International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Effectiveness of Eye Exercise on Visual Problems among Computer Workers in Selected College at Namakkal District

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Abstract

Vision is our most precious sense. Our eyes are in constant use every waking minute of every day. Over eighty percent of our learning is mediated through our eyes, indicating important role our vision plays in our daily activities. Objectives of the study, to assess the level of visual problems among computer workers before and after Eye exercise..The design used for this study was pre-experimental design one group pre and post-test.. The researcher selected sample in K.S.R college of Arts and Science and Namakkal district. The investigator selected 38 patients in experimental group assessment done with by using visual acuity and visual field assessment scale, pupillary size to light assessment scale to assess the visual problems. The result of the study shows, most of the computer workers were in the age group of more than 31-40 years having eye problems and using spectacles since10 years. From the findings in visual acuity the difference in mean percentage was 20%, in visual field 16.2% and pupillary size to light was 18%. paired 't' test value was 26.30 in visual acuity,19.8%in visual field and 3.05in pupillary size to light when compared to the level of significant($p<0.05$) .

Keywords: Eye Exercise, Visual Problems, Computer Workers, Visual And Pupillary Assessment Scale

INTRODUCTION:

Our most valuable sense is sight. Every waking moment of the day is spent using our eyes. Our lifelong productivity can be influenced by how we use our eyes. Our eyes mediate more than 80% of our learning, demonstrating the critical function that vision plays in our day-to-day activities.

An estimated 60 million people worldwide suffer from vision problems, with one million new instances reported year, according to the American Optometric Association. The pathophysiologies of vision problems can be broken down into three mechanisms: the extra-ocular mechanism, which is linked to non-ergonomic posture in front of a computer screen and causes musculoskeletal symptoms like headaches and shoulder pain; the visual mechanism, which causes blurred vision, double vision, and slow focus change; and the ocular mechanism, which causes dryness and redness of the eyes with a decrease in blink rate.

Samudre Manjusha Manohar et al (2023) have done quantitative experimental method study to assess the effectiveness of oculomotor exercises in reducing the visual discomfort among computer workers on 30 participants between the age group of 25-60 years, who work on computer for more than 5 hours per day. The participants were taught the oculomotor exercises and were instructed to perform these exercises twice a day for 21 days followed which a post test was done.. Out of the 30 participants, 25 were males and 05 were females. It was noted that 93.3% of participants had occasional eye pain and 6.7% experienced eye pain frequently. The results showed that performing oculomotor exercises for 21 days led to a significant reduction of visual discomfort as per statistical analysis drawn by Paired T tests was P <0. 001.Eye exercises therapy is a series of movement performed repeatedly by the eyes to train our eye muscles and its surroundings to be elastic and strong, relax the eyes as to reduce discomfort in the eyes.

STATEMENT OF THE PROBLEM:

A study to assess the effectiveness of Eye Exercise on Visual Problems among Computer Workers in Selected College at Namakkal District, Tamilnadu.

OBJECTIVES:

1. To assess the level of visual problems among computer workers before and after Eye exercise.

2. To determine the effectiveness of Eye exercise on visual problems among computer workers.

3. To find out the association between post test scores on visual problems among computer workers and their demographic variables.

MATERIALS AND METHODS:

Pre experimental research design was used to evaluate the effectiveness of eye exercises on visual problems among computer workers. Samples were assessed for visual problems using visual acuity assessment and scale and pupillary size assessed by light assessment scale with help of convenient sampling technique, the researcher selected the 38 samples by consecutive sampling technique.

Tools used for the study:

There are three types of tools were used.

Section A: Demographic variables

- It consists of Age, gender, associated disease conditions, duration of visual problems, duration of illness.

Table 1: Section B: Visual Acuity assessment scale and Scoring procedure.

Visual acuity	**SCORES**				
	1	2	3	4	5
Right eye	6/24	6/18	6/12	6/9	6/6
Left eye	6/24	6/18	6/12	6/9	6/6

Level of visual acuity	**Actual scores**	**Percentage of scores**
Moderate impairment of visual acuity	1– 4	<40%
Mild impairment of visual acuity	5 – 8	41 – 80%
Normal visual acuity	9 – 10	>81% to 100

Section C:

Table 2: Visual field assessment scale. It is assessed by using visual field chart.

