To Study the Effect of Omega-3 Fatty Acid Rich Dietary Supplement (Flaxseed Powder) in the Management of Dry Eyes Induced by Computer Vision Syndrome (CVS)

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Abstract—*Computer Vision Syndrome is an occupational hazard these days. Dryness of Eyes, an important part of this syndrome, cannot be addressed completely or permanently by tear substitutes alone. This study was undertaken to find out whether dietary supplementation by omega-3 fatty acid rich flaxseed powder could help in providing long lasting relief from dry eye disorder. The respondents were divided into two groups; the cases in the experimental group were given a daily dose of freshly ground flaxseed powder in addition to tear substitutes while the control cases were kept on tear substitute eye drops alone. Examination by a trained professional and TBUT and Schirmer's Test were done on every follow up visit.*
Comparison of the results demonstrates that those whose diet was supplemented with flaxseed powder (omega-3 fatty acid) showed a greater improvement on all parameters. This proves that omega-3 fatty acid containing flaxseed powder helps in improvement of dry eye disorder.

Keywords*: Computer Vision Syndrome, dry eyes, omega-3 fatty acid, flaxseed powder.*

1. INTRODUCTION

Computers are probably one of the biggest scientific inventions of the modern era, and they have become an integral part of our life. Despite the innumerable benefits of computers there are certain health issues and occupational hazards which computer-users should be aware of.

The increased usage of computers has lead to a variety of ocular symptoms which include eye strain, tired eyes, irritation, redness, blurred vision, and diplopia, collectively referred to as Computer Vision Syndrome (CVS).

Computer Vision Syndrome (CVS) can be defined as a group of visual, or ocular, symptoms caused and/or exacerbated by the use of a computer. It is a complex of eye and vision problems related to near work which are experienced during or related to computer use [1].

Computer Vision Syndrome affects 75% of the people who work on computers, most markedly those who work more than 3 to 4 hours with computers.

The symptoms of computer vision syndrome may vary depending on several factors which include amount of time spent, viewing distance, sitting posture, level of computer screen, and underlying visual acuity disturbances if any. Treatment of computer vision syndrome involves proper identification of the etiologic factors and correction of visual errors if existent. Special attention should be paid to ergonomic factors like correct posture in the chair, lighting arrangement, antiglare screen on the computer and establishing proper working habits [2].

The eye depends on the flow of tears to provide constant moisture and lubrication to maintain vision and comfort. When there is an imbalance in this tear system, a person may experience dry eyes. It has been observed that with prolonged use of the computers the blinking rate reduces. Since blinking is important for hydration of eyes reduced blinking is also considered one of the causes of dry eyes and Computer Vision Syndrome [2].

Studies have shown up to a two-thirds decline in a person's blink rate during computer use. Computer users gaze straight ahead with their eyes fully open exposing their ocular surface, thus allowing for greater evaporation of their tear film [1].

Doctors sometimes recommend special nutritional supplements for dry eyes. Studies have found that supplements containing omega-3 fatty acids can decrease dry eye symptoms.

Some fatty acids — called essential fatty acids (EFAs) — are necessary to our diet, because our body can't produce them. Amongst them, studies have found that omega-3 fatty acids, in

particular, may be beneficial for eye health. Omega-3 fatty acids may help treat dry eyes.

Flaxseeds are an excellent source of omega-3 fatty acid. Flaxseed and flaxseed oil are rich in alpha-linolenic acid (ALA), an omega-3 fatty acid that may be helpful for heart disease, inflammatory bowel disease, arthritis, and relevant to the present study, dryness of eye.

The daily intake of flaxseed should be as given under-

Pediatric

Children (2-12 years): One example, is using 1 teaspoonful (tsp) of ground flaxseeds, or 1 tsp of fresh flaxseed oil for constipation.

Adult Flaxseed: Take 1 tablespoonful (tbsp), 2-3 times daily or 2-4 tbsp, 1 time daily. Grind before eating and take with lots of water.

Freshly ground flaxseeds are a good alternative to flaxseed oil for dry eye nutrients [3]. Flaxseeds are a better source of omega-3 fatty acids than fish oil as they are more economical, a vegetarian source, it agrees with the gastro-intestinal tract and do not have an after-taste.

Objectives of this research project are:

- Identification of computer users suffering from dry eyes, a component of CVS.
- Symptomatic management of CVS and its attendant problems of irritation, burning and redness.
- To ascertain whether nutritional supplementation with omega-3 fatty acid rich flax seeds can be used in treating dryness of eyes.

