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Effect of Omega-3 Nutritional Supplementation on Dry Eyes

Results of a new study show extended use of omega-3s decreases inflammation and improves tear osmolarity in patients with dry eye.

Supplementation with omega-3 fatty acids can improve significantly the signs and symptoms associated with dry eye, according to Eric D. Donnenfeld, MD.

“In patients with dry eye, re-esterified (rTG) omega-3s (EPA/DHA) supplementation significantly improves tear osmolarity, matrix metalloproteinase 9 (MMP-9), tear break-up time (TBUT), ocular surface disease index (OSDI), and increases the omega-3 index,” Donnenfeld said as he presented his study findings during the 2014 ASCRS Annual Meeting.

Prescribing a daily regimen of rTG omega-3s has become a regular part of Donnenfeld’s practice and in his daily life. He and his family all take omega-3 supplements regularly because according to Donnenfeld, this study adds to the growing evidence that confirms what many dry eye experts have suspected for a long while.

STUDY DETAILS

Donnenfeld participated in a recent double-masked, randomized, placebo-controlled, multicenter study¹ of rTG omega-3s (EPA/DHA). A total of 105 individuals completed this study (with 54 in the treatment group and 51 in the placebo group). The average age of the subjects was 57 years and 70% were women.

The primary endpoint of this study was to determine the efficacy of 2,668 mg of EPA and DHA rTG omega-3s on tear osmolarity. The secondary endpoint was to review the changes in OSDI, TBUT, staining of the cornea, lipid layer thickness, Schirmer’s test, and MMP-9. In addition, Donnenfeld and colleagues analyzed the omega-3 index score, a blood test that measures the omega-3 fatty acids EPA+DHA on the red blood cell membrane.

“We wanted to learn if all these factors can be influenced by the intake of rTG omega-3s,” said Donnenfeld, professor of ophthalmology at NYU and a trustee of Dartmouth Medical School in Hanover, NH.

STUDY RESULTS

Tear Osmolarity

Mean tear osmolarity for the individuals taking the rTG

omega-3s and those in the placebo group were about the same (326 mOsm/L) at the initial screening, and at baseline up to week 6. The difference was significant from week 6 to week 12. Compared with baseline, there was a drop in the omega-3 group from 309 mOsm/L to 307 mOsm/L, which represents a difference of 19 mOsm/L (Figure 1). Tear osmolarity stayed the same in patients taking placebo ($P=.0004$).

“It is evident that omega-3s, in this form and concentration, have an influence on tear osmolarity,” Donnenfeld said. “In my opinion, it is safe to extrapolate that this change will continue to occur with continuous use.”

MMP-9

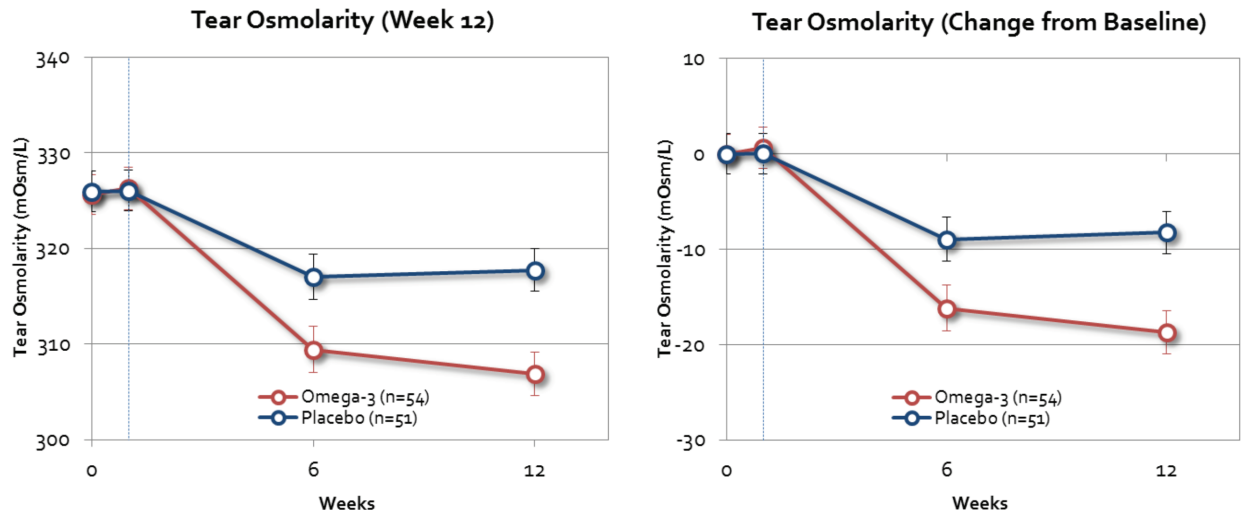
The MMP-9, an inflammation marker test, showed a significant decrease from baseline to week 12 in the omega-3 group: 43 ng/mL to 20 ng/mL. In contrast, the placebo group results were minimal and changed only from 32 ng/mL to 30 ng/mL. Donnenfeld said that this signifies a very positive effect in decreasing inflammation with the use of omega-3s.

