

# Dietary Patterns and Cardiovascular Disease: A systematic review of 29 prospective studies with 1,249,644 participants, published in the last 20 years

Athanasia Karagiannidi<sup>1</sup>, Aikaterini Kanellopoulou<sup>1</sup>, Demosthenes Panagiotakos<sup>1,2</sup>

<sup>1</sup>Department of Nutrition & Dietetics, School of Health Science & Education, Harokopio University, Athens, Greece

<sup>2</sup>Faculty of Health, University of Canberra, ACT, Australia

## ABSTRACT

**Aim:** The fact that the role of various dietary patterns on cardiovascular disease (CVD) incidence has not yet been well established, reveals the need to estimate the association of dietary patterns and CVD risk.

**Material and Methods:** A review of English language articles, archived in PubMed (2000-2021) was performed. Additional studies were identified by searching the bibliographies of the eligible articles at the start of the review. Search items included: coronary heart/cardiovascular disease, dietary patterns, diet, Mediterranean, DASH, prudent, western, vegan, plant-based. Only prospective cohort studies with adult participants that had no underlying disease at baseline were included. Independent extraction of articles by 2 authors using predefined data fields, including study quality indicators. Guidelines of the Prisma statement were kept.

**Results:** 1,249,644 participants and 31,709 CVD fatal or non-fatal events were observed out of 29 studies that were included. The Mediterranean, the DASH-style, the Prudent, and the Plant-based dietary patterns were consistently associated with reduced risk of a CVD event, while the western dietary pattern was associated with an increase or did not show any significant relationship with CVD outcomes.

**Conclusions:** Based on the present findings and the fact that the role of diet has been underestimated in CVD prevention guidelines, a dietary pattern rich in fruits and vegetables, whole grains, nuts, fish, and vegetable oils, with alcohol in moderation, if at all, and avoids red and processed meats, refined carbohydrates, foods and beverages with added sugar, sodium, and trans, should be further promoted.

**KEY WORDS:** *Dietary patterns, coronary heart disease, Mediterranean diet, DASH diet, Western, prudent diet, Plant-based diet*

## Corresponding author:

Catherine Kanellopoulou, RN, MSc, PhDc  
Department of Nutrition and Dietetics  
School of Health Science & Education  
Harokopio University of Athens  
70 Eleftheriou Venizelou (Thiseos) Ave  
Kallithea, Athens, 176 76 Greece  
e-mail: katerkane@gmail.com, katerkan@hua.gr

## INTRODUCTION

Cardiovascular disease (CVD) is still the leading cause of death and disability in the western world, and one of the major causes of mortality around the world. According to the National Health Service, CVD is referred to the condi-

*Submission: 02.01.2022, Acceptance: 12.03.2022*

tions affecting the blood vessels or the heart directly<sup>1</sup>. The triggering cause of CVD is still debatable, although one scenario now coming to the forefront is that the primary event is free radical damage to cholesterol in circulating low-density lipoproteins<sup>2</sup>. Concerning the epidemiology of CVD, according to the European Heart Network (EHN) each year CVD causes 3.9 million deaths in Europe and over 1.8 million deaths in the European Union (EU); whereas CVD accounts for 45% of all deaths in Europe and 37% of all deaths in the EU. CVD mortality is now falling in most European countries, including Central and Eastern European countries which saw considerable increases until the beginning of the 21st century<sup>3</sup>. Moreover, the most recent Heart Disease and Stroke Statistics update in 2019 of the American Heart Association (AHA) has recently reported, an estimated 18.2 million Americans  $\geq 20$  years of age have CVD<sup>4</sup>.

A dietary pattern is defined as the quantity, variety, or combination of different foods, rather than individual constituents of food, and beverages in a diet and the frequency with which they are habitually consumed. Several dietary patterns have been presented over the past 50-70 years in nutritional epidemiology and studied in relation to human health, i.e., the so-called Mediterranean pattern, the Dietary Approaches to Stop Hypertension (DASH), the Western, the Prudent, and, more recently, the Plant-based and the Vegetarian patterns. In brief, the main characteristics of the Mediterranean dietary pattern include low consumption of meat and related products, with very low consumption of red meat, like beef for example, processed meats, butter, ice creams, or other whole-fat dairy products. It is considered a fat-rich diet (even if the fat comes from healthy sources) because of the abundant consumption of olive oil, together with the overconsumption of minimally processed, locally grown, legumes, vegetables, nuts, fruits, and cereals<sup>5</sup>. Considering that the Mediterranean diet is high in fat, nowadays it is considered with skepticism for people with high cholesterol levels or other blood lipid disorders. Due to this fact, in recent years, another healthy dietary approach has been proposed, the DASH dietary pattern. The DASH pattern is rich in whole grains, legumes, fruits and vegetables, nuts, low-fat dairy, and low intake of sodium, flesh and processed meats, and sweetened beverages. The DASH diet is basically designed to promote a higher intake of nutrients rich in potassium, calcium, and magnesium, and a lower intake of nutrients high in saturated fat and cholesterol. This dietary pattern has been strongly associated with a decrease in blood pressure levels, and consequently the risk for cardiovascular diseases<sup>6,7</sup>. Another healthy eating pattern, which often refers to the opposite of the Westernized dietary pattern, is the Prudent pattern. This kind of diet is characterized by a high intake of whole grains, fish, legumes, poultry,

vegetables and fruits rather than refined or processed foods, red meats, high concentrated sweets, eggs, and butter<sup>8</sup>. The Western pattern contains food that is dense in calories, is characterized by large portions, features meat, especially processed, and refined carbohydrates, while it is high in sodium and cholesterol, and has a poor dietary fatty acid profile<sup>9</sup>. Moreover, Western pattern is rich in refined grains, sweets and desserts, and fried food, in contrast to the Prudent dietary pattern<sup>8</sup>. In recent years a plant-based diet, which is high in consumption of leafy greens, whole grains, vegetables, nuts, fruits and whole grains and has also a high content in cereal, beans, poultry, fish and yogurt, has received much attention. This kind of diet, often called Vegetarian as well, constitutes a dietary pattern that (almost) excludes some or all animal foods<sup>10</sup>.

