



Effectiveness of interventions applicable to primary health care settings to promote Mediterranean diet or healthy eating adherence in adults: A systematic review



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ABSTRACT

Objective. To evaluate the effects on healthy eating or the Mediterranean diet adherence achieved by interventions suitable for implementation in primary care settings.

Methods. Medline (PubMed) and The Cochrane Library bibliographic searches retrieved randomized controlled trials published in English or Spanish, January 1990–January 2013. The inclusion criteria were adult population, >3 months follow-up, and interventions suitable for primary care settings. Exclusion resulted if studies focused exclusively on weight loss or did not analyze food intake (fats, fruits and vegetables – F&V, fiber) or Mediterranean diet adherence. Validity (risk of bias) was independently evaluated by two researchers; discrepancies were reviewed until a consensus was reached.

Results. Of the 15 included articles (14 studies), only 3 studies surpassed 12-months follow-up. Ten interventions emphasized healthy nutrition (n = 9948); 4 added activity levels (n = 3816). Six trials included participants with cardiovascular risk; 7 were community-based; 1 focused on women with cancer. Eleven studies showed 9.7% to 59.3% increased F&V intake with counseling interventions, compared to baseline (–13.3% to 27.8% in controls). Seven studies reported significant differences between intervention and control groups.

Conclusion. Nutritional counseling moderately improves nutrition, increases intake of fiber, F&V, reduces dietary saturated fats, and increases physical activity. Studies with longer follow-up are needed to determine long-term effects, cardiovascular morbidity, and mortality.

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Introduction

The health benefits of the Mediterranean diet and of eating fruits and vegetables are based on evidence provided in the literature about their inverse relationship with various forms of cancer (Bamia et al., 2013; Buckland et al., 2010; Couto et al., 2011; Verberne et al., 2010) and with inflammatory markers (Esposito et al., 2006; Richard et al., 2013; Urpi-Sarda et al., 2012). The most important results, however, are those that show the inverse relationship between the Mediterranean diet, cardiovascular risk factors, and cardiovascular disease (Estruch et al., 2006, 2013). Despite this evidence and the programs directed at

improving eating habits at both the individual and population levels, a progressive abandonment of the Mediterranean diet can be observed in the developed parts of the world, including the Mediterranean countries, due to the influence of newer and less healthy eating habits (Van Diepen et al., 2011), especially among younger people (Patino-Alonso et al., 2014).

The potential protective effect of the Mediterranean diet against numerous diseases has been widely studied. Nonetheless, the effectiveness of interventions in increasing adherence to the Mediterranean diet has not been well researched. Two recent reviews that analyzed the effect of counseling interventions showed a 35.5% greater adherence to the Mediterranean diet, a reduction in total and saturated fat intakes of 1.8% and 1.1% respectively, favoring the intervention group (Piscopo, 2009), and an average increase in fruits and vegetables of 1.13 servings/day above control condition (Thomson and Ravia, 2011). Nevertheless, both state that more information is needed about interventions that have evaluated adherence to the Mediterranean diet and about strategies that have been effective in obtaining positive results with respect to changes in food choices.

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Several of the studies included in systematic reviews examined the effectiveness of multifactor interventions carried out in the community context as primary prevention to reduce cardiovascular risk. [Piscopo \(2009\)](#) focuses exclusively on the Mediterranean diet as a nutritional education tool, concluding that more extensive research is required to review interventions that used MD education and strategies which were effective in bringing about positive health behavior change. This was not a full-scale systematic review. [Thomson and Ravia \(2011\)](#) published a systematic review to update the earlier reviews that reported on the effect of behavior-based interventions to increase fruit and vegetable consumption with a focus on studies since 2005 and those not targeting individuals with pre-existing medical conditions. Therefore, neither of these reviews had the aim of analyzing the effectiveness and efficiency of interventions that could be implemented in PHC settings. As the general population's entry point to the health system, PHC provides an opportunity to develop interventions that modify lifestyle-related behavioral habits, but no previous review focused specifically on the primary health care context; instead, they cover interventions carried out in any sector. In addition, the interventions carried out were very different and the conclusions varied greatly. Therefore, it is necessary to evaluate the effect of these interventions on primary care efforts to promote healthy eating and to encourage the consumption of fruits and vegetables or Mediterranean diet adherence.

The objective of the present review was to evaluate the effect on healthy eating or adherence to the Mediterranean diet as a result of interventions providing assistance, counseling, or education and suitable for implementation in primary care settings to promote healthy food choices in adults.

Methods

This review followed the recommendations of the 'PRISMA Statement for Reporting Systematic Reviews and Meta-analyses' ([Moher et al., 2009](#)).

Eligibility criteria

Only randomized controlled trials (RCTs) were considered for this review. Studies were included if they collected information about food intake (fats, fruits and vegetables or fiber) or adherence to the Mediterranean diet, were published in English or Spanish and had a study population that included adults, a follow-up period longer than 3 months, and interventions suitable for implementation in the primary care setting. The interventions considered were motivational counseling, assistance, or educational activities, offered in individual or group sessions by primary care professionals or by experts in dietetics and nutrition. Studies were excluded if the interventions were exclusively directed toward weight loss and carried out in environments that would be difficult to replicate in primary care (e.g., educational settings or religious communities).

