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Dr. Sanjay Verma
Associate Professor, Rama
Medical College, Pilukhwa,
Hapur, Uttar Pradesh, India

Dr. Nupur Suman
Professor, Department of
Ophthalmics, Rama Medical
College, Pilukhwa, Hapur,
Uttar Pradesh, India

Effect of omega 3 fatty acids on the visual acuity of school-going children

Dr. Sanjay Verma and Dr. Nupur Suman

Abstract

This is a one-year program with follow-up assessment performed on 1040 school-going students from Grade 1 to grade 10th. Out of 1040 students, 100 students were taken as controls, and 940 students included in the study consisted of 320 female students and 620 male students in the age group of five years to 16 years. All 1040 students had visual acuity ranging from 6/9 to 6/12p. The students taken as controls were not given omega-3 fatty acid preparations while rest 940 students were given Omega-three fatty acid preparations in the dose of 250 to 500 milligram per day for three months. In Group 2 students, the visual acuity improved to 6/9 in 60% students and to 6/12 in 47% of students.

Keywords: Plastibell, circumcision, local anaesthesia, neonate

Introduction

The purpose of this study was to conduct a systematic review and the human evidence for the effect of omega-3 fatty acids on eye health. (Hodge. *et al.*) Omega-three fatty acids have been shown to reduce the risk of certain eye diseases, including dry eyes and macular degeneration. They have proven to be vital to brain and ophthalmic development during both pregnancy and infancy. We focused on eye health conditions that have a significant health impact in all age groups. The impact was defined in various ways, but here we focus only on the visual acuity of school-age students. Omega-3 fatty acids are found in the brain and eye in large quantities, which accumulate in these tissues. Very high levels of DHA are present in the retina, especially in the Disc membranes of the outer segment of photoreceptor cells. (Hodge W *et al.*). DHA influences the biophysical properties of membranes via its high polyunsaturation and it may help in creating a membrane that accommodates the dynamic behavior of rhodopsin during the photoreceptive process (2). The three main omega-3 fatty acids are 1. alpha-linolenic acid (ALA), 2. Eicosapentaenoic acid (EPA), and 3. Docosaheanoic acid (DHA). Plant oils such as flaxseed oil, soybean oil, and canola oil, are high in ALA, whereas DHA and EPA are found in fish and other kinds of seafood.

Aims and Objective

To study the effect of Omega-3 Fatty Acids on eye health *viz* Visual Acuity and identify its impacts on various age groups of school children.

Materials and Methods

A total of 1040 students of various age groups (i.e.- 5 to 16 years) of different classes from first to 10th standard were taken. Out of 1040 students, hundred students were taken as controls, and out of the remaining 940 students, 320 students were females, and 620 students were males. All the 1040 students had visual acuity ranging from 6/9 to 6/12p.

Table 1: Children in study

	Total number of students	Males	Females
Group 1(control)	100	60	40
Group 2(Study group)	940	620(66%)	320(44%)

Table 2: Incidence of Diminision of vision (visual acuity) in study group

Students	Visual Acuity	
	6/9	6/12p
Control Group (100)	90 (90%)	10(10%)
Study Group (940)	820(87.3%)	120(12.7%)

Correspondence
Dr. Nupur Suman
Professor, Department of
Ophthalmics, Rama Medical
College, Pilukhwa, Hapur,
Uttar Pradesh, India

Table 3: After giving Omega 3 F.A. Preparation (250-500 mg) for Three months.

Study group	Visual acuity	
	6/6	6/6p & 6/9p
(940 children)	(53% i.e 498)	(47% i.e 442)

Note: The table shows improvement of vision from 6/9 to 6/6 in 53% of children and from 6/12p to 6/6p or 6/9p in 47% of children.

A dose of 250-500 mg/day of omega-3 fatty acids is recommended by most organizations; however, higher amounts are recommended for specific health conditions.