2. METHODOLOGY

Computer professionals belonging to the age group of 20-35 years, and working for more than 3-4 hours in front of a computer, were selected for this study. The sample size was 140, i.e. 70 in the experimental group and 70 in the control group. To identify respondents with dry eye related to CVS, a number of tools were used for clinical evaluation and tests; these were done before, as well as after the trial. Tools used for clinical evaluation and tests are-

- Slit Lamp Biomicroscope
- Fluorescein Test Strips
- Schirmer's Tear Test Strips

Freshly ground flaxseed powder was given to each respondent as the dietary supplement of omega-3 fatty acid. 2 leaflets with tips and precautions on how to prevent or manage CVS and dry eyes were also distributed amongst the respondents as a take home message.

Prior to the trial, each respondent's detailed history was recorded, including their age, job, their dietary habits, time spent working on a computer, their work surroundings and their posture while working, and sensitivity to their environment. The respondents were requested to rate their symptoms prior to the trial and after the trial; the tests, namely- Schirmer's Test and TBUT (Tear Break-Up Time), were also conducted before and after the trial and the scores were recorded for the study.

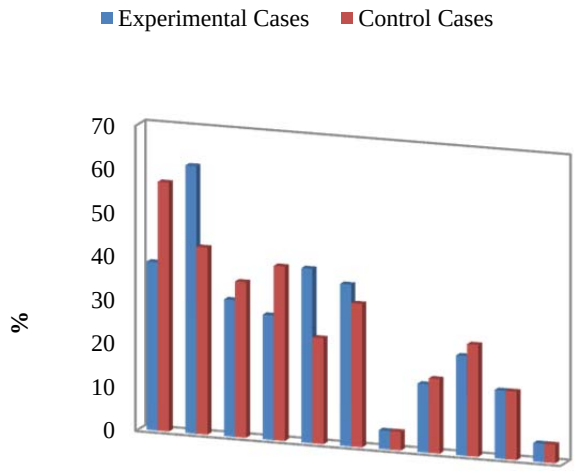
After the trial was over, and both sets of scores were recorded and statistical analysis was done, where the analysis was carried out by using SPSS 16.0. The results are presented in mean±SD and percentage. The comparison was carried out by using Chi-square test. The scores between cases and controls were compared by using Unpaired t-test at pre and post-trial. The change in the scores from pre to post-trials in cases and controls were compared by using Paired test. The p-value<0.05 was considered significant.

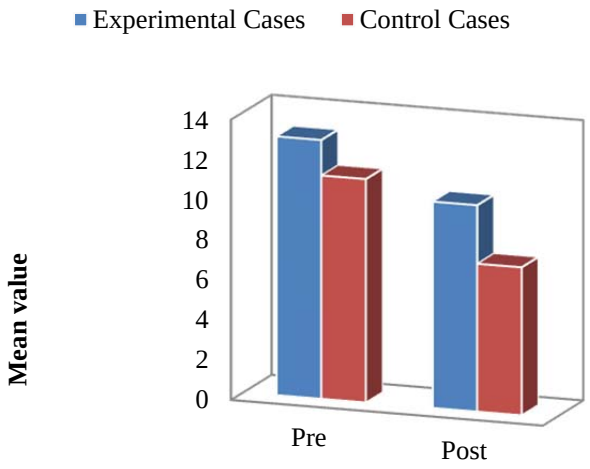
3. RESULTS AND DISCUSSION

A total of 70 experimental cases and 70 control cases were included in this study.

3.1. Demographic profile of experimental cases and controls cases

Demographic profile	Experimental Cases (n=70)		Control Cases (n=70)		p-value
	No.	%	No.	%	
Age in year					
20-30	61	87.1	57	81.4	0.35
31-35	9	12.9	13	18.6	
Gender					
Male	40	57.1	36	51.4	0.49
Female	30	42.9	34	48.6	
Educational					
Graduate	38	54.3	37	52.9	0.65
Post- Graduate	32	45.6	33	47.1	
Occupation					
Student	18	25.7	21	30.0	0.60
Bank Employee	37	52.9	31	44.3	
Computer Analyst	15	21.4	18	25.7	



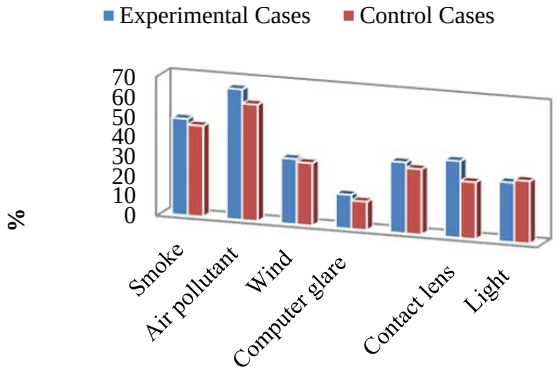


3.2. Dietary habits of experimental cases and control cases

	Experimental Cases (n=70)		Control Cases (n=70)		P-value
	No.	%	No.	%	
Vegetarian/Non-vegetarian					
Non-vegetarian	39	55.7	44	62.9	0.39
Vegetarian	31	44.3	26	37.1	
Does diet include					
Green leafy vegetables	19	27.1	23	32.9	0.75
Fruits	29	41.4	26	37.1	
High protein food items	22	31.4	21	30.0	
Average no. of glasses of water per day	11.7±2.24		15.4±3.24		0.04*
Omega-3 fatty acids					
Yes	38	54.3	42	60.0	0.49
No	32	45.7	28	40.0	

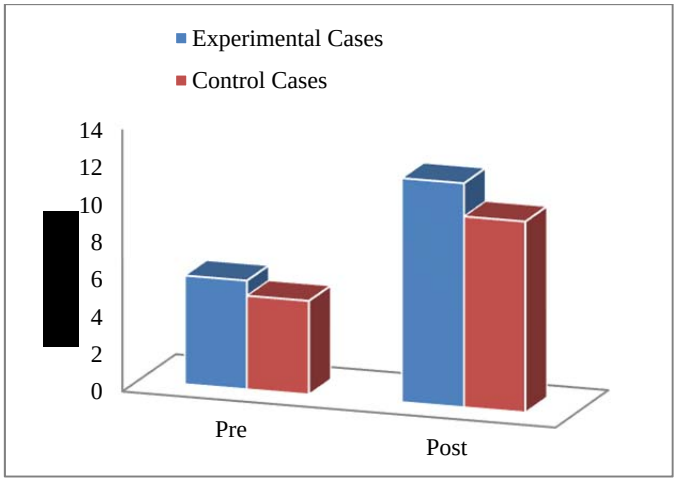
3.3. Clinical evaluation of experimental cases and control cases

	Experimental Cases (n=70)		Control Cases (n=70)		p-value
Adequate lighting at work place	**No.**	**%**	**No.**	**%**	
Yes	27	38.6	40	57.1	0.02
No	43	61.4	30	42.9	
Time spent in front of computer					
4-6 hours	22	31.4	25	35.7	0.12
7-10 hours	20	28.6	28	40.0	
10 or more hours	28	40.0	17	24.3	
Posture while working					
Bending	26	37.1	23	32.9	0.99
Sitting	3	4.3	3	4.3	
Sitting straight	11	15.7	12	17.1	
Slouched	16	22.9	18	25.7	
Straight	11	15.7	11	15.7	
Variable	3	4.3	3	4.3	



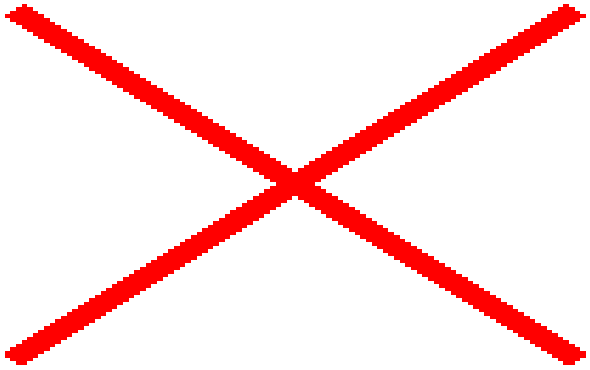
3.4. Comparison of symptom score between experimental cases and control cases

	Experimental Cases (n=70)	Control Cases (n=70)	p-value
Pre	12.93±2.88	11.16±1.09	0.001*
Post	8.11±4.15	7.39±3.22	0.001*
Mean change	4.82	3.77	
p-value[2]	0.001*	0.001*	



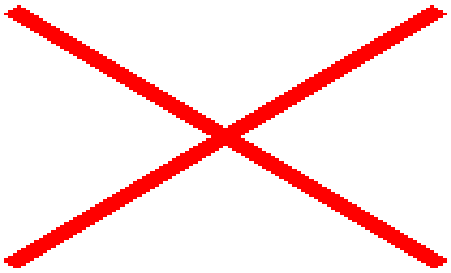
3.5. Comparison of eye sensitive conditions between experimental cases and control cases