OSDI

To evaluate the OSDI, patients were given a subjective panel of questions asking them about dry eye symptoms, including fluctuation of vision, feeling of dryness, or gritty feeling in their eyes. There was a significant difference from baseline to week 12 in the omega-3 group compared with the placebo group. The mean OSDI in the omega-3 group decreased from 32 at baseline to 16 after 12 weeks of omega-3 supplementation versus a change from 27 at baseline to 22 at week 12 in the placebo group ($P=.002$).

TBUT

TBUT is very characteristic of meibomian gland dysfunction (MGD) and the investigators discovered when they looked at the baseline between omega-3s and placebo that they were virtually the same. In the time between week 6 to week 12, the TBUT improved in the omega-3 group, but not in the placebo group,



Tear Osmolarity (n=105)	Screening (Week -1)	Baseline (Week 0)	Week 6	Week 12	Change from Baseline
Omega-3	325.6 (15.5)	326.2 (15.8)	309.4 (13.4)	306.9 (12.1)	-19.39
Placebo	325.9 (14.9)	326.0 (15.4)	317.0 (20.5)	317.7 (19.7)	-8.25
<i>P</i> -value*			0.042	0.004	0.004

Least Square Estimates for Tear Osmolarity Change from Baseline by Visit

Figure 1. The difference in mean tear osmolarity was significant from week 6 to week 12 among patients taking rTG Omega-3.

and there was a statistically significant 3.5-second improvement in the omega-3 group, compared with the placebo group.

Omega Index

Among the individuals in the treatment group, the omega index, a blood test that measures the omega-3 fatty acids, EPA+DHA on the red blood cell membrane also showed a statistically significant increase from baseline to 12 weeks, according to the study findings. Donnenfeld highlighted a study from Frank A. Bucci Jr., MD,² in 2011 that compared the rTG form omega-3s to an ethyl ester form.

“The amount of saturation and the amount of omega-3s on the red cell membrane is similar to the systemic numbers. It increases significantly from baseline with continual use,” he said.

CONCLUSION

Omega-3s supplemented in the rTG form and in the concentration of 2,240 mg EPA/DHA improves tear osmolarity, MMP-9, TBUT, OSDI and increases the omega-3 index. Although the study results indicate a significant improvement in dry eye after 12 weeks in patients taking omega-3s in the properly regulated dose and form, Donnenfeld concluded that this treatment should be considered as ongoing and should not cease at 12 weeks. ■

1. Donnenfeld ED. Effect of oral re-esterified Omega-3 nutritional supplementation on dry eye disease: double-masked randomized placebo-controlled study. Paper presented at: ASCRS; April 17-21, 2015; San Diego.

2. Bucci FA. Comparison of RBD saturation with Omega-3 oral supplements. Paper presented at: ASCRS; March 25-29, 2011; San Diego.