

Benefits of Essential Fatty Acid Supplementation on Language and Learning Skills in Children with Autism and Asperger's Syndrome

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Abstract

Fish oil provides essential fatty acids which are critical for brain health. Children aged 3–10 years who had been professionally diagnosed with autism or Asperger's syndrome were each given one gram of Nordic Naturals ProEFA™ [Complete Omega-3.6.9™] per day for 90 days. On days 0, 45, and 90 of supplementation, 49 developmental items from the Assessment of Basic Language and Learning Skills (ABLLS), a criterion-referenced tool, were used to measure 8 primary areas of language and learning: receptive language, requesting, labeling, intraverbals, imitation, play skills, social interaction, and generalization. Eighteen (18) of the initial 22 children completed the 90-day trial. All of the children displayed significant increases in their language and learning skills based upon the ABLLS. A t-test analysis of the data showed high statistical significance in all areas: receptive language, requesting, play skills, intraverbals and social interaction resulted in a p-value <0.0001. A p-value of <0.001 was obtained in the areas of labeling and generalization. In addition, a p-value of <0.01 was obtained for vocal imitation. No adverse effects were noted. The highly significant results of this small, open label pilot trial shows promise for children with autism spectrum disorder.

Introduction

Omega-3 and omega-6 provide fats that are as essential to health as vitamins, minerals, carbohydrates, and protein. Omega-3 essential fatty acids (EFAs) from fish oil provide eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), while omega-6 EFAs derived from borage oil provides gamma-linolenic acid (GLA), an additional important essential fatty acid¹. These polyunsaturated fats, which cannot be produced by the body and thus must be obtained through diet, are critical for brain health².

It is well documented that children with autism have many of the same behavioral and learning difficulties that are exhibited by those with attention-deficit/hyperactivity disorder (ADHD)³. Recent studies have shown that children with ADHD and autism have significantly lower levels of EFAs in their red blood cells than control subjects^{4,5}. A study of 41 children with specific learning difficulties and above-average ADHD ratings displayed significant differences in the mean scores for both cognitive and general behavior problems between the placebo group and the treatment group following 12 weeks of EFA supplementation⁶. In a more recently published case study, an 11-year-old boy diagnosed with autism displayed complete elimination of severe anxiety and ritualistic behavior when supplemented with EFAs⁷. The coordinators of the open-label study reported here, a speech/language pathologist and pediatrician sought to investigate the effect of an EFA supplement on 8 primary areas of language and learning in 22 children diagnosed with autism or Asperger's syndrome.

Materials and Methods

Only children who had been diagnosed with autism or Asperger's syndrome by a neurologist or qualified pediatric specialist were included. Parents enrolled their children in the study following review of a written study description. The study subjects (16 boys and 6 girls) ranged in age from 3 to 10 years.

Children who had been diagnosed with seizures or allergies to fish or borage, or who were currently taking an essential fatty acid supplement were excluded from the study. Any current regimens the children were following remained the same, and no implementation of other new therapies was permitted during the 90-day trial period.

Each of the 22 children ingested one gram of ProEFA™ (Nordic Naturals, Watsonville, CA) daily for 90 days. ProEFA [Complete Omega-3.6.9™] is comprised of 31% omega-3 fatty acids from fish oil, 4% GLA from borage oil, and natural vitamin E. Each one-gram serving provided 135mg EPA, 90mg DHA, and 33mg GLA (actual weight) along with 15 I.U. of vitamin E (d-alpha

tocopherol). Capsules were used for consistent, convenient dosing. Parents were asked to report any deviations in the supplementation practice. The supplement was lot-controlled.

Selected items from the Assessment of Basic Language and Learning Skills (ABBLs) were utilized to measure 8 primary areas of language acquisition. The ABBLs is a criterion-referenced tool designed to assess 25 areas of child development with autistic children or children with other types of developmental disabilities⁸. For the purpose of this study, 49 items were selected from the 8 areas: receptive language, requesting, intraverbals, labeling, imitation, play skills, social interaction, and generalization. Skill levels were measured at day 0, day 45, and day 90 into supplementation.

