

Nutrient composition in non-alcoholic fatty liver disease- A review

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Abstract: Non-Alcoholic Fatty Liver Disease (NAFLD), the most prevalent non communicable disease arising due to obesity, is a reversible condition. Poor lifestyle comprising of excessive caloric intake and sedentary physical activity are the major causes leading to hepatic fat deposition. Even though, there is no medicinal treatment for NAFLD, lifestyle management plays an important role in reversing the situation. Early treatment can prevent liver related mortality. An increased caloric consumption in NAFLD subjects is reported. As per ESPEN guidelines (2019) a 7-10 % weight loss is recommended to improve hepatic steatosis in obese patients and liver parameters and more than 10 % to improve fibrosis. Achieving a weight loss of 0.5 to 1 kg/week with daily calorie reduction by 500 to 1000 Kcal/day is recommended rather than a rapid weight loss, which may be deleterious for NAFLD patients. The quality of diet is more important than the quantity. Modifying the macronutrients (carbohydrates, proteins and fats) and micronutrients even without weight loss can prove beneficial to NAFLD patients. The percent calories of carbohydrate coming from the diet and the glycemic index of food stuffs are likely to affect NAFLD. Carbohydrate rich diets can raise blood glucose, insulin and triglycerides levels which can worsen NAFLD condition. There is an increased consumption of highly processed food products often rich in sucrose and fructose which raises the liver enzymes and is implicated in Metabolic Syndrome (MetS). Dietary fiber which is the nondigestible carbohydrate found in cereals, vegetables, fruits etc. have advantage through weight reduction, decrease in liver enzymes and microbiota modulation that stimulate production of short chain fatty acids. Some fibers are prebiotics (non digestible carbohydrates) such as fructooligosaccharides and control growth of harmful bacteria. The current recommendations of many scientific associations indicate a carbohydrate intake >50% of the total energy and choosing whole grain and low-glycemic index foods. The American Dietetics Association (ADA) recommends increased intake of complex carbohydrates for example those found in whole grains, pulses and legumes, vegetables and fruits and decrease intake of simple or refined carbohydrates. Studies report that excess or deficiency of proteins is linked to NAFLD. In absence of evidence based studies to state the impact of dietary protein on NAFLD, the ADA guidelines which are based on recommended dietary allowances (RDA) seems appropriate (15-20 % of total calories). Animal protein like red meat and processed meat should be avoided due to its high sodium content, added preservatives, saturated fat and trans fats. Plant based protein like whole grains, legumes, seeds, vegetables are recommended. Over ingestion of fats are causative factors for insulin resistance (IR) and impaired metabolism of lipids leading to NAFLD formation. Intake of Saturated fatty acids (SFAs) promotes oxidative stress, inflammation and mitochondrial dysfunction. Consumption of SFAs in processed meat, butter, bakery products is discouraged. McCarthy and Rinellas review (2012) summarized the SFA to be in range of 6-10% of total energy for NAFLD patients. Studies show that high cholesterol intake is responsible for NAFLD, in view of the current dietary guidelines for cholesterol from USDA

(2015) the requirements needs to be revisited. Dietary Mono Unsaturated Fatty Acids (MUFA) increase the lipid oxidation and decrease IR, thereby reducing fatty liver formation. Diets high in MUFA may be preferable if they are not coupled with increased energy intake or contain higher quantities of cholesterol and a moderate consumption is recommended. PUFAs include omega 3 and omega 6 fatty acids. Omega 6 fatty acids in excess amounts have been known to induce proinflammatory effects in liver. Its consumption is discouraged. Omega 3 fatty acids enhance the anti-inflammatory mediators and alter the hepatic lipid composition, which increases the insulin sensitivity thereby lowering the serum triglyceride levels and lipid storage in adipose tissue. The disturbance in omega-3: omega-6 ratio has been reported in NAFLD patients. Overall omega 3 fatty acids are preferred and it is important to advise its sources like sea foods (2 to 3 times per week) and vegetarian sources like flaxseeds, with n6/n3 ratio of 1-2:1. As per ESPEN guidelines, omega 3 fatty acids cannot be recommended until data on efficacy of omega 3 is available. In view of the deleterious effects of trans fats (hyperinsulinemia, liver fat accumulation and severe necroinflammation) the use of packaged and processed foods should be avoided as part of dietary recommendations for NAFLD. The ADAs recommendations for increased MUFAs and n3 PUFAs consumption and decreased consumption of saturated fats and trans fats seems appropriate. Micronutrients-are important in pathogenesis of NAFLD as they have antioxidant, immune modulatory, anti fibrotic and lipo protective effect. Vitamin E is an antioxidant and involved in inflammation responses, gene expression and reduces the risk of fatty liver in NAFLD patients. The American Association for the Study of Liver Diseases (AASLD) guidelines states that Vitamin E should be considered as pharmacological therapy to non-diabetic adult patients (biopsy proven NASH) when prescribed, at a dose of 800 IU/d on a daily basis. In patients with impaired fasting glucose or with fibrosis, 300 mg/d supplementation of vitamin E has been reported to be effective and safe. Caution has to be exercised with prescription of Vitamin E supplements. Vitamin D deficiency can cause oxidative stress and can result in MetS, IR and NAFLD. NAFLD patients have low values of retinoic acid and the deficiency is more pronounced with progression of NAFLD. The role of B3 (Niacin) and B12 has been studied of the B vitamins in NAFLD. There are no conclusive studies on Vitamin C and Vitamin K in NAFLD. Copper deficiency is associated with IR, steatosis and promotes progression to NASH. Zinc deficiency initiates insulin resistance, iron overload and hepatic steatosis. Iron excess unlike other minerals whose deficiencies play an important role in NAFLD have been reported. Polyphenols (resveratrol, curcumin, quercetin and catechins) found in fruits, vegetables, wine, coffee, reduce IHTG, by inducing antioxidant and anti-inflammatory effects are protective in NAFLD. In conclusion dietary modification with restriction of calories, refined carbohydrates and fats (SFA and trans fats) and diets high in lean protein, n-3 PUFA, MUFA and fiber content have been studied to benefit the NAFLD patients. The components of the Mediterranean diet can guide patients to make healthy choices. Dietary guidelines for NAFLD patients should be recommended based on sound dietary intervention trials.