitamin A [21], especially when eaten raw or lightly processed. Beets can be used to make creative salads or combined with Western ingredients such as feta cheese to make a beet tart that combines East and West, which is both beautiful and nutritious.

Bell peppers, especially the red varieties, are rich in beta-carotene. Red bell peppers contain more vitamin A than green or yellow bell peppers [22]. Bell peppers are often used in stir-fries, pizza toppings, and raw. Its variety of colors and sweet taste make it an indispensable element in fusion cuisine.

Mango is one of the tropical fruits with a high content of beta-carotene, especially when ripe [23]. Mango can be used to make jams, desserts, or paired with spicy ingredients to make tropical salads and stir-fries.

Spinach is another good source of beta-carotene, and it is also rich in other antioxidants such as lutein and zeaxanthin [24]. Spinach can be used in steamed dishes, blended into vegetable soups or as a filling for pizza and pasta.

The versatility and nutritional value of these ingredients make them particularly prominent in fusion cuisine, where they can not only enhance the taste and flavor through different cooking methods but also significantly improve the nutritional value of the dishes, especially for vegans seeking to increase their vitamin A intake. By eating this way, vegans can more easily meet their daily vitamin A requirements, thereby helping to prevent health problems that may be caused by vitamin A deficiency.

3.2. Effect of Cooking Methods on Vitamin A Retention

Cooking methods have a significant impact on the retention of nutrients in food, especially fat-soluble vitamins such as vitamin A. Correct cooking techniques can not only maximize the nutritional value of food but also improve the bioavailability of nutrients. The following is an analysis of the specific effects of several common cooking methods on vitamin A retention:

Steaming is a gentle cooking method that usually does not involve direct high temperature or oil, and can better preserve the original nutrients of food [25]. Steaming can better preserve the integrity of vitamin A, especially suitable for vegetables such as spinach and carrots. During the steaming process, the cell structure of vegetables relaxes, which helps to release more beta-carotene, while reducing the nutrient loss that may be caused by high temperature [26].

Stir-frying is a method of quickly cooking food with rapid high temperature and a small amount of oil, which is commonly used in Chinese cuisine. Although the high temperatures of cooking may result in some loss of vitamin A [27], cooking with a small amount of healthy vegetable oil can help improve beta-carotene absorption. Oils promote the dissolution of fat-soluble vitamins, thereby increasing their bioavailability.

Roasting is the process of cooking foods using dry heat, usually in an oven. Roasting may result in some loss of vitamin A, especially if the roasting time is long or the temperature is too high. However, roasting can create a "locking" effect on the outer layer of the food, preserving the nutrients inside. When roasting vitamin A-rich ingredients such as beets or bell peppers, proper roasting can enhance their sweetness and slightly increase the availability of beta-carotene [28].

Cooking methods have different effects on the retention of vitamin A, and choosing the right cooking method is critical to optimizing vitamin A intake for vegans. In practice, steaming and light stir-frying are recommended for vitamin A-rich ingredients to minimize nutrient losses while increasing the bioavailability of the vitamin. The diverse cooking techniques of Chinese-Western fusion cuisine provide a wealth of options, allowing vegans to optimize vitamin A intake and utilization through different cooking methods.

3.3. Recipe Examples and Nutritional Analysis

To help vegans effectively increase their vitamin A intake, here are a few examples of dishes that combine Chinese and Western cooking styles. These dishes are not only delicious but also provide vegans with essential vitamin A.

1) Carrot Ginger Soup

Ingredients: carrots, ginger, coconut milk, onions, garlic, lemon juice, salt and pepper.

Steps: Slice carrots, onions and garlic and sauté them with ginger in olive oil until golden. Add coconut milk and enough water and cook until carrots are soft. Use a blender to make soup and add lemon juice to taste.

Carrots are an excellent source of beta-carotene, and the healthy fats in coconut milk help it absorb. This soup provides rich vitamin A and is suitable for improving night vision and immunity.