Pre- and post-test assessments utilizing the 49 selected items on the ABBLs were conducted by the speech/language pathologist in a clinical pediatric setting. The scores obtained from the pre-test date were not referenced prior to the post-test evaluation. A qualified adult (parent, teacher, therapist), trained by the study examiners in scoring the items on the ABBLs, assessed the child midway into the study at day 45.

Results

Due to the small sample size, a t-test analysis of the data was conducted. Results from the t-test revealed high statistical significance in the increase in mean scores from day 0 to day 90 in each of the eight areas measured. The following specific p-values were obtained: 1) receptive language, requesting, play skills, intraverbals, and social interaction <0.0001; 2) labeling and generalization <0.001; and 3) vocal imitation <0.01. (See Figures 1, 2, 3).

To further display the longitudinal nature of the data, a random-effects model was used (Figure 4). This model also shows that the increase in scores was linear and highly significant.

Discussion

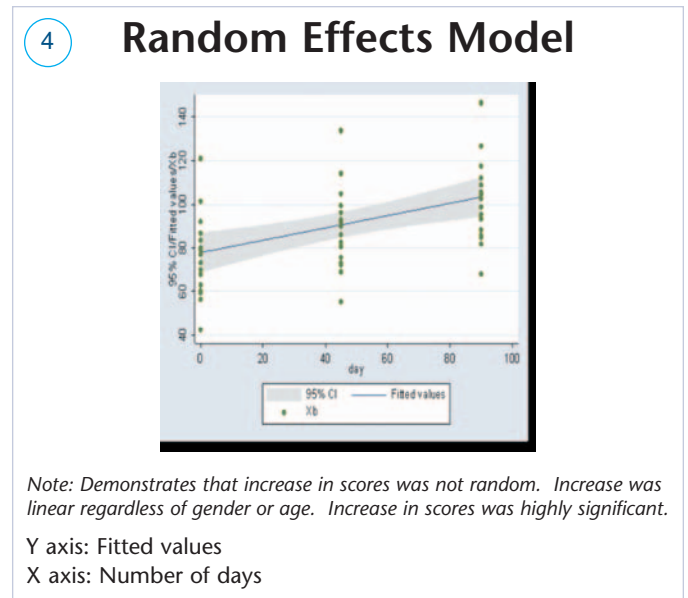
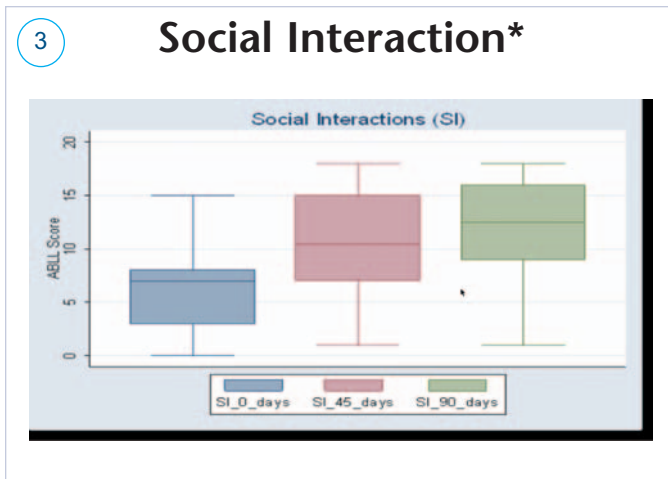
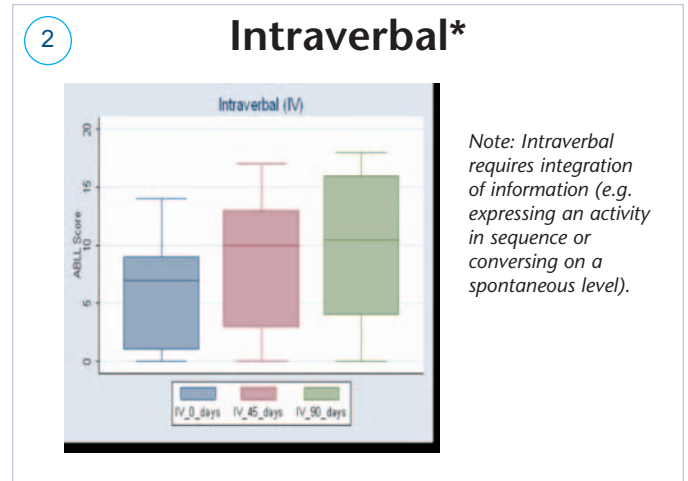
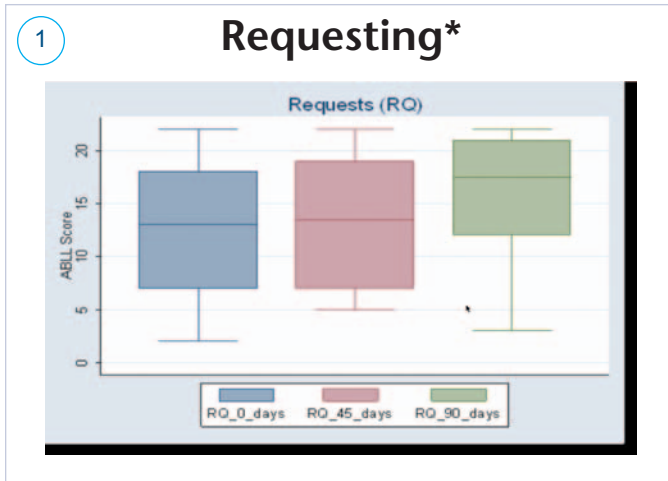
Of the 22 children who were initially enrolled in the study, 4 withdrew prior to conclusion of the 90-day trial; 2 families were excluded for non-compliance and 2 families stopped supplementation due to an observable increase in physical activity in their child. The lemon-flavored fish oil blend capsules were well accepted by the children. All 18 children (12 boys, 6 girls) who did complete the trial displayed significant increases in language and learning skills after supplementation with a relatively low dose of essential fatty acids.