Visual field	**SCORES**				
	1	**2**	**3**	**4**	**5**
Superior					
Right eye	**30^0**	**35^0**	**40^0**	**45^0**	**50^0**
Left eye	**30^0**	**35^0**	**40^0**	**45^0**	**50^0**
Lateral					
Right eye	**50^0**	**60^0**	**70^0**	**80^0**	**90^0**
Left eye	**50^0**	**60^0**	**70^0**	**80^0**	**90^0**
Inferior					
Right eye	**50^0**	**55^0**	**60^0**	**65^0**	**70^0**

Left eye	**50^0**	**55^0**	**60^0**	**65^0**	**70^0**
Medial					
Right eye	**40^0**	**45^0**	**50^0**	**55^0**	**60^0**
Left eye	**40^0**	**45^0**	**50^0**	**55^0**	**60^0**

Table 3 Grades of visual field: Scoring Procedure.

Level of visual field	**Actual score**	**Percentage of scores**
Moderate impairment of visual field Mild impairment of visual field Normal visual field	1 – 16 17 - 32 33 - 40	<40% 41 – 80% >81%

Based on the percentage of scores the level of visual field was graded in 3 categories. They are "moderate impairment of visual field" "mild impairment of visual field" and "normal visual field".

Section D: Pupillary size to light assessment scale.

Table : 4 It is assessed by using torch. The Pupillary sizes are as follows,

Pupillary size to light in mm	**SCORES**				
	1	2	3	4	5
Right Eye	≤2	3	4	5	5>
Left Eye	≤2	3	4	5	5>

Scoring procedure:

Based on the percentage of scores the level of pupillary size to light was graded in 3 categories. They are "normal pupil" "mildly dilated pupil" and "moderately dilated pupil".

Table 5 Grades of Pupillary size to light

Level of Pupillary size to light	**Actual scores**	**Percentage of scores**

Normal pupil	2 – 4	<40%
Mildly dilated pupil	5 – 8	41 – 80%
Moderately dilated pupil	9 - 10	>81%

Ethical Consideration:

- Prior to collection of data, permission was obtained from the Principal of KSR Arts and science, Namakkal.
- Informed written consent form was obtained from the participants.
- The nature of the study was explained to each participant in details.
- No physical or psychological harm produced during the study.
- Participants had the right to quit the study at any point of time during the study.

Validity and Reliability:

The content validity of the demographic variables, visual acuity and visual field assessment scale, pupillary size to light assessment scale and content of Eye exercise was validated with guide and experts. The experts were Nursing professionals, Optometrist, and Statistician. The tool was modified according to the suggestions and recommendations of the experts.

Period of data collection

The data was collected from 10.04.2024 – 11.05.2024. The investigator collected both pretest and post test data.

Pre test

The pretest was conducted by using visual acuity and visual field assessment scale, pupillary size to light assessment scale, were used to assess the level of visual problems among the computer workers. Totally 38 computer workers were assessed. The time of assessment was varied from 30 minutes.

Implementation of Eye exercise

Immediately after pretest, Eye exercise blinking, palming, eye rolling figure of eight, near and far focus ,eye massage & zooming was given to the computer workers with visual problems, residing in KSR Arts and Science College, Namakkal district as in group. The time period was 30 minutes, 2 times per day for 30 days.

Post test

The post test was conducted at the end of 30th day by using Visual acuity and Visual field assessment scale and Pupillary size to light assessment scale to assess the level of visual problems among computer workers.

RESULTS:

Section A: Description of computer workers according to their demographic variable.

