Contact Lens & Anterior Eye 38 (2015) 206–210

Contents lists available at ScienceDirect

Contact Lens & Anterior Eye

journal homepage: www.elsevier.com/locate/clae

Oral omega-3 fatty acids treatment in computer vision syndrome related dry eye

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ARTICLE INFO

Article history:
Received 5 May 2014
Received in revised form 3 December 2014
Accepted 26 January 2015

Keywords:
Computer vision syndrome
Dry eye
Goblet cell density
Tear film break up time
Omega 3 fatty acids (O3FAs)

ABSTRACT

Purpose: To assess the efficacy of dietary consumption of omega-3 fatty acids (O3FAs) on dry eye symptoms, Schirmer test, tear film break up time (TBUT) and conjunctival impression cytology (CIC) in patients with computer vision syndrome.
Setting and design: Interventional, randomized, double blind, multi-centric study.
Methods: Four hundred and seventy eight symptomatic patients using computers for more than 3 h per day for minimum 1 year were randomized into two groups: 220 patients received two capsules of omega-3 fatty acids each containing 180 mg eicosapentaenoic acid (EPA) and 120 mg docosahexaenoic acid (DHA) daily (O3FA group) and 236 patients received two capsules of a placebo containing olive oil daily for 3 months (placebo group). The primary outcome measure was improvement in dry eye symptoms and secondary outcome measures were improvement in Nelson grade and an increase in Schirmer and TBUT scores at 3 months.
Results: In the placebo group, before dietary intervention, the mean symptom score, Schirmer, TBUT and CIC scores were 7.5 ± 2, 19.9 ± 4.7 mm, 11.5 ± 2 s and 1 ± 0.9 respectively, and 3 months later were 6.8 ± 2.2, 20.5 ± 4.7 mm, 12 ± 2.2 s and 0.9 ± 0.9 respectively. In the O3FA group, these values were 8.0 ± 2.6, 20.1 ± 4.2 mm, 11.7 ± 1.6 s and 1.2 ± 0.8 before dietary intervention and 3.9 ± 2.2, 21.4 ± 4 mm, 15 ± 1.7 s, 0.5 ± 0.6 after 3 months of intervention, respectively.
Conclusion: This study demonstrates the beneficial effect of orally administered O3FAs in alleviating dry eye symptoms, decreasing tear evaporation rate and improving Nelson grade in patients suffering from computer vision syndrome related dry eye.

1. Introduction

Dry eye syndrome is public health problem affecting vision related quality of life. Recently, there have been significant advances in our understanding of the dry eye pathogenesis; ocular surface inflammation is now considered to be an integral part of dry eye disease [1].

Ocular surface health may be influenced by hormones, contact lens wear, refractive surgeries, humidity, medications, smoking and computer work [2–5].

Role of personal computers has increased exponentially in all spheres of life (school, office and home). Almost everyone including children, college students, software professionals and the elderly are hooked on to the computers every day, ranging from 2 to 12 h; use of mobile phones further add to the overall burden. Prolonged visual display terminal tasks reduce blink rate, blink amplitude and blink quality leading to tear film instability [6,7]. People experience one or more symptoms referred to as computer vision syndrome; these include eye strain, tired eyes, headache, burning of eyes, redness, foreign body sensation, blurring of vision, sometimes accompanied by backache and neck pain; visual symptoms predominate in 64–90% patients [8–10].

Artificial tear supplements are commonly used to treat dry eye in computer users; although, these supplements provide symptomatic relief, they do alter the pathophysiology of dry eye [11–13].

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http://dx.doi.org/10.1016/j.clae.2015.01.007
1367-0484/

Table 1
Dry eye questionnaire and scoring system (DESS©).

Symptom	Score (maximum 18)			
	Absent (0)	Sometimes (1)	Frequent (2)	Always present (3)
Itching or burning				
Sandy or gritty sensation				
Redness				
Blurring of vision				
Ocular fatigue				
Excessive blinking				

Scores of 0–6 were mild, 6.1–12 were moderate, and 12.1–18 indicated severely symptomatic dry eye [17]. © Bhargava R. Laser Eye Clinic, Noida, India.

O3FAs are anti-inflammatory and have proven to be effective in conditions like rheumatoid arthritis and coronary artery disease [14]; moreover, some studies have reported increased tear production in dry eye patients following dietary supplementation of fish oil and flaxseed oil for 3 months [15].