Conclusion

The results of this study strongly support the benefits of essential fatty acid supplementation on language and learning skills in autism and Asperger's syndrome. Future studies using large sample size and placebo-controlled formats would be of significant benefit for individuals with autism and Asperger's syndrome, and those who strive to assist them in increasing their quality of life.

Acknowledgements:

Special thanks to Duane Sherrill, PhD, Professor, College of Public Health, University of Arizona, Tucson, AZ and Jerry Hedden, MPH, for biostatistical analysis.



* Bar graphs represent range of ABLLS scores from lowest to highest on day of supplementation (0, 45, 90).

About the authors:

For over ten years, **Louise Patrick CCC/SLP/L** has specialized in providing services for children with autism and Asperger's Syndrome. She specializes in integrating evidence-based best practice techniques in a variety of clinical and educational settings. Ms. Patrick provides free consultation regarding essential fatty acid supplementation for children with communication difficulties at:
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References

1. Fan Y-Y, Chapkin RS. Importance of dietary gamma-linolenic acid in human health and nutrition. *J Nutr* 1998;128:1411-1414.
2. Stordy J, Nicholl M. *The LCP Solution*. New York, NY: Ballantine Books, 2000.
3. Kennedy DM. *The ADHD Autism Connection*. Colorado Springs, CO: Water Brook, 2002.
4. Stevens LJ, Zentall SS, Deck JL, et al. Essential fatty acid metabolism in boys with attention-deficit hyperactivity disorder *Am J Clin Nutr* 1995;62:761-768.
5. Bell JG, Dick JR, MacKinlay EE, et al. Abnormal fatty acid metabolism in autism and Asperger's syndrome. In *Phospholipid Spectrum Disorders in Psychiatry and Neurology*. 2nd ed. Lancashire, UK: Marius Press, 2002.
6. Richardson AJ, Puri BK. A randomized double-blind, placebo-controlled study of the effects of supplementation with highly unsaturated fatty acids on ADHD-related symptoms in children with specific learning difficulties. *Progress in Neuro-Psychopharmacol & Biol Psychiatry* 2002;26:233-239.
7. Johnson SM, Hollander E. Evidence that eicosapentaenoic acid is effective in treating autism. *J Clin Psychiatry* 2003;64(7):848-849.
8. Partington JW, Sundberg ML. *The Assessment of Basic Language and Learning Skills: An Assessment, Curriculum Guide and Tracking System for Children with Autism or Other Developmental Disabilities*. Danville, CA: Behavior Analysts, Inc., 1998.

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