The Role of the Mediterranean Diet on Health and Its Inspiration for Chinese Diet

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Abstract. Health problems in China are becoming increasingly serious, as people's consumption levels increase, the drawbacks of imbalanced dietary intake continue to emerge. On the list of the world's best diets, Mediterranean Diet has been champion for five consecutive years. As the top, the Mediterranean diet has a unique and superior dietary pattern. Many studies have shown that the MD helps to lower rates of chronic diseases. Therefore, this paper explores the advantages of MD's nutritional structure and its positive impact on chronic diseases, in order to find new solutions for the Chinese diet to be more beneficial to human health. After introducing the origin and development of the Mediterranean diet, this paper explains the main dietary rules and food composition of the Mediterranean diet, and analyzes the advantages of its nutritional structure by combining specific food groups with their nutrient content. MD's positive effects on different kinds of chronic diseases, such as cancer and diabetes, are presented through a synthesis of studies. Then the current status and shortcomings of the Chinese diet are analyzed, and the possibilities for the development of the Chinese diet are further explored by comparing the two different dietary patterns. It is hoped that this paper will contribute to a healthier Chinese diet in the future.

Keywords: Mediterranean Diet; health; chronic disease; Chinese diet.

1. Introduction

Health related to living environment, habits, hobbies, genetic factors, etc. closely. Among these influencing factors, diet is very crucial as one of the bases for the body to maintain life. Diet can provide the body with a large amount of daily energy, immune substances to fight germs, essential vitamins, fiber and trace elements, enzymes and hormones for biochemical and reactions in the body, etc. If the diet is not properly consumed, it can drain the body's health, from accelerated aging to diseases, so it must be taken seriously. For example, vitamins can promote the growth and development of the body, regulate physiological functions. Vitamin A can maintain the normal visual function of the human body, and its lack could lead to dry eye diseases and toad skin disease. Vitamin D can regulate blood calcium levels and immunity, lack of which could lead to children's suffering from rickets and adults' suffering from osteoporosis, etc. Minerals include macronutrients and trace elements, among which selenium has the functions of protecting the heart muscle health, antioxidant, protecting cell membranes, etc., lack of which could lead to osteoporosis. Selenium has the functions of protecting heart muscle health, antioxidation, protecting cell membrane, etc., and is susceptible to Creutzfeldt-Jakob disease when deficient. MD is built on naturally occurring nutrients, consisting of vegetables, fish, fruits, seafood, olive oil, and legumes, with moderate amounts of garlic and red wine, complemented by a unique way of cooking with condiments. It is rich in plant foods, with low processing of food and high freshness, mainly consuming seasonal and locally produced foods, with fats providing 25-35% of all energy in the diet, with sat and fat accounting for just around 7-8%. Fruit is a typical everyday necessity after-meal treat, and desserts are consumed a few times a week only. Current Chinese diet is composed of 70% of calories and 67% of protein from staple grains, with fresh natural food as a side dish, rich in vegetables, with an appropriate mix of fruits, mushrooms and algae, and low levels of fine processing, but with a significant increase in meat consumption. Mediterranean Diet has received a lot of attention due to its ranking in the list and its positive effects on health. Therefore, this article will introduce the association of MD and chronic diseases, and comparison together with inspiration for the Chinese diet.

2. Characteristics of Mediterranean Diet

2.1. The Origin of Mediterranean Diet

The Mediterranean Sea lies among Asia, Europe, Africa, with around 20 countries along the coast, most of which are European cities. Researches of MD originate from scholar's concern on the regional differences in human health around 1960. In a seven-country study, Ancel Keys et al. found that people from Mediterranean regions or countries that follow a diet whose primary source of fat is olive oil have lower mortality and cardiovascular disease rates, due to this fact they started their survey on MD [1]. In the year of 1957, Ancel Keys first proposed the definition of 'Mediterranean Diet' as the explanation of the dietary pattern with low saturated fatty acid content and high vegetable oils content [2]. They use 'Mediterranean Diet' to represent the dietary patterns found in the late 1950s and 1960s in the olive growing regions of Crete, Greece and southern Italy [3]. Now, decades later, not only does MD represent a kind of dietary pattern, but also a unique lifestyle.