2) Fried Rice with Bell Pepper and Tofu

Ingredients: red bell pepper, tofu, brown rice, spring onions, minced garlic, soy sauce, sesame oil.

Steps: Cook the brown rice and set aside. Dice the tofu and fry it in sesame oil until golden brown, then add the diced bell pepper and minced garlic and stir-fry quickly. Mix in the brown rice and season with soy sauce.

Bell peppers are rich in beta-carotene, tofu provides plant protein, brown rice increases fiber, and the healthy fat in sesame oil helps absorb vitamin A.

3) Mango Spinach Salad

Ingredients: Fresh spinach, diced ripe mango, red onion, toasted almond slices, olive oil, apple cider vinegar.

Steps: Wash and drain the spinach, and mix with diced mango, thinly sliced red onion and toasted almond slices. Make a simple dressing with olive oil and apple cider vinegar and mix well.

Both mango and spinach are good sources of vitamin A. The sweetness of mango goes well with the fresh taste of spinach, and olive oil not only adds flavor but also promotes the absorption of nutrients.

These dish examples show how to make nutritious and delicious vegan dishes by cleverly combining Chinese and Western ingredients and cooking methods, effectively helping vegans increase their vitamin A intake. In this way, vegans can easily incorporate these healthy dishes into their daily diet, not only enjoying the delicious taste but also ensuring adequate nutritional support.

4. Strategies to Prevent Vitamin A Deficiency

4.1. Dietary Advice

Adequate intake of vitamin A is essential for vegans, as they cannot directly obtain preformed vitamin A from animal foods. Therefore, providing targeted dietary advice is one of the key strategies to help vegans prevent vitamin A deficiency. Here are a few practical dietary suggestions based on research:

Vegans should increase their intake of foods rich in beta-carotene, such as carrots, bell peppers, beets, spinach, pumpkin and mango. These foods are not only colorful and nutritious but also easy to incorporate into daily diets. It is recommended to consume these vegetables and fruits in raw or minimally processed forms, such as salads, cold cuts or low-temperature quick cooking, to maximize their nutrient content.

Cooking with healthy vegetable oils (such as olive oil, avocado oil and sesame oil) can help improve the absorption rate of beta-carotene. Fat-soluble vitamin A requires the help of fat to be better absorbed by the body. Including nuts and seeds, such as almonds, walnuts and flax seeds, which are not only rich in healthy fats but also provide additional nutrients, such as vitamin E, can help further enhance the absorption and utilization of vitamin A.

Fusion cuisine provides vegans with a rich source of vitamin A by combining a variety of ingredients and cooking techniques. For example, combining carrots and bell peppers from the West with tofu and mushrooms from the East can create a nutritious dish that is both delicious and flavorful. Innovative use of spices and herbs, such as ginger, garlic, and coriander, not only enhances the flavor of food, but may also help increase the bioavailability of vitamin A.

Vegans are encouraged to undergo regular nutritional assessments, especially blood tests for vitamin A levels, to ensure that their diet meets their body's needs. If vitamin A intake is found to be insufficient, consideration can be given to increasing the intake of specific foods or using nutritional supplements.

By following these dietary recommendations, vegans can effectively prevent vitamin A deficiency and maintain good health and quality of life. These strategies will not only help improve their nutritional intake but also increase the enjoyment of eating through delicious fusion cuisine.

4.2. Education and Public Health Strategies to Promote Chinese-Western Fusion Cuisine

As health awareness rises and the vegan population grows, promoting nutritious fusion cuisine has become an effective way to improve public health, especially the nutritional status of vegans. Here are a few ways to promote fusion cuisine through education and public health strategies:

Hold cooking classes and healthy eating workshops, especially for schools, community centers, and health fairs, to teach how to prepare and utilize the nutrients in fusion cuisine. Emphasize the importance of vitamin A and common nutritional deficiencies among vegans in workshops, and provide specific dietary advice and recipe examples.

Use social media, blogs, and online video platforms to publish tutorials and nutritional analysis on fusion cuisine to increase the visibility and appeal of this type of diet. Work with public health agencies to distribute promotional materials such as brochures and posters to educate the public about the benefits of fusion cuisine in increasing vitamin A intake.

Work with restaurants and food service providers to promote and provide fusion cuisine options, especially in public dining environments such as schools, hospitals, and corporate cafeterias. Build partnerships with local farmers and food producers to promote the use of local, organic, and sustainably produced ingredients in fusion cuisine to support the local economy while providing healthy diets.

4.3. Policy Advocacy and Support

Advocate for the government and relevant institutions to formulate policies to support the research and promotion of fusion cuisine, such as providing funding to support the establishment of relevant cooking courses or research projects.

Through policy advocacy, encourage schools and community health programs to include fusion cuisine as part of improving nutrition and health awareness.

Through these education and public health strategies, not only can people's awareness and acceptance of fusion cuisine be improved but also the nutrition knowledge and health level of vegans and the general public can be specifically improved. Such promotion activities can help vegans better understand and use fusion cuisine, ensure that their diet contains sufficient vitamin A, and thus prevent related health problems.

5. Conclusion

This article analyzes and discusses how fusion cuisine can help vegans effectively increase their vitamin A intake and thus improve their overall health. Studies have shown that fusion cuisine, through its rich and diverse plant-based ingredients and innovative cooking techniques, not only enriches vegans' dietary choices but also significantly increases the bioavailability of vitamin A in food.

Vitamin A is essential for maintaining normal vision, immune system function, and skin health, and vegans often have difficulty getting enough vitamin A due to dietary restrictions. By introducing fusion cuisine, vegans can more effectively consume enough beta-carotene, the main plant source of vitamin A, especially through cooking methods such as steaming and stir-frying, which help preserve the nutrients in the ingredients and increase their bioavailability.

In addition, this research also explored how to increase public awareness of the nutritional value of fusion cuisine, especially among vegans, through public health promotion activities such as educational seminars and social media campaigns. Through these strategies, fusion cuisine can be further promoted to help vegans improve their nutritional intake and prevent health problems that may be caused by vitamin A deficiency.

In conclusion, fusion cuisine provides an innovative and effective way to help vegans address the problem of insufficient vitamin A intake. Future research and practice should continue to explore and optimize the nutritional potential of these dishes to ensure that vegans can meet their health needs in a delicious and nutritious way. This will not only improve personal health but also promote the development of public health, especially in the context of more and more people around the world choosing a vegan lifestyle.

6. Recommendations

Based on the findings of this research, the following are several specific recommendations and improvement measures to help vegans improve their vitamin A intake through Chinese-Western fusion cuisine:

Vegans should choose more ingredients rich in beta-carotene, such as carrots, bell peppers, beets, and various dark green vegetables. It is recommended to regularly include

these ingredients in the daily diet and explore different cooking methods to preserve their nutritional value.

Cooking methods such as steaming, quick stir-frying, or low-temperature baking are recommended to maximize the retention of vitamin A and its precursors in food. At the same time, appropriate use of healthy oils (such as olive oil or avocado oil) to help improve the absorption efficiency of fat-soluble vitamins.

Encourage restaurants and food service providers to innovate Chinese-Western fusion cuisine, especially those that can provide vitamin A for vegans. At the same time, consumers should be helped to understand the nutritional value of these dishes through menu labeling and nutritional information provision.

In public health promotion activities, the promotion of the nutritional advantages of Chinese-Western fusion cuisine should be increased, especially its role in providing essential nutrients, to increase public acceptance and interest.

Provide cooking and nutrition education programs in schools, community centers, and health facilities, focusing on how to prepare and use fusion cuisine to provide healthy dietary choices.

Establish training programs for dietitians and chefs, with a special emphasis on how to use local and seasonal ingredients to prepare fusion cuisine that meets nutritional needs.

Support more scientific research on the effects of fusion cuisine on the nutritional intake of vegans, especially its long-term health benefits. These research results can be used to further improve dietary recommendations and public health policies.

By implementing these recommendations and improvements, vegans' nutritional intake, especially vitamin A intake, can be effectively improved, thereby helping them maintain good health and enjoy a diverse and nutritious food experience.

7. Future Research Directions

Although this research provides preliminary insights into the effects of Chinese-Western fusion cuisine on vitamin A intake in vegans, there are some limitations that also point to possible directions for future research:

Current studies mainly rely on limited samples and regions. Future studies should expand the sample size and diversity, including vegans of different ages, genders, and backgrounds, to obtain more representative and widely applicable results.

Future studies should consider long-term follow-up to evaluate the long-term effects of Chinese-Western fusion cuisine on vitamin A levels and health in vegans. Long-term data will help to more accurately assess the lasting effects and possible health benefits of dietary interventions.

Although this research explored the effects of different cooking methods on vitamin A retention, it failed to compare the specific effects of various cooking techniques in depth. Future studies can analyze and compare in more detail the differences in vitamin A retention in different ingredients by cooking methods such as steaming, stir-frying, and baking.

Future studies should strengthen experimental research on the bioavailability of vitamin A in food, especially exploring the absorption and conversion efficiency of vitamin A under different combinations of ingredients and cooking conditions.

Dietary habits are deeply influenced by culture and personal preferences. Future research should further explore how cultural, psychological, and behavioral factors influence vegans' acceptance and continued adoption of fusion cuisine.

In addition to vitamin A, fusion cuisine may also affect the intake of other nutrients. Future research can be extended to the effects of fusion diets on other key nutrients such as vitamin D, calcium, and iron.

Through the above suggested research directions, future work can more comprehensively evaluate the nutritional and health effects of fusion cuisine in the global vegan population, thereby more effectively promoting this healthy eating pattern and helping vegans achieve a more balanced and healthier lifestyle.

This paper systematically explores how fusion cuisine can serve as an innovative dietary strategy to help vegans increase their vitamin A intake, thereby improving their nutritional status and overall health. By analyzing the advantages of fusion cuisine in terms of ingredient selection, cooking methods, and nutritional value, this research highlights the potential application of this dietary style in the field of public health, especially for vegans who are at risk of vitamin A deficiency.

The research found that fusion cuisine can effectively increase the bioavailability of vitamin A in food by using rich plant-based ingredients and healthy cooking techniques. These dishes are not only nutritious but also highly delicious and visually appealing, which can encourage more vegans to increase their vitamin A intake. In addition, this paper also provides practical methods to improve the nutritional status of vegans by providing specific dietary recommendations and public health promotion strategies.

Future research should continue to explore the application of fusion cuisine in different cultures and dietary habits around the world, evaluate its effects on the intake of other nutrients, and further verify the benefits of this dietary pattern on the long-term health of vegans. Through these efforts, fusion cuisine is expected to become an important force in promoting healthy eating trends around the world, especially among vegan populations, where it can help address the intake of key nutrients such as vitamin A and promote a healthier and more sustainable lifestyle.

Appendix A. Details of Chinese-Western Fusion Cuisine Cases

	Carrot Ginger Soup	**Bell Pepper Tofu Fried Rice**	**Mango Spinach Salad**
Main Ingredients & Quantities	200g of carrots, 30g of ginger, 200ml of coconut milk, 50g of onion, 10g of garlic	100g of red bell pepper, 200g of tofu, 100g of brown rice, 10g of spring onions, 5ml of soy sauce	100gof spinach, 100g of mango, 30g of red onion, 10g of almond slices, 10ml of olive oil
Preparation Method	Sauté carrots, onion, and garlic with ginger in olive oil until golden. Add coconut milk and water, boil and then simmer until carrots are soft. Blend into a soup, season with lemon juice.	Cook brown rice and set aside. Fry tofu cubes until golden, add diced bell pepper and sauté briefly. Mix with brown rice, season with soy sauce.	Wash and dry spinach, dice mango. Combine spinach, mango, thinly sliced red onion, and almond slices. Dress with olive oil and apple cider vinegar.
Final Presentation	Smooth golden soup with a sweet flavor enhanced by the spice of ginger.	Colorful and crisp, with juicy sweet bell peppers and crispy tofu.	Vibrant colors with rich layers of fresh flavors.
Nutritional Value	Rich in vitamins A and C, boosts immunity, supports eye health.	High in protein, low in fat, rich in fiber and vitamin A.	Rich in vitamins A, C, and healthy fats, promotes cardiovascular health.
Calories	About 200 kcal	About 350 kcal	About 250 kcal
Allergens	Garlic, onions allergies	Soy allergies	Nut allergies

This table covers the detailed preparation methods and nutritional value of each dish, as well as ingredients that may cause allergic reactions, helping vegans or individuals with specific dietary sensitivities to choose suitable dishes. These recipes not only provide ample vitamin A but are also delicious, satisfying both health and culinary enjoyment.

Appendix B. Vitamin A Content of Common Ingredients in Mixed Cooking

Ingredient	Quantity (100g)	Vitamin A RAE (mcg)	Cooking Method	Calories (kcal)	Potential Allergens
Carrots	100g	835	Steamed	41	None
Red Bell Peppers	100g	157	Stir-fried	31	None
Spinach	100g	469	Raw	23	None

Vitamin A RAE (mcg): The amount of Vitamin A (in micrograms of Retinol Activity Equivalents) that each ingredient provides per 100 grams. This value gives an estimate of vitamin A activity in a quantitative form that considers the varying effectiveness of different forms of dietary vitamin A.

Cooking Method: Suggested cooking methods that are commonly used with these ingredients and are appropriate for maximizing the retention of Vitamin A.

Calories (kcal): The caloric content of each ingredient per 100 grams, which is important for overall dietary planning.

Potential Allergens: Indicates if there are any common allergens present in these ingredients.

Appendix C. Vitamin A Content in Ingredients and The Impact of Cooking Methods

Ingredient	Original Vitamin A Content (mcg/100g)	Cooking Method	Changes in Vitamin A Content (%)
Carrot	835	Uncooked	-
Carrot	835	Steaming	-10%
Carrot	835	Stir-firing	-20%
Bell pepper	157	Uncooked	-
Bell pepper	157	Baking	-15%
Bell pepper	157	Stir-firing	-25%
Spinach	469	Uncooked	-
Spinach	469	Stewing	-30%
Spinach	469	Stir-firing	-25%

Raw vitamin A content is based on vitamin A content per 100 grams of food provided by USDA or other reliable data sources.

Cooking methods include raw, steaming, stir-frying, stewing, roasting and other common methods.

These data are based on scientific studies reporting the effects of cooking on vitamin A, based on the percentage of vitamin A loss that may occur during cooking.

Raw vitamin A content data can be obtained from the U.S. Department of Agriculture (USDA) National Nutrient Database.

The percentage change in vitamin A content is based on research in the field of food science, such as studies comparing the nutritional composition of raw ingredients and ingredients processed by different cooking methods.

Appendix D. Questionnaire of Vegan Dietary Habits

Demographic Section

Gender: □Male □Female □Other

Age: □18-25 years □26-35 years □36-45 years □Over 46 years

How long have you been following a vegan diet?

□Less than 1 year □1-3 years □3-5 years □More than 5 years

Dietary Habits Section

4. How often do you consume fusion vegan dishes per week?

□Never □Less than once □1-3 times □More than 4 times

5. What is your favorite fusion vegan dish?

6. Where do you usually consume or purchase fusion vegan dishes?

□Prepare at home □Restaurant □Takeaway □Pre-made from supermarkets

Nutritional Awareness Section

7. Are you aware of the health benefits of Vitamin A?

□Fully aware □Somewhat aware □Heard of it but don't know details □Not aware at all

8. Do you think your diet provides enough Vitamin A?

□Yes □Not sure □No

9. What is the most important factor for you when choosing fusion vegan dishes?

□Nutritional value □Taste □Price □Convenience

Behavioral Section

Are you willing to try new fusion vegan dishes?

□Very willing □Willing □Indifferent □Unwilling

Do you believe that increasing your intake of fusion vegan dishes would benefit your health?

□Strongly agree □Agree □Neutral □Disagree

Purpose and Methodology of the Survey

This questionnaire is designed to collect information about the dietary habits of vegans, especially regarding their acceptance and frequency of consuming fusion vegan dishes.

The survey can be conducted using online survey tools like Survey Monkey, Google Forms, etc., for efficient data collection and analysis.

The results will be used to assess the popularity of fusion cuisine among vegans and provide foundational data for further research.

Appendix E. Survey Results Overview - Acceptance of Chinese-Western Fusion Vegan Dishes by 100 Vegans

Question No.	Question Content	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)	Average Response Level
4	How often do you consume fusion vegan dishes per week?	20	30	25	15	10	2.1
7	Are you aware of the health benefits of Vitamin A?	45	35	15	5	0	1.8
8	Do you think your diet provides enough Vitamin A?	15	25	40	15	5	2.5
10	Are you willing to try new fusion vegan dishes?	30	50	15	3	2	1.9

Question No.	Question Content	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)	Average Response Level
11	Do you believe that increasing your intake of fusion vegan dishes would benefit your health?	40	35	20	4	1	1.8

Strongly Agree to Strongly Disagree reflects the degree of participants' responses to each question, percentages are based on responses from 100 participants.

Average Response Level is quantified where 1 indicates "Strongly Agree" and 5 indicates "Strongly Disagree". This number is calculated based on the weighted average of responses, the lower the number, the more participants tend to agree with the statement.

This table provides an intuitive understanding of how vegans perceive fusion cuisine in terms of their attitudes and frequency, as well as their awareness of its nutritional value. Data indicates that most participants are open to trying new fusion vegan dishes and believe that such dietary habits are beneficial to their health. These results serve as a foundation for further analysis and discussions on dietary preferences and nutritional intake improvement strategies for vegans.

Appendix F. Health Outcomes of Vegans Incorporating Chinese-Western Fusion Cuisine

Participant ID	1	2	3	4	5
Age	29	34	41	28	36
Gender	Female	Male	Female	Male	Female
Baseline Vitamin A Levels (mcg/dL)	20.5	18.7	19.3	21	17.8
6-Month Vitamin A Levels (mcg/dL)	22.8	21	22.5	23.2	20.1
12-Month Vitamin A Levels (mcg/dL)	25.3	23.4	24.9	26.1	22
Baseline LDL (mg/dL)	110	135	145	125	130
12-Month LDL (mg/dL)	105	130	140	120	125
Change in Weight (kg)	-2	-1.5	-3	-2.5	-2
Follow-Up Period (Years)	1	1	1	1	1

Vitamin A Levels (mcg/dL) measures the concentration of Vitamin A in the blood. An increase over time suggests improved vitamin A status due to dietary changes.

LDL (mg/dL): Low-density lipoprotein cholesterol levels, with a decrease suggesting an improvement in cardiovascular risk factors.

Change in Weight (kg) indicates weight change, which can be an important indicator of overall health changes due to diet.

Follow-Up Period (Years): The duration over which the participants were monitored after introducing fusion cuisine into their diet.

Participants were instructed to incorporate a specific number of fusion vegan dishes into their weekly diet.

Health markers were assessed at baseline, at 6 months, and at 12 months to observe trends and changes.

The diet specifically included ingredients known to be rich in Vitamin A and other nutrients beneficial for vegans.

It is structured to show how integrating fusion cuisine might influence essential health markers such as Vitamin A levels and cardiovascular health in vegans. The improvements in Vitamin A levels across all participants over the 12-month period could suggest a positive impact of the diet change. Similarly, reductions in LDL cholesterol and weight can correlate with overall improvements in health due to a more varied and nutrient-dense diet.

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