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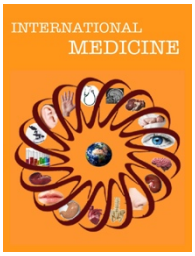

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Editorial

Recent topics for optimal intake of monounsaturated fatty acid (MUFA) and polyunsaturated fatty acid (PUFA)

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In recent years, various lipid research has been found. In this article, several topics would be described especially concerning monounsaturated fatty acids (MUFAs) and polyunsaturated fatty acids (PUFAs). American College of Cardiology (ACC), American Heart Association (AHA), and National Lipid Association (NLA) have recommended standard guidelines of nutrition [1]. Some important items are as follows: I) Continue a heart-healthy diet to keep weight-appropriate caloric requirements with personal food preferences. II) Consult a registered dietitian-nutritionist (RDN) for personalized counseling concerning diabetes, prediabetes, hypertension, obesity, and metabolic syndrome to be helpful for cardioprotective diet adherence. III) Consume an adequate diet emphasizing vegetables, fruits, and whole grains and other foods, and combine DASH, Mediterranean and vegetarian diet integrated to personal preference for cardioprotective meal pattern [1].

According to the standard guideline of the American Diabetes Association (ADA) in 2021, lifestyle control, dietary interventions, and lipid management have been crucial [2]. Adequate weight control and a well-balanced diet are indispensable for patients with diabetes, obesity, metabolic syndrome, and atherosclerotic cardiovascular disease (ASCVD). Among them, secondary prevention recommendations showed that all cases with diabetes and ASCVD have to receive high-intensity statin therapy with level A.

In order to prevent cardiometabolic diseases, the reduction of intake of dietary fat has been conventionally known by various health organizations [3]. However, their comments are equivocal. A recent report presented available evidence on the cardiometabolic risk and dietary recommendations from the Cochrane central register of controlled trials, and other databases. As a result, there are several pieces of evidence that higher intakes of saturated fatty acid (SFA) are related to the increased risk of cardiovascular disease (CVD), which is the same as the previous scientific evidence [3]. Moreover, replacement of total SFA with PUFA, MUFA, and high-quality carbohydrates may reduce cardiometabolic risk.

A systematic review was recently reported concerning the relationship between fat intakes and CVD risk in patients with type 2 diabetes mellitus (T2DM) [4]. It included five eligible prospective studies with 22,591 cases on average 9.8 years. There were rather limited results as follows: reduced CV disease occurrence was I) replaced analyses of SF (saturated fat) with PUFA (RR= 0.87), and II) SF with carbohydrate (RR = 0.82), III) SF with higher PUFA (RR=0.75). However, the quality of evidence was not satisfactory level, then further evaluation would be required in the future [4].

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Diet can be a modifiable risk factor, and it may change the gene expression and inflammatory biomarkers, which are related to atherosclerosis and obesity. There was the Brazilian Cardioprotective Nutritional (BALANCE) Program, in which a variety of biomarkers was investigated against the qualitative-quantitative food plan for half years [5]. They included blood glucose, insulin level, lipid profile, C-reactive protein, adiponectin, some kinds of interleukins, TNF-alpha, and expression of 84 atherosclerosis-related genes. Regarding the changes after nutritional intervention, the results showed the decrease of body weight ($p<0.04$), waist circumference ($p<0.04$), Homeostasis Model Assessment index for insulin resistance (HOMA-R) ($p = 0.046$), and significant increase of the expression of human elastin (ELN) ($p = 0.017$), IL4 ($p = 0.037$), and Apo A1 ($p = 0.011$) genes. For secondary prevention for CVD, Brazilian usual foods have increased the expression of genes related to decreasing the risk of cardiometabolic in obese cases.

Omega(ω)-3 PUFAs are known to show the influence on protein metabolism and energy expenditure. Then, supplementing of ω-3 PUFAs may increase resting metabolic rate (RMR). Its mechanism includes reducing the effect of sarcoplasmic reticulum (SR) Ca^{2+} ATPase (SERCA) activity and to increase Na^{+}/K^{+} ATPase (NKA) activity [6]. The study protocol was that 24 healthy subjects aged 65 years were provided either olive oil (OO) (5 g/day) or fish oil (FO) (5 g/day) containing EPA 2 g and DHA 1 g/day for 12 weeks. As a result, FO administration would be not effective in changing several biomarkers, such as RMR, substrate oxidation, and also SERCA and NKA protein levels and activities in the skeletal muscle [6].

A variety of research was reported concerning FO, OO, and extra-virgin olive oil (EVOO). Several differences were found among them, in which OO does not contain polyphenols and EVOO contains polyphenols [7]. On the other hand, some research has been found using FO and OO for mice in vivo. Among them, the prevention of arteriosclerosis was observed in MUFA contained in FO and the preventive effect for aging by OO was found [8,9].

Various health and medical benefits were found about EVOO, which has several kinds of fractions associated with some cardioprotective function [10]. Systematic reviews and meta-analyses were conducted for health benefits for EVOO [11]. The study included 633 cases from 13 related trials. Pooled analysis EVOO intake showed the results of no statistically significant effect on FBS, insulin, or HOMA-IR. However, decreasing trends were found. Consequently, evaluating the effect of EVOO on glycemic parameters will be required with well-designed RCTs for longer durations.

It has been known that the type and amount of consumed dietary fat would be involved in human metabolic health [12]. Higher intake of PUFAs can bring a decrease of CV risk, improve glucose homeostasis, reduce central adiposity, and increase the lean body mass. There are some important biomarkers for giving influence to body composition. They include plant-based essential fatty acids (ePUFAs)-n-6 linoleic acid (LA), n-3 α-linolenic acid (ALA), marine-derived long-chain EPA, and DHA. The previous results showed that LA and ALA provide a larger impact on fat mass/lean mass and glucose variability than EPA and DHA. Furthermore, it is reported that both of ePUFAs (LA and ALA) may show anti-inflammatory function in the human [12].

The controversy was observed about the cardiovascular influence of LA which is a major dietary omega-6 fatty acid and its major metabolite, arachidonic acid (AA). International studies showed the relationship of these levels in blood and CVD incidents [13], which included 68,659 cases, 15,198 cardiovascular events, from 30 prospective studies. The results showed that higher LA levels were related to lower risks of cardiovascular mortality, total CVD, and ischemic stroke. In contrast, AA did not show relationships for these [13].

Conjugated linoleic acid (CLA) has been known as a dietary PUFA, which exists in animal fats such as dairy products and red meat [14]. Regarding CLAs, preclinical and human studies were recently reviewed [15]. As a result, CLAs show clinical beneficial effects against atherosclerosis, obesity, and cancer. Although CLA exists in all food, CLA has not been evaluated as trans fat. The reason is that CLA is judged for generally recognized as safe (GRAS) for a mixture. It contains about 60–90% of the cis-9, trans-11, and trans-10, cis-12 isomers in the ratio of approximately 50:50 [15].

In summary, recent topics concerning MUFA and PUFA were described in this article. These perspectives would be useful for optimal nutritional management in patients with metabolic syndrome and so on. Cardiovascular events would be hopefully rather reduced by recommended optimal nutrition.

Conflict of interest

The author declares no conflict of interest.

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