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Japanese-style diet and life expectancy

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Abstract

Japanese-style diets have been linked to Japan's long life expectancy. However, the prevalence of non-communicable diseases has increased as Japanese diets have become more influenced by Western food culture. Since it is impossible to administer a lifelong diet to humans, rodent studies have addressed the question of which diet is linked to longevity. National surveys were used to compile menus representative of the Japanese diet at various points over several decades. These studies found that the typical Japanese diet in the late 1990s was healthier than the American diet at that time. Furthermore, mice fed a Japanese diet from 1975 showed the slowest aging and longest life expectancy compared to those fed diets from more recent years. Characteristic components of the 1975 Japanese diet included fish, vegetables, fruits, seaweed, soybean foods, dashi soup stock, and fermented seasonings. Although human studies suggest that the 1975 Japanese diet is healthier than the typical Japanese diet today, more research is needed to confirm these results when considering other lifestyle factors.

Keywords: Japanese diet; Health; Life expectancy; Longevity; Washoku.

1. Introduction

Japan has one of the longest life expectancies in the world and the highest healthy life expectancy, defined as the period of life spent in good health, free from major illness or disease (Tokudome et al., 2016). From 1990 to 2013, life expectancy increased significantly for both Japanese men (from 76.0 to 80.1 years) and women (from 82.0 to 86.4 years) (Tokudome et al., 2016).

In addition to advances in modern hygiene and medicine, the Japanese people's longevity has been attributed to the health benefits of their traditional diet, Nihonshoku or Washoku, which was inscribed on UNESCO's List of the Intangible Cultural Heritage of Humanity in 2013 (Cang, 2018; Lange and Nakamura, 2025b). A traditional Japanese diet score has been found to be inversely correlated with obesity and positively correlated with healthy life expectancy (Imai et al., 2019). Findings from a nine-year longitudinal study using international data suggest that a traditional Japanese diet based on rice may promote health and prolong average life expectancy (Koga et al., 2017; Imai et al., 2026). These results raise the question of what the Japanese diet consists of and which foods in Japan are particularly healthy. Japanese people do not primarily consume Japanese specialties that are well known abroad, such as sashimi, sushi, and tempura. Furthermore, Japanese eating habits have changed over the years.

Until the 1950s, the Japanese diet emphasized staple foods and was low in energy, protein, fat, vitamins, and minerals. Consequently, many people in Japan suffered from nutritional deficiencies. These deficiencies resulted in high neonatal mortality rates, stunted growth, low immunity in children, and high prevalence rates of tuberculosis and other infectious diseases. Ultimately, this led to low life expectancy (Nakamura, 2022). After World War II, rapid economic growth significantly improved the nutritional situation in Japan. Processed livestock foods from America and Europe were introduced. Consequently, infant mortality rates and the prevalence of infectious diseases declined.

The cuisine now considered traditional Japanese developed in the early 20th century. These "traditional" dishes are a fusion of Japanese, Chinese, and Western cuisines. Even as foreign foods began to influence the Japanese diet, the people remained com-

mitted to a rice-based diet. Consequently, Chinese and Western dishes modified to suit the Japanese palate were served as side dishes alongside the main course of rice. Although the Japanese are known as rice eaters, rice production before World War II was insufficient to feed the entire population. In rural rice-growing areas, a mixture of rice, barley, other grains, and vegetables was a staple food. In non-rice-growing areas, rice was scarce, and people ate a variety of grains and tubers. In urban areas, people other than the upper class could not afford to eat enough white rice. The rice shortage during and after the war was severe, and most Japanese people could not regularly eat rice (Shintani and Sekizawa, 2013). Due to severe food shortages after World War II, Japan received food aid from the United States and promoted a Western-style diet. In the 1970s, when health problems caused by this diet became apparent, Japan began exploring the concept of a Japanese-style diet (Center for Food and Agricultural Policy Research, 1983).

A traditional Japanese meal consists of a soup and three dishes, known as ichijū-sansai. This includes one main dish, which is often fish or other protein, and two side dishes, typically vegetables. Rice and soup are also served. This combination provides nutritional variety. The Japanese-style diet is influenced by traditional Japanese eating habits and consists of rice, fish, vegetables, fruit, soybeans, and seaweed. Based on typical Japanese menus from the 1970s, this diet avoids excessive consumption of animal fats, salt, and sugar (Center for Food and Agricultural Policy Research, 1983). The Ministry of Agriculture, Forestry and Fisheries first proposed the concept of a Japanese-style diet in 1980, and it was endorsed in 1983 (Center for Food and Agricultural Policy Research, 1983).

