

Japanese Dietary Habits and Their Impact on Health

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Abstract. In recent years, the impact of dietary patterns on human health has come under an increasing attention. A wealth of data suggests that healthy dietary patterns reduce the risk of diet-related diseases. Japan currently has the longest average life span in both sexes in the world. Japanese diet has always been known to be healthy, and its unique dietary habits are one of the key reasons for the longevity of the Japanese people. This study examines the relationship between certain non-communicable diseases' incidence and mortality and the Japanese diet. According to this study, in women, eating a lot of soy products is related to a reduction of breast cancer risk. however, relations between soy foods and prostate cancer in men is still debatable. Consumption of soy and fish is linked to a reduction in cardiovascular disease. The high-sodium diet in Japan is related to the increase of stroke and gastric cancer risks, while green tea and coffee are related to a lower risk of stroke. There are few studies that analyses the association between dietary patterns and related diseases in Japan, and this study provides ideas for analyzing the relationship between diet and health in Japan.

Keywords: Japanese Diet, Disease, Nutrition.

1. Introduction

Diet is one of the human lifelong exposure risk factors and a modifiable factor that has important health implications. A variety of dietary patterns have been evaluated. For example, one dietary pattern, the Mediterranean diet (MD), is derived from observations of the dietary habits of populations in Mediterranean regions such as Greece, Spain, and Italy. Reduced consumption of red meat, sugar, and saturated fatty acids are characteristics of the model, with olive oil serving as the main supply of fats. A lower mortality rate from all causes, from cancer, and from cardiovascular disease is linked to MD. Additionally, it is connected to a decline in diabetes and obesity. The DASH diet is suggested to assist preserve cardiovascular health over the course of a person's lifetime. The DASH diet limits the intake of total fat and saturated fats, cholesterol, and sugary products, while being rich in lean meats, vegetables, fruits, and dairy products that are low in fat or free of fat. The DASH diet can improve myocardial damage and reduce prehypertension blood pressure, as well as reduce the risk of stroke, obesity, the incidence rate and mortality of cardiovascular disease (CVD), and diabetes [1]. This shows that dietary habit is one of the influencing factors of human health and can affect the incidence and mortality of some diseases. The geographical and cultural environment of Japan makes the Japanese diet characterized by more seafood, more soy foods, more tea drinks, and more salt, and these characteristics have impacts on the health status of Japanese people. This article focuses on the effects of Japanese dietary patterns on cancer, CVD, and cerebrovascular disease.

2. Characteristics of Japanese dietary pattern

Compared with western countries, Japan's eating habits are quite different. Japanese consume more fish and seafood, as well as meat with low saturated fatty acids. In 2019, the food supply quantity of marine fish in Japan was 5.16 kg/capita/year, which is significantly higher than the world average of 1 kg/capita/year and 0.58 kg/capita/year in the European Union [2]. Docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) can regulate immunity, lower blood lipids, and reduce the chance of CVD death, these two omega-3 polyunsaturated fatty acids (n-3 PUFA) are mostly found in marine fish [3]. Soy can prevent cancer, lower blood pressure and blood lipid. Asians eat a lot of soybeans and soy food. Japanese eat a lot of soybean products such as tofu, miso, soy sauce and natto in their

daily diet, while western countries rarely eat soy. In addition, green tea is a traditional drink in Japan, and is widely consumed in Japan. Today, Coffee is also widely welcomed in Japan. The Japanese have a high salt intake, which is mainly due to the use of various condiments.

3. Comparison of mortality and incidence rate of the diseases with other countries or worldwide

Table 1. Lifespan and healthy lifespan in six countries in 2019

Country	Lifespan			Healthy lifespan		
	Total	Male	Female	Total	Male	Female
Japan	84.26	81.49	86.94	74.1	72.6	75.5
United States of America	78.5	76.28	80.73	66.1	65.2	67
Canada	82.24	80.4	84.05	71.3	70.5	72
Germany	81.72	78.72	84.77	70.9	69.7	72.1
United Kingdom	81.4	79.79	82.99	70.1	69.6	70.6
France	82.48	79.76	85.09	72.1	71.1	73.1

Table 1 shows statistics from a World Health Organization (WHO) database. These statistics show that in 2019, compared with a group of western countries, including Italy, France, United Kingdom (UK), Canada, Germany, and United States (US), both men and women in Japan have the longest life span and the longest healthy life expectancy [4]. In terms of death causes, compared with these countries, CVD and cancer (especially breast cancer and prostate cancer) have the lowest mortality in Japan. On the contrary, the mortality of cerebrovascular diseases is relatively high [5].

