Vegetarian Diet: Why Is It Beneficial?

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Abstract. A vegetarian diet is a type of diet that excludes meats, or seafoods, or sometimes even eggs and dairy. People choose to have a plant-based diet like that are called vegetarians, and some of them do so for the purpose of preventing and treating disease. Because of the higher intake of vegetables, grains, fruit, nuts and fiber from a vegetarian diet and lower intake of saturated fat and cholesterol, a vegetarian diet has health benefits in lowering the risks of getting chronic disease like obesity, cardiovascular disease, and maybe even cancer. However, some people believe that eating a plant-based diet might cause an increased risk of deficiency of certain nutrients. The evidence available suggests that through carefully planning their diets and eating fortified food or supplement regularly, vegetarians can certainly be able to meet their nutrition needs. In order to give people who are considering to become a vegetarian some information about the health benefits and suggestions of having a plant-based diet, in this article, we carefully describe and analyze the relationships between vegetarian diets and BMI, obesity, and cardiovascular disease, and then the relationship between vegetarian diets and mortality from the commonest causes of death and cancer.

Keywords: Vegetarian diet, vegans, lacto-ovo vegetarians, obesity, cardiovascular disease, type2 diabetes, cholesterol level, vitamin B12, iron, calcium.

1. Introduction
A vegetarian diet becomes a fashion trend around the word. Evidence suggests that widespread adoption of a vegetarian diet can prevent approximately 40 000 deaths from disease like IHD (ischemic heart disease) in British each year.[1] A lot of researches have done about the role of the vegetarian diet. Researches and evidences have shown that a vegetarian diet can play a role in lowering the risks of having certain chronic diseases. The molecular mechanism and principle of vegetarian diet are hot topics. In this review, we discuss about how a vegetarian diet can lower the BMI (body mass index) and then further reduce the risk of having obesity.[2] According to the research, people who have or who want to avoid having cardiovascular disease are also benefited from a vegetarian diet due to its higher intake of dietary fibers and lower intake of saturated fat compared with a non-vegetarian diet.[3] Besides, effects of a vegetarian diet on cancer are also explore in this article. Furthermore, since a lot of people are concerning the possibility of malnutrition when adapting a vegetarian diet, the current article also provides information regarding calcium, iron and B12 those three nutrients, to demonstrate that if a vegetarian diet is appropriately planned, it can be beneficial to individuals during all stages of life cycles.
2. Definition and classification of vegetarian
Depending on various life styles, health considerations and religions, people always have different choices for their diets. Vegetarians is a group of people who abstain meat, eggs or milk consumptions from their diet, and normally have a diet that based on plants like vegetables, fruits, nuts, legumes and grains. In fact, there are many types of vegetarian mainly included Lacto-ovo-vegetarian, Lacto-vegetarian, Ovo-vegetarian and vegan. In this case, “lacto” refers to dairy products and “ovo” refers to eggs. So a Lacto-ovo-vegetarian consumes a plant-based diet that excludes meat, fish, and poultry but includes dairy and eggs; a Lacto-vegetarian has a plant-based diet that excludes meat, fish, eggs and poultry but includes dairy; a Ovo-vegetarian diet excludes meat, fish, dairy and poultry but includes eggs; and Pesco-vegetarian is someone who also consume fish and seafood besides plants, and a vegan will exclude all the animal products in their diet.[4]

The reason why people would like to choose a vegetarian diet is mainly because they want to have a longer life span. Researches have shown that compared with non-vegetarians, vegetarian normally have a lower mean BMI, a lower average plasma cholesterol concentration, which are among the commonest causes of death.[1] Based on experimental data, researchers have suggested that a vegetarian diet may carry advantages for prevention of obesity, type II diabetes, ±cardiovascular disease and cancer. [5, 6] Because compared with a non-vegetarian diet, a plant based diet tend to be lower in saturated fat and cholesterol, and have higher amount of dietary fiber, magnesium and potassium, vitamins C and E, folate, carotenoids, flavonoids, and other phytochemicals.[4] Table 1 shows a sample of lipid serum level observed from different types of diets includes omnivores, lacto-ovo vegetarians, lacto vegetarians and vegans. The highest cholesterol is observed in omnivores which is 208.09±49.04 mg/dl, and the lowest is found in vegan group which is 141.06±30.56md/dl. (as shown in Table 1) [7].