Many studies have examined how individual components of Japanese cuisine impact physical and mental health (Lange, 2020, 2021, 2022; Lange et al., 2015; Lange et al., 2020; Lange et al., 2021; Lange et al., 2022a; Lange et al., 2022b; Wang et al., 2022). The lifespan-increasing effects of phytochemicals, such as catechins (found in green tea) and isoflavones (found in soy), have been demonstrated in animal models (Wagner et al., 2015; Piegholdt et al., 2016). Plant polyphenols, in particular, have emerged as bioactive molecules that can modulate key cellular pathways associated with chronic diseases and aging. The traditional Japanese and Mediterranean diets are both rich in polyphenol-containing foods and beverages. Epidemiological studies have linked these diets to reduced morbidity and an increased lifespan (Fiore et al., 2025; Lange and Li, 2018; Lange, 2018; Lange et al., 2020; Lange, 2019). Mechanisms of action include anti-inflammatory, antioxidant, and hormetic effects. However, people do not choose individual nutrients; rather, they choose combinations of foods in varying amounts. The potential health effects of the Japanese diet as a whole remain unclear.

Studying the health effects of dietary habits in humans requires analyzing diets over many years. In observational studies (e.g., epidemiological), researchers observe the effects of a diet but cannot control exposure. The main limitation of these studies is that they cannot establish cause-and-effect relationships. Randomized controlled intervention trials provide the highest level of evidence for a causal effect of diet. However, it is not feasible to conduct such long-term experiments on humans, so animal subjects are required. Several studies have investigated the effects of a Japanese-style diet on health and life expectancy in rats and mice.

2. Japanese-style diet in animals

Animal experiments are necessary to assess the impact of nutrition and diet on health and life expectancy in ways that are not possible in human trials. Several rodent studies have addressed the effects of Japanese-style diets.

2.1. Japanese versus American diets in rats

In an experimental rodent feeding trial, Tsuduki et al. (Tsuduki et al., 2008) explored differences in liver gene expression between a typical Japanese diet and an American diet from the late 1990s. Two weekly meal plans consisting of 21 meals each, one Japanese and one American, were prepared, freeze-dried, homogenized, and fed to two groups of rats. The outcomes regarding various health indicators were then compared. After three weeks, rats fed the Japanese diet showed increased expression of genes associated with carbohydrate and lipid metabolism, as well as decreased expression of stress-response genes, compared to rats fed the American diet. The Japanese diet group also had lower blood lipid levels and less visceral fat (Tsuduki et al., 2008). Since the ratios of carbohydrates, fats, and proteins were similar in both diets, the different outcomes may be related to qualitative differences, such as the primary sources of carbohydrates (e.g., rice versus wheat) and protein (e.g., fish, soybeans, or meat). In conclusion, the Japanese diet appears to have greater health benefits than the American diet. The Japanese diet showed a lower risk of causing stress, which leads to an accelerated metabolism and is less likely to cause obesity.

However, the prevalence of lifestyle diseases in Japan has increased as the Japanese diet has become more Westernized over the past 60 years. Therefore, the health benefits of the modern Japanese diet are questionable.

2.2. Japanese diets in mice

Over the last few decades, the Japanese diet has changed, and the spread of Western foods and eating habits in Japan is thought to contribute to an increase in various lifestyle-related conditions. To quantify the impact of these dietary changes on health and aging, weekly menus representative of Japanese diets from 1960, 1975, 1990, and 2005 were recreated based on the National Health and Nutrition Survey in Japan. These menus were then prepared as powdered foods (Honma et al., 2013). Groups of normal ICR (imprinting control region) and SAMP8 (senescence-accelerated mouse prone 8) mice, which are widely used as animal models for studying aging-associated diseases, were fed these diets ad libitum. The effects on lipid and glucose metabolic pathways were then examined (Honma et al., 2013). The Japanese diet of 1975 was found to be the most beneficial. This diet suppressed visceral fat accumulation in white adipose tissue and reduced liver fat accumulation and hyperglycemia in both mouse strains. Furthermore, a DNA microarray analysis of the liver was conducted to examine the mechanisms underlying energetic lipid metabolism. The Japanese food mixture from 1975 was found to promote gene expression for high-energy expenditure in ICR mice. Additionally, the food mixture promoted gene expression for enhanced triglyceride degradation, fatty acid synthesis suppression, and cholesterol catabolism in SAMP8 mice (Honma et al., 2013). Overall, these findings suggest that the components of traditional Japanese cuisine are more effective than those of modern Japanese cuisine in preventing metabolic syndrome.