Information sources and searches

A literature search was carried out in Medline (via PubMed) and The Cochrane Library, covering the period from January 1, 1990 to January 31, 2013. Additional studies were identified from a review of the references cited by the publications retrieved. The search strategy combined controlled vocabulary and free-text terms. The complete Medline (via PubMed) search strategy is shown in [Table 1](#).

Study selection

One researcher was responsible for reviewing all titles and abstracts retrieved. This person also confirmed that all the full-text articles evaluated met all the selection criteria. Likewise, these articles were distributed among the remaining 6 researchers for independent review. Therefore, each article was reviewed by two authors and any disagreements were resolved by discussion to reach a consensus.

Table 1

Search strategy used in Medline (via PubMed).

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(“Diet, Mediterranean”[Mesh] OR “Mediterranean diet” OR “Mediterranean diets” OR “Mediterranean dietary” OR “healthy diet” OR “healthy food” OR “healthful diet” OR “healthy eating”) AND (“Counseling”[Mesh:noexp] OR “Directive Counseling”[Mesh:noexp] OR “Motivational Interviewing”[Mesh] OR “Health Promotion/methods”[Mesh] OR “Health Education/methods”[Mesh] OR Counsel* OR “Motivational Interviewing” OR “Health Campaign” OR “Health Campaigns” OR “Health Education” OR ((complex OR multiple OR multifactorial OR multifaceted) AND (intervention* OR program* OR strateg*))) AND (“Patient Compliance”[Mesh:noexp] OR “Cooperative Behavior”[Mesh] OR “Risk Reduction Behavior”[Mesh] OR “Health Behavior”[Mesh] OR ((complan* OR cooperati* OR adherence OR collaboration*) AND (patient OR behavio*)) OR “risk reduction” OR ((“Mortality”[Mesh] OR mortalit* OR death OR “Morbidity”[Mesh] OR morbidit*) AND (“Cardiovascular Diseases”[Mesh] OR cardiovascular OR “hypertension”[MeSH Terms] OR hypertension OR “diabetes mellitus”[MeSH Terms] OR diabetes OR “Metabolic Syndrome X”[Mesh] OR “metabolic syndrome”)))
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The following filter was applied to references retrieved using this strategy:
 ((Clinical[Title/Abstract] AND Trial[Title/Abstract]) OR Clinical Trials[MeSH Terms] OR Clinical Trial[ptyp] OR Random*[Title/Abstract] OR Random Allocation[MeSH Terms] OR Controlled Clinical Trial[ptyp] OR Randomized Controlled Trial[ptyp] OR Review[ptyp] OR Meta-Analysis[ptyp] OR Systematic [sb]) AND (“1990/01/01”[Date – Publication]:“2013/01/31”[Date – Publication])

Note: The term “primary care” was not incorporated into the search strategy to limit the results to the study setting because the goal was to increase the sensitivity of the strategy and explore whether some interventions developed in other settings could be adapted to primary health care.

^a Source: modified from PubMed Clinical Queries Search Filters ([PubMed Help \[Internet, 2005\]](#)).

Data extraction process and bias assessment

An evidence table was designed for data extraction, based on those proposed by NICE and SIGN ([National Institute for Health and Clinical Excellence, 2012](#); [Scottish Intercollegiate Guidelines Network, 2011](#)), and modified after pilot testing with 16 of the retrieved studies. Data collection was carried out by 5 investigators, and one of them reviewed all of the data obtained. Any disagreements were resolved by discussion to reach a consensus.

Information obtained for each study included the following elements: study characteristics (name, authors, year of publication, location, region, setting, context, design); number and characteristics of study participants (age, sex, morbidities) and the selection criteria (inclusion and exclusion); description of interventions (content, responsible professionals, individual or group sessions, frequency of activities, use of complementary elements such as sms, email, or app); comparisons analyzed; length of follow-up; evaluation criteria or outcome measures (frequency of fats, fruits and vegetables, or fiber intake, adherence to the Mediterranean diet, physical activity); and a summary of major findings. In addition, comments were recorded about study limitations, specific problems, and possible conflicts.

The validity of the trials included in the present review was independently evaluated by two authors, using The Cochrane Collaboration's tool for assessing risk of bias ([Higgins and Green, 2011](#)), which includes the following domains: Random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, and selective reporting. After the evaluation was completed, each study was assessed as having low, unclear, or high risk of bias. In the case of disagreement between the two evaluators, a consensus was reached by discussion.

Data synthesis and analysis

We carried out a descriptive systematic review. An intervention was classified as “low intensity” if there was only one session lasting 30 min or less, “high intensity” if there were 6 or more sessions lasting 30 min or longer, and “medium intensity” in all other cases ([Pignone et al., 2003](#)). Due to the heterogeneity of the studies with respect to interventions, participants, outcome measures and results, we decided not to do a meta-analysis to attempt to estimate effect size.

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