Result

A clear answer to our study is that omega3 fatty acids have a role in improving visual acuity in school-going children. We, for this reason, find it a reasonable practice to encourage higher consumption of foods rich in omega-3 fatty acids. However, it should be kept in mind that these omega-3 fatty acid preparation supplements need some time to work. In this study, 1040 students were taken out of which a hundred students served as control while the rest 940 students served as study group out of which 620 students were male, and 320 were female. In the control group, 90 students had 6/9 vision and 10 students had 6/12p. While in the study group, out of 940 students, 820 (87.3%) had 6/9 vision, and 120 had 6/12p. Students of the control Group were not given omega-3 fatty acid preparation while the study group which consisted of 940 students were given omega-3 fatty acids in the dose of 250 to 500 milligram per day for three months. In the control group, all the students' visual acuity was approximately the same. i.e. 6/9 and 6/12 partial after three and then six month follow up. Visual acuity markedly improved in the study group i.e 498(53%) students improved to 6/6 vision and 442 (47%) to 6/6 or 6/9p (out of 442 students 60% had 6/6 and 40% had 6/9p respectively). However, there was no gender difference in the improvement of visual activity in the study.

Discussion

DHA, A type of omega-3 FA is a major structural component of the retina. When enough DHA is not available vision problems may arise; however, it can cause vision impairment due to macular degeneration and blindness in people in the late 50's. DHA accounts for 40% of polyunsaturated Fatty acids in the brain and 60% in the retina of the eye. It is of no surprise that infants fed a DHA fortified formula have better eyesight than infants fed a formula without it. The earliest publications by cristina compoy *et al.* [1] in human infants in the early 1990s showed that infants fed with a formula supplemented with n-3 LC PUFA, mainly DHA, had improved retinal sensitivity and visual acuity when compared to preterm infants who had low n-3 PUFA [9, 10] intakes. L. Lauritzen *et al.* [5] studies on formula fed infants indicates a beneficial effect of dietary DHA on visual acuity. The result showed that infants with higher RBC levels of n-3 LC PUFA had a better visual acuity at four months of age, suggesting that n-3 LC PUFA may influence visual maturation. R. Uauy *et al.*, [6] studied that essential Fatty acids are structural components of all tissues and are indispensable for cell membrane synthesis: the Brain, Retina, and other Neural tissues are particularly rich in long-chain poly unsaturated fatty acids. The main findings are that light sensitivity of retinal rod photoreceptors is significantly reduced in newborns with n-3

fatty acids deficiency, and DHA significantly enhances visual acuity, maturation, and cognitive functions. DHA also has a significant effect on photoreceptor membranes and neurotransmitters involved in the signal transduction process, rhodopsin activation, rods and cones development, neuronal dendritic activity, and functional maturation of CNS. Lewin GA *et al.* [7] studied the effect of omega 3 FA on child & maternal health and found that DHA And Arachidonic acid (AA) have been identified as important structural Components of highly specialized Membrane lipids of human CNS. With phospholipid of brain grey matter containing high proportion of DHA. DHA has also been observed to be a major long-chain polyunsaturated fatty acid in outer segments of the retina's rods and cones. Other studies have also provided the evidence that dietary DHA improves visual, mental, and motor skill development in some pre term and term infants fed with supplemented formula [12, 13, 14]. Judge *et al.* [16] showed significant main effects for visual acuity at four months of age in infants whose mothers were supplemented with DHA during pregnancy. The author shows better visual acuity in the offspring of DHA supplemented mothers at four months of age. Lauritzen *et al.* reported no significant differences in sweep VEP at two and four months in babies whose mothers received fish oil supplementation during lactation [18]. Birch *et al.* [15, 19, 20, 21] have consistently demonstrated that DHA supplementations with or without Arachidonic acid during 1st 17 weeks of life, Improved visual acuity at 17, 26, and 52 weeks. At four years, the supplemented group had a small but statistically significant effect on visual acuity. Makrides. *et al.* [12, 17, 22, 25] and Birch *et al.* [23, 24] have conducted the largest study and have shown in different studies with multiple repeated measures that n-3 LC PUFA supplementation in infant formula benefits visual acuity & mental development indices for up to 4 years. Thus, our study shows that dietary DHA plays an essential role in the maturation of rods and cones which in turn play a major role in improving the visual acuity. Hence, DHA is the reason for the improvement seen in school-going children's visual acuity.

Conclusion

Omega 3 FA are very important part of our diet as they have many powerful benefits for body and brain. There are some major and some minor benefits of omega 3 some of which are- maintaining eye health, promotion of brain health during pregnancy, decreasing the risk of heart disease, fighting inflammation and autoimmune diseases, protection of skin from sun by increasing collagen production.

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