2.2. Connotations of Mediterranean Diet

MD is characterized the following dietary features: highly daily intake of vegetables (minimum two), fruits (minimum one),grains(mainly whole grains),legumes, nuts, fish, allowance for moderate amount of poultry, egg and dairy products. It is recommended to select different types of fruits and vegetables through different colors and textures in order to ensure the intake of antioxidants and other beneficial ingredients. Main source of fats come from olive oils which is rich in unsaturated fatty acid. It is also recommended to drink some wine in everyday life, and limit the amount of red meat, butter and refined food. Mediterranean Diet as a whole is marked by low consumption of SFA, higher intake of USFA, high-quality protein, low salt and low calories. It tends to use herbs and spices (basil, garlic, rosemary, mint, nutmeg, sage, pepper, cinnamon, etc.) instead of common condiments, and cook mainly by low-temperature heating. In addition to diet, people also cooperate with regular physical activity. From the aspect of nutritional composition, grains, fruits, vegetables can bring a large number of dietary fiber, vitamins, minerals and other beneficial ingredients. Grains mainly include brown rice, whole oats, barley, rye, whole wheat, buckwheat, etc. Vegetables mainly include tomatoes, broccoli, onions, cauliflower, etc. Fruits mainly include apples, bananas, oranges, pears, etc. Red wine contains flavonoid and other potent antioxidants., Seafood mainly includes sardines, salmon, trout, mackerel, tuna, etc. Nuts mainly include walnuts, cashews, etc. Seafood, nuts and olive oil can provide a great amount of unsaturated fatty acids [4-11].

3. MD and chronic diseases

3.1. MD and diabetes mellitus

The Mediterranean diet, rich in unsaturated fatty acids, can control blood glucose by reducing late glycosylation end products and regulating metabolism. Kuo Zhang et al. indicated that the MD could effectively decrease FBG, 2hPG and HbA1c levels in type 2 diabetes patients, and the longer the intervention, the better the effect: lower fasting glucose [WMD= -0.66, 95% CI (-0.95, -0.36), $P < 0.01$], 2-h postprandial glucose [WMD= -1.15, 95% CI (-2.20, -0.09), $P = 0.03$] and glycosylated hemoglobin [WMD= -0.28, 95% CI (-0.41, -0.15), $P < 0.01$] levels [4]. Subgroup analysis showed that 6 months ≤ 12 months of intervention reduced glycosylated hemoglobin [WMD= -0.33, 95% CI (-0.54, -0.12), $P = 0.002$] and ≥12 months of intervention had the best effect on glycosylated hemoglobin reduction [WMD= -0.33, 95% CI (-0.54, -0.12), $P = 0.002$]. The best effect on glycated hemoglobin reduction was observed after 12-month intervention [WMD= -0.36, 95% CI (-0.47, -0.25), $P < 0.01$]. FBG, 2hPG and HbA1c. As main source of fats in the Mediterranean diet, olive oil provides a large amount of monounsaturated fatty acids and phenolic substances, which can improve the lipid structure by regulating cholesterol levels and increase the antioxidant effect of the body, thus reducing HbA1c. Meanwhile, the low intake of red meat and butter ensures low saturated fatty acids,

which is beneficial to the improvement of reduction of blood glucose. A series of controlled trials of MD about gestational diabetes in pregnancy showed that MD controlled the incidence of pregnant women's gestational diabetes effectively, including those at high risk (family history of type 2 diabetes and gestational diabetes), improving the quality of delivery and reducing the incidence of neonatal critical illness. The analysis of 660 pregnant women (traditional diet group 328, dietary intervention group 332) showed that from 24 to 28 weeks of gestation, compared to conventional diet group, the incidence of gestational diabetes was dramatically lower in the diet intervention group ($P < 0.05$) in terms of fasting hemoglobin and glucose tolerance test, 2-h glucose level after sugar intake, and gestational diabetes, as well as in terms of pregnancy weight gain, emergency cesarean section, preterm delivery, macrosomia, and perineal tear. The incidence of emergency cesarean section, preterm delivery, perineal tears, large babies, and the probability of admission to the care unit were reduced ($P < 0.05$).