In another study, mice were fed Japanese diets from 1960, 1975, 1990, and 2005 for four weeks (Kitano et al., 2014). The mice fed the 1975 diet exhibited a reduction in white adipose tissue weight. DNA microarray analysis of the liver revealed increased gene ex-

Table 1. Examples of Japanese menus from 1960, 1975, 1990 and 2005 (Yamamoto et al., 2016)

	Breakfast	Lunch	Dinner
Example 1 (1960)	Mixed rice with dried whitebait and green seaweed flakes/Taro and Japanese mustard Spinach miso soup/Cooked beans/Food boiled in soy sauce	Sautéed wheat noodles/Fruit	Rice/Miso-marinated grilled Spanish mackerel/Simmered hijiki seaweed and lotus root
Example 2 (1960)	Toast/Sautéed vegetables/Fruit/Milk	Boiled barley and rice/Simmered soybeans and kelp/Sweet potato boiled in sugar/Pickles	Rice/Sake-steamed short-neck clams/Simmered kiriboshi-daikon/ Miso soup with eggplant
Example 1 (1975)	Rice/Rolled omelet/Fermented soybeans/Miso soup with cabbage and deep-fried tofu/Fruit	Rice with chicken and egg/ Vinegared radish and carrot salad/Vegetables or shellfish stewed in soy sauce	Rice/Marinated horse mackerel/ Skewered tofu and vegetables glazed with sweet miso sauce/Clear squash and Japanese mustard spinach soup
Example 2 (1975)	Toast/Bacon and eggs/Yogurt with fruit	Sweet potato rice/Simmered freeze-dried tofu/Miso soup with pork and vegetables	Rice/Simmered mackerel in miso/ Cooked soybeans with mixed vegetables/Clear soup with Chinese cabbage and wakame seaweed
Example 1 (1990)	Toast/Omelet/Tuna salad with green asparagus/Fruit/Milk	Beef bowl/Simmered spicy konjac/Tofu and deep-fried tofu miso soup	Bread/Seafood gratin/Seaweed salad
Example 2 (1990)	Rice/Rolled omelet/Simmered hijiki seaweed/Miso soup with sweet potato and shimeji mushrooms/Pickles	Hamburger/French fries/Orange juice	Rice/Fried horse mackerel/Lotus root kimpira/Grilled eggplant/ Miso soup with white radish
Example 1 (2005)	Toast/Omelet/Rolled bacon with asparagus/Fruit/Milk	Spaghetti with meat sauce/Pumpkin salad	Aluminum foil-steamed Japanese Spanish mackerel/Braised burdock root/Japanese mustard spinach with mustard sauce
Example 2 (2005)	Rice/Salt-grilled salmon/Pickled spinach dipped in Sauce/Fermented soybeans/Tofu and onion miso soup	"As-you-like-it" pancake/ Marinated bean sprout/Fruit	Rice/Sautéed ginger pork/Potato salad/Onion and beans soup

pression related to glucose and lipid metabolism in the mice fed this diet, indicating metabolic activation (Kitano et al., 2014). Then, the energy ratio of protein, fat, and carbohydrates was kept the same for each Japanese diet using refined feed. Consequently, no significant differences in white adipose tissue weight were observed between the experimental groups (Kitano et al., 2014). In conclusion, the 1975 Japanese diet was associated with a reduced risk of obesity, independent of the diet's energy ratio of protein, fat, and carbohydrates.