In the past years, there have been numerous studies conducted, most of them observational, analyzing the association between dietary patterns and CVD (fatal or not) events. However, the findings varied substantially across studies, and have not been well understood and appreciated, especially in CVD prevention guidelines, as well as in daily clinical practice. Thus, the aim of this review was to investigate the relationship between the various dietary patterns and CVD risk, based on prospective studies published the last 20 years.

## MATERIAL AND METHODS

### Search Strategy

Studies were identified by searching in the PubMed database and scanning the reference list of the articles included in those studies. Both were searched from the 1st of January 2000 to the 31st of August 2021. The keywords used in this study were: coronary heart / cardiovascular disease, dietary patterns, diet, Mediterranean, DASH, prudent, western, vegan, plant-based. We performed this systematic review in accordance with the guidelines found in the PRISMA statement<sup>11</sup>.

### Inclusion criteria

The included studies met the following criteria: (1) there were prospective (cohort) studies that examined the association of dietary patterns with CVD in humans; (2) the outcome was CVD, including incidence and mortality; (3) the relevant articles were accessible in full-text or abstract; (4) the language used was English; (5) the participants were adults of any age.

### Exclusion criteria

Studies were not included if: (1) they reported irrelevant findings; (2) they were methodological studies,

experimental studies, narrative reviews, editorial papers, case-control or cross-sectional; (3) they had dietary patterns consisted of the same nutrients, as the ones we selected to study but named differently; (4) they did not present the preferred outcome (i.e., CVD event); (5) the participants had an underlying disease at the start of the prospective study.

### Data extraction

The data extraction was as follows: In the first stage, made the selection of articles based on their title. For the papers that passed the first screening, their abstract was read. Then, for the papers that passed the second screening, their full-text was read. From this procedure, were chosen the articles. In all steps, two of the authors (AK and AK) independently assessed the articles and they finally extracted the relevant information, such as type of study, authors' names, publication year, sample and country details, and main findings; in case of disagreement, the third author (DP) made a decision.

## RESULTS

### Study selection

The initial search strategy identified 6,822 papers, from which 4,157 were duplicates. From the rest 2,665 unique items, 2,541 were excluded after screening titles because of irrelevant information, not referring to the dietary patterns, not being prospective studies, not having CVD as an outcome, or because the participants had an underlying disease when participating in the study. Of the 124 that were left for abstract reading, 34 were not accessible to read (no abstract available, no communication with the authors). Of the remaining 90 items, 45 were eligible for full-text reading. Finally, 16 articles were excluded because of one of the exclusion criteria mentioned above, thus, 29 articles were included in this review. Figure 1 provides a flow summary of our selection process. In addition to those, one article was not in English, thus excluded and so was one article that was outdated even though we applied a publication date filter when searching our databases. Table 1 provides the number of studies retrieved for each keyword combination that was applied.

### Studies' characteristics

The included studies were conducted across Europe (i.e., Spain, Croatia, Serbia, Greece, Finland, Netherlands), but also outside Europe, in the USA and Japan. Most of the studies in our analysis used FFQ based on self-report or interviewer-administered questionnaires to ascertain dietary information, despite the fact that the length of

items listed in the questionnaire varied across studies. In summary, the included studies had in total 1,249,644 participants and there were 31,709 CVD events. There were also 2,101 CVD events in which it wasn't clear what the specific reason was (myocardial infarction, stroke, other). The specific number of CVD events gives us a percentage of 2.5% of the participants having a CVD event after at least 5 years of follow-up. There was also a higher risk of CVD events across men than in women, in all studies that referred to the number of participants of both genders.

