

# Efficacy of diets in weight loss regimens: is the Mediterranean diet appropriate?

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The increasing number of overweight and obese individuals, with several associated conditions, such as type 2 diabetes mellitus, hypertension and dislipemia, has become one of the leading public health concerns in many countries around the world.<sup>1</sup> Concomitant with this increase in the prevalence of obesity has been the rise in the number of weight-loss diets.

Strategies recommended for weight control have generally included the adoption of low-fat dietary patterns, which facilitate energy restriction and cardiovascular disease risk reduction.

Although guidelines to follow a high-complex carbohydrate (HCD), low fat energy-deficient diet to achieve weight loss are generally accepted<sup>2-4</sup>, the persistence of an epidemic of obesity and type 2 diabetes suggests that new nutritional strategies are needed if the epidemic is to be overcome. Studies of the role of a high dietary ratio of protein to carbohydrate in enhancing weight loss and disease risk management have emerged along with increasing public interest in weight control<sup>5</sup>, and considerable public and media attention has focused on low-carbohydrate (LCD)/high protein diets.

LCD diets are attractive because they promise rapid weight loss without having to count calories and without relinquishing the consumption of many palatable foods. In contrast, traditional dietary recommendations for weight loss endorse a fat-restricted and calorie-restricted diet high in complex carbohydrates, which may be more difficult to follow. Nonetheless, some intervention studies comparing both diets have concluded that, irrespective of the diet being consumed, the only variable predicting the amount of weight loss was the self-reported history of dietary compliance.<sup>6,7</sup>

The efficacy of low fat diet HCD in comparison with a LCD, has now been established in a recent meta-analysis covering six outpatient randomized trials.<sup>8-13</sup> The authors of the study<sup>14</sup> concluded that LCD, non-energy-restricted diets appear

to be at least as effective as low-fat, energy-restricted diets in inducing weight loss for up to 1 year. After 6 months, individuals randomized to LCD diets had lost more weight than individuals randomized to low-fat diets. However, after 12 months, this difference was no longer significant. There were no differences in blood pressure. Triglyceride and high-density lipoprotein cholesterol values changed more favorably in individuals assigned to LCD diets, but total cholesterol and low-density lipoprotein cholesterol values improved in individuals assigned to low-fat diets.

As not all obese persons are insulin resistant, McLaughlin et al.<sup>15</sup>, focused on obese, insulin-resistant persons to study the effects of moderate variations in the carbohydrate and fat content of calorie-restricted diets on weight loss and cardiovascular disease risk over a 16 week period. They concluded that a calorie-restricted diet, moderately lower in carbohydrate and higher in unsaturated fat (Mediterranean type diet), is as efficacious as the traditional low-fat diet in producing weight loss and may be more beneficial in reducing markers for cardiovascular disease. The recent study from Shai et al.<sup>16</sup> demonstrate in 322 moderately obese subjects, mainly males followed during 24 months, that both Mediterranean and LCD diets may be effective alternatives to low fat diets for weight loss. The more favorable effects on glycemic control with the Mediterranean diet (MD), and the almost nonexistent weight relapse with this diet suggest that the MD is probably the best alternative to lose weight in moderately obese or overweight people. However, other alternatives may be appropriate for the very obese.

Other factors to take into account are the role of the glycemic-index and the type of carbohydrate content (complex or simple) comprising the diet. Moreover, one should also bear in mind that the analysis of food consumption patterns within the more recent context of the obesity and diabetes epidemic in the USA demonstrate

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Received: August 12, 2008.

Accepted: October 17, 2008.

Conflict of interests: none declared.

Pol Arch Med Wewn. 2008;

118 (12): 691-693

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that the increase in calories was almost entirely due to an increase in carbohydrate<sup>17</sup>; however the pattern seems quite different in Mediterranean countries where a decrease in the major sources of carbohydrates has accompanied the rise in obesity rates<sup>18</sup>.

A recent systematic review<sup>19</sup> concluded that epidemiological evidence assessing the association between MD adherence and overweight/obesity is limited and conflicting as only 21 studies have assessed this relationship (the majority being interventions, the rest cross-sectional or cohort studies). No studies reported that a MD significantly increased obesity. Just over half of the studies provided evidence that adhering to a MD was associated with less overweight/obesity or promoted weight loss. The extent of the protective effect of the MD was reasonably strong in some studies, as individuals with high MD adherence were up to 29% less likely to become obese (in men)<sup>20</sup> in cohort studies. An even stronger protective effect was seen in cross-sectional studies, with up to 51% less probability of being overweight or obese.<sup>21</sup> In addition, some intervention studies reported important weight loss benefits, reaching up to 14 kg in one study.<sup>22</sup>

There are several physiological explanations that could elucidate why key components of a MD might protect against weight gain. The MD is rich in plant-based foods that provide a large quantity of dietary fiber, which has been shown to increase satiety and satiation through mechanisms such as prolonged mastication, increased gastric distention, and enhanced release of cholecystokinin.<sup>23</sup> Energy density has an important role in weight gain as palatable energy-dense food consumption is associated with poor appetite control and leads to over-consumption. The MD has a low energy density<sup>23</sup> and also relatively low glycemic load<sup>24</sup> compared to many other dietary patterns, which along with its higher water content lead to increased satiation and lower calorie intakes, thus facilitating the prevention of weight gain.

In the few studies (all interventions) that specified the percentage of total energy derived from fat with the MD, cited values were consistent with the moderately high fat content characteristic of the traditional MD (ranging from 30–40% of energy). The consequences of diets with a relatively high total fat content have been a topic of concern, partly due to the possible effects on weight gain.<sup>25</sup> However, there is some evidence that high fat diets are not the major cause of obesity<sup>24</sup>, as important cohort studies<sup>26–28</sup> and long-term trials<sup>22,29</sup> have found no significant relation between diets with greater fat content and obesity.

Both the MD and a low-fat diet could possess similar favorable protective effects on weight due to the high fibre content and low energy density of their components. However, the MD has several advantageous characteristics that are beneficial for preventing obesity. Firstly, the quality

composition of fat is low in cholesterol-raising fatty acids (saturated and trans fatty acids) and high in monounsaturated fatty acids (approximately 67% of fat energy)<sup>30</sup> such as oleic acid in olive oil, which has important health benefits<sup>23</sup>. Secondly, although fat is believed to be the least satiating of the macronutrients, the habitual use of olive oil in salads, vegetable and legume dishes enhances their palatability. This increases consumption of foods high in dietary fibre and low in energy density, resulting in greater satiation and satiety. Thirdly, the use of monounsaturated fat has been found to increase postprandial fat oxidation, diet-induced thermogenesis and overall daily energy expenditure compared to other fats such as saturated fats.<sup>31,32</sup> This may provide a physiological explanation of why olive oil consumption is less likely to be associated with weight gain.<sup>27</sup> Finally, the MD is highly palatable and therefore well liked and tolerated among dieters and compliance to the MD has been found to be high.<sup>29,33,34</sup>

Apart from the favorable fatty acid profile of the MD, the variety in vegetable products and higher composition of plant-based foods (including nuts and seeds) provide additional health benefits. As it includes less animal products, contributing 10–15% of energy as proteins, the MD consists of a diet rich in non-nutritional factors and micronutrients, particularly antioxidants, which in its entirety enhances health benefits such as reducing risk of coronary heart disease and type 2 diabetes.<sup>30,35</sup>

To conclude, the MD has been shown to have no association with obesity, and in addition, may be a very effective tool to reduce weight in overweight and obese patients.

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