The above findings demonstrated some of the health benefits of the Japanese diet, which has changed over time. Another rodent study examined the effects of Japanese-style diets on delayed senescence and enhanced life expectancy. This study investigated the comparative impact of the aforementioned four diets on longevity and the aging process using senescence-accelerated mice (Yamamoto et al., 2016). Four groups of SAMP8 mice were fed standard laboratory chow supplemented with 30% Japanese meals from 1960, 1975, 1990, or 2005 *ad libitum* throughout their lifetime. A control group received only standard laboratory chow. One group of mice (diet of 1960), for example, ate boiled barley with rice, miso soup with clams, chilled tofu, and fruit for breakfast; rice, simmered pumpkin, ground chicken, cucumber, and wakame seaweed for lunch; and rice, tuna, grated yam, and sautéed eggplant with miso for dinner. Another group (diet of 2005) had toast, an omelet, rolled bacon with asparagus, fruit, and milk for breakfast; spaghetti with meat sauce and pumpkin salad for lunch; and aluminum foil-steamed *Scomberomorus niphonius* (Japanese Spanish mackerel), braised burdock root, and komatsuna (Japanese mustard spinach) with mustard sauce for dinner (see Table 1). Further details on the various menus used in the study can be found in Yamamoto et al. (Yamamoto et al., 2016). The mice in a fifth control group were given only standard laboratory chow to examine how mice develop when reared under standard conditions. Changes in the appearance and behavior of the mice associated with the aging process were assessed using an 11-category grading system (Hosokawa et al., 1984). All mice were reared until their natural death to determine the average lifespan of each group.

The results of this study on aging and lifespan are as follows: At 24 weeks, the groups were similar in terms of physical aging according to the grading score results. However, by 48 weeks, senescence was more pronounced in the 2005 group than in the 1975 and 1990 groups. Aging progressed most slowly in the 1975 group. Regarding learning and memory, as assessed by a passive avoidance task, the four groups showed little difference at 24 weeks. However, by 48 weeks, the 1975 group demonstrated less memory and learning impairment than the 2005 group (Yamamoto et al., 2016).

Comparisons of the average lifespans of the 2005 diet group and the groups fed traditional Japanese diets revealed that the lifespan of the 1975 diet group (average 58.1 ± 5.2 weeks) was significantly longer than that of the 2005 diet group (average 49.0 ± 2.5 weeks). The lifespan of the 1990 group (average 54.4 ± 3.6 weeks) tended to be longer than that of the 2005 group. There were

no statistically significant differences in lifespan when comparing the 1960 group (average 52.0 ± 3.7 weeks) and the control group (average 51.3 ± 4.4 weeks) with the 2005 group (Yamamoto et al., 2016). In conclusion, these findings suggest that the 1975 diet extends the lifespan of mice more effectively than the modern Japanese diet.

3. Characteristics of the Japanese diet of 1975

The 1975 diet used in the aforementioned rodent studies contained more legumes, fruits, seafood, seaweed, seasonings, and spices than the diets from 1960, 1990, and 2005. It also contained a greater variety of ingredients. Consumption of juice and sweetened soft drinks was relatively low. (Sugawara et al., 2018) suggested five beneficial elements characteristic of the 1975-type Japanese diet (with the respective ratios between the 1975-type Japanese diet and the modern diet in brackets).

The first component is variety, indicating the number of ingredients used in the diet (ratio of 1.14). The second component is the nature of cooking, indicating the frequency of boiled, simmered, steamed, and uncooked foods (ratio of 1.26). The third component is the composition of foods, indicating a higher proportion of soy products, seafood, vegetables, fruits, seaweed, mushrooms, and green tea (ratio of 1.30). The fourth component is condiments, indicating the use of soup stock (dashi) and fermented seasonings, such as soy sauce, miso, mirin, sake, and vinegar (ratio of 1.43). The fifth component is form, indicating consumption of cooked rice and soup (ratio of 1.42).

To identify the characteristic components of the 1975 diet, mass spectrometry and principal component analysis were used to analyze Japanese diets from several years (Iwagaki et al., 2017). Components that had particularly high values in 1975 but low values in other years were histamine, histidine, naringin, pyridoxamine, catechin, chromium, boron, isoleucine, arachidonic acid, glycitein, stearidonic acid, daidzein, tyramine, and leucine. Searching for foods containing these components revealed that fish contains histamine and arachidonic acid, fruits contain naringin and catechin, vegetables contain pyridoxamine, seaweed contains chromium and boron, dried bonito contains histidine, isoleucine, and leucine, soy foods contain glycitein and daidzein, and fermented foods contain tyramine (Iwagaki et al., 2017).

