

# The Potential Role of the Mediterranean Diet in Preventing Depression in the Elderly

Xinyue Jiang

*Department of Food system, Nutrition and Health University of Washington. Seattle WA 98105*

*\*Corresponding author*

**Abstract:** In the recent decade, due to its nutritional components and diversified food structure, the Mediterranean diet has been under extensive research for having relations to the prevention or improvement of several health problems. This review aims at discussing the potential preventive role of the Mediterranean diet in elderly depression. This article first summarizes the core characteristics of the Mediterranean diet and its benefits in improving physical health. Meanwhile, the paper discusses the prevalence of depression among the elderly and the major influencing factors, including psychological, physiological, and social ones. By analyzing the existing literature, this article explains in detail the positive effect of the Mediterranean diet on the mental health of the elderly and then further develops the possible role of the Mediterranean diet in preventing depression through anti-inflammatory and antioxidant mechanisms. This article summarized the association between depression in the elderly and Mediterranean diet. It could serve as a useful reference for the public health area and support its use as a potential intervention strategy in the prevention of elderly depression.

**Keywords:** Mediterranean Diet; Depression in the Elderly; Prevention; Mental Health; Antioxidant

## 1. Introduction

### 1.1 Research Background and Importance

It has also become an increasingly serious public health problem worldwide, especially in an aging society. Depression not only seriously affects the quality of life of the elderly but also increases the burden on their

physical health [1]. Since the elderly often have multiple chronic diseases and have limited medication treatment options, non-drug interventions are becoming increasingly important in preventive and therapeutic measures against depression [2]. Dietary patterns have recently become a focus, attracting more and more attention regarding their potential antidepressive effects. Among them, the Mediterranean diet has been widely regarded because of its rich antioxidant components and anti-inflammatory mechanisms that would serve as a preventive effect in a variety of psychological and physiological diseases [3].

The Mediterranean diet is characterized by a high intake of olive oil, fish, vegetables, and fruits, which may lower the level of inflammation responses and oxidative stress in the body quite efficiently [4]. This has a close relation to the pathological mechanism of depression. There is a great deal of evidence that strongly points to the Mediterranean diet having an especially essential role in modulating neurotransmitter function, improving intestinal microbiota, and reducing inflammation in the body and as such, preventing elderly depression [5]. Second, this positive relationship between the Mediterranean diet and mental health has been verified in many prospective studies, especially those in the elderly population, whose benefits are particularly prominent [6].

### 1.2 Research Objectives

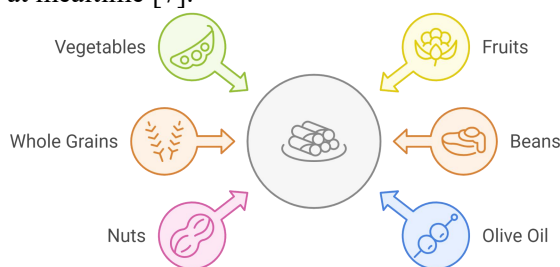
This paper systematically reviews the literature related to the possible role of the Mediterranean diet in preventing depression among the elderly, explores the biological mechanism behind this hypothetical association, and summarizes the results of previous studies that reflect the diet-depression association. The review focuses on the

antidepressant effect of the Mediterranean diet in the elderly population, its contribution to alleviating depressive symptoms, and improving quality of life. This paper attempts to theoretically prepare for the further research and clinical application by reviewing the existing literature in this field, thus further promoting the promotion and application of the Mediterranean diet in the field of elderly mental health.

## 2. Overview of the Mediterranean Diet Pattern

### 2.1 Definition and Characteristics of the Mediterranean Diet

The Mediterranean diet pattern originated from the traditional dietary habits of the Mediterranean coastal areas. It is mainly based on plant-based foods (see figure1); its core includes a large amount of vegetables, fruits, whole grains, beans, nuts, and olive oil. Olive oil in every form constitutes the major source of fat in the Mediterranean Diet. Antioxidant effects may be strong due in large part to the polyphenols contained therein, though olive oil is the richest source of monounsaturated fats. The Mediterranean diet recommended fish and white meat in limited quantities and reduced the consumption of red meat and processed meat. Fermented milk products, like yogurt and cheese, especially moderate drinking, focusing on moderate consumption of red wine at mealtime [7].