Eyes sensitive to*	Experimental Cases (n=70)		Control Cases (n=70)		p-value
	No.	%	No.	%	
Smoke	34	48.6	32	45.7	0.11
Air pollutant	46	65.7	41	58.6	0.23
Wind	23	32.9	22	31.4	0.10
Computer glare	12	17.1	10	14.3	0.13
Air conditioning or heaters	25	35.7	23	32.9	0.12
Contact lens	27	38.6	20	28.6	0.06
Light	21	30.0	22	31.4	0.44



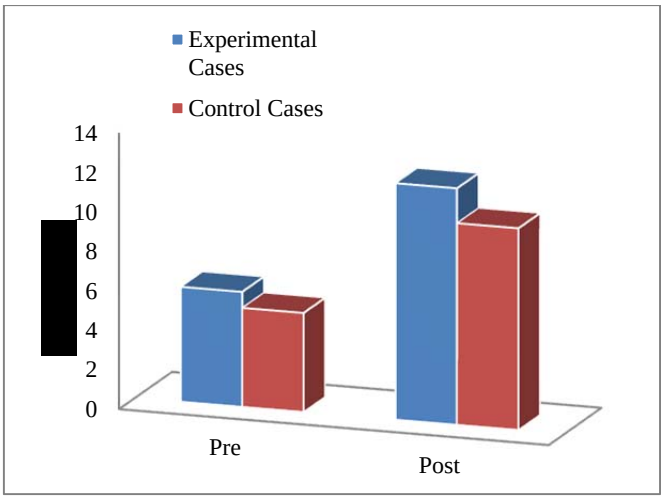
3.6. Comparison of TBUT between experimental cases and control cases

	Experimental Cases (n=70)	Control Cases (n=70)	p-value
Pre	7.50±2.04	6.70±0.95	0.001*
Post	13.93±3.67	10.03±2.13	0.001*
Mean change	6.43	3.33	
p-value	0.001*	0.001*	



3.7. Comparison of Schirmer's Test score between experimental cases and control cases

	Experimental Cases (n=70)	Control Cases (n=70)	p-value
Pre	5.84±1.47	5.03±0.63	0.001*
Post	12.01±2.45	10.24±2.99	0.001*
Mean change	6.17	5.21	
p-value	0.001*	0.001*	



The occurrence and severity of the symptoms was assessed and scored as “Never”, “Rarely”, “Sometimes”, “Often”, and “All the time”. A total score of more than 7 on a 0-24 number scale indicates a ‘true dry eye’. The comparative assessment of the symptoms and the symptom score of the two groups, pre and post trial, clearly reveals that the symptoms of dryness of eyes associated with computer vision syndrome were markedly decreased in the respondents who were given flaxseed powder in addition to eye drops. This demonstrates that flaxseed powder containing omega-3 fatty acids helps in the alleviation of dryness of eyes.

The Tear Break-Up Time was carefully measured and recorded before the start of the trial and subsequently on each follow-up visit of all the respondents in both groups. A TBUT score of less than 10 seconds usually reveals an anomaly of the tear film. A perusal of the TBUT score results, pre and post-trial, clearly shows that the experimental cases have benefitted by the addition of omega-3 fatty acid rich flaxseed as their TBUT scores are significantly higher in comparison to this of the control cases, thereby proving that tear film stability became better in the respondents of the experimental group.

Schirmer’s test was carried out in all the respondents to assess the tear flow and wetting of eyes. This test was carried out on pre, follow up, post-trial visits. The results were recorded and compared. A test score less than 5 mm of wetting in 5 minutes is a sign of a pathological dry eye, and 5-10 mm suggests a borderline dry eye. The results of Schirmer’s Test in this study demonstrate that the tear film flow is significantly increased in cases who received flaxseed powder as compared to those in the control group who were kept on tear substitutes alone.

The observations and results of the present study provide sufficient evidence to conclude that Omega-3 fatty acid supplementation is beneficial in the treatment of dryness of eyes, which form an integral part of the Computer Vision Syndrome. This study provides evidence for the usefulness of flaxseed powder in treating dryness of eyes. The three month follow up of experimental and control group cases and the comparison of symptoms, signs, Tear Break-Up Time and Schirmer’s Test values and results amply prove that most of the patients of the experimental group had marked relief of their dry eye symptoms while the control group reported much less and insignificant relief.

The study recommends that computer professionals should not rely on tear substitutes alone for permanent relief from the occupational hazard called Dry Eye Disease, but should add omega-3 fatty acid rich food like flaxseed powder to their daily diet. This will ensure that not only will there be symptomatic relief but significant cure of the problem of dryness of eyes. Hence working on a computer for a prolonged time would be much less troublesome for the user and more productive for the employer.

4. CONCLUSION

Many reports say that omega-3 fatty acids seem like a cure-all for just about anything that ails patients nowadays.

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