Histamine exhibits hormonal activity in the brain, stimulating the satiety center and reducing appetite and visceral fat (Chiba et al., 2016). Although histamine cannot cross the blood-brain barrier, the amino acid histidine can (Sakata, 2003). In the brain, histidine is converted to histamine (Chiba et al., 2016). Naringin, a polyphenol flavanone glycoside found in citrus fruits, promotes lipid metabolism in the liver and serum (Kanitsar et al., 2001; Jung et al., 2006). Pyridoxamine, a water-soluble vitamin B6 compound found in cereals and vegetables, can improve metabolic dysfunction, insulin resistance, and adipose tissue inflammation (Maessen et al., 2016). Catechin, a polyphenol found in apples, citrus fruits, and tea (Amaki et al., 2011), can promote weight loss, alleviate metabolic syndrome, and prevent cardiovascular disease and diabetes (Yang et al., 2016). Chromium, an essential trace element, is present in seafood and seaweed and improves lipid metabolism (Seif, 2015). Boron, an essential trace element for plants, is found in vegetables, legumes, fruits, and marine algae (Tanaka and Hori, 1999). Compounds containing boron have been shown to improve lipid homeostasis (Zhao et al., 2014). The essential amino acid isoleucine, found in fish and dairy products, suppresses lipid accumulation in tissues (Nishimura et al., 2010). The free fatty acid arachidonic acid is found in eggs, meat, fish, and shellfish. It affects the taste of food, and sensory testing has shown that it tastes delicious in chicken fat or vegetable oils with high levels of arachidonic acid (Kiyohara et al., 2011). However, the health benefits of arachidonic acid may be limited due to its proinflammatory activity and positive correlation with circulating cholesterol levels (Monteiro et al., 2014). Isoflavones, such as glycitein and daidzein, are present in soy foods (Tsuda, 2008) and can improve lipid metabolism in the liver (Izumi et al., 2000; Kobayashi et al., 2014). Stearidonic acid, an omega-3 polyunsaturated fatty acid, is found in vegetable oils and seaweed (Baik et al., 2015). The beneficial health effects of stearidonic acid are assumed to be due to elevated tissue levels of eicosapentaenoic acid, docosapentaenoic acid, and docosahexaenoic acid after ingestion, as observed in animal experiments (Surette, 2013). Tyramine is produced primarily by microorganisms during fermentation and is found in seafood, cheese, miso, and soy sauce (Ibe, 2004). The essential amino acid leucine is found in dairy products, fish, shellfish, and meat. Leucine can improve metabolic abnormalities and mitochondrial dysfunction (Li et al., 2012).

In conclusion, the main characteristic components of the 1975 Japanese diet with potential health benefits appear to be fish, vegetables, fruits, seaweed, soybean foods, dashi soup stock, and fermented seasonings.

4. Japanese-style diet in humans

Several studies have examined whether health-related outcomes associated with the 1975 Japanese diet apply to humans.

A randomized controlled trial was conducted to compare the effects of the 1975 Japanese diet to those of a modern Japanese diet (Sugawara et al., 2018). For this study, 32 young adults, aged 20–29 years, were randomly assigned to follow either the 1975 Japanese diet or the modern Japanese diet, as defined by the 2015 Japan National Health and Nutrition Survey. Each individual consumed their respective diet three times a day for 28 days. Changes in body composition and blood biochemistry were evaluated. The group that consumed the 1975 Japanese diet experienced statistically significant reductions in body weight, body fat mass, body fat percentage, serum triglyceride levels, and serum low-density lipoprotein cholesterol levels. Meanwhile, serum high-density lipoprotein cholesterol and serum magnesium levels increased significantly (Sugawara et al., 2018). These results suggest the 1975 Japanese diet has beneficial effects on human lipid metabolism.

Another study aimed to investigate whether the 1975 Japanese diet could reduce abdominal fat in overweight individuals (Asano et al., 2019). In a randomized controlled trial with a single blind design, the 1975 Japanese diet and the modern diet were compared in 60 overweight individuals (body mass index 25–30 kg/m^2) aged 20–70 years. Participants consumed their assigned diet three times a day for four weeks. Body composition and blood biochemical examinations were performed before and after the test phase. Compared to the modern diet group, the 1975 diet group showed statistically significant decreases in body mass index, fat mass, and levels of low-density lipoprotein cholesterol, glycated hemoglobin, and C-reactive protein. Meanwhile, high-density lipoprotein cholesterol levels increased significantly (Asano et al., 2019). In conclusion, the 1975 Japanese diet appears to have beneficial effects on lipid metabolism in overweight individuals and may reduce the risk of metabolic disorders such as obesity and diabetes.

In summary, the available research suggests that the Japanese diet of 1975 is healthier than the typical Japanese diet today.