| Lipid (mean+SD)     | Omnivores    | Lacto-ovo Vegetarians | Lacto Vegetarians | Vegans          |
|---------------------|--------------|-----------------------|-------------------|-----------------|
| Total Cholesterol   | 208.09±49.09 | 175.32±28.47          | 164.82±51.00      | 141.06±30.56    |
| HDL                 | 57.71±14.92  | 55.47±14.61           | 57.75±14.92       | 55.67±13.93     |
| HDL/Total Cholesterol ration | 0.29±012 | 0.32±0.09 | 0.37±0.13 | 0.41±0.11 |
| LDL                 | 123.43±42.67 | 101.47±28.07          | 87.71±41.67       | 69.28±29.53     |
| Triglyceride        | 155/68±11984 | 93.95±33.43           | 95.71±62.51       | 81.67±81.90     |

3. Role of a vegetarian diet in controlling disease.
The beneficial effects of a vegetarian diet on control chronic disease have been reported for numerous times in previous studies. Here, we provide a systematic review of the effect of a vegetarian diet on obesity, type2 diabetes, cardiovascular disease and cancer. Because of the higher intake of vegetables, grains, fruit, nuts and fiber from a vegetarian diet and lower intake of saturated fat and cholesterol, a vegetarian diet or vegan diets demonstrate strong effects on losing weight, and then further lowering the risks of having chronic disease like obesity and cardiovascular disease and also potential impacts on cancer.

3.1. Obesity
The prevalence of obesity is increasing nationally and worldwide [8], and a diet that contains less saturated fat and more fibers are always recommended to obese people. A vegetarian eating patterns have been associated with lower BMI, and BMI increased as the frequency of meat consumption increased in both women and men.[8] From a cohort study collecting data from 22434 men and 38469 women, the results show that the mean BMI was lowest in vegans(23.6 kg/m²) and incrementally higher in lacto-ovo-vegetarian(25.7 kg/m²), pesco-vegetarian(26.3 kg/m²), semi-vegetarians (27.3
The lower BMI of non-meat eaters than meat eaters is partly due to a higher intake of dietary fibre and a lower intake of animal fat, and in men only, a lower intake of alcohol in their meal.[9]

Consistent evidence from clinical trials suggest that vegetarian diets may be helpful for prevention and management of weight-related conditions.[5] Researches have shown that vegetarian diets, and vegan diets in particular, appear to have beneficial effects on weight reduction. However, these benefits appear to attenuate over time.[10]

3.2. Type 2 Diabetes

Type 2 diabetes results from insulin insufficiency superimposed on long-term insulin resistance., and there are about 29 million people in the U.S. with type 2 diabetes. It has always a challenge to cure the type 2 diabetes. It is important for diabetics to control the amount carbohydrates in their diet. a fiber-rich vegan diet is characterized by a low glycemic index and a low to moderate glycemic load.[11] Some evidence indicate lower insulin resistance and higher insulin sensitivity in vegetarians compared to nonvegetarians.[12] Studies have shown that higher intakes of vegetables, whole grain foods, legumes and nuts are associated with a lower risk of insulin resistance and type 2 diabetes, and they are beneficial for glycemic control in morbid or insulin-resistant individuals.[13] On the contrary, processed meats like bacon or hotdog may increase the incidence of diabetes, possibly because of their nitrite content.[6]

Studies are also done in order to investigate the relationship between a vegetarian diet and the prevalence of diabetes in different BMI groups. For BMIs 30 kg/m², the prevalence of diabetes was 8.0% in vegans, 9.4% in lacto-ovo vegetarians, 10.4% in pesco-vegetarians, 11.4% in semi-vegetarians, and 13.8% in nonvegetarians. For BMIs 30 kg/m², the prevalences were 2.0%, 2.1%, 3.3%, 3.7%, and 4.6% in the groups, respectively.[9] Because the high amounts of carbohydrates and low amounts of fat as seen in vegetarian diets can increase the cellular sensitivity thereby providing some protection against diabetes.[14]

3.3. Cardiovascular disease

Large cohort studies have reported that vegetarians have lower risk of cardiovascular disease (CVD) and coronary mortality. [14] A combined analysis of 5 prospective studies demonstrate a 24% lower risk of mortality from ischemic heart disease (IHD) in vegetarians compared with non-vegetarians, with lacto-ovo vegetarians having a 34% reduced risk and vegans a 26% reduced risk. Findings also show large reductions in low LDL cholesterol levels 25-30% in healthy subjects of a vegetarian diets based on fruits, leafy vegetables and nuts [15], and that phytochemical contained in vegetables can act like antioxidants to prevent blood clotting and platelet aggregation.[16]

Based on another relevant study, the lower intake of saturated fat, increased consumption of soluble fiber, whole grains, legumes, soy proteins and nuts from a vegetarian diet are likely to contribute to its cardiovascular benefits.[17] Furthermore, the component of processed meat in a non-vegetarian diet is associated with a higher risk of coronary heart disease (CHD). [18] Therefore, it’s reasonbale to argue that a plant-based diet has a role of preventing chronic disease included CVD.