Some authors are of the opinion that the ratio of O6FA to O3FA determines the overall inflammatory status of the body; a cross sectional study by Miljanović et al. in a large series of patients (Women Health Study) found that a higher ratio of O6FA to O3FA consumption was associated with a significantly increased risk of dry eye disease in women [16].

However, safety and efficacy of O3FAs for dry eye in computer users has not been established. An extensive review of literature (Medline search) revealed that no randomized trial has been done to determine this.

The present study hypothesize that oral O3FA supplementation does improve dry eye symptoms, limbal cytology and morphology (as seen on CIC) as well as clinical markers like Schirmer test and TBUT in symptomatic computer users when compared to administration of placebo (olive oil).

2. Methods

A prospective, multi-centric, randomized, double blind interventional study was done at Rotary Eye Hospital, Palampur, Laser Eye Clinic, Noida and Santosh Medical College, Ghaziabad, which are referral eye centres in northern part of Indian subcontinent. The trial was approved by the institutional review boards and the local ethics committee. A written informed consent for the study, based on Helsinki protocol was obtained from all the participating patients.

2.1. Inclusion criteria

A survey (questionnaire based) was conducted in regional IT parks, call-centres, regional medical schools and universities. Symptomatic computer users (using computers for >3 h/day for minimum 1 year) were identified and invited to take part in the trial. The patients were enrolled on the basis of a questionnaire of dry eye related symptoms (Table 1) (Dry Eye Scoring System, DESS©) [17].

2.2. Exclusion criteria

Patients having current ocular infection, past history of laser in situ keratomileusis (LASIK), allergic conjunctivitis, contact lens wear, herpetic eye disease, diabetes, liver diseases were excluded. Other exclusion criteria included pregnancy or lactating mothers, HIV and Hepatitis B and C. Patients with inability to swallow soft gel capsules, on aspirin or anti-coagulant therapy, and those allergic to fluorescein were also excluded. Systemic (tetracycline's and corticosteroids) or topical medications (other than artificial tear supplements) that could affect tear film or meibomian gland functions were discontinued prior to intervention. However, patients were instructed not to use artificial tear preparations, 2 h prior to testing.

2.3. Randomization, masking and sample size calculation

To calculate the sample size to compare the mean difference in symptom scores between the two groups, a pilot study was first done on 20 subjects. The mean decrease in symptoms score in O3FA group was 0.83 and in placebo group 0.69, respectively. The common standard deviation was 0.47. Assuming 1:1 randomization, alpha was set at 0.05 and power 90%. The estimated sample size in each group was 237. Fig. 1 shows the patients flow chart, randomization schedule and follow up protocol.

Patients were randomly allocated to one of the two groups by parallel assignment. The allocation codes were generated by a DOS based software in the Department of Community Ophthalmology. The codes were sealed in blue coloured envelopes and were opened by health care personnel not involved in patient care. O3FA group received two 300 mg capsules containing each containing 180 mg eicosapentaenoic acid (EPA) and 120 mg docosahexaenoic acid (DHA), twice daily for 3 months. Placebo group received two capsules containing olive oil, twice daily for 3 months. The subjects as well as the investigators were masked to the contents. The two types of capsules and packs were similar to each other. Patient compliance was assessed by health care personnel (not involved in

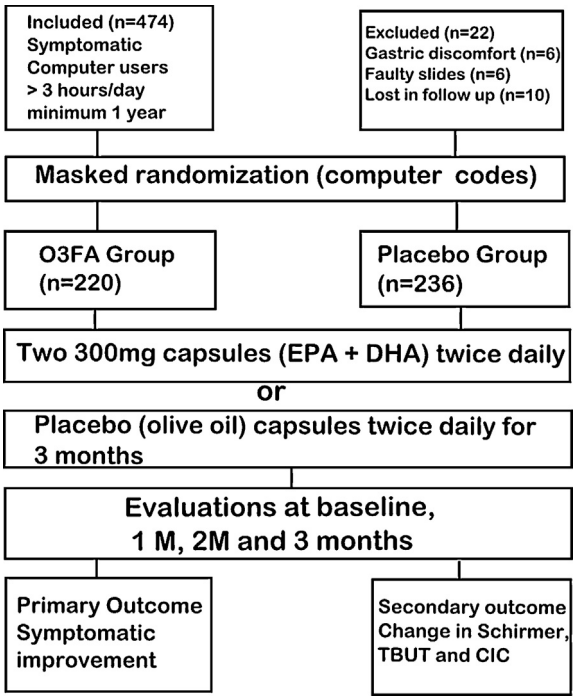

Fig. 1. Flow chart for enrolment, randomization, intervention, analysis and follow up.