No	Demographic variables	Frequency (N)	Percentage (%)
1.	**Age in years**		
	a) **20 - 30 years**	**13**	**18.4**
	b) **31 – 40 years**	**7**	**47.4**
	c) **41 - 50 years**	**18**	**34.2**
2.	**Gender**		
	a) **Male**	**20**	**52.6**
	b) **Female**	**18**	**47.4**
3.	**Associated Disease condition**		
	a) **Diabetes Mellitus**	**16**	**42.2**
	b) **Hypertension**	**11**	**28.9**
	c) **Neurological disease**	**0**	**-**
	d) **Any other**	**11**	**28.9**
4.	**Duration of using spectacles**		
	a) **Below 5 years**	**4**	**10.5**
	b) **6 - 10 years**	**34**	**89.5**
	c) **11 - 15 years**	**0**	**-**
	d) **Above 15 years**	**0**	**-**
5.	**Duration of visual problems**		
	a) Below 5 years	**4**	**10.5**
	b) 6 - 10 years	**34**	**89.5**
	c) 11 - 15 years	**0**	**-**
	d) Above 15 years	**0**	**-**
6.	**How well is your working room illuminated**	**29** **9** **0** **0**	**76.3** **23.7** **-** **-**

SECTION – B: Assess the Level of Visual Problems among Computer Workers Before and After Eye Exercise

Table 2: Frequency and percentage distribution of the pre and post test scores of visual acuity among computer workers (N = 38)

		Pre test scores	Post test scores

S.No	Level of visual acuity among computer workers	Right eye		Left eye		Right eye		Left eye	
		F	%	F	%	F	%	F	%
1.	Moderate	34	**89.5**	33	**86.8**	14	36.8	11	28.9
2	Mild	4	10.5	5	13.2	22	**57.9**	25	**65.8**

Table 3: Frequency and percentage distribution of the pretest and post test scores of visual field among computer workers.

Pretest scores of visual field

Levels Of Visual Field among Computer Workers		Visual field assessment scale					
		Moderate		Mild		Normal	
		F (n)	P (%)	F (n)	P (%)	F (n)	P(%)
Superior	RE	30	78.9	8	21.1	-	-
	LE	26	68.4	12	31.5	-	-
Lateral	RE	33	**86.6**	5	**13.3**	-	-
	LE	30	78.9	8	21.1	-	-
Inferior	RE	27	71.1	11	28.9	-	-
	LE	26	68.4	12	31.6	-	-
Medial	RE	10	26.4	28	73.7	-	-
	LE	8	**21.1**	30	**78.9**	-	-

Post test scores of visual field

Levels of visual field among computer workers		Visual field assessment scale					
		Moderate		Mild		Normal	
		F (n)	P (%)	F (n)	P (%)	F (n)	P (%)
Superior	RE	9	23.7	29	76.3	-	-
	LE	8	21.1	30	**78.9**	-	-
Lateral	RE	23	60.5	14	**36.8**	1	**2.7**
	LE	21	**65.2**	16	42.1	1	**2.7**
Inferior	RE	9	23.7	29	76.3	-	-
	LE	9	23.7	29	76.3	-	-
Medial	RE	3	7.9	28	73.7	7	18.4
	LE	2	**5.2**	28	73.7	8	**21.1**

Table 4. Frequency and percentage distribution of the pre and post test scores of pupillary size to light among computer workers

S. No	Level of pupillary size to light among computer workers	Pre test				Post test			
		Frequency (n)		(%)		Frequency (n)		(%)	
		Rt	Lt	Rt	Lt	Rt	Lt	Rt	Lt
1	Normal	-	1	-	2.6%	27	30	71%	78.9%
2	Mild	38	37	100%	97.4%	11	8	28.9%	21.1%
3	Moderate	-	-	-	-	-	-	-	-

SECTION C: Determine the Effectiveness of Eye Exercise on Visual Problems Among Computer Workers.

Paired "t" values of pre and post test scores of visual acuity, visual field and pupillary size to light.

Computer workers	Paired "t" value	Level of significance
Visual acuity	26.30	P< 0.05 significant

Visual field	19.8	P< 0.05 significant
Pupillary size to light	3.05	P< 0.05 significant

Df = 30 **Table value = 2.02.**

SECTION D: Find Out the Association Between the Post Test Scores of Visual Problems Among Computer Workers and Their Demographic Variables.

