Topics: Brain function, cognitive performance in healthy young adults, mild cognitive impairment (MCI), omega-3 fatty acids, docosahexaenoic acid (DHA), long chain polyunsaturated fatty acids (LC-PUFAs), fish, fish oil

Objective: To determine if DHA supplementation would improve cognitive performance in healthy young adults.

Background: DHA is important for brain structure and function and its concentration in the body is dependent on dietary intake. Studies in infants and children with learning disorders have proven its necessity for normal cognitive function. Population studies have shown that habitual intake of oily fish in later life leads to better cognitive function, slower rates of cognitive decline and a lower risk of developing dementia while omega-3 supplementation improves some aspects of brain performance in the elderly. However, few studies to date have established the role of DHA on cognitive performance in normal, healthy, young adults.

Method: This double-blind, placebo-controlled trial included 176 healthy adults aged 18-45 years matched for age and gender and randomly assigned to take either 1.16 g DHA daily or a high oleic acid placebo for 6 months.

Inclusion criteria:

- Male and female
- 18-40 years;
- Non-smokers;
- Healthy (no known condition or disease and not taking medication for any condition or disease)
- Low habitual intake of fatty fish (<1 serving/month) or any other omega 3 fortified food products
- Haven't taken fish oil supplements over the past 6 months
- No allergies to seafood
- Not pregnant or lactating

Subjects were requested not to consume any fatty fish or fish oil supplements (other than those provided) and to maintain their normal daily routine (eating pattern, physical activity, and alcohol consumption) for the duration of the study, and to maintain a diary recording consumption of the supplement and any deviations from the study protocol e.g. changes in dietary patterns, illness, use of medication or other nutritional supplements, etc. Compliance was determined by pill-counting every 4 weeks.

Exclusion Criteria

- Pregnancy
- Lactation
- Taking Omega-3 Supplements
- High habitual intake of fatty fish
- Smoking
- Any known chronic condition/disease
- Taking medication

The following assessments were completed:

Pretrial Entry Assessments

1. Screening questionnaire to determine whether the subjects meet the inclusion criteria including level of education, age, gender, first language and alcohol consumption habits, plus intake of omega-3 rich food products

Before and After Treatment Assessments

1. **Cognitive assessment** of memory (working and long-term memory), reaction time and attention. Using the following tests:

- **Working memory:** N-Back, Corsi Blocks and Letter-number sequencing
- **Long-term memory:** Immediate and Delayed Word Recall, Immediate and Delayed Word Recognition, Immediate and Delayed Picture Recognition
- **Processing speed / reaction time:** Finding A's,Simple reaction time, Choice reaction time
- **Attention:** Stroop test

2. Blood pressure and heart rate
3. Red Blood Cell (RBC) fatty acid composition
4. Height, weight, waist and hip circumference, and body mass index

Since cognitive function varies according to food intake, time-of day and environmental factors, the following measures were taken to minimize variability:

- Assessments were performed at a similar time of day (between 7-10am);
- Subjects received guidelines to follow the day prior to the test days regarding intake of cognitive stimulants such as caffeine and alcohol, sport activity and sleep.
- Assessments were not conducted during exam periods;
- On the test days, subjects fasted from food or stimulants (caffeine, alcohol), except for water for a minimum of 10 hours and had a standard breakfast at the research unit before commencing the cognitive tests.
- Environmental factors such as noise and temperature were controlled to avoid any distraction during the tests.

Intent to treat analysis was performed using ANOVA controlling for gender, age and baseline test performance (to see whether low performers at baseline benefited more than high performers at baseline).

Findings:

1. Memory accuracy and working memory improved by 3% and 2.5% respectively with DHA compared to placebo in women, but not in men. Mean (95% CI) difference: 0.25 (0.05, 0.45) SD, P=0.01; 0.19 (0.01, 0.36) SD, p=0.04, respectively)
2. Speed of working memory improved with DHA compared to placebo in men by 15% (Reaction time -0.56 (-0.90, -0.21) SD, P=0.002).
3. Although speed of memory (delayed word and picture recognition) failed to reach significance between treatments (P=0.07), speed of delayed word recognition improved in women by 7% (Reaction time -0.34 (-0.59, -0.08) SD, P=0.01).
4. Attention was not affected

Conclusion: DHA supplementation improved memory and speed of memory in healthy, young adults whose habitual diet was low in DHA. DHA affected the memory domains differently in men and women with memory and speed of long-term memory improving only in women and speed of working memory improving in men.