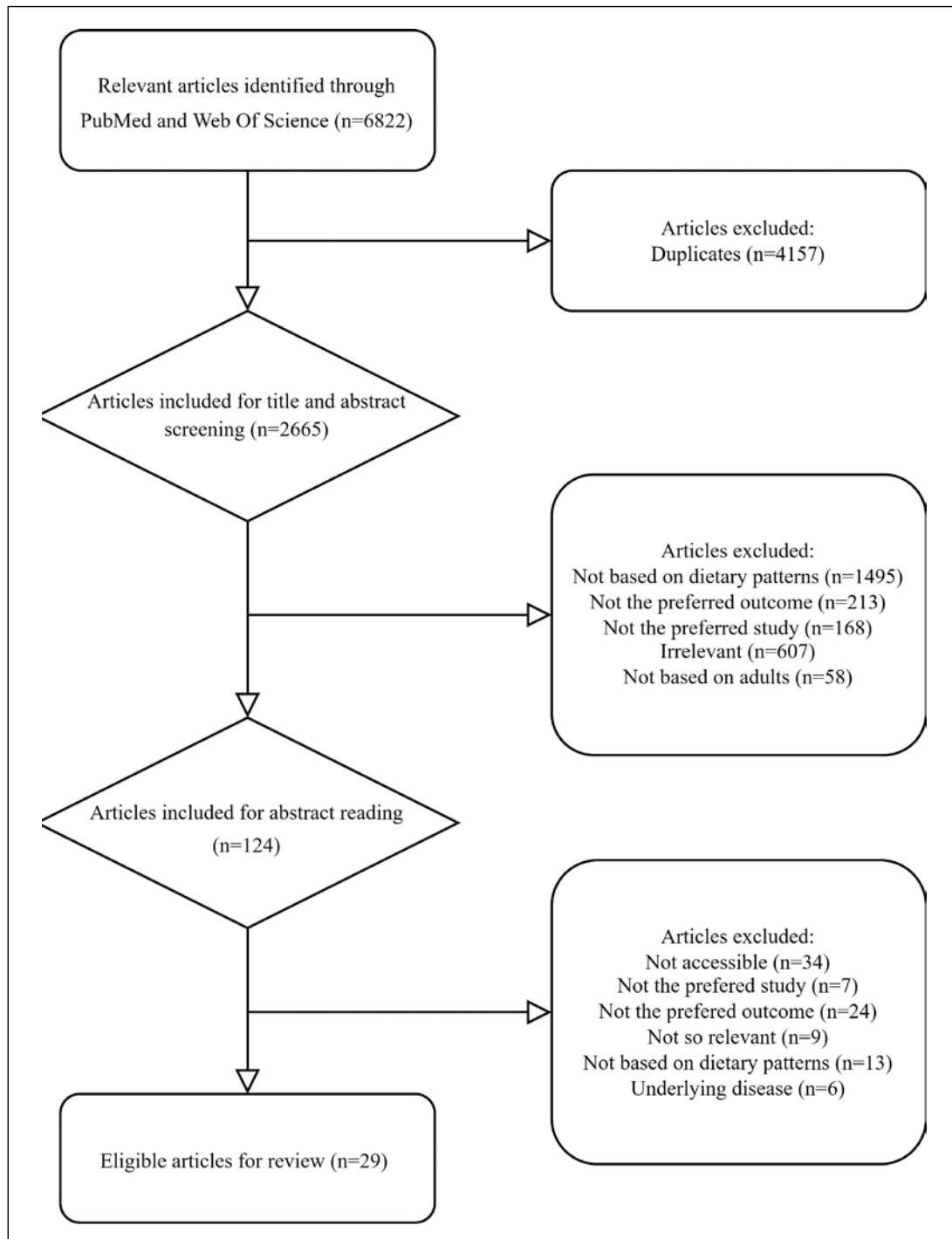
## DIETARY PATTERNS AND CVD RISK

### Mediterranean dietary pattern and CVD risk

In the articles included referring to the Mediterranean dietary pattern, more than 4,525 CVD events occurred (Table 2), mostly among the participants not showing compliance with the Mediterranean diet, revealing an inverse relationship between the adherence to the Mediterranean standard and the risk of CVD (with a p-value <0.001 or even <0.0001). Compared to men, women consumed significantly more vegetables, fruits, olive oil, dairy products, all significant nutrients of the Mediterranean diet, not any alcohol at all, while men consumed more fish, cereals, legumes, meat, and alcohol. Among men, there was a significant negative relationship with vegetables and fish intakes and a positive relationship with dairy products intake. Among women, there was a negative relationship with olive oil and a positive association with meat intake.

### DASH dietary pattern and CVD risk

Considering the studies referring to the DASH-style dietary pattern, 2,568 CVD events occurred (Table 3), showing that there was a strong inverse association of the adherence to the DASH diet and the risk of CVD (p-values < 0.001). Those showing a more consistent adherence to this particular dietary pattern seemed to be women, exercising more, taking multivitamins, consuming more fiber, ω-3 fatty oils, and less saturated fat, trans fat, high intakes of fiber, vitamin D, folate, calcium, potassium, and magnesium; and a low intake of cholesterol, while and their total energy was quite low. However, it should be noted that those participants who had higher DASH scores at baseline were also more likely to have diabetes mellitus and hypertension, a fact that should be taken into account when interpreting the findings. Another finding regarding the adherence to the DASH diet is that women who adhered strongly to a DASH style diet tended to be older, postmenopausal, hormone therapy users, hypercholesterolemic, frequent exercisers, and more educated.



**FIGURE 1.** Flow chart for Search Strategy.

### Western and Prudent dietary pattern and CVD risk

In two cohort studies that evaluated the association between Western dietary pattern, the relationship between adopting a Westernized diet, or a Southern dietary pattern as it is called in some studies, and developing a CVD event was proportional to the level of adherence (p-value

=0.0029). Specifically, a study that refers to the Southern dietary pattern showed that by adopting such a diet, there was a 56% higher hazard of CVD. In the cases that there was, indeed, a relationship, the studies showed that in comparison with participants in the lowest quintile of the Western pattern, the ones in the highest quintile were younger and more educated, and were more frequently

**TABLE 1.** Number of studies retrieved per keywords' combinations.

Keywords' combinations	Number of studies
diet and coronary heart disease and prospective study	1298
diet and coronary heart disease and longitudinal study	312
diet and coronary heart disease and cohort study	2247
dietary patterns and coronary heart disease and prospective study	623
dietary patterns and coronary heart disease and longitudinal study	180
dietary patterns and coronary heart disease and cohort study	1104
Mediterranean diet and coronary heart disease and prospective study	90
Mediterranean diet and coronary heart disease and longitudinal study	19
Mediterranean diet and coronary heart disease and cohort study	159
western diet and coronary heart disease and prospective study	52
western diet and coronary heart disease and longitudinal diet	14
western diet and coronary heart disease and cohort study	91
prudent diet and coronary heart disease and prospective study	192
prudent diet and coronary heart disease and longitudinal study	46
prudent diet and coronary heart disease and cohort study	303
dash diet and coronary heart disease and prospective study	20
dash diet and coronary heart disease and longitudinal study	4
dash diet and coronary heart disease and cohort study	25
vegan diet and coronary heart disease and prospective study	2
vegan diet and coronary heart disease and cohort study	5
vegetarian diet and coronary heart disease and cohort study	36

smokers, with a sedentary occupation, and inactive in their leisure time.