5. Mechanisms underlying the health effects of the 1975 Japanese diet

To study the physiological effects of the 1975 Japanese diet, the serum of mice fed the 1960, 1975, 1990, or 2005 Japanese diets was analyzed using mass spectrometry and principal component analysis (Iwagaki et al., 2018). Components with particularly high values in the 1975 diet and low values in the other diets included gamma-aminobutyric acid (GABA), which has beneficial physiological effects, including stress reduction (Kim et al., 2004; Krystal et al., 2002). Thus, a stress-reduction effect was inferred as a novel physiological effect of the 1975 diet. To test whether this diet actually reduces stress, mice were fed the 1975 diet or a control diet for four weeks (Iwagaki et al., 2018). Mice were fed either the 1975 diet or a control diet for four weeks. One group was housed under ordinary conditions, while the other group was subjected to restraint stress. Consumption of the 1975 diet significantly reduced elevated serum corticosterone and glucose levels in mice exposed to restraint stress (Iwagaki et al., 2018). Furthermore, serum GABA levels increased significantly in mice exposed to restraint stress and increased further with the intake of the 1975 diet. Previous studies have shown that serum GABA increases to relieve stress when stress is applied (Kim et al., 2004; Krystal et al., 2002). An increase in serum GABA was observed in mice fed the 1975 diet regardless of stress presence (Iwagaki et al., 2018). These findings suggest that the 1975 diet increases serum GABA levels and reduces stress.

Another study aimed to investigate variations in lipid metabolism and intestinal bacterial flora, as well as the mechanisms involved, using mice. Visceral fat accumulation and gut microbial flora were examined in three groups of mice that were fed a modern Japanese diet, a 1975-type Japanese diet, or a control diet for four weeks (Asano et al., 2020). Compared to the control diet, the other two diets were low in protein and high in fat and carbohydrates. The total weight of white adipose tissue was significantly higher in mice fed the modern Japanese diet than in the control group, and lower in the 1975 Japanese diet group than in the modern Japanese diet group. Mice fed the 1975-type Japanese diet showed inhibited adipocyte hypertrophy, reduced serum levels of triacylglycerol, total cholesterol, and phospholipids, enhanced expression of hormone-sensitive lipase mRNA in epididymal adipose tissue, and increased numbers of bacteria associated with short-chain fatty acid production (Asano et al., 2020). In summary, consumption of the 1975-type Japanese diet inhibited fat accumulation in the white adipose tissue of mice compared to consumption of the modern Japanese diet. This was due to the diet's ability to increase the number of beneficial bacteria in the host and reduce serum lipid levels and adipocyte size.

A randomized controlled trial was conducted to explore the involvement of intestinal bacteria in the health benefits of the 1975 Japanese diet. The trial analyzed the fecal microbiota composition of individuals who consumed this diet and those who consumed a modern Japanese diet (Kushida et al., 2019). Participants aged 20–29 years were randomly assigned to the 1975 or modern diet groups. Each person consumed their respective diet three times a day for four weeks, and changes in their intestinal microbiota were evaluated. Four bacterial genera (unclassified *Lachnospiraceae*, *Parabacteroides*, *Sutterella*, and unclassified *Rikenellaceae*) changed significantly following consumption of the 1975-type diet. Correlation analyses revealed relationships between changes in these genera and decreases in biological parameters that indicate lifestyle diseases, such as body fat percentage, fat mass, and levels of glutamic oxaloacetic transaminase, triacylglycerols, and hemoglobin A1c (Kushida et al., 2019). These results suggest that alterations in intestinal bacteria contribute to the health benefits of the 1975 Japanese diet.

6. Future directions

The life expectancy of mice was shown to be influenced by Japanese diets from different years. The relevance of these findings to human health requires further investigation. The percentages of protein, fat, and carbohydrates contributing to the total energy of the experimental meals may play a role. The percentage of protein was highest in 1990 and lowest in 1960; the percentage of fat was highest in 2005 and lowest in 1960; and the percentage of carbohydrates was highest in 1960 and lowest in 2005 (Yamamoto et al., 2016). Although the extension of life span related to diet is unlikely to result from a single factor, the role of the respective contributions of major nutrients to healthy aging requires further research. A difference in dietary fiber intake can be ruled out since all four diets contained similar amounts. The quantity of certain foods may be an important factor that contributes to their health benefits and potential to extend lifespan. For example, the long-term consumption of high quantities of fish oil, which contains omega-3 polyunsaturated fatty acids, has been shown to reduce the lifespan of SAMP8 mice and the nematode worm *Caenorhabditis elegans* (Tsuduki et al., 2011; Sugawara et al., 2013). In mice, the negative impact on lifespan was likely caused by strong oxidative stress, which led to the hyperoxidation of membrane phospholipids and diminished the antioxidant defense system by decreasing tocopherol levels (Tsuduki et al., 2011). Conversely, small amounts of fish oil containing antioxidants increased the lifespan of both species (Sugawara et al., 2013; Tsuduki, 2015).

