Editorial

Nonalcoholic fatty liver disease (NAFLD) prevention: role of Mediterranean diet and physical activity

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Nonalcoholic fatty liver disease (NAFLD) is one of the most common causes of chronic liver disease in Western countries leading to high morbidity and mortality and is strongly related to obesity (1). Indeed, metabolic syndrome and insulin resistance play a role in the pathogenesis of NAFLD, which involves intrahepatic triglyceride accumulation and inflammation (2). NAFLD is a consequence of genetic predisposition interacting with environmental and behavioral factors. Data within the literature strongly support the idea that it represents the hepatic feature of a multisystem disease together with type 2 diabetes, cardiovascular disease (CVD), chronic kidney disease and osteoporosis (3). Nevertheless, the exact mechanism of hepatic fat accumulation and the progression to nonalcoholic steatohepatitis (NASH) is not completely understood. Hepatic fat is closely related to cardiometabolic risk (4) and, in order to decrease intrahepatic lipid (IHL) content and improve NAFLD, lifestyle interventions involving both diet and physical activity are recommended (2). In particular, great attention is focused on Mediterranean diet, which seems to help in gradually improving the severity of NAFLD (5). A randomized, cross-over intervention study demonstrated that in just 6 weeks, an olive-oil rich Mediterranean diet can result in a 40% relative reduction in liver fat measured by magnetic resonance in the form of IHL% (6). NAFLD improvement was associated with increased insulin sensitivity and reduced circulating insulin concentrations, even without a change in body weight (6).

Mediterranean diet is characterized by a large intake of fruits, vegetables, whole grains, nuts, legumes and fish and low consumption of red meats with moderate alcohol intake, usually red wine consumed with meals (5). A large fraction of the dietary lipid content consists of monounsaturated fatty acids provided by extra-virgin olive oil (EVOO). The beneficial effects of EVOO may be attributed to phenolic compounds, tocopherol, carotenoids, which show antioxidant, antimicrobial and anti-inflammatory properties, preventing cellular injury and oxidative stress with subsequent positive effects on diseases risk (7,8). Animal models have demonstrated that EVOO and its phenols could regulate hepatic lipid metabolism by reducing the lipogenic pathway, and thus attenuating liver steatosis and collagen deposition (7,8). The largest study on the benefits of the Mediterranean diet was the seven countries study of CVDs that began in the 1950s and has spanned for over 50 years (9). It was an epidemiological study enrolling, at entry, 12,763 men from 16 population cohorts in eight nations of seven countries (Italy, USA, Japan, Netherlands, Greece, Yugoslavia and Finland). Cultural and dietary differences were evaluated in relation to incidence of CVD. Higher incidence and mortality rates from CVD were found in USA and northern Europe whilst Mediterranean countries and Japan showed lower mortality rates (9). In the same period, the Framingham Heart Study [1948], another ongoing and long-lasting epidemiological study on CVD, started to document the natural history of CVD (10). Now the study is turning 70 years old and continues to provide valuable information regarding cardio-

metabolic diseases.

A very recent study by Ma and collaborators, involving the second- and the third-generation cohorts of the Framingham Heart Study (11), demonstrated that improved diet quality led to a decrease in liver fat accumulation and consequently a reduced risk and severity of steatosis in adults. Moreover, it was suggested that adopting a healthier diet might blunt the genetic predisposition to NAFLD. In particular their focus was on the Mediterranean Diet assessed by Mediterranean-style diet score (MDS) and the Alternative Healthy Eating Index (AHEI) score. Greater adherence to these dietary patterns was associated with reduction in weight gain and hepatic fat together with lower incidence of CVD and decreased risk of death (11). Authors found that increased intake of fruits, legumes, vegetables, nuts, whole grains, eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), and reduction in red meat and trans-fat, was associated with lower risk of steatosis. Furthermore, Ma and collaborators strongly support a long-term diet-quality change that might induce improvements in liver fat accumulation reducing the risk of NAFLD (11). Liver fat deposition may be influenced by the consumption of fruits and vegetables rich in water and fiber, which help to decrease the energy intake by affecting satiety and, thus, avoiding weight gain (11). Moreover, high fiber consumption increases bacteria degrading fiber which may increase the production of short-chain fatty acids (SCFAs), including butyrate which may suppress inflammation reducing the possible onset and progression of NAFLD (11). Another hypothesis explaining the association between diet and reduced liver fat accumulation is independent of change in weight gain and is related to increased nut or legume consumption suggesting that nut intake may promote lipid oxidation and reduce ectopic visceral fat (10). Mediterranean diet interventions in non-Mediterranean countries may have additional challenges and need specific approaches (11). An English study on NAFLD patients found Mediterranean diet as an acceptable healthy eating model without associations between socio-demographic characteristics and adherence to dietary changes (12). The main issue for patients is to accept NAFLD as a disease, indeed successful nutritional changes are strongly related to patients' knowledge about their condition. Indeed, the lack of early symptoms and the misperception of a long-term disease with severe outcome make difficult the intervention in this kind of patients. The role of clinicians, instead, is to give the message that NAFLD is treatable and even reversible if diet improvements are achieved. Moreover, it has been demonstrated that weight loss promotes the adoption and adherence to the diet (12).

Together with diet, physical activity is suggested in NAFLD prevention and treatment, data from literature reported that physical activity influences hepatic metabolism and is inversely associated with the onset of NAFLD and NASH (1). Exercise training induces significant improvement of hepatic and visceral fat accumulation, increased lipid oxidation and insulin sensitivity (13). Decreased hepatic fat content, adipose tissue and insulin resistance have been showed at similar extent with both aerobic and anaerobic resistance training (14). Unfortunately, it has not yet been established the optimal type, duration, and intensity of exercise training for patients with NAFLD so that clinical studies are needed to focus which are the best conditions of physical activity in order to obtain the best results in prevention of NAFLD (15). Even if a large number of studies support the efficacy of both diet-based approaches and physical activity for NAFLD prevention, further future investigations are needed to confirm scientific data and to explore the possible molecular mechanisms underlying the association between NAFLD, diet and physical activity.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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