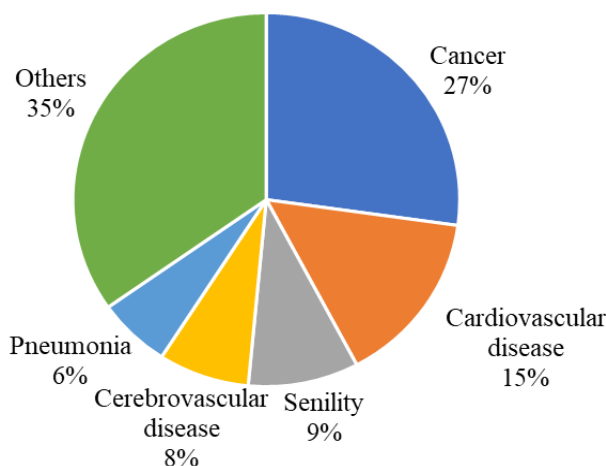


Figure 1. Death rates by cause of death in Japan: 2018-2021

In recent years, as shown in Figure 1, cancer has been the major cause of mortality in Japan, which accounted for approximately 27% on average of all fatalities from 2018 to 2021, followed by heart disease at 15%, senility at 9% and cerebrovascular disease at 8% [6].

4. Dietary patterns and diseases

4.1. Cancer

4.1.1 Breast cancer and prostate cancer

In 2022, breast cancer accounted for 21.4% of the incidence rate of cancer among Japanese women, ranking first, and 9.5% of the cancer mortality among Japanese women, ranking fourth. Prostate cancer had the highest incidence rate of 17.7% among cancers of male in Japan, and accounted for 5.6% of death among cancer deaths of male [7].

According to the thorough analysis, consuming more soybean food was linked to a lower risk of breast cancer than eating little to no soybean food. This could be the case since hormone-dependent disorders like breast cancer and prostate cancer are more likely to occur when estrogen levels are high. Glycitein, genistein, and daidzein are the predominant soy isoflavones that are structurally and functionally similar to 17- β -estradiol. These compounds have the ability to combine with estrogen receptors alpha (ER α) and beta (ER β), which might competitively block the binding of more potent natural estrogens. By preventing the activities of several enzymes, isoflavones can also inhibit cell proliferation and cause apoptosis. In addition, isoflavones, especially genistein, also have the functions of inhibiting tumor angiogenesis and metastasis, promoting antioxidant defense and DNA repair, and interfering with other ER independent signal transduction pathways. One study showed that the incidence of overall mortality and recurrence in post-menopausal patients was statistically considerably reduced when isoflavone and soy consumption was included [8]. Another cohort study had found that, among Japanese women, consumption of isoflavones or miso soup was linked to a statistically significant decrease in the breast cancer incidence. Women who consumed the lowest amount of miso soup or had the minimum intake of isoflavone had approximately twice the breast cancer risk as women who consumed the most miso soup or had the maximum consumption of isoflavone. Additionally, compared with premenopausal women, postmenopausal women have a higher negative connection between consuming isoflavones and being at risk for breast cancer [9]. In general, breast cancer risk in women is inversely correlated with high isoflavone or soy diet.

It is debatable at the moment whether eating soybeans and isoflavones prevents prostate cancer. In 2007, the World Cancer Study Fund recognized Soy as a limited suggestive factor for reducing the incidence of prostate cancer, however with ongoing research, it is currently classed as limited no conclusion [10]. According to some studies, an antagonistic relationship between isoflavones, soy products, and prostate cancer risk was identified [11]. However, a prospective research conducted at a public health center in Japan suggests that a high soy and isoflavone diet may raise the mortality of prostate cancer [10]. A strong positive correlation between total isoflavone consumption and advanced prostate cancer incidence was discovered by another prospective cohort research [12].

4.1.2 Gastric cancer

The rate of gastric cancer in Japan is significantly higher than the average among developed countries, which may be mainly related to the sodium intake of the Japanese population. A strong association between sodium consumption and gastric cancer have been shown in studies [13]. Gastric ulcers, stomach cancer, and duodenal ulcers are all brought on by the H-pylori infection. H-pylori infection is directly connected with sodium consumption. High quantity of sodium is harmful to the sensitive lining of the stomach. This increases the likelihood and severity of H. pylori infection, which subsequently leads to stomach cancer. According to relevant research statistics, the WHO recommended allowance for an adult is 2000 mg/d. It is highly recommended that sodium intake be calculated using the 24-hour urinary sodium excretion because approximately 90% of the consumed sodium is excreted in urine. A study analyzed the 24-hour urine sodium excretion of Japanese healthy adults from 1953 to 2014. The results showed that in healthy adult Japanese populations, the mean urinary sodium excretion weighted 4900 ± 190 mg/d [14]. This showed that the sodium intake of Japanese healthy adults obviously exceeds the recommended salt intake published by WHO. Gastric cancer in Japan is significantly higher than that in other developed countries, and this may be related to the high sodium diet.

