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# Adherence to a healthful life attenuates lipid parameters among a healthy Italian population<sup>☆</sup>

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## KEYWORDS

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**Abstract** *Background and aim:* During the last 5 years, an increasing body of evidence on the association between adherence to the Mediterranean diet (MD), calculated through specific diet scores, and health status have been accumulated, but limited data are available regarding the association between MD scores and biomarkers. Similarly, many studies have demonstrated a significant protection against chronic diseases from a global healthy lifestyle (HL) pattern which includes not only dietary habits but also physical activity and abstinence from smoking, whereas few data regarding the influence of a HL pattern on circulating biomarkers are available. Using the framework of an epidemiological study conducted in Florence, Italy between 2002 and 2004 we evaluated the association between two different scores (a score of adherence to the MD and a score of adherence to a healthful life which includes abstinence from smoking and a moderate-to-high physical activity level) and some circulating parameters linked to chronic diseases.

*Methods and results:* Dietary habits and anthropometric and biochemical profiles were studied in 932 individuals (365 M; 567 F) with a median age of 47.5 years.

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Subjects who reported a greater adherence to the MD were found more frequently to be male, married and over 45 years of age. A general linear model dividing the study population into quartiles of scores was used. After adjustment for age, gender, educational status, body mass index and total energy intake, we observed no influence of adherence to the MD on circulating levels of biomarkers. On the other hand, an inverse association between circulating levels of lipid parameters (namely total cholesterol, LDL-cholesterol and triglycerides) and higher scores of adherence to a HL, was reported. In addition, a significant difference between the highest and the lowest quartiles of HL scores for homocysteine plasma levels was observed ( $p = 0.04$ ).

*Conclusion:* A high adherence to a HL, which includes not only a high adherence to the MD but also to other lifestyle factors (i.e. abstinence from smoking, and increasing physical activity during leisure time), is able to lower lipid parameters and homocysteine in a clinically healthy Italian population.

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## Introduction

The relationship between nutrition patterns and chronic diseases has been intensively studied for nearly half a century [1]. Indeed, data from epidemiological studies showed that increased consumption of some food groups that form the main components of the Mediterranean dietary pattern, such as fruits, vegetables, legumes, grains, nuts and n-3 fatty acids, can contribute to health status and to a better quality of life [2,3]. However, the failure of clinical trials that supplemented diets with single nutrients and the consideration that people do not eat isolated nutrients suggested that the global Mediterranean diet (MD), rather than specific nutrients, might have protective effects on the occurrence of such diseases.

Therefore, research efforts in this field switched progressively from the identification of single nutrients in association with a disease, to the evaluation of a score for adherence to the MD. Accordingly, some authors operationalised adherence to the MD through dietary scores, and found an association with a reduction in overall and cardiovascular mortality [4–6]. Moreover, an inverse association between variants of this score and several disease states such as endothelial dysfunction and obesity has been shown [7,8]. On the other hand, no clear data regarding the influence of dietary scores on circulating levels of atherosclerotic biomarkers have been reported.

At present there is no doubt that dietary habits represent only one of the essential components of a healthy lifestyle which also includes moderate physical activity and abstinence from smoking. Guidelines from the major scientific associations clearly indicate that adherence to the majority of all their recommendations is able to significantly

reduce the overall risk of occurrence of chronic diseases [9–11]. Indeed, findings on the healthy effect of a moderate amount of physical activity during leisure times have been clearly and widely reported by many cohort prospective studies; consistent data for the association between a smoking habit and health status have also been reported [12,13]. However, until now, there has been scarce information on the association between scores for adherence to a global healthy lifestyle (HL) pattern and circulating markers of chronic degenerative diseases.

Hence, the aim of the present study was to evaluate the possible association between scores of adherence to the MD and HL and some circulating parameters linked to the primary prevention of major chronic diseases within a population of middle-aged healthy Italian subjects enrolled within the framework of an epidemiological study conducted in Florence, Italy between 2002 and 2004.

## Methods

### Study population

The present paper reports data from an epidemiological study, "Alimentazione per la Salute e la Prevenzione di Malattia", funded by the Italian Minister of Health and aimed at evaluating dietary and lifestyle habits which contribute to the occurrence of chronic diseases in a population of middle-aged clinically healthy subjects living in a specific district of Florence, Italy [14]. From January 2002 to January 2004, 932 healthy subjects (365 M; 567 F) with a median age of 47.5 years, randomly drawn from the population registers of Florence, were enrolled in the study. The

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