Considering the prudent dietary pattern, a strong and

inverse association was observed between the prudent pattern and CVD event risk (p-values <0.05). Those that were more likely to adopt a prudent diet were women, exercising more, more educated, with a Body Mass Index <25 kg/m<sup>2</sup>, non-smokers, and moderate alcohol drinkers.

### Plant-based dietary pattern and CVD risk

In the literature, several studies have dealt with the plant-based diet. Adherence to an overall plant-based dietary pattern showed an improved weight management (p-value <0.001), but not a clear association with the risk of having a CVD event. Table 4 provides in detail information about the studies concerning Western/Prudent dietary patterns and the Plant-based dietary pattern.

### DISCUSSION

The present review examined the most common dietary patterns and their association to CVD risk. Studying the end result of the whole diet rather than analyzing single foods or nutrients, could be a better predictor of health outcomes. Up to date, substantial disagreement exists regarding the relationship between several dietary patterns and CVD risk. The summarized findings showed that greater adherence to the Mediterranean, DASH-style, and Prudent dietary patterns had an inverse relationship with CVD risk. Moreover, there was an absence of significant association between the westernized dietary pattern and the risk of CVD, whereas, in the cases that there was an association, it was positive with the risk of a CVD event.

It has already been proposed that dietary habits play a vital role in the development of CVD. Given the complex interaction between intakes of various food or nutrient items, and that they can never be eaten in isolation, the results revealing the effects through individual foods or nutrients consumption on a given health outcome may be spurious resulting in masking true associations<sup>12</sup>. In addition to that, CVD is a complex condition involving numerous physiologic systems, which makes it unlikely that modifying the intake of a few nutrients would alter these systems and influence clinical outcomes. Recently, there has been growing attention in the identification of dietary patterns, representing a combination of foods and nutrients, as a substitute approach to single nutrient analysis concerning the risk of disease or death.

Our review highlighted 29 prospective cohort studies concerning the associations of particular dietary patterns and their effect on CVD, numbering a total of 1,249,644 participants and 31,709 CVD cases. The traditional Mediterranean diet is characterized by a high intake of nuts, legumes, vegetables, fruits, and cereals and a higher intake of olive oil but a moderately high intake of fish, a rather low intake of saturated lipids, a low intake of poultry and

**TABLE 2.** Results from the studies regarding the Mediterranean dietary pattern.

Author	Year	Country	Participants	Age	Outcome	Findings
Fung TT et al.	2009	USA	74,886 women	38-63 years old	2391 incident cases of CVD	decreases CVD event risk
Trichopoulou A et al.	2003	Greece	22,043	20-86 years old	275 deaths of CVD	decreases CVD event risk
Knoops KT et al.	2004	Europe (19 cities)	2339	70-90 years old	122 cases of CVD	decreases CVD event risk
Buckland G et al.	2009	Spain	41,078	29-69 years old	609 cases of CVD	decreases CVD event risk
Menotti A et al.	2012	Northern and Central Italy	1139	45-64 years old	79 CVD	decreases CVD event risk
deKoning L et al.	2004	Greece	28 572	20-86 years old	275 CVD	decreases CVD event risk
Panagiotakos DB et al.	2008	Greece	2101	>18 years old	110 CVD	Mediterranean diet decreases the risk of CVD event
Hoşcan Y et al.	2015	Turkey	900	25-70 years old	25 CVD events	Mediterranean diet decreases the risk of CVD event
Hodge AM et al.	2018	Melbourne	39,532	40-69 years old	281 CVD	Mediterranean diet decreases the risk of CVD event
Fidanza F et al.	2004	Finland, Italy, Greece, Japan, Serbia, Yugoslavia, The Netherlands	12763 men	40-59 years old	-	Mediterranean diet decreases the risk of CVD event
Dilis V et al.	2012	Greece	28 572	20-86 years old	636 CVD events	Mediterranean diet decreases the risk of CVD event
Martínez-González MA et al.	2011	Spain	13,609	38 years old average age	68 CVD events	Mediterranean diet decreases the risk of CVD event

**TABLE 3.** Results from the studies regarding the DASH-style dietary pattern.

Author	Year	Country	Participants	Age	Outcome	Findings
Fung TT et al.	2008	USA	88 517 women	34-59 years old	976 CVD deaths	decreases CVD event risk
Talaei M et al.	2019	China	63257	45-74 years old	610 cases of CAD mortality	decreases CVD event risk
Mertens E et al.	2018	United Kingdom	1867	56.7 mean age	407 CVD events	DASH diet decreases CVD event risk
Patel YR et al.	2021	USA	15,768	65.9 average age	488 CVD deaths	Both Mediterranean and DASH diet decrease the risk of CVD event
Fitzgerald KC et al.	2012	Boston	39 876 women	>45 years old	85 incidents of CVD	DASH diet decreases CVD event risk
Folsom AR et al.	2007	USA, Iowa	41,386 women	55-69 years old	2 CVD deaths	DASH diet decreases CVD event risk

meat, a low-to-moderate intake of dairy products, and a regular but moderate intake of ethanol, primarily in the form of wine and generally during meals, is remarkably associated with lower risk of incident CVD<sup>12-23</sup>. In fact, a higher Mediterranean diet score was associated with more favourable levels of adiponectin, an adipocytokine linked to CVD risk<sup>12</sup>. In some studies, the reduction in CVD risk

was up to 40%<sup>24</sup>. These findings are in agreement with interventional studies, such as the PREDIMED study<sup>25</sup>, conducted in the past few years, that showed even a 30% depletion in the chance of having a CVD event when in great adherence to the Mediterranean diet.