**Figure 1: Plant-based Foods Mainly Included in the Mediterranean Diet**

Another important aspect of the Mediterranean diet is that it relies a great deal on foodstuffs of natural origin, unprocessed-providing emphasis on fresh, seasonal, and locally produced foods. The characteristics of this model are related not only to food but also to dietary culture, such as family meals, social interactions, and healthy lifestyles [8]. Various components of the diet interact synergistically, thereby exerting an effect other than that of a

single nutrient. As research digs deeper, the nutrition median thought is that the Mediterranean diet is a holistic diet involving several food components' synergistic effects. In this way, the Mediterranean diet could meet nutritional needs and show significant advantages in health and the prevention of various diseases by means of different mechanisms [9].

### 2.2 Health benefits of the Mediterranean diet

The Mediterranean dietary pattern was characterized by a peculiar nutritional profile, having a preventive effect on several chronic diseases, mainly cardiovascular events and metabolic syndrome. A large number of studies have shown that long-term adherence to the Mediterranean diet can effectively reduce the incidence of cardiovascular events and has a significant improvement effect on a variety of metabolic-related diseases such as obesity, hypertension, and type 2 diabetes [9]. For example, the Mediterranean diet with olive oil and vegetables is generously composed of antioxidants that, besides reducing oxidative stress, might delay the progression of cardiovascular disease through anti-inflammatory mechanisms [10].

It has also been observed that, besides various cardiovascular health benefits, the Mediterranean diet also has a preventive role in the neurodegenerative disorders of the brain, such as Alzheimer's disease. Several prospective studies have demonstrated that the Mediterranean diet is closely associated with reduced cognitive decline among the elderly [11]. The evidence for mental health-supported Mediterranean diet has gradually attracted attention, especially the potential role in preventing depression supported by more and more experimental evidence.

Improved levels of inflammation and oxidative stress may mean that the Mediterranean diet has an important role to play in promoting mental health [12].

## 3. Influencing Factors and Current Status of Elderly Depression

### 3.1 Definition and Epidemiology of Elderly Depression

Elderly depression is the depression that happens to the elderly, usually with

accompanying physiological aging, chronic diseases, and increased psychosocial stress. It affects not just the quality of life of the elderly but is also associated with a higher rate of comorbidity and mortality. Epidemiologically, it is shown that the incidence of elderly depression increases linearly with age, with the incidence rate significantly increasing after the age of 75 years. In a study among elderly people over 75 years, the overall incidence of elderly depression was 38.2%, wherein 1.0% had severe depression and 2.5% had mild depression [13]. This result reflects that depressive symptoms are very common among the elderly population, especially the incidence of mild depression and depressive symptoms increases significantly with increasing age.

Besides, the epidemiological studies carried out in different parts of the world presented the fact that the incidence of depression among elderly people is connected with several variables: marital status, educational level, and health status. Those who are divorced, widowed, lesser educated, and who appraise their health condition as poor possess a greater risk of depressive symptoms [14]. It has shown that the depression of the elderly is related to physiological, socioeconomic, and psychological reasons. Therefore, the epidemiological feature of depression in elderly patients provides an important reference for understanding the complexity of this disease.

### **3.2 Main Factors Affecting Depression in the Elderly**

Depression in old age is influenced by many complex and varied factors including physiological, psychological, social environment, and lifestyle. First, the health of one's body plays an important role in affecting depression in old age. It has been learned from recent studies that the incidence of depression among elderly people suffering from cardiovascular diseases, stroke, and diabetes has increased tremendously. These diseases may not only bring direct influence on aged people's physical function but also give more psychological burdens to them, with induction of depression due to pain, mobility problem, and life quality decline [15].

These factors are also psychological and social in nature, wherein the increment of depression among the elderly is the most important. As

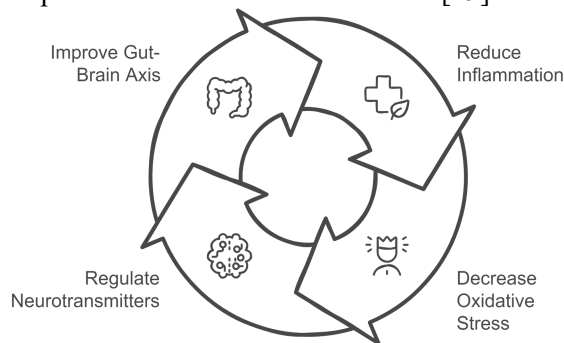
usual, loneliness and a lack of social support are common triggers that facilitate the cascade of depression among the elderly. For instance, it has been pointed out in the literature that among the elderly, those with feelings of loneliness or a lack of social interaction have a higher chance of developing depressive symptoms [16]. Other common risk factors for depression among the aged include financial pressure, low life satisfaction, and functional decline [17]. This therefore means that besides physical health, the mental and social state of the aged serve as the key determinants in depression. Therefore, preventing depression among the elderly requires not only intervention at the physiological level but also pays attention to psychological and social improvement.