4.2. Cardiovascular disease

Japan is a collection of variously sized islands, with rich marine resources and a large fish consumption. Fish is an important source of various nutrients, such as iodine, selenium, n-3 PUFAs, protein and taurine. Among these nutrients, n-3 PUFAs are considered to be related to CVD. Epidemiological and case-control studies in western populations indicates that the consumption of fish with n-3 PUFAs including EPA and DHA, is associated with lower CVD incidence and mortality rates. The researchers found that those with the highest dietary EPA and DHA intakes had a lower

chance of developing heart failure compared to those with the lowest plasma concentrations of EPA and DHA. In addition, people who consume large amounts of EPA and DHA in their diets or who eat several meals of fatty fish every week had significantly reduced sudden cardiac death risk and incidence rate of coronary heart disease [15]. Due to a series of different mechanisms, n-3 PUFAs have many beneficial effects. They have antiarrhythmic action, reduce plasma triglyceride levels, affect lipid metabolism and thrombosis, increase high-density lipoprotein levels, reduce the secretion of proinflammatory cytokines, and act on membrane fluidity.

In addition, the beneficial effects of taurine contained in fish, especially lean fish, on cardiovascular risk factors has been proposed. Taurine is associated with the reduction of blood pressure, and has beneficial effects on blood lipids and anti-atherosclerosis and anti-inflammatory effects.

CVD is also influenced by soy and isoflavone consumption in the diet. Research shows that isoflavones may contribute to vascular protection in high-risk groups. In addition, the high consumption of isoflavones is related to higher brachial flow-mediated dilation, less carotid atherosclerosis in the high-risk population of CVD, better endothelial function, and lower mean maximum carotid intima-media thickness [16]. Additionally, it has been shown that in women, the intake of soy and isoflavone is significantly inversely related to the risk of ischemic CVD death, cerebral infarction and myocardial infarction [17].

4.3. Cerebrovascular disease

Current researches show that consuming more salt dramatically raises the risk of stroke and stroke death. This might be brought on by excessive sodium levels, which cause the inhibition of nitric oxide synthesis, endothelial cell sclerosis, and the thickening and narrowing of resistant arteries, which further increases blood pressure, and about 60% of strokes are caused by high blood pressure. According to studies, an increase in sodium intake of 100 mmol per day considerably increased the incidence and mortality of stroke [18]. On contrary, consuming coffee and green tea can lower the risk of stroke and its subtypes. Green tea contains catechins, which can exert vascular protective effects through a variety of mechanisms, including anti-thrombotic, antioxidant, and anti-inflammatory. Relevant research shows that in the general population, the increase of green tea and coffee consumption is negatively related to stroke incidence rate [19]. This may be related to the strength and co-action of antioxidants and other biological components in the two beverages. However, some non-dietary factors may also play a role in these effects. A person who frequently consumes green tea, is more likely to do physical exercise consistently. People who consume coffee more frequently are more likely to be younger and less likely to be anti-hypertensive drug users or to have a history of diabetes.

5. Conclusion

Through research, this paper has identified a number of possible effects of Japanese dietary patterns on several diseases in the Japanese population, including the following. Breast cancer incidence in women, especially in postmenopausal women, is inversely related to high intake of soy products, but the relationship with prostate cancer is inconclusive. In addition, the high-sodium diet in Japan may be the reason of the relatively high risk of stroke and stomach cancer, whereas high consumption of coffee and green tea is linked to a lower stroke incidence rate. Fish and soy consumption have been associated with a decreased risk of CVD.

This study correlates Japanese dietary patterns with the health of Japanese people and summarizes the possible association of morbidity and mortality of some diseases with dietary patterns. This facilitates further research on the Japanese dietary pattern on human health and the comparison between various dietary patterns with the Japanese dietary pattern.

Finally, this research concentrates on the investigation of the impact of specific nutrients contained in some important foods of the Japanese diet on human-related diseases. However, due to the multiple

covariate limitations of dietary intake, further studies on the overall diet could be conducted in the future to better predict disease risk.

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