

EVALUATION OF THE FREQUENCY OF COMPLICATIONS OF WORKING WITH COMPUTERS IN A GROUP OF YOUNG ADULT COMPUTER USERS

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ABSTRACT

Objective: To evaluate the complications of working with computer in a group of students of computