

**A CONTROLLED STUDY TO DEMONSTRATE THE EFFICACY OF ORAL NUTRITIONAL FORMULATIONS OF EFAS IN DES**Bahubali Jain<sup>1</sup>, M. Shrivastawa<sup>2</sup>, P. A. Siddiqui<sup>3</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT:** Two group of 50 patients each of DES were taken for study with schirmer's test – 1 value of <7 mm/ 5min .Group A received artificial tear & nutritional supplements of EFAs for 8 weeks and Group B received artificial tears only for 8 week . Study reveals that dietary intervention with omega-3 fatty acid not only causes symptomatic improvement but also betters clinical markers of dry eye as seen by a positive drift in primary and secondary outcome measures. There is a likely improvement in inherent stability of the tear film as seen by the larger TBUT drift and CIC scores. This paper will discuss the results in detail.

**INTRODUCTION:** Dry eye syndrome (DES) is a multifactorial disease, affecting tears and the ocular surface. It is accompanied by increased osmolarity of tear film, and inflammation of the ocular surface.<sup>[1]-[3]</sup> Despite recent advances in understanding the etiopathogenesis of DES, there remain a lacuna in diagnosis, prevention and definitive treatment.

DES is a common problem worldwide and can reduce the working efficiency of an individual. Dry eye is therefore a frequent reason that patient present to eye care clinics. Common patient's complaints related to dry eye include reduced vision, difficulty reading, difficulty driving at night and difficulty doing computer work.<sup>[5]</sup>

Most diagnostic tests for dry eye are poorly standardized, making compare between studies tenuous at best. A generally agreed upon 'gold standard' still does not exist. Additionally, some of these tests are poorly associated with subjective symptoms.<sup>[6]-[7]</sup>

Artificial tear supplementation is the most common therapy for dry eye. However, artificial tears provide only temporary and incomplete symptomatic relief and may not reverse metaplastic changes.<sup>[8]</sup> Hence, DES has been the subject of important and interesting research over the past few decades. Therapeutic regimens such as extracellular Uridine tri-phosphate, androgen hormones and tear replacements containing recombinant forms of cytokine growth factors are currently under evaluation.<sup>[9]-[11]</sup>

Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) and alpha linolenic acid (ALA) are the three Omega-3 fatty acids that cannot be synthesized in the body and have to be supplemented in diet. EPA and DHA modulate prostaglandin metabolism towards anti-inflammatory prostaglandin synthesis due to competitive inhibition of the arachidonic acid pathway.<sup>[12]</sup> Inflammation plays a significant role in DES. For example, increased concentrations of cytokines such as interlukin-1, interlukin-6, and tumor necrosis factor-alpha have been found in the tear film of dry eye patients.<sup>[13]</sup>

The geographical terrain in the plains and foothills of the northern part of the sub-continent has dry, windy conditions with high exposure to ultraviolet radiation. Moreover, semi-urban diets are devoid of food of animal.

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Dry eye can be either due to decrease of tear secretion or due to increase tear evaporation, it can be also post-surgical & age related.

EFAs provides overall anti-inflammatory effect by increasing the fluidity of meibomian gland secretion, improving tear film quality & decreasing evaporative loss. EFAs Optimizes function of goblet cells by increasing mucin production and improves epithelial cells microvilli expression & adhesion leading to stabilization of tear film. They also help in corneal nerve regeneration. overall they decreases risk of dry eye.

EFAs not used in patients on anticoagulant therapy and those with platelet abnormality.

Source of EFAs-cold water fishes; flex seed oil, walnuts, canola oil, safflower oil etc. EFAs cannot be synthesized by the body.

Indication –sjogren’s syndrome, old age, contact lens wearers, computer vision syndrome, post lasik surgery, meibomitis, MGD. DEWS/DELPHI guidelines recommend EFAs in dry eye treatment level 2 onwards.

**MATERIAL & METHODS:** Two group of 50 patients each (age & sex matched) of DES were taken for study with schirmer’s test – 1 value of <7 mm/ 5min of dry eye.

Group A received –artificial tear & nutritional supplements of EFAs for 8 weeks. They receive one capsule (500mg) two times a day containing 325mg EPA and 175mg DHA for 8 weeks.

Group B received- artificial tears only for 8 weeks.

**Exclusion criteria were:** any pre-existing ocular disease other than DES; patients on oral tetracycline or corticosteroids and; past history of herpetic eye disease, liver disease, diabetes or laser in situ keratomileusis (LASIK). Other exclusion criteria included pregnancy, or lactating mothers, cognitive or psychiatric disorder, post-menopausal women, HIV and Hepatitis B and C. Patients with inability to swallow soft gel capsules. Patients on aspirin or anti-coagulant therapy, allergy to fluorescein, patients with a malignancy or chronic infection of the lacrimal gland were also excluded from the study. Topical medications and contact lens usage was discontinued prior to intervention.

**Evaluation of Patients:** Subjective assessment of patients was done based on symptoms of dry eye like discomfort, burning & itching, photosensitivity, excess tears secretion, foreign body sensation, irritation and blurring of vision.

Gross examination of Eye was done by slit lamp biomicroscopy followed by schirmer `s test-1, Rose Bengal staining and, Flouroscein staining.

Primary outcome measures includes change in TBUT score, schirmer’s test 1 score, meibomian score and OSDI Score.

### RESULTS:

Parameters	Schirmer’s Test Mean Value	Rose Bengal staining Mean value	Frequency of Artificial Tears Instillation
Group A	4.45mm	5.3mm	6 times/day
Group B	4.50mm	5.2mm	6 times/day
Baseline values			

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parameters	Frequency of artificial tear instillation for eye comfort	Decrease in blurring of vision	Schirmer's test 1mean value	Rose Bengal staining score by NEIW GROUP grading
Group A	4 times	44%	21.25 mm	2.9
Group B	6 times	12%	16.75 mm	3.9

**VALUES AT THE END OF 8 WEEKS**

### CONCLUSION:

- In group A concomitant artificial tears use was decreased by 33%.
- Blurring of vision was decreased by 44% cases in Group A while only in 12% cases of group B.
- Schirmer's test- I value was increased by > 4 times in group A while in group B it increased to 3 times only.
- Rose Bengal staining score was decreased by 45% in group A while decrease of only 25% was recorded in group B.

**DISCUSSION:** Rosenberg and Asbell<sup>[17]</sup> recently performed an analysis of all currently published literature on omega-3 fatty acids and dry eye disease and found that although correlation exists between essential fatty acids supplementation and dry eye disease, strong conclusions still cannot be made because of limitations in research reported. It is likely that dietary supplementation of omega-3 fatty acids alters the composition of meibomian gland secretions and meibum quality in patients with meibomian gland disease and chronic blepharitis. However, we did not attempt to study meibum characteristics in the present study.

Recent advances in understanding the pathophysiology of DES has lead to evolution of newer modalities of treatment. Omega-3 fatty acids modulate the inflammatory process in the body and nutritional supplementation may have a promising role to play in dry eye.

Dietary intervention with omega-3 fatty acid not only causes symptomatic improvement but betters clinical markers of dry eye as seen by a positive drift in primary and secondary outcome measures. There is a likely improvement in inherent stability of the tear film as seen by the larger TBUT drift and CIC scores. However, these tests are not a specific marker for any subtype of dry eye and further studies of changes in meibum quality and quantity may broaden the usefulness of omega-3 fatty acids.

In a nutshell, with judicious use of advanced formula ocular lubricants in addition to oral nutritional formulation of EFAs, patients may regain the ocular comfort they have lost due to dry Eye

### REFERENCES:

1. The definition and classification of dry eye disease: report of the Definition and Classification Subcommittee of the International Dry Eye Workshop (2007) *Ocul Surf.* 2007; 5 (2):75-92. [PubMed].
2. Gumus K, Crockett CH, Rao K, Yeu E, Weikert MP, Shirayama M, Hada S, Pflugfelder SC. Noninvasive assessment of tear stability with the tear stability analysis system in tear dysfunction patients. *Invest Ophthalmol Vis Sci.* 2011; 52 (1): 456-461. [PMC free article] [PubMed].