High consumption of fresh fruits, vegetables, cereals, fish, and olive oils are defining features of the prudent,

**TABLE 4.** Results from the studies regarding the Western/Prudent dietary patterns and the Plant-based dietary pattern.

Author	Year	Country	Participants	Age	Outcome	Diet	Findings
Guallar-Castillón P et.al.	2012	Spain	40,757	29-69 years old	606 CVD	Mediterranean/Western dietary pattern	Med.diet decreases CVD event risk Western pattern increases CVD event risk
Osler M et.al.	2002	Denmark	7316	30-70 years old	280 CVD	Prudent/Western dietary pattern	Prudent pattern decreases CVD event risk Western pattern increases CVD event risk
Shikany JM et.al.	2015	USA	17,418	>45 years old	536 CVD	Western/Plant-based dietary pattern	Southern/Western pattern increases CVD event risk Plant-based diet decreases CVD event risk
Hu FB et.al.	2000	USA	44875	40-75 years old	1089 CVD	Prudent/Western dietary pattern	Prudent pattern decreases CVD event risk Western pattern increases CVD event risk
Odegaard AO et.al.	2012	USA	52 322	45-74 years old	1397 CVD	Western dietary pattern	Western pattern increases CVD event risk
Fung TT et.al.	2001	USA	121 700	38-63 years old	821 CVD	Prudent/Western dietary pattern	Prudent pattern decreases CVD event risk Western pattern increases CVD event risk
Heidemann C et.al.	2008	USA	72,113 women	30-55 years old	1,154 deaths from CVD	Prudent/Western dietary pattern	Prudent pattern decreases CVD event risk Western pattern increases CVD event risk
Stricker MD et.al.	2013	The Netherlands	35910	20-69 years old	1843 CVD	Prudent/Western dietary pattern	Prudent and plant-based diets decrease risk of CVD Western diet increases risk of CVD
Choi Y et.al.	2021	USA	2621	18-30 years old	289 incident CVD cases	Plant-based dietary pattern	Plant-based diet decreases CVD event risk
Glenn AJ et.al.	2021	USA	123 330 women	50-79 years old	5640 CVD events	Plant-based dietary pattern	Plant-based diet decreases CVD event risk
Satija A et.al.	2017	USA	209289	25-75 years old	8,631 CVD	Plant-based dietary pattern	Plant-based diet decreases CVD event risk

or else healthy, dietary pattern. Because this pattern is abundant in vitamins (folate as shown in a study<sup>13</sup>) fiber, minerals, antioxidants, monounsaturated fatty acids, and ω-3 fatty oils, it seems protective in people’s cardiac health. We found that a prudent pattern was associated with a lower occurrence of CVD<sup>8,24,26-30</sup>.

Frequent consumption of refined grains, red and processed meat, eggs, fried food, desserts, high-fat dairy prod-

ucts, sweets and desserts characterizes the westernized dietary pattern. No notable association was found between the western dietary pattern and CVD, a fact that could be attributed to the very few numbers of cohort studies that evaluated Western dietary pattern and CVD or due to the fact that the majority of studies that evaluated Mediterranean or Prudent or plant-based dietary patterns, used the Westernised dietary pattern as the comparison category<sup>31</sup>.

Nevertheless, intake of red meat, and especially processed meat, shows to be significantly associated with increased risk of CVD, and coronary heart disease in particular<sup>8,9,13,24,26,32</sup>.

When it comes to a plant-based diet, the concerted action of nutrients, including ascorbic acid, tocopherols, carotenoids, and phenolics, are abundant in vegetables and fruits, whole grains, nuts and seeds and bioactive compounds found in a combination of plant foods may lead to a beneficial cardiovascular outcome<sup>10,12,33-35</sup> as they can trap free radicals and reduce the levels of reactive oxygen molecules, thus protecting against tissue damage<sup>10</sup>. Similarly, higher DASH diet scores trended toward a lower risk of CVD rate among the studies referring to that particular kind of diet<sup>6,7,36-38</sup>. A key feature of the DASH diet is its emphasis on low sodium intake, and randomized control trials have indicated that the DASH can produce noteworthy reductions in blood pressure, even across a range of sodium intake. In other studies<sup>10</sup>, though, there was no significant association between the DASH dietary pattern and the risk of a CVD event and that could be because the FFQ that was used to assess the adherence to the DASH diet, was not designed to evaluate sodium intake, thereby, information regarding added sodium before or after prepared meals or the use of low-sodium foods was missing.

## Limitations

Several limitations in our systematic review should be acknowledged. First, we did not take into consideration any other lifestyle factors and genetic factors such as age, sex, body weight, physical activity, so we could not exempt the possibility that other variables are relevant to the observed outcomes. Secondly, despite all the studies being prospective, differences among follow-up periods or measurement of CVD endpoint may lead us to misreport the true associations of dietary patterns on the risk of a CVD event. As an additional limitation of this review, one could consider that we only focused on PubMed database. However, this is the most widely used and complete database that comprises, more than 33 million citations for biomedical literature.