Table 5: Association between the post test scores of visual acuity among computer workers and their demographic variables

Variables	**DF**	**Chi Square value**	**Table value**	**Level of significant**
Age	1	4.37	3.84	**Significant**
Gender	1	0.12	3.84	Not Significant
Associated disease condition	3	3.63	7.82	Not Significant
Duration of visual problems	1	19.90	3.84	**Significant**
Duration of using spectacles	1	0.05	3.84	Not Significant
Working room illuminated	3	0.19	7.82	Not Significant

Significant P < 0.05 **Not significant P > 0.05**

Table .6: Association between the post test scores of visual field among computer workers and their demographic variables.

Variables	**df**	**Chi-square value**	**Table value**	**Level of significant**
Age	1	10.95	3.84	**Significant**
Gender	1	1.7	3.84	Not Significant
Associated disease condition	3	0.96	7.82	Not Significant

Duration of visual problems	1	0.02	3.84	Not Significant
Duration of using spectacles	1	0.02	3.84	Not Significant
Working room illuminated	3	0.7	7.82	Not Significant

Table 9: Association between the post test scores of pupillary size to light among computer workers and their demographic variables.

Variables	**DF**	**Chi-square value**	**Table value**	**Level of significant**
Age	1	4.71	3.84	**Significant**
Gender	1	0.47	3.84	Not Significant
Associated disease condition	3	5.8	7.82	Not Significant
Duration of visual problems	1	0.03	3.84	Not Significant
Duration of using spectacles	1	0.03	3.84	Not Significant
Working room illuminated	3	0.19	7.82	Not Significant

DISCUSSION:

This study was conducted to assess the effectiveness of Eye Exercise on visual problems among computer workers in selected college at Namakkal district.

a) Frequency and percentage distribution of pre and post test scores of visual acuity among computer workers.

In **pretes**t, right eye 89.5% were having moderate level of visual acuity, 10.5% were having mild level.In left eye 86.8% were having moderate level of visual acuity,13.2% were having mild level of visual acuity .In **posttest** ,right eye 36.8% were having moderate level of visual acuity, 57.9% were having mild level.In left eye 28.9% were having moderate level of visual acuity,65.8% were having mild level of visual acuity.

b) Frequency and percentage distribution of pre and post test scores of visual field among computer workers

1. Superior

In **pretest**, right eye 78.9% were having moderate level of visual field and 21.1% were having mild level of visual field.In left eye 68.4% were having moderate level of visual field and 31.5% were having mild level of visual field.In **posttest**, right eye 23.7% were having moderate level of visual field and 76.3 % were having mild level of visual field.In left eye 21.1% were having moderate level of visual field and 78.9% were having mild level of visual field.

2. Lateral

In **pretest**, right eye 86.6 % were having moderate level of visual field and 13.3% were having mild level of visual field.In left eye 78.9 % were having moderate level of visual field and 21.1 % were having mild level of visual field.In **posttest,** right eye 60.5 % were having moderate level of visual field and 36.8 % were having mild level of visual field.In left eye 65.2% were having moderate level of visual field and 42.1% were having mild level of visual field.

3. Medial

In **pretest**, right eye 26.4 % were having moderate level of visual field and 73.7% were having mild level of visual field.In left eye 21.1 % were having moderate level of visual field and 78.9 % were having mild level of visual field.In **posttest,** right eye 7.9 % were having moderate level of visual field and 73.7 % were having mild level of visual field.In left eye 5.2% were having moderate level of visual field and 73.7% were having mild level of visual field.

4. Inferior

In **pretest,** right eye 71.1 % were having moderate level of visual field and 28.9% were having mild level of visual field.In left eye 68.4% were having moderate level of visual field and 31.6 % were having mild level of visual field.In **posttest,** right eye 23.7 % were having moderate level of visual field and 76.3 % were having mild level of visual field.In left eye 23.7% were having moderate level of visual field and 76.3% were having mild level of visual field.

c)To determine the effectiveness of Eye exercise on visual problems among computer workers.

a) Paired "t" values of pre and post test scores of visual acuity, visual field and pupillary size to light.