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3. Versura P, Profazio V, Campos EC. Performance of tear osmolarity compared to previous diagnostic tests for dry eye diseases. *Curr Eye Res.* 2010; 35 (7): 553–564. [PubMed].
4. Savini G, Prabhawasat P, Kojima T, Grueterich M, Espana E, Goto E. The challenge of dry eye diagnosis. *Clin Ophthalmol.* 2008; 2 (1): 31–55. [PMC free article][PubMed].
5. Pouyeh B, Viteri E, Feuer W, Lee DJ, Florez H, Fabian JA, Perez VL, Galor A. Impact of ocular surface symptoms on quality of life in a United States veterans affairs population. *Am J Ophthalmol.* 2012; 153 (6):1061–1066. [PubMed].
6. Sullivan BD, Crews LA, Sonmez B, de la Paz MF, Comert E, Charoenrook V, de Araujo AL, Pepose JS, Berg MS, Kosheleff VP, Lemp MA. Clinical utility of objective tests for dry eye disease: variability over time and implications for clinical trials and disease management. *Cornea.* 2012; 31 (9): 1000–1008. [PubMed].
7. Begley CG, Himebaugh N, Renner D, Liu H, Chalmers R, Simpson T, Varikooty J. Tear breakup dynamics: a technique for quantifying tear film instability. *Optom Vis Sci.* 2006; 83 (1):15–21. [PubMed].
8. Dartt DA, Bex P, D'Amore P, Dana R, Mcloon L, Niederkom J. *Great Britain: Academic Press;* 2011. Immunology, inflammation and diseases of the eye; p. 338.
9. Chang KC, Oh JY, In YS, Kim MK, Shin KC, Wee WR, Lee JH, Park MG. Preliminary effects of oral uridine on the ocular surface in dry eye patients. *J Korean Med Sci.* 2009; 24 (4):701–707. [PMC free article][PubMed].
10. Zheng X, Paiva C, Rao K, Li DQ, Farley WJ, Stern M, Pflugfelder SC. Evaluation of the transforming growth factor-beta activity in normal and dry eye human tears by CCL-185 cell bioassay. *Cornea.* 2010; 29 (9):1048–1054. [PMC free article] [PubMed]
11. Pinna A, Piccinini P, Carta F. Effect of oral linoleic acid and gamma-linolenic acid on meibomian gland dysfunction. *Cornea.* 2007; 26 (3):260–264. [PubMed].
12. Amparo F, Dastjerdi MH, Okanobo A, Ferrari G, Smaga L, Hamrah P, Jurkunas U, Schaumberg DA, Dana R. Topical interleukin 1 receptor antagonist for treatment of dry eye disease: a randomized clinical trial. *JAMA Ophthalmol.* 2013; 131 (6):715–723. [PMC free article] [PubMed].
13. Bhargava R. The dry eye syndrome. A diagnostic enigma. *International Journal of Contemporary Surgery.* 2013; 1 (2): 72–77.
14. Van Bijsterveld OP. Diagnostic tests in the Sicca syndrome. *Arch Ophthalmol.* 1969; 82 (1): 10–14. [PubMed].
15. Nelson DJ. Impression cytology. *Cornea.* 1988; 7 (1):71–81. [PubMed].
16. Rosenberg ES, Asbell PA. Essential fatty acids in treatment of dry eye. *Ocular surface.* 2010; 8 (1):18–28. [PubMed].
17. Age-Related Eye Disease Study 2 Research Group Lutein+zeaxanthin and omega-3 fatty acids for age-related macular degeneration: the Age-Related Eye Disease Study 2 (AREDS2) randomized clinical trial. *JAMA.* 2013; 309(19):2005–2015. [PubMed].
18. Adkins Y, Kelley DS. Mechanisms underlying the cardio protective effects of omega-3 polyunsaturated fatty acids. *J Nutr Biochem.* 2010; 21(9):781–792. [PubMed].

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