Today, centenarians and other very old people in Japan consumed the Japanese diet of the 1970s when they were middle-aged, between 40 and 55 years old. Thus, they had a good diet at an age when senescence begins and lifestyle-related chronic diseases usually develop. However, the increase in life expectancy cannot be extrapolated because young adults, adolescents, and children eat a modern Japanese diet. Therefore, today's exceptional life expectancy may not be maintained in the future when diet-related noncommunicable diseases may increase. Further exploration, development, and promotion of the traditional Japanese diet are needed to delay the aging process and maintain good health.

For example, a study aimed to develop a diet with even greater health benefits than the 1975-style Japanese diet based on the findings of health benefits and increased life expectancy in mice following this diet (Iwagaki et al., 2017). Mass spectrometry was used to analyze Japanese diets from different years and determine the characteristic components of the 1975 diet. Principal component analysis revealed 14 characteristic compounds in the 1975 diet from fish, seaweed, vegetables, fruits, soybean foods, soup stock dashi, and fermented seasonings, including histamine, histidine, naringin, pyridoxamine, catechin, chromium, boron, isoleucine, arachidonic acid, glycitein, stearidonic acid, daidzein, tyramine, and leucine (Iwagaki et al., 2017). A modified diet containing more of these components was prepared and fed to mice. Compared to mice fed the 1975 diet, those fed the modified diet showed a significant decrease in liver total cholesterol and serum LDL cholesterol levels, as well as a downward trend in serum total cholesterol. Additionally, the serum adiponectin level increased in mice fed the modified diet. Both serum thiobarbituric acid reactive substances (an indicator of oxidative stress) and interleukin levels (an indicator of inflammation) were reduced (Iwagaki et al., 2017).

In conclusion, modifying the 1975 diet resulted in a healthier diet. The translational relevance of these findings requires further investigation.

Metabolic health appears to be affected by the complex interactions among diet, gut bacteria, and host genetics (Huda et al., 2022). Findings indicating that changes in intestinal microbiota are involved in the health benefits of the 1975 Japanese diet (Kushida et al., 2019) suggest that the diet-microbiome-metabolic health axis must be considered when developing more effective nutritional strategies to improve metabolic health.

Maintaining a healthy weight and avoiding obesity are key to good health over the entire lifespan. Some argue that the relatively modest daily food energy intake in Japan is more important than the composition of the Japanese diet. Studies have demonstrated the effects of significantly reducing energy intake on longevity in many animal species (Anderson et al., 2009). However, restricting specific nutrients without reducing overall food energy intake did not show the same effect. Okinawa's reduced calorie intake over long periods of time is believed to contribute to its high life expectancy compared to other parts of Japan (Willcox et al., 2007). The lower prevalence of being overweight or obese in Japan compared to other G7 countries likely delays the onset of age- and diet-related diseases (NCD Risk Factor Collaboration, 2017).

An important nutritional factor related to health in Japan is salt intake. Salt consumption was extremely high in the past (Sakata and Moriyama, 1990) and remains high today, exceeding the World Health Organization's and the Japanese government's recommended daily intake of 5–7.5 g (Ikeda et al., 2025). This high intake of salt likely contributes to increased mortality and reduced life expectancy. High salt intake contributes significantly to hypertension, cardiovascular disease, and stroke (Strazzullo et al., 2009). Stroke was the leading cause of death in Japan in the 1950s, and the stroke-related death rate was the highest worldwide (Marmot and Smith, 1989; Fujishima, 1996). After the 1950s, the increased availability of fresh food and the widespread adoption of refrigeration enabled the Japanese to reduce their consumption of salt-preserved food. The stroke mortality rate decreased by 70% from 1960 to 1990 (Shimamoto et al., 1996). The reduction of salt intake from food and the subsequent decrease in blood pressure were the main factors responsible for this success (Marmot and Smith, 1989; Ueshima, 2007). Furthermore, consumption of green and yellow vegetables and fresh fruits has been inversely correlated with mortality from stroke and other cerebrovascular events (Nagura et al., 2009; Takachi et al., 2008; Sauvaget et al., 2003b). Consumption of animal products, including fish, dairy, and eggs, may protect against intracerebral hemorrhage (Sauvaget et al., 2003a). However, Japan's relatively high salt intake still needs to be addressed by public health measures.