## CONCLUSION

Based on the presented findings and the fact that the role of diet has been underestimated in CVD prevention guidelines, a dietary pattern rich in fruits and vegetables, whole grains, nuts, fish, and vegetable oils, with alcohol in moderation, if at all, and avoidance of red and processed meats, refined carbohydrates, foods and beverages with added sugar, sodium, and trans, should be further promoted.

## ΠΕΡΙΛΗΨΗ

### Διατροφικά Πρότυπα και Καρδιαγγειακή Νόσος: Μια συστηματική ανασκόπηση 29 προοπτικών μελετών 1.249.644 συμμετεχόντων, τα τελευταία 20 έτη

Αθανασία Καραγιαννίδη<sup>1</sup>, Αικατερίνη Κανελλοπούλου<sup>1</sup>, Δημοσθένης Παναγιωτάκος<sup>1,2</sup>

<sup>1</sup>Τμήμα Διατροφής & Διαιτολογίας, Σχολή Επιστημών Υγείας & Αγωγής, Χαροκόπειο Πανεπιστήμιο, Αθήνα, Ελλάδα, <sup>2</sup>Σχολή Επιστημών Υγείας, Πανεπιστήμιο της Canberra, ACT, Αυστραλία

**Σκοπός:** Το γεγονός ότι ο ρόλος των διαφόρων διατροφικών προτύπων στη συχνότητα εμφάνισης καρδιαγγειακών παθήσεων (CVD) δεν έχει ακόμη τεκμηριωθεί επαρκώς, αποκαλύπτει την ανάγκη εκτίμησης της συσχέτισης των διατροφικών προτύπων και του κινδύνου καρδιαγγειακής νόσου.

**Υλικό και Μέθοδοι:** Πραγματοποιήθηκε μία ανασκόπηση άρθρων αγγλικής γλώσσας, αρχειοθετημένων στο PubMed (2000-2021). Επιπρόσθετες μελέτες εντοπίστηκαν αναζητώντας τις βιβλιογραφίες των επιλεγμένων άρθρων στην αρχή της μελέτης. Τα στοιχεία αναζήτησης περιελάμβαναν: στεφανιαία/καρδιαγγειακή νόσο, διατροφικά πρότυπα, διατροφή, μεσογειακή, DASH, prudent, δυτική, vegan, φυτική. Συμπεριλήφθηκαν μόνο προοπτικές μελέτες κοόρτης με ενήλικες συμμετέχοντες που δεν είχαν υποκείμενη νόσο κατά την έναρξη. Πραγματοποιήθηκε ανεξάρτητη εξαγωγή άρθρων από 2 συγγραφείς χρησιμοποιώντας προκαθορισμένα πεδία δεδομένων, συμπεριλαμβανομένων δεικτών ποιότητας μελέτης. Οι κατευθυντήριες οδηγίες της δήλωσης Prisma τηρήθηκαν.

**Αποτελέσματα:** 1.249.644 συμμετέχοντες και 31.709 CVD θανατηφόρα ή μη θανατηφόρα συμβάντα παρατηρήθηκαν από 29 μελέτες που συμπεριλήφθηκαν. Τα μεσογειακά, τα διατροφικά πρότυπα τύπου DASH, τα



prudent και τα vegan διατροφικά πρότυπα συσχετίστηκαν σταθερά με μειωμένο κίνδυνο εκδήλωσης καρδιαγγειακής νόσου, ενώ το δυτικό διατροφικό πρότυπο συσχετίστηκε με αύξηση ή δεν έδειξε καμία σημαντική σχέση με τα αποτελέσματα καρδιαγγειακής νόσου.

**Συμπεράσματα:** Με βάση τα παρόντα ευρήματα και το γεγονός ότι ο ρόλος της διατροφής έχει υποτιμηθεί στις κατευθυντήριες οδηγίες για την πρόληψη της καρδιαγγειακής νόσου, ένα διατροφικό πρότυπο πλούσιο σε φρούτα και λαχανικά, δημητριακά ολικής αλέσεως, ξηρούς καρπούς, ψάρια και φυτικά έλαια, με μέτρο αλκοόλ, ή και καθόλου, και το οποίο αποφεύγει τα κόκκινα και επεξεργασμένα κρέατα, τους επεξεργασμένους υδατάνθρακες, τα τρόφιμα και τα ποτά με πρόσθετη ζάχαρη, το νάτριο και τα τρανς λιπαρά, θα πρέπει να προωθηθεί περαιτέρω.

**ΛΕΞΕΙΣ ΚΛΕΙΔΙΑ:** Διατροφικά πρότυπα, στεφανιαία νόσος, μεσογειακή διατροφή, δίαιτα DASH, δυτική διατροφή, prudent διατροφή, φυτική διατροφή