3.2. MD and cancer

The morbidity and mortality rates of colon cancer (CRC) have been the highest of all tumor types in both men and women, and dietary factors like fruits and vegetables account for about 40% of the main causes of CRC incidence and death. Colorectal cancer is one of the most common malignant tumors of the gastrointestinal tract [6]. Rosato V et al. analyzed 3745 CRC patients and 6804 non-CRC patients in Italy, with a score range of 0-9 according to MD adherence, and calculated the relationship between OR and 95% CI of colorectal cancer by a multifactorial logistics regression model, controlling for confounding factors, indicating that adherence to MD reduces the incidence of CRC (OR=0.52, 95% CI) [7]. The MD diet is rich in vitamins, dietary fiber, and fatty acids from the large consumption of whole grains, fruits and vegetables. According to one study by Shasha Li et al. on MD and CRC, the occurrence of CRC was negatively associated with vitamin D intake, and this negative association was more pronounced in the female population, and CRC was negatively associated with a diet high in dietary fiber (OR=0.65, 95% CI=0.54-0.77), especially from grains or fruits [6]. A nutritional structure that substantially replaces saturated fatty acids with unsaturated fatty acids helps to reduce bile accumulation, thus reducing the incidence of CRC. In a cohort study by Xiaoyun Zhu et al. on MD to decrease the risk of colorectal neoplasms, adhering to the MD has implications for reducing the risk of colorectal tumors in men and women, and the protective effect was stronger in men (M: OR = 0. 76, 95% CI: 0. 65, 0. 88; F: OR = 0. 86, 95% CI: 0. 77, 0. 86) [8]. The risk of intestinal neoplasia was higher in men (male: OR = 0. 76, 95% CI: 0. 65, 0. 88; female: OR = 0. 86, 95% CI: 0. 77, 0. 97).

3.3. MD and other diseases

3.3.1. MD and intestinal flora

The common bacterial phyla of the intestinal flora are Phyllobacterium, Thick-walled, Actinomycetes, Aspergillus, Clostridium, and Wolbachia, with Phyllobacterium and Thick-walled accounting for more than 90% of the total intestinal flora in abundance. increased levels of short-chain fatty acids (SCFA), Pseudomonas putida and Phylum thick-walled. When subjects better followed the rules of the Mediterranean diet, they had higher levels of Pseudomonas spp. and Bifidobacterium spp. and SCFA. Some specific components of the intestinal flora were associated with typical food components of the Mediterranean diet, for example, cereals with Bifidobacterium, E. faecalis, olive oil and red wine with E. faecalis. Accumulation of polyphenols in the colon causes microbial fermentation and promotes the growth of beneficial bacteria, and reduces the genus containing pathogens.

3.3.2. MD and atherosclerosis

A study by Yuanyuan Xiao et al. indicated that Mediterranean dietary pattern is favorable to reduce the incidence of myocardial infarction, and the possible mechanism is that the nutrients have cardioprotective effect by delaying atherosclerosis and anti-thrombosis, which may be related to the

anti-oxidative stress effect of these nutrients [10]. Most foods in the Mediterranean diet are rich in natural oxidants such as vitamin E, vitamin C, lycopene, and polyphenolic compounds (including quercetin, resveratrol, tyrosol, and curcumin), and thus may inhibit oxidative stress by inhibiting ROS or affecting specific ROS-generating enzymes, thereby slowing the progression of atherosclerosis and inhibiting platelet activation and the coagulation cascade through this antioxidant effect. This antioxidant effect can slow down the progression of atherosclerosis, inhibit coagulation cascade and platelet activation, and thus affect the process of atherosclerotic plaque rupture and thrombosis. It has also been shown that the relative risk of the cardiovascular event composite endpoint (myocardial infarction, stroke and mortality from circulatory causes) was decreased by 30% in MD group using exceptional virgin olive oil or nuts in comparison to the lower fat control diet group [12].

