Fish Oil for Attenuating Posttraumatic Stress Symptoms among Rescue Workers after the Great East Japan Earthquake: A Randomized Controlled Trial

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The Great East Japan Earthquake and tsunami that occurred on March 11, 2011 devastated the northeastern coast of Japan, and left about 20,000 dead or missing. Many rescue workers, as well as survivors, were exposed to traumatic experiences. An appropriate strategy for the attenuation of posttraumatic stress disorder (PTSD) symptoms is therefore clearly required.

In the pathogenesis of PTSD, fear memory becomes excessively consolidated and extinction learning does not progress [1]. However, the role of hippocampal neurogenesis is a crucial factor in determining the period of hippocampal-dependent fear memory. This finding suggested that the fear memory, which is a characteristic of PTSD, might be controlled by appropriately regulating hippocampal neurogenesis [3].

Based on the animal research conducted to date, fish oil is the most promising candidate for dietary intervention to facilitate adult hippocampal neurogenesis [4]. In an open-label trial in patients with physical injury, we previously found that PTSD symptoms at 12 weeks after injury were significantly alleviated by the intervention [5]. Against this background, this study aimed to determine whether fish oil supplementation can attenuate PTSD symptoms among Disaster Medical Assistance Team members who were deployed during the acute disaster phase of the Great East Japan Earthquake. Disaster Medical Assistance Team members are doctors, nurses, and operational coordination staff (medical or clerical staff who are neither doctors nor nurses) who are dispatched as a mobile medical team with specialized training that is capable of acting during the acute phase of a large-scale disaster.

This single-blind, randomized, parallel-group trial was approved by the Ethics Committee of the National Disaster Medical Center, Tokyo, Japan, on April 1, 2011, and registered at UMIN Clinical Trials Registry as UMIN00005367. The detailed trial procedures and baseline assessment have been reported elsewhere [6].

Participants provided informed consent and were randomly assigned to either the fish oil supplementation plus psychoeducation group or the psychoeducation alone group. For participants allocated to the fish oil plus psychoeducation group, 7 capsules per day, each containing 320 mg of fish oil, were provided in line with previous research [7]. The fish oil composition of each capsule was 70% DHA and 7% eicosapentaenoic acid (EPA). For participants of both groups, a leaflet on psychoeducation about posttraumatic distress focusing on critical incident stress was provided.

The primary outcome was a total score on the Impact of Event Scale-Revised (IES-R) at 12 weeks after shipment of the supplementation on April 19, 2011. The IES-R is a self-reporting questionnaire about PTSD symptoms and is the most widely used measure in all forms of disaster area research [8]. Safety of the intervention was evaluated by the presence of adverse events during the observation period.

All analyses were conducted according to the intention-to-treat principle. Analysis of covariance was used to investigate the significance of the differences in the initial values as well as of the net changes after the intervention among the groups. Covariates for the analysis of covariance were sex, age, and baseline IES-R score at baseline. We examined the impact of sex difference for fish oil supplementation on PTSD symptoms as scheduled, because previous studies showed that the prevalence of PTSD was higher in women than in men [9]. All statistical analyses used two-tailed tests. For all statistical evaluations, p values less than 0.05 were considered indicative of significant differences. All data analyses were performed using SAS version 9.1 (SAS Institute Inc., Cary, N.C., USA).

Of the 1,816 Disaster Medical Assistance Team workers deployed to the disaster areas, 172 participated in the study between April 2 and 12, 2011. The participants did not differ significantly from nonparticipants in terms of occupation. The two groups were well balanced with respect to baseline characteristics. Primary outcome data were available for all participants except one. A sensitivity analysis was performed using a multiple imputation...
In conclusion, fish oil supplementation may offer a safe strategy for attenuating PTSD in women, and thus is an important topic that should be further explored in disaster mental health care.

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Table 1. Change in IES-R scores of participants in the intervention and control groups stratified by sex

| IES-R (only men)                | Baseline (mean ± SD) | After 12 weeks (mean ± SD) | Net change (95% CI) | p value |
|----------------------------------|----------------------|----------------------------|---------------------|---------|
| IES-R (only men)                 |                      |                           |                     |         |
| Fish oil group (n = 62)          | 14.0 ± 15.3          | 8.9 ± 9.9                 | 0.2 (–2.2 to 2.7)   | 0.86    |
| Psychoeducation alone group (n = 63) | 10.5 ± 11.1          | 6.9 ± 9.0                 |                     |         |
| IES-R (only women)               |                      |                           |                     |         |
| Fish oil group (n = 24)          | 15.7 ± 14.9          | 9.3 ± 8.8                 | –3.9 (–7.5 to –0.3) | 0.04    |
| Psychoeducation alone group (n = 23) | 11.2 ± 13.0          | 10.4 ± 12.3               |                     |         |

Net change: analysis of covariance adjusted for age and IES-R score at baseline.
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