The paired't' test value was 26.30 in visual acuity,19.8 in visual field,3.05 in pupillary size to light. When compared to table value ($P< 0.05$) it was high. Hence it can be concluded that there is highly significant difference between the pre and post test scores of visual acuity, visual field and pupillary size to light. It seems that Eye exercise was highly effective among computer workers.

b) Comparison of Mean, SD and Mean percentage of pre and post test scores of visual acuity, visual field and pupillary size to light

Pre -test: Mean, Standard deviation and Mean percentage value of visual problems among computer workers. In visual acuity, the Mean, Standard deviation was 3.6 ± 1.26 and Mean percentage was 36% .In visual field, the Mean, Standard deviation was 17.9 ± 4.36 and the Mean percentage was 44.8% .In pupillary size to light the Mean, Standard deviation was 6.3 ± 0.80 and the Mean percentage was 63%.

Post-test: Mean, Standard deviation and Mean percentage value of visual problems among computer workers. In visual acuity the Mean, Standard deviation was 5.6 ± 1.52 and Mean percentage was 56%. In visual field the Mean, Standard deviation was 24.4 ± 4.6 and the Mean percentage was 61%. In pupillary size to light the Mean, Standard deviation was 4.5 ± 0.94 and the Mean percentage was 45%.

Difference in Mean percentage of pre and post-test visual problems among computer workers. In visual acuity the difference in Mean percentage was 20%. In visual field the difference in Mean percentage was16.2%. In pupillary size to light the difference in Mean percentage was18%. It seems that Eye exercise on visual problems among computer workers was highly effective.

d) To find out the association between post test scores on visual problems among computer workers with their demographic variables

a) Association between the post test scores of visual acuity among computer workerswiththeir demographic variables.Chi – square value depicts that there was a significant association between post test scores of visual acuity with age (4.37) and (19.90) duration of visual problems, when ($P < 0.05$). Thus, it can be interpreted that the difference in the mean scores related to age and duration of visual problems with visual acuity were true difference. However, there was no significant association between post test scores of visual acuity when compared with sex, associated disease condition, duration of using spectacles, and working room illumination ($p> 0.05$). Hence, it can interpret the difference in mean scores related to demographic variables were only by chance and not true difference.

b) Association between the post test scores of visual field among computer workerswith theirdemographic variables.Chi – square value depicts that there was a significant association between post test scores of visual field with age (10.95), when ($P < 0.05$). Thus, it can be interpreted that the difference in the mean scores related to age with visual field were true difference. However, there was no significant association between post test scores of visual filed when compared with sex, associated disease condition, duration of visual problems, working room illumination , ($P>0.05$). Hence, it can interpret the difference in mean scores related to demographic variables were only by chance and not true difference.

c) Association between the post test scores of pupillary size to light among computer workers with their demographic variables. Chi – square value depicts that there was a significant association between post test scores of pupillary sizes to light with age (4.71), when ($P < 0.05$). Thus, it can be interpreted that the difference in the Mean scores related to age with pupillary size to light were true difference.

CONCLUSION:

The study concluded that eye exercise is effective in reducing the visual discomfort among the computer workers. There was statistically significant evidence on improvement in visual acuity, visual field assessment and pupillary size to light assessment before and after Eye exercise. This hypothesis is accepted.

ACKNOWLEDGEMENT:

We indebted hearty thanks to Prof. **Dr. N. Ganapathy, MBBS., MD., DA., FCCP., DCCM (Cardio), MCAM**, Chairman, Dhanvantri College of Nursing, who made us what we are now, who has given inspiration, the amenable constant and tremendous encouragement. It's our great privilege to thank respected **Prof. Dr. P. Padmavathi., M.Sc. (N), PhD (N)., Principal**, Dhanvantri College of Nursing for her dedicated support and sincere commitment for the success of this study.

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