

The effects of dietary omega-3 polyunsaturated fatty acid supplementation on attention and impulsivity in an animal model of attention deficit/hyperactivity disorder (ADHD)

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Submission date: February 28, 2014; Acceptance date: July 2, 2014; Publication date: July 3, 2014

ABSTRACT

Background: Attention deficit/hyperactivity disorder (ADHD) is one of the commonest psychiatric disorders in children and adolescents. The main symptoms of ADHD are hyperactivity, inattention and impulsivity. Both etiology and neurobiological basis of ADHD are unknown. In this context, long-chain polyunsaturated fatty acids (LC-PUFAs), especially omega-3 (n-3) PUFAs, have become a focus of interest. The symptoms of ADHD have been suggested to be associated with a deficiency of n-3 PUFAs. In addition, the impact of a supply of dietary n-3 PUFAs in the treatment of ADHD has frequently been discussed.

Objective: The aim of the present study was to examine the influence of n-3 PUFA supplementation on attention and impulsivity in the spontaneously hypertensive rat (SHR) which has been proposed to be a valid genetic animal model of ADHD.

Methods: Seven-week-old male SHRs were randomly divided into two groups of 15 rats and fed one of two experimental diets (n-3 PUFA-enriched or n-3 PUFA-deficient) prior to and during behavioral testing. Attention and impulsivity were assessed using a three-choice-serial-reaction-time-task (3CSRTT) which is based on the five-choice-serial-reaction-time-task. The experiment was performed with three-month-old rats.

Results: Our findings demonstrate a marked difference between groups regarding impulsivity but not attention. The n-3 PUFA-enriched diet significantly reduced impulsivity in SHRs compared with rats fed with the n-3 PUFA-deficient diet.

Conclusion: The present data show a decrease in impulsivity following a dietary n-3 PUFA supplementation, but no changes in attention. A possible explanation for these results is that the attention displayed by SHR may not be linked to n-3 PUFA supply. It is important to note that inattention and impulsiveness are two of the main symptoms of ADHD. Our results

regarding dietary n-3 PUFA supply may support the positive findings in human studies demonstrating that n-3 PUFA administration can improve the cognitive or behavioral symptoms in children with ADHD.

Key words: omega-3 polyunsaturated fatty acid, animal model, spontaneously hypertensive rat, attention, impulsivity, attention deficit/hyperactivity disorder