## REFERENCES

- National Health Service. Cardiovascular disease. [cited 2022 March 7]. Available from: <https://www.nhs.uk/conditions/cardiovascular-disease/>
- Ulbricht TL, Southgate DA. Coronary heart disease: Seven dietary factors. *Lancet*. 1991 Oct;338(8773):985-92. Doi: 10.1016/0140-6736(91)91846-m.
- Wilkins E, Wilson L, Wickramasinghe K, Bhatnagar P, Leal J, Luengo-Fernandez R, et al. European Cardiovascular Disease Statistics. European Heart Network. 2017. Brussels. [cited 2021 Dec 11]. Available from: <https://ehnheart.org/images/CVD-statistics-report-August-2017.pdf>
- Benjamin EJ, Muntner P, Alonso A, Bittencourt MS, Callaway CW, et al. Heart Disease and Stroke Statistics—2019 Update: A Report From the American Heart Association. *Circulation*. 2019 Mar;139(10):e56-e528. Doi: 10.1161/CIR.0000000000000659.
- Martínez-González MA, Gea A, Ruiz-Canela M. The Mediterranean Diet and Cardiovascular Health. *Circ Res*. 2019 Mar;124(5):779-98. Doi: 10.1161/CIRCRESAHA.118.313348.
- Talaei M, Koh W, Yuan J, van Dam RM. DASH Dietary Pattern, Mediation by Mineral Intakes, and the Risk of Coronary Artery Disease and Stroke Mortality. *Journal of the American Heart Association [Internet]*. 2019 Feb [cited 2021 Dec 11];8(5):e011054. Doi: 10.1161/JAHA.118.011054. Available from: <https://www.ahajournals.org/doi/10.1161/JAHA.118.011054>.
- Fung TT. Adherence to a DASH-style diet and risk of coronary heart disease and stroke in women. *Arch Intern Med*. 2008 Apr;168(7):713-20. Doi: 10.1001/archinte.168.7.713.
- Fung TT, Willett WC, Stampfer MJ, Manson JE, Hu FB. Dietary Patterns and the Risk of Coronary Heart Disease in Women. *Arch Intern Med*. 2001 Aug;161(15):1857-62. Doi: 10.1001/archinte.161.15.1857.
- Odegaard AO, Koh WP, Yuan JM, Gross MD, Pereira MA. Western-style fast food intake and cardiometabolic risk in an eastern country. *Circulation*. 2012 Jul;126(2):182-8. Doi: 10.1161/CIRCULATIONAHA.111.084004.
- Choi Y, Larson N, Steffen LM, Schreiner PJ, Gallaher DD, Duprez DA, et al. Plant-centered diet and risk of incident cardiovascular disease during young to middle adulthood. *J Am Heart Assoc [Internet]*. 2021 Aug [cited 2021 Dec 11];10(16):e020718. Doi: 10.1161/JAHA.120.020718. Available from: <https://pubmed.ncbi.nlm.nih.gov/34344159/>
- Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gotzsche PC, Ioannidis JPA, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. *BMJ*. 2009 Jul;339:b2700. Doi: 10.1136/bmj.b2700.
- Fung TT, Rexrode KM, Mantzoros CS, Manson JE, Willett WC, Hu FB. Mediterranean diet and incidence of and mortality from coronary heart disease and stroke in women. *Circulation*. 2009 Mar;119(8):1093-100. Erratum in: *Circulation*. 2009 Mar;119(12):e379. Doi: 10.1161/CIRCULATIONAHA.108.816736.
- Hu FB, Rimm EB, Stampfer MJ, Ascherio A, Spiegelman D, Willett WC. Prospective study of major dietary patterns and risk of coronary heart disease in men. *Am J Clin Nutr*. 2000 Oct;72(4):912-21. Doi: 10.1093/ajcn/72.4.912.
- Fidanza F, Alberti A, Lanti M, Menotti A. Mediterranean Adequacy Index: Correlation with 25-year mortality from coronary heart disease in the Seven Countries Study. *Nutr Metab Cardiovasc Dis*. 2004 Oct;14(5):254-8. Doi: 10.1016/s0939-4753(04)80052-8.
- Panagiotakos DB, Pitsavos C, Chrysohou C, Skoumas I, Stefanadis C, ATTICA Study. Five-year incidence of cardiovascular disease and its predictors in Greece: the ATTICA study. *Vasc Med*. 2008 May;13(2):113-21. Doi: 10.1177/1358863x07087731.
- Trichopoulou A, Costacou T, Bamia C, Trichopoulos D. Adherence to a Mediterranean Diet and Survival in a Greek Population. *New England Journal of Medicine*. 2003 Jun;348(26):2599-608. Doi: 10.1056/NEJMoa025039.
- Knoops KT, de Groot LC, Kromhout D, Perrin AE, Moreiras-Varela O, Menotti A, et al. Mediterranean diet, lifestyle factors, and 10-year mortality in elderly European men and women: The HALE project. *JAMA*. 2004 Sep;292(12):1433-9. Doi: 10.1001/jama.292.12.1433.
- Martínez-González MA, García-López M, Bes-Rastrollo M, Toledo E, Martínez-Lapiscina EH, Delgado-Rodríguez M, et al. Mediterranean diet and the incidence of cardiovascular disease: A Spanish cohort. *Nutr Metab Cardiovasc Dis*. 2011 Apr;21(4):237-44. Doi: 10.1016/j.numecd.2009.10.005.