4. Chinese Diet and Mediterranean Diet

4.1. Current Chinese diet

Survey data on Chinese diet from 1961 to 2017 shows that energy intake per Chinese almost tripled in the last few decades and the major issue has changed from the shortage of food to the imbalance of nutrition structure and over-nutrition [13]. In terms of the specific types of food, the focus of consumption has shifted from grains to high-nutrition-value food, especially red meat. What is more, as estimated, meat and dairy consumption would be continuously increasing in a long period of time. Throughout the investigation period, the consumption of cereals in China has increased yearly and legumes consumption has decreased annually, however, they are still above the dietary guideline recommendation level, which lead to over-intake of staple food. The intake of fruits and vegetables has gradually risen from the severe deficiency to excess and come to balance. The intake of meat has also shifted from lack to excess. However, dairy products consumption has been consistently lower than suggested levels and grown in an extreme slow way. Due to the Chinese excessive staple food as well as meat intake and insufficient consumption of dairy products, there lies a huge problem in current Chinese diet structure.

4.2. Comparison between Chinese Diet and MD

In terms of cooking, the completion of Chinese traditional food will always go after deep frying or stewing. Although this kind of cooking style leads to its rich taste, diverse colors and varied aromas, inevitably, it destroys the nutrients in the ingredients contributing to the loss of nutrition. In terms of ingredients, the difference between Chinese Diet and Mediterranean Diet mainly lies in red meat and processed food. It has been shown that the risk of CHD in T2DM patients with a per capita intake of red meat >50 g/d is 6.76 times higher than that in T2DM patients with a per capita intake of <25 g/d [14]. It has also been shown that an additional daily serving of processed red meat in the US population is linked to a 21% elevated risk of cardiovascular death [15]. Nowadays, the consumption of processed food growing constantly in China for its delicious taste, convenience, stable shelf life and cheapness. However, on the other hand, MD raises objections towards processed food. It does harm to human health. For example, it lacks water and carbohydrates and has high glycemic load and high energy density, which, in some degree, equals to a lower diet quality. As a result, there are much more energy than needed stored inside, which will lead to obesity. Research shows that obesity can lead to cardiovascular disease, cancer and type 2 diabetes, and the percentage of obesity will increase as the consumption of refined processed foods increases [16].

4.3. Possibilities of the combination between MD and Chinese Diet

The Chinese diet can be improved by replacing staple foods with whole grains, limiting the consumption of refined processed foods, replacing some of the heavy cooking with light cooking, and drinking wine in moderation as to improve the current diet. In terms of cooking oil, the olive oil used in the Mediterranean diet does offer some benefits, but many common domestic cooking oils such as peanut oil and canola oil also have many merits. Intake of only one type of oil may be

detrimental to human health due to the imbalance in fatty acid intake, so a healthier oil goal can be achieved by changing vegetable oils on a regular basis.

5. Conclusion

Most of the foods in the Mediterranean diet are rich in protein, fiber, vitamins and polyphenolic compounds, which together can strengthen the body's immunity and improve its health. From enhancing physical fitness through a balanced intake of nutrients to controlling chronic diseases such as diabetes, cancer and atherosclerosis, the MD has many positive effects on human health. Following the Mediterranean diet pattern is a healthy and effective way to change lifestyle habits and thus prevent diseases. Even if one cannot strictly follow the Mediterranean diet, understanding its components and making appropriate changes can promote individual health. In daily life, people should try to avoid foods such as red meat and refined processed foods, and actively advocate MD. Given the superiority of the MD, it has great reference value for the improvement of the Chinese diet. However, there are few studies on the improvement of the Chinese diet in the direction of the MD, and further studies can be carried out to seek the feasibility.

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