

論 文 要 旨

**Relationship between fish consumption,
serum free fatty acids and cognitive function
among Japanese residents in a remote island**

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【Backgrounds and Study Purpose】

Polyunsaturated fatty acids (PUFAs) can be obtained from diet mainly fish, meat, dairy products, vegetables and oils. Although PUFAs such as docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) can be synthesized in vivo from α -linolenic acid via other intermediates, the conversion rate is quite low in humans. DHA, which is abundant in brain tissue, has been suspected to reduce the risk of dementia and cognitive decline based on the previous animal experiments and epidemiological studies. However, epidemiological reports from Asian countries, where the fish-consumption is relatively higher than that in European countries, are quite limited.

In the present study, the association of fish consumption and DHA with the scores of Kana Pick-out test (KPT), a cognitive function test to detect pre-dementia, were examined in a remote island of Kagoshima, Japan.

【Study Subjects and Methods】

Annual health checkup of residents was conducted in a remote island of Kagoshima using a questionnaire survey, hair sample collection, and the KPT, during September and October, 2007. Out of 1,188 residents taking health checkup, 505 (224 men and 281 women, age 30-69) were analyzed. Among these subjects, serum samples from 424 subjects were available for a free fatty acid assay. Hair mercury level was analyzed by cold vapour atomic absorption method, and serum free fatty acid level was measured by gas chromatography. Information on fish consumption and lifestyles were collected using a questionnaire.

Multivariate linear regression analysis was used to calculate the age-, sex-, and education-level-adjusted KPT scores among different levels of mercury and the ratio of DHA to arachidonic acid (AA).

【Results and Discussions】

There were significant differences in the distribution of habits of smoking and alcohol drinking between men (n=224) and women (n=281). The average of KPT score in women (38.1) was higher than that of men (35.0, $p<0.001$). The KPT scores significantly decreased with age ($p<0.001$) and lower education levels ($p<0.001$) in both men and women.

Hair mercury concentration was measured to use a surrogate marker of fish consumption. Spearman's correlation coefficients between mercury and fish consumption among men and women were 0.176 ($p=0.009$) and 0.236 ($p<0.001$), respectively.

KPT scores tended to increase with hair mercury levels in the subjects under the age of 60 although this association was not statistically significant. On the other hand, there was no such a trend in the subjects aged 60 or older.

Serum samples from 178 men and 246 women were analyzed for a free fatty acid. After adjusting for the effects of age, sex, and education level, KPT score was positively related to the DHA/AA (p for trend = 0.034) in the subjects under the age of 60 but this tendency was not observed in aged 60 or older. Similar trend was observed in association with hair mercury levels though there was no statistical significance. One of the explanations in the absence of the association between serum DHA and KPT score in the elderly people is that KPT may not be sensitive for the population aged 60 or older. According to the previous studies, the magnitude of the age-dependent decrease of KPT score was small in the elderly population, and the most elderly subjects were deviated to low scores without a peak.

Regarding EPA, there was no association between the KPT score and EPA/AA ratio in both age groups. This is consistent with the fact that brain EPA levels are significantly lower than those of DHA and AA. EPA may not play an important role in the brain.

【Conclusion】

The present study suggested a potential benefit of DHA on cognitive function in the subjects under the age of 60 but further studies are needed to check the beneficial effect among elderly people.