3.4. Cancer

Cancer is a leading cause of death worldwide and lots of scientists are trying to cure it. There is hypothesis saying that a plant-based diet might play a role in lowering the risks of having cancer like lung, colorectal, breast, prostate and stomach cancer, but the results are not adequately convincing and more study is required.[19] Findings suggest that the high fiber intakes of vegetarians may play a essential role in reducing colon cancer risk, since the bulking effect of the fiber may increase the transit rate of carcinogens through the bowel [20], and then further reduce the surface contact exposure of carcinogens with the wall of the bowel,[21, 22], thus some concluded that in populations with a low fiber intake, doubling the fiber intake could reduce the colorectal cancer by 40%. But this hypothesis
is still controversial given that there is research contradicting previous findings supporting that dietary fiber intakes are not directly related to the incidence of colorectal cancer, and more study and experiments are needed.[23]

4. Nutritional adequacy in a vegetarian diet
Although vegetarian diets show lots of health benefits of preventing chronic diseases like overweight, CVD and diabetes, people concern about the nutrients contained in a plant-based diet, because some nutrients might be more difficult to obtain from a plant-based diet compared with a diet contained meat. Nevertheless, studies prove that as long as people carefully plan their diets and use fortified food or supplement regularly, a vegan diet can be nutritionally adequate for individual’s needs.

4.1. Iron
Iron is an essential mineral to the formation of haemoglobin and myoglobin, which carry the oxygen in the blood and the muscle. [24] Since the nonheme (inorganic) Fe from plant sources is less well-absorbed than heme Fe from animal sources, lots of people are concerning about how much Fe can be drawn in from a vegetarian diet.[24] Food component that enhance iron absorption are normally food of animal origin, and foods that inhibit iron absorption are mainly plant absorption.[25] (as shown in Table 2) Research shows that vegetarian adults typically have lower iron stores than nonvegetarians, although most studies indicate that the ferritin levels are within a normal range.[26] In fact, the vitamin C and other organic acids found in vegetables and fruit can enhance iron absorption and reduce the inhibitory effects of phytate, so then the iron status can be improved.[27]

| Enhancer                        | Inhibitor                  |
|--------------------------------|----------------------------|
| Meat, poultry, and fish.       | Phytic acid                |
| Ascorbic acid.                 | Polyphenols/tannins (tea and coffee) |
| Alcohol                        | Soy protein                |
| Retinol and carotenes          | Egg                        |

4.2. Calcium
Calcium is an important mineral for bones, muscle, blood clotting and nerve. Calcium intakes of lacto-ovo-vegetarians are similar to, or higher than those of nonvegetarians, and intakes of vegans tend to be lower than both groups and may fall below recommended intakes. [28] Although asxlates, phytates and fibre in plant food decrease calcium availability, it is shown that absorption of calcium from many pant foods is excellent.[24] Therefore, compared with nonvegetarian, lactovegetarians seem to be at greater risk of osteoporosis, and vegans are at increased risk of not meeting their calcium needs, especially during the rapid growth phase. [29]. However, many vegans can find it easier to meet their calcium needs if calcium-fortified foods or dietary supplements are utilized.[30]

4.3. B-12
Vitamin B-12 is only contained in food derived from animals. The main sources of vitamin B-12 for humans in a nonvegetarian diet are meat, fish, milk, cheese and eggs [29], and in a vegan diet, main resources of B-12 are omitted. Lacto-ovo-vegetarians can obtain adequate vitamin B-12 from dairy foods, eggs, of other reliable sources, but for vegans, vitamin B-12 can only be obtained from regular use of vitamin B-12 fortified foods like fortified soy and rice beverages. Vitamin B-12 deficiency can contribute to the development of hyperhomocysteinemia, which has been recognized as a risk factor for atherothrombotic and dementia.[31] So for people who are adapting a strict vegan lifestyle, it is essential for them to take supplements and B-12 fortified food, and regular check of vitamin B-12 status is also recommended.
5. Conclusions
People who adapt a vegetarian diet shows a lower BMI and a lower cholesterol concentration that in turn results in a lower risk of having diseases like obesity, cardiovascular disease and type 2 diabetes. Despite the popularity of such topic in research field and numerous findings from previous studies, the effects of being a vegetarian on diseases like cancer still need to be discovered and more solid evidence are required. If a plant-based diet is appropriately planned, and fortified food or supplements are taken regularly, the vegetarian diet is actually nutritionally adequate. As a result, for a person who want to lower risks of having certain chronic disease, a well-planned vegetarian diet is always recommended. Overall, the benefits of a well-balanced vegetarian diet deserve further consideration.

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