Relevance to: Efalex Active 50+, Efalex Active Mind

Reference:

Stonehouse W, Conlon C, Podd J, Kennedy D, Haskell C. DHA supplementation influences cognitive performance in healthy young adults. 2011 In Press.

PRESS RELEASE

DHA Supplementation Improves Brain Performance in Healthy Young Adults

For the third time, DHA supplementation has proven to enhance mental performance in normal, healthy, young people. The collaborative study between the Institute of Food, Nutrition and Human Health and School of Psychology, Massey University, Auckland, NZ and Department of Psychology, Northumbria University, Newcastle, UK, and funded by a Massey University Research Fund, Efamol Ltd. and Health & Herbs International Ltd., revealed that DHA supplementation improved memory and speed of memory in healthy young adults whose habitual diet was low in DHA[1].

The double-blind, placebo controlled trial included 176 healthy, adults aged 18-45 years who were randomly assigned to take either 1.16 g DHA daily or a placebo containing no DHA for 6 months. Assessments before and after treatment included a variety of cognitive assessments of memory (working and long-term memory), processing speed, reaction time and attention, blood pressure and heart rate, red blood cell fatty acid composition, height, weight, waist and hip circumference, and body mass index. Cognitive assessments were compared between the DHA and placebo group while correcting for gender, age and baseline test performance (to see whether low performers at baseline benefited more than high performers at baseline).

In women, memory accuracy, working memory and speed of delayed word recognition significantly improved with DHA supplementation compared to placebo by 3%, 2.5% and 7% respectively. In men, speed of working memory significantly improved by 15% with DHA supplementation compared to placebo. Attention was not affected in either sex.

Numerous previous studies in infants and children with learning disorders have proven the necessity of DHA for normal brain structure and function. In addition, population studies have consistently proven the benefits of EPA+DHA supplementation to prevent mild cognitive impairment (MCI) associated with age. In 2007, two studies showed that regular intake of EPA + DHA rich foods prevents MCI in the elderly. The first[2] reported those who ate 10 grams or more of fish or fish products per day had significantly better test scores and a lower prevalence of poor cognitive performance than did those whose intake was less than 10 g/day. The second[3] showed that those with higher blood levels of EPA and DHA had less decline in sensorimotor speed and complex speed over the 3 years. Two additional studies showed that men who ate about 400 mg of omega-3 LC-PUFAs per day had less cognitive decline in a five year period than those who ate only about 20 mg/day[4] and that higher blood levels of EPA+DHA prevented deterioration in verbal fluency[5]. In November 2006, the Framingham Heart Study which followed 899 initially healthy volunteers with a median age of 76 years[6] showed that people who ate two or more servings of fish per week were 39 percent less likely to develop dementia, but those who ate less than that did not derive any benefit. Although oily fish contains both EPA and DHA, it was only the DHA that was responsible for preventing dementia in this study.

Randomized, double-blind, placebo controlled clinical studies measuring brain function in MCI have reported improvements in learning and memory skills the equivalent of a person three years younger in normal, healthy, older adults taking 900 mg/day of DHA[7], no decline in cognitive function following either placebo or EPA+DHA treatment in healthy adults aged 70-79 years[8] and improvements in cognitive test scores in the active as well as the placebo group mostly due to learning effects in cognitively healthy adults[9]. The improvements measured in the placebo group masked the effects of the active and the researchers stated that the choice of placebo may not have been appropriate.

Up to now, only two intervention studies in healthy, young adults have reported significant improvements in reaction time and sustained attention[10,13,14]. The first included treatment with 1.6 g of eicosapentaenoic acid and 0.8 g DHA per day for 35 days in 22-51 year olds[10]. The second showed that DHA-rich fish oil increased attention/response time and increased blood flow to the brain, while EPA-rich fish oil reduced mental fatigue at times of high cognitive demand in healthy, young adults aged 18-35 years[13,14]. Another study using similar dosage and duration of treatment reported no effect on any cognitive measures including attention, memory, response, inhibition and emotional recognition, but small improvements in mental fatigue[11]. A fourth study reported that 1.5-1.8 g/day DHA from fish oil for 3 months prevented increases in aggression towards others during times of mental stress (during exams) in forty-one healthy students[12].

Results of the Massey University study substantiate these results by showing that DHA supplementation improved memory and speed of memory in healthy, young adults whose habitual diet was low in DHA. It also showed that DHA affected the memory domains differently in men and women with memory and speed of long-term memory improving only in women and speed of working memory improving in men.

The most effective way of improving DHA status is through direct dietary ingestion, but intake of DHA is low in most Westernized diets. This research highlights the need for DHA supplementation to enhance cognitive performance in healthy young adults.

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