The ME-BYO concept from Japan's Kanagawa Prefecture is interesting in terms of maintaining good health and requires further evaluation (Nakamura et al., 2023; Nakamura et al., 2025). Similar to traditional Eastern medicine, ME-BYO views health and sickness as a continuum rather than a dichotomy. ME-BYO emphasizes recognizing and managing non-disease states before they develop into clinical conditions, encouraging people to take a proactive approach to health. Individuals are supported in maintaining health and preventing disease progression through lifestyle-based approaches that complement medical approaches. A ME-BYO-based diet focuses on improving the "pre-disease" phase with a Mediterranean-style Japanese diet to slow aging and prevent chronic inflammation. This diet combines characteristics of the Japanese and Mediterranean diets, such as high consumption of plant-based foods and seafood (Santa, 2025). The Mediterranean diet uses extra virgin olive oil and dairy products but limits red meat. In contrast, the Japanese diet includes seaweed and fermented foods (Lange and Nakamura, 2025a, 2026; Lange et al., 2015; Suzuki et al., 2018). Balancing fish and meat consumption may promote health and longevity (see Lange and Nakamura, 2025b, for a discussion of this topic). Further scientific studies are required to investigate these aspects.

The health benefits of the Japanese diet of 1975 and the Mediterranean diet have been compared (Mizowaki et al., 2017). For this study, one-week menus for each diet were created using FAOSTAT Food Balance Sheets. The diets were prepared, freeze-dried, and powdered, then fed to mice for four weeks to examine their effects on lipid metabolism. Compared to mice fed the Mediterranean diet, those fed the Japanese diet had lower visceral fat weight, smaller adipocytes, lower liver weight, and less lipid accumulation in hepatocytes. Furthermore, the expression levels of genes related to fatty acid synthesis were lower and the expression levels of genes related to the catabolism of fatty acids and cholesterol were higher in mice fed the Japanese diet compared to the Mediterranean diet (Mizowaki et al., 2017). In conclusion, compared to the Mediterranean diet, the Japanese diet decreased lipid accumulation in white adipose tissue and the liver. This was achieved by suppressing fatty acid synthesis and promoting the catabolism of fatty acids and cholesterol in the liver. The comparative and potentially synergistic effects of these diets on life expectancy require further investigation.

While diet is undoubtedly important for health, other lifestyle factors also play a role (Nyberg et al., 2020). One such factor is regular physical activity (Lange, 2017; Lange et al., 2023; Lange, 2024), which is generally higher in Japan than in many other countries (Inoue et al., 2020). Japanese people, for example, walk more as part of their daily lives (Lange and Nakamura, 2024, 2025c). Insights from the world's Blue Zones, regions with high concentrations of centenarians and healthy older adults, show that longevity is related to diet, exercise, and an environment that promotes healthy lifestyle choices (Buettner, 2025). Further research should address the interaction between diet and other lifestyle factors to improve health and life expectancy.

7. Conclusion

The Japanese diet has sparked global interest due to its association with Japan's high life expectancy. However, Japanese food culture has increasingly been influenced by American and European cuisine over the years, while the prevalence of non-communicable diseases has increased.

Since it is impossible to conduct lifelong dietary studies on humans, typical Japanese diets from decades past were recreated and examined in rodent studies to determine their impact on aging and life expectancy. National surveys were used to compile menus representative of the Japanese diet at various points over several decades. Studies on rats showed that the typical Japanese diet of the late 1990s had greater health benefits than the American diet of that time. The Japanese diet was found to promote a more active metabolism and lead to a lower likelihood of obesity. Furthermore, mice fed a 1975 Japanese diet showed the slowest aging and longest life expectancy compared to those fed more recent diets.

The 1975 Japanese diet mainly consisted of fish, vegetables, fruits, seaweed, soybean foods, dashi soup stock, and fermented seasonings. Although human studies suggest that the 1975 Japanese diet is healthier than the typical Japanese diet today, more research is needed to confirm the relevance of these results in the context of other lifestyle factors.

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