



## CLÍNICA E INVESTIGACIÓN EN ARTERIOSCLEROSIS

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# Mediterranean diet, physical activity and ideal body weight, all wanting in Spanish children and adolescents



## La adherencia a la dieta mediterránea, la actividad física y el peso corporal idóneo dejan mucho que desear en niños y adolescentes españoles

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There is consistent epidemiological evidence that an unhealthy lifestyle (smoking, sedentariness, abstinence or excess alcohol, poor diet, and overweight or obesity) contributes nearly 80% of population-attributable risk of cardiovascular diseases (CVD)<sup>1,2</sup>. The converse, i.e., that a salutary lifestyle will afford close to 80% CVD protection, is also valid, as attested by a recent report from a large Swedish community study<sup>3</sup>. Thus, lifestyle changes are critical for the prevention of CVD at both the individual and the population level. Presently there is overwhelming evidence that smoking is harmful, while there are still controversies on which is a safe level of alcohol intake<sup>4</sup>. On the other hand, there is continuous progress on the epidemiology, health consequences and management of excess body weight, physical inactivity and poor dietary habits.

Currently the obesity pandemic and its attendant enhanced risk for premature mortality, CVD, type 2 diabetes, cognitive impairment, some types of cancer and other chronic diseases is a major global public health concern, as both the prevalence and disease burden related to a high body mass index (BMI) are increasing globally, and the rate of increase is steeper in children and adolescents than in adults<sup>5</sup>. Excessive body weight is particularly important at younger ages because it predicts adverse health consequences throughout the life-course. Changes in the food environment have resulted in more processed and energy-dense foods being increasingly available, accessible, and affordable; together with aggressive marketing of such foods, these are likely to be major drivers of excess energy intake and weight gain among different populations, children being

particularly susceptible<sup>6</sup>. The reduced opportunities for physical activity that have followed urbanization, major changes in means of mechanic transportation, and the pervasiveness of leisure-time sedentary activities like TV-watching, videogames, internet navigation and smart phone use can also be considered as potential drivers. Spain is no exception to the obesity epidemic: according to a recent survey, overweight has remained stable in the last 25 years at nearly 35% of the adult population, but obesity has more than doubled from 8% to 16.5%<sup>7</sup>. Similar rates of overweight and obesity have been reported for Spanish children<sup>8</sup>.

In this issue of the journal, Rosa-Guillamón et al. report on associations between body weight, physical activity and adherence to the Mediterranean diet (MeDiet) in a cross-sectional study of a non-random sample of 520 schoolchildren aged 8 to 17 years attending public schools in the region of Murcia<sup>9</sup>. Even though the socioeconomic status of the families of the study subjects is defined as medium-high, which is usually associated with healthier dietary behaviors, lower obesity rates, and better overall health indexes compared with disadvantaged social groups<sup>10</sup>, the prevalence of overweight/obesity was 40%. A low-quality diet with poor adherence to the MeDiet was present in 29% of males and 33% of females, while 28% overall reported a low physical activity level and only 2% had high physical activity. These data concur with a recent report of the ANIBES study, a cross-sectional investigation conducted on a random sample of the Spanish population aged 9–75 years, which shows that a high proportion of both young people and adults in Spain have poor dietary

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habits and low physical activity<sup>11</sup>. Another finding of the study of Rosa-Guillamón et al. worth mentioning is that the more physically active schoolchildren reported a better adherence to the MeDiet, which makes sense, but this association was independent of body weight status, i.e., both exercising normal weight and overweight/obese individuals followed the MeDiet to a greater extent than those physically inactive, regardless of adiposity<sup>9</sup>. These might be a spurious result, due to low statistical power and lack of adjusting for critical confounders, such as energy intake. Indeed, available evidence suggests that compliance with the MeDiet is associated with a lower body weight independently of physical activity in both children<sup>12</sup> and adults<sup>13,14</sup>. Randomized controlled trials (RCTs) have also demonstrated that an energy-restricted MeDiet is superior to low-fat or low-carbohydrate dietary patterns to obtain significant loss of weight and medium-term maintenance of weight loss in persons with overweight or obesity<sup>15–17</sup>. Attesting to the long-reaching beneficial effect of the MeDiet, adherence to this dietary pattern by pregnant mothers results in reduced adiposity in the offspring at 4 and 7 years of age<sup>18</sup>. Favorable effect tracking into the next generation might be attributable to advantageous fetal epigenetic changes by the MeDiet, which seems a biological feat!

Individuals adhering to the MeDiet tend to have healthier lifestyles than those with lesser compliance, and this can explain in part why they are more physically active. Interestingly, a recent systematic review of 58 papers describing rates of adherence to the MeDiet in various children and adolescent populations points out that most studies showed MeDiet adherence to be directly associated with physical activity and inversely with sedentary behavior<sup>19</sup>. Although not considered as important as unhealthy diets rich in energy-dense ultra-processed foods and sugar-sweetened beverages, sedentariness (or lack of physical activity) is also relevant in the obesity pandemic, and promotion of exercise is effective to help lose weight in overweight and obese individuals<sup>20</sup>. Concurring with the low overall adherence to the MeDiet by Spanish children and adolescents, the present situation for physical activity is also unsatisfactory, as trend data from the Spanish National Health Survey for 2016 show that the proportion who follow the recommendations to spend at least 60 minutes daily 5 times per week in moderate-to-vigorous exercise reaches only 31% males and 15% females 3 to 18 years old<sup>21</sup>. Underlining the importance of fulfilling both the MeDiet and appropriate exercise, a recent meta-analysis of 11 RCTs conducted in adults populations concluded that, compared to control conditions, promoting the MeDiet in combination with physical activity has a strong beneficial effect on body weight, while the effect on other cardiometabolic risk factors is moderate<sup>22</sup>.

The PREDIMED RCT showed that promotion of the MeDiet together with supplementation of healthy fatty foods (extra-virgin olive oil and nuts) induced a 30% reduction of CVD events in older adults at high cardiovascular risk but no prior CVD events, thus providing the highest level of scientific evidence for the efficacy of a food pattern, in this case the MeDiet, in the primary prevention of CVD<sup>23</sup>. In PREDIMED, though, the diets were isoenergetic and increased physical activity was not recommended. To learn whether a reduced-energy MeDiet plus exercise promotion leading to sustained weight loss in persons with overweight/obesity and features

of the metabolic syndrome would go a step further in CVD prevention, the PREDIMED-Plus RCT was launched in September 2013. This trial thus tackles the three CVD risk factors dealt with in this paper: diet, body weight and physical activity, although its aim of CVD prevention through weight loss mandates to study older individuals at high cardiovascular risk, not young ones<sup>24</sup>. Preliminary results at 1 year in the first 626 study subjects recruited has shown that such intensive lifestyle intervention was effective in decreasing adiposity and improving cardiovascular risk factors<sup>25</sup>.

Overall, the data of Rosa-Guillamón et al. and the available epidemiological evidence indicate that a great effort needs to be made at the public health level among Spanish youth to foster adherence to the MeDiet and fight against sedentariness to both forestall undue weight gain and promote good health now and in the life-course. It is also critical to attempt to close the ever increasing gap between rich and poor, which entails a great disparity in dietary habits and overall lifestyle translating into obesity, increased chronic disease rates, and a shortened life span for the more disadvantaged. Eventually, the results of the PREDIMED-Plus trial will tell us whether sustained weight loss through diet and exercise in overweight/obese individuals results in prevention from CVD and other non communicable diseases.

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