## **4. Association Between Mediterranean Diet and Depression in the Elderly**

### **4.1 Mechanism of the Effect of Mediterranean Diet on Mental Health**

The Mediterranean diet has widely been studied for its various beneficial implications on mental health, and it exerts anti-inflammatory, antioxidant, and neurotransmission-modulating effects. This fact is succinctly expressed in Figure 2. This is because the Mediterranean diet contains a tremendous amount of ingredients with antioxidants and anti-inflammatory chemicals, including polyphenols in olive oil, fish rich in omega-3 fatty acids, and a variety of vegetables and fruits that effectively help diminish inflammatory responses and oxidative stress in the body. Inflammation is associated with oxidative stress, and both are closely linked to the development of depression. By decreasing these pathological mechanisms, the Mediterranean diet may play an important role in both prevention and alleviation of depressive symptoms [18]. In addition, the Mediterranean diet can regulate the function of neurotransmitters, especially acting on the levels of serotonin in the brain to enhance mood and mental health. Several studies have shown that the incidence of depression and anxiety in individuals following the Mediterranean diet is significantly lower compared to other dietary patterns. Such a dietary pattern, by promoting intestinal health and improving the function of

the gut-brain axis, may also result in positive impacts on mental health conditions [19].



**Figure 2. Mechanism of the Mediterranean Diet's Impact on Mental Health**

#### 4.2 Review of Research on Mediterranean Diet and Elderly Depression

Many studies have confirmed that the effect of the Mediterranean diet on preventing and relieving elderly depression is large. A systematic review has revealed that adherence of the elderly to the Mediterranean diet can significantly reduce the incidence of depressive symptoms, especially in the high-risk group where the benefit of such is more prominent [20]. A multicenter European study demonstrated that elderly subjects with a good adherence to the Mediterranean diet had significantly lower scores in depression when compared to subjects showing poor adherence to such diet, and this factor is most definitely expressed in people in older age with chronic diseases [21]. Additionally, the protective long-term effects of the Mediterranean diet have also been confirmed. In the intervention study, after 6 months of improvement, there was not only an improvement in the mental health of participants but also an extension to quality of life and overall health [22]. This therefore implies that the Mediterranean diet can be used as an effective intervention strategy in preventing and managing elderly depression amidst the growing incidence of depression in an aging society. This dietary pattern can be a key booster for public health policies.

#### 5. Conclusion

Existing studies have consistently shown that the Mediterranean diet has a positive impact on the mental health of the elderly, especially in preventing and alleviating elderly depression. These studies reveal that the Mediterranean diet can effectively reduce the

incidence of depressive symptoms and improve the overall health of the elderly through mechanisms such as anti-inflammatory, antioxidant and improved neurotransmission. In addition, the Mediterranean diet pattern is not only beneficial for depression, but also provides broad support for cognitive function, cardiovascular health and chronic disease management in the elderly. However, although the results are generally consistent, there are still some differences in research methods, such as the way to assess dietary compliance and the differences in intervention effects in different regions and populations. Therefore, more standardized research designs are needed to ensure the general applicability of the conclusions.

Nevertheless, the benefits of the Mediterranean diet in reducing depressive symptoms and improving the mental health of the elderly have been supported by multiple prospective studies and systematic reviews. This provides a theoretical basis for public health intervention, especially in the context of coping with the high incidence of depression in an aging society. The promotion of this dietary pattern can play an important role in reducing the burden of depression in the elderly.

#### References

- [1] Rudzińska, A., Perera, I., Gryglewska, B., Gąsowski, J., Piotrowicz, K.: Can the Mediterranean diet decrease the risk of depression in older persons - a systematic review. *Psychiatria polska*, 1-16 (2022).
- [2] Hodge, A., Almeida, O., English, D., Giles, G., Flicker, L.: Patterns of dietary intake and psychological distress in older Australians: benefits not just from a Mediterranean diet. *International Psychogeriatrics* 25, 456-466 (2012).
- [3] Skarupski, K., Tangney, C., Li, H., Evans, D., Morris, M.: Mediterranean diet and depressive symptoms among older adults over time. *The journal of nutrition, health & aging* 17, 441-445 (2013).
- [4] Hernández-Galiot, A., Goñi, I.: Adherence to the Mediterranean diet pattern, cognitive status and depressive symptoms in an elderly non-institutionalized population. *Nutricion hospitalaria* 34, 338-344 (2017).