19. Menotti A, Alberti-Fidanza A, Fidanza F. The association of the Mediterranean Adequacy Index with fatal coronary events in an Italian middle-aged male population followed for 40 years. *Nutr Metab Cardiovasc Dis.* 2012 Apr;22(4):369-75. Doi: 10.1016/j.numecd.2010.08.002.
20. Patel YR, Robbins JM, Gaziano JM, Djoussé L. Mediterranean, DASH, and alternate healthy eating index dietary patterns and risk of death in the physicians' health study. *Nutrients.* 2021 May;13(6):1893. Doi: 10.3390/nu13061893.
21. Hoscan Y, Yigit F, Mùderrisoglu H. Adherence to Mediterranean diet and its relation with cardiovascular diseases in the Turkish population. *Int J Clin Exp Med [Internet].* 2015 Feb [cited 2021 Dec 14];8(2):2860-6. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4402893/>
22. Hodge AM, Bassett JK, Dugué PA, Shivappa N, Hébert JR, Milne RL, et al. Dietary inflammatory index or Mediterranean diet score as risk factors for total and cardiovascular mortality. *Nutr Metab Cardiovasc Dis.* 2018 May;28(5):461-9. Doi: 10.1016/j.numecd.2018.01.010.
23. De Koning, L, Anand SS. "Vascular viewpoint." *Vascular medicine* 2004 May;9(2):145-6.
24. Buckland G, González CA, Agudo A, Vilardell M, Berenguer A, Amiano P, et al. Adherence to the Mediterranean diet and risk of coronary heart disease in the Spanish EPIC Cohort Study. *Am J Epidemiol.* 2009 Dec;170(12):1518-29. Doi: 10.1093/aje/kwp282.
25. Estruch R, Ros E, Salas-Salvadó J, Covas MI, Corella D, Arós F, et al. Retraction and republication: primary prevention of cardiovascular disease with a mediterranean diet. *N Engl J Med.* 2013;368:1279-90. Corrected and republished in *N Engl J Med.* 2018 Jun;378(25):2441-2442. Doi: 10.1056/NEJMc1806491.
26. Ding EL, Mozaffarian D. Optimal dietary habits for the prevention of stroke. *Semin Neurol.* 2006 Feb;26(1):11-23. Doi: 10.1055/s-2006-933305.
27. Fung TT, Stampfer MJ, Manson JE, Rexrode KM, Willett WC, Hu FB. Prospective study of major dietary patterns and stroke risk in women. *Stroke.* 2004 Sep;35(9):2014-9. Doi: 10.1161/01.STR.0000135762.89154.92.
28. Dilis V, Katsoulis M, Lagiou P, Trichopoulos D, Naska A, Trichopoulou A. Mediterranean diet and CHD: the Greek European Prospective Investigation into Cancer and Nutrition cohort. *Br J Nutr.* 2012 Aug;108(4):699-709. Doi: 10.1017/S0007114512001821.
29. Osler M, Helms Andreasen A, Heitmann B, Høidrup S, Gerdes U, et al. Food intake patterns and risk of coronary heart disease: a prospective cohort study examining the use of traditional scoring techniques. *Eur J Clin Nutr.* 2002 Jul;56(7):568-74. Doi: 10.1038/sj.ejcn.1601360.
30. Stricker MD, Onland-Moret NC, Boer JM, van der Schouw YT, Verschuren WM, May AM, et al. Dietary patterns derived from principal component- and k-means cluster analysis: Long-term association with coronary heart disease and stroke. *Nutr Metab Cardiovasc Dis.* 2013 Mar;23(3):250-6. Doi: 10.1016/j.numecd.2012.02.006.
31. Guallar-Castillón P, Rodríguez-Artalejo F, Tormo MJ, Sánchez MJ, Rodríguez L, Quirós JR, et al. Major dietary patterns and risk of coronary heart disease in middle-aged persons from a Mediterranean country: The EPIC-Spain cohort study. *Nutr Metab Cardiovasc Dis.* 2012 Mar;22(3):192-9. Doi: 10.1016/j.numecd.2010.06.004.
32. Heidemann C, Schulze MB, Franco OH, van Dam RM, Mantzoros CS, Hu FB. Dietary patterns and risk of mortality from cardiovascular disease, cancer, and all causes in a prospective cohort of women. *Circulation.* 2008 Jul;118(3):230-7. Doi: 10.1161/CIRCULATIONAHA.108.771881.
33. Folsom AR, Parker ED, Harnack LJ. Degree of concordance with DASH diet guidelines and incidence of hypertension and fatal cardiovascular disease. *Am J Hypertens.* 2007 Mar;20(3):225-32. Doi: 10.1016/j.amjhyper.2006.09.003.
34. Glenn AJ, Lo K, Jenkins DJA, Boucher BA, Hanley AJ, Kendall CWC, et al. Relationship between a plant-based dietary portfolio and risk of cardiovascular disease: Findings from the women's health initiative prospective cohort study. *J Am Heart Assoc.* 2021 Aug;10(16):e021515. Doi: 10.1161/JAHA.121.021515.
35. Satija A, Bhupathiraju SN, Spiegelman D, Chiuve SE, Manson JE, Willett W, et al. Healthful and unhealthful plant-based diets and the risk of coronary heart disease in U.S. Adults. *J Am Coll Cardiol.* 2017 Jul;70(4):411-22.
36. Shikany JM, Safford MM, Newby PK, Durant RW, Brown TM, Judd SE. Southern dietary pattern is associated with hazard of acute coronary heart disease in the reasons for geographic and racial differences in stroke (REGARDS) study. *Circulation.* 2015 Sep;132(9):804-14. Doi: 10.1161/CIRCULATIONAHA.114.014421.
37. Mertens E, Markey O, Geleijnse JM, Lovegrove JA, Givens DI. Adherence to a healthy diet in relation to cardiovascular incidence and risk markers: Evidence from the Caerphilly Prospective Study. *Eur J Nutr.* 2018 Apr;57(3):1245-1258. Doi: 10.1007/s00394-017-1408-0.
38. Fitzgerald KC, Chiuve SE, Buring JE, Ridker PM, Glynn RJ. Comparison of associations of adherence to a Dietary Approaches to Stop Hypertension (DASH)-style diet with risks of cardiovascular disease and venous thromboembolism. *J Thromb Haemost.* 2012 Feb;10(2):189-98. Doi: 10.1111/j.1538-7836.2011.04588.x.