

A REVIEW ANALYSIS ON THE EFFECTIVITY OF MEDITERRANEAN DIET IN THE PREVENTION AND MANAGEMENT OF DIABETES MELLITUS

S. Gayathri¹, B. Bharathi^{2*}, V. Eunice¹ and Deepa C. Philip³

¹Dept., Clinical Nutrition, MMM College of Health Sciences.

²Dept., of Microbiology, MMM College of Health Sciences.

³Principal, MMM College of Health Sciences.

***Corresponding Author: Dr. B. Bharathi**

Dept., of Microbiology, MMM College of Health Sciences.

Article Received on 30/04/2022

Article Revised on 20/05/2022

Article Accepted on 09/06/2022

ABSTRACT

A review-based study that analyzes the effectivity of Mediterranean diet in the prevention and management of diabetes mellitus. The study included objectives such as the effectiveness of the Mediterranean diet in the prevention of diabetes in healthy non-diabetic individuals, understanding if the Mediterranean diet is truly effective in the management of diabetes among diabetics and the impact of the Mediterranean diet in the control of diabetes-related comorbidities. Based on review related articles, the study concluded that the Mediterranean diet consisting of high MUFA, nuts, whole grains, legumes and salmon gives great effects on the control of diabetes. Inter-relationship of diabetes and gut microbiome also resulted in an inverse association and the Mediterranean diet helped in a better balance of the ratio. Long-term effects even provided better reproductive health in men and women.

KEYWORDS: Mediterranean Diet, MUFA, Microbiome, Diabetes-related comorbidities.

INTRODUCTION

Diabetes is a disorder of high blood sugar levels. Glucose is the chief source of energy from the diet. Insulin from the pancreas helps conversion of glucose from food to energy (Ancel Keys, A. M, 1986). The prevalence rate of diabetes has seen a significant rise from 108 million (1980) to 422 million (2014) especially, in low- and middle-income than high-income countries. Further from 2000 to 2016, a 5% increase in premature mortality has been recorded due to diabetes. By 2019 it has become the ninth leading cause of death

across the globe (1.5 million deaths) with blindness, kidney failure, heart attacks, stroke, and lower limb amputation as the key complications caused by diabetes.

The Mediterranean diet was first described by Ancel Keys, in 1960 based on the observation of dietary patterns of some populations in the Mediterranean region. The Mediterranean dietary pattern (Image 1.1) emphasizes the following foods to be included in the diet (Ancel Keys et al, 1986; Dong D Wang et al, 2002).

PERIOD	FOOD
DAILY	OLIVE OIL – MUFA FRUITS VEGETABLES LOW FAT DAIRY PRODUCTS WHOLE GRAINS
WEEKLY	FISH POULTRY TREE NUTS LEGUMES
MONTHLY	RED MEAT
MODERATELY	ALCOHOL

Image 1.1: Components of Mediterranean Diet and their consumption pattern.

MATERIALS AND METHODOLOGY

The study was performed as a review analysis of various articles. The articles chosen were published between the years 2015 - 2022. The study conducted was grouped to find answers to the various objectives.

RESULTS AND FINDINGS

DIABETES PREVENTION IN NON-DIABETIC HEALTHY INDIVIDUALS

The first objective of the study is to find the efficacy of the Mediterranean diet in preventing diabetes occurrence among non-diabetic healthy individuals. In a prospective clinical trial-based study conducted by Brigham and Women's Hospital, Harvard Medical School among a study population of 25,000 American women for over 5 years, it was observed that higher consumption of MED lowered the risk of type 2 diabetes by 30%. The study used biomarkers such as insulin resistance, BMI, HDL, inflammation markers, and Fasting Blood Glucose levels to monitor the outcomes. Amidst, the general American population, higher MED intake was associated with a 25% reduction in the occurrence of diabetes. Apart from diabetes prevention the reports also showed improved metabolic performance, insulin resistance, adiposity biomarkers and reduced inflammatory signs. The use of a plant-based diet with higher MUFA through extra virgin olive oil and lower red meat & sweets consumption account for the major beneficial agents of the diet and their mechanism of functioning is complex nutrient density with a low glycemic index (Elham Rahmanian *et al.*, 2019).

Among the European population, a meta-analysis of randomized controlled trials and cohort studies by Cambridge University showed a 19% reduction in the risk of diabetes and suggests it to be a nutritional strategy for public health to combat diabetes. The reported mechanism of control seems to be an alteration through diet in the causal linkage between oxidative stress, inflammation, endothelial dysfunction and diabetes, though; this is suggestive of further study for interconnections (Jordi Salas *et al.*, 2016).

DIABETES MANAGEMENT

Diabetes is a disorder that needs maintenance of normal blood glucose levels. According to Standards of Medical Care in Diabetes 2020 by the ADA, the insistence is on focused lifestyle modifications for improved management of diabetes even with significant development of pharmacological support. Looking back at the history of the Mediterranean diet, the initial implementation of the diet was for the benefits of cardiovascular health and diabetes then was being overlooked as a mere state of hyperglycemia. Eventually, Type 2 diabetes mellitus & cardiovascular health were found to be intertwined and the Mediterranean diet began to be consumed by a larger population.