- [5] Luciano, M., Möttus, R., Starr, J., McNeill, G., Jia, X., Craig, L., Deary, I.: Depressive symptoms and diet: Their effects on prospective inflammation levels in the elderly. *Brain, Behavior, and Immunity* 26, 717-720 (2012).
- [6] Trichopoulou, A., Martínez-González, M., Tong, T., Forouhi, N., Khandelwal, S., Prabhakaran, D., Mozaffarian, D., de Lorgeril, M.: Definitions and potential health benefits of the Mediterranean diet: views from experts around the world. *BMC Medicine* 12, 112 (2014).
- [7] Ventriglio, A., Sancassiani, F., Contu, M., Latorre, M., Di Slavatore, M., Fornaro, M., Bhugra, D.: Mediterranean Diet and its Benefits on Health and Mental Health: A Literature Review. *Clinical Practice and Epidemiology in Mental Health: CP & EMH* 16, 156-164 (2020).
- [8] Martínez-González, M., Gea, A., Ruíz-Canela, M.: The Mediterranean diet and cardiovascular health: A critical review. *Circulation Research* 124, 779-798 (2019).
- [9] Guasch-Ferré, M., Willett, W.: The Mediterranean diet and health: a comprehensive overview. *Journal of Internal Medicine* 290, 549-566 (2021).
- [10] Tosti, V., Bertozzi, B., Fontana, L.: Health benefits of the Mediterranean diet: Metabolic and molecular mechanisms. *The Journals of Gerontology: Series A* 73, 318-326 (2018).
- [11] Serra-Majem, L., Roman-Viñas, B., Sánchez-Villegas, A., Guasch-Ferré, M., Corella, D., la Vecchia, C.: Benefits of the Mediterranean diet: Epidemiological and molecular aspects. *Molecular Aspects of Medicine* (2019).
- [12] Finicelli, M., Di Salle, A., Galderisi, U., Peluso, G.: The Mediterranean Diet: An Update of the Clinical Trials. *Nutrients* 14 (2022).
- [13] Luppá, M., Sikorski, C., Luck, T., Weyerer, S., Villringer, A., Koenig, H., & Riedel-Heller, S.: Epidemiology of depression in old age: results of the Leipzig longitudinal study of the aged (LEILA 75+). *Journal of Epidemiology & Community Health* 65, A127 (2011).
- [14] Maier, A., Riedel-Heller, S., Pabst, A., & Luppá, M.: Risk factors and protective factors of depression in older people 65+. A systematic review. *PLoS ONE* 16 (2021).
- [15] Huang, C., Dong, B., Lu, Z., Yue, J., & Liu, Q.: Chronic diseases and risk for depression in old age: A meta-analysis of published literature. *Ageing Research Reviews* 9, 131-141 (2010).
- [16] Espirito-Santo, H., Vicente, F., Cardoso, D., Silva, G. F., Ventura, L., Costa, M., & Daniel, F.: EPA-1653 – Risk and Protective Factors of Depression in Institutionalized Elderly. *European Psychiatry* 29, 1-1 (2014).
- [17] Lue, B., Chen, L. J., & Wu, S. C.: Health, financial stresses, and life satisfaction affecting late-life depression among older adults: a nationwide, longitudinal survey in Taiwan. *Archives of gerontology and geriatrics* 50, S34-8 (2010).
- [18] Ghosh, T., Rampelli, S., Jeffery, I., et al.: Mediterranean diet intervention alters the gut microbiome in older people reducing frailty and improving health status: the NU-AGE 1-year dietary intervention across five European countries. *Gut* 69, 1218-1228 (2020).
- [19] Vicinanza, R., Bersani, F. S., D'Ottavio, E., et al.: Adherence to Mediterranean diet moderates the association between multimorbidity and depressive symptoms in older adults. *Archives of gerontology and geriatrics* 88, 104022 (2020).
- [20] Rudzińska, A., Perera, I., Gryglewska, B., et al.: Can the Mediterranean diet decrease the risk of depression in older persons - a systematic review. *Psychiatria polska*, 1-16 (2022).
- [21] Castelló, J. V., & Tubianosa, C.: Linking Mediterranean Diet and Lifestyle with Cardio Metabolic Disease and Depressive Symptoms: A Study on the Elderly in Europe. *International Journal of Environmental Research and Public Health* 17 (2020).
- [22] Parletta, N., Zarnowiecki, D., Cho, J., et al.: A Mediterranean-style dietary intervention supplemented with fish oil improves diet quality and mental health in people with depression: A randomized controlled trial (HELFIMED). *Nutritional Neuroscience* 22, 474-487 (2017).