

Effects of strength training combined with sustainable source of omega-3 fatty acids on muscle strength and cognitive functions in adults.

According to the World Health Organization, physical inactivity is the fourth leading risk factor for global mortality, being responsible for 6% of deaths globally, whereas engaging in physical activity can have beneficial effects in up to 23 diseases. One of the serious consequences of physical inactivity is a decrease in muscle strength - the best single measure of age-related muscle changes. Research indicates that higher muscle strength is inversely correlated with the frequency of cardiovascular disease, type 2 diabetes, metabolic syndrome or cognitive dysfunction. Searching for methods using a holistic approach, that is, combining appropriate training and supplementation, incorporate principles of sustainability, to increase muscle mass and strength in healthy adults, seems to be the most effective way to address the far-reaching consequences of physical inactivity. Strength training is a form of training with proven effectiveness in increasing muscle mass and strength in healthy adults. A growing body of evidence suggests that strength training also has the potential to improve cognitive functioning, the decline of which is observed as early as age 30 with concomitant declines in muscle strength. Omega-3 fatty acids (n-3 PUFAs), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), may have a significant impact on both muscle strength and cognitive functions, yet they are consumed in insufficient amounts in many regions of the world including Poland, as indicated by their low blood status. Both n-3 PUFAs and physical activity play a significant role in controlling inflammation. Importantly, the use of more economically and environmentally sustainable sources of n-3 PUFAs than those from the fish and other marine organisms is warranted. Current resources of both farmed and wild fish no longer meet human dietary needs for n-3 PUFAs.

The purpose of our project is to evaluate the effects of long-term supplementation with algae-derived DHA combined with strength training on muscle strength, neuromuscular parameters, post-exercise inflammation and cognitive functions in healthy adults compared to fish-derived EPA and DHA combined with strength training, strength training alone and control group. Concentrations in blood serum of specific markers associated with muscle strength parameters, cognitive function and inflammation will also be assessed. Given our experience in long-term training and supplementation projects and our successful collaboration with a leading world expert in metabolism of n-3 PUFAs, we want to take a step forward and implement muscle biopsy in participants. This will allow us to evaluate changes in n-3 PUFA and selected markers concentrations in muscle and establish their relationship with changes in muscle strength. We expect that the combination of strength training and supplementation with algae-derived DHA will improve muscle strength parameters, cognitive function and reduce post-exercise inflammation. Moreover, muscle concentrations of selected markers will positively correlate with muscle strength parameters. These changes will be the same in the group supplementing with algae-derived DHA and fish-derived EPA and DHA and smaller in the group using strength training alone. Changes will not be observed in the control group.