The PREDIMED (Prevention by Mediterranean Diet) study suggests that the Mediterranean diet supplemented with extra-virgin olive oil or nuts majorly slowed down cardiovascular eventualities, compared to other popular diets of reduced-fat. In addition, it showed that a Mediterranean diet with nuts helped 13.7% of people with metabolic syndrome reverse their condition. For the first time, the PREDIMED study also firmly indicated that the Mediterranean diet reduced the risk of developing Type 2 diabetes mellitus by 52% in patients who had no diabetes (Lukas Schwingshac *et al.*, 2014).

In the study conducted among 1076 pregnant women from 10 different countries, the Mediterranean Diet pattern was associated with a lower incidence of gestational diabetes and better glucose tolerance in women with gestational diabetes also.

The recent findings from the total PREDIMED cohort after 4.8 y of follow-up also showed that the Mediterranean diet was associated with reversion of metabolic disorders by a reduction in the hyperglycemia and waist circumference components of the syndrome despite very little weight loss.

Image 1.2 showed a sub-analysis of the PREDIMED trial involving 110 women with metabolic syndrome also reports that compared to the control diet, the MED reduced oxidative damage to lipids and DNA (Maria *et al.*, 2016).

EFFECT ON DIABETES BASED CO-MORBIDITIES

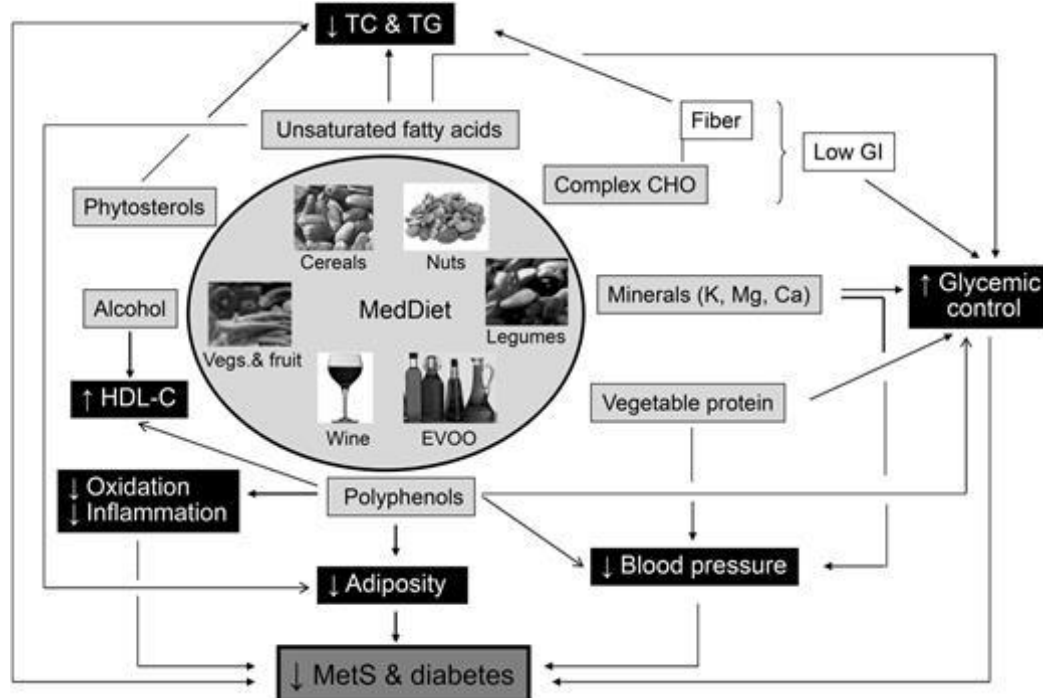


Image 1.2: Flow chart of components of the Mediterranean diet and their effect on various disorders.

A Cohort study of USA Hispanic/Latino men and women who are the native consumers of the Mediterranean diet showed that adherence to MED had higher abundances of major dietary fiber metabolizers (e.g., *Faecalibacterium prausnitzii*). This association was greater among diabetics in MED with depleted levels of Prevotella. The 1-SD increment in the MED index was associated with 24% lower odds of diabetes in Prevotella non-carriers (Shafqat Ahmad., 2020).

Infertility among women is seen as vascular and ovarian hormone dysfunction. Based on an RCT, no significant difference was observed in baseline sexual function in men or women, but, C-reactive protein levels predicted erectile dysfunction in men. Over the entire follow-up, the changes in the primary outcomes were significantly lower in the Mediterranean diet group compared to the other low-fat diet group with IIEF and FSFI showing a significant decrease with the Mediterranean diet (Tatjana Milenkovic *et al.*, 2021) (Trichopoulou, A, 2001).

CONCLUSION

- Mediterranean diet consisting of high MUFA, nuts, whole grains, legumes and salmon gives great effects on the control of diabetes.
- The randomized trials showed lower glucose and insulin levels among healthy non-diabetic individuals and high-risk individuals.
- A meta-analysis among diabetics shows a decreased magnitude of risk by 19%.
- Management of diabetes included metabolic pathways leading to diabetes mellitus, metabolic syndrome and CVD and diabetes hemostasis, lipid

profile and CRP levels thus, a control strategy inclusive of co-morbidities.

- Inter-relationship of diabetes and gut microbiome also resulted in an inverse association and the Mediterranean diet helped in a better balance of the ratio.
- Long-term effects even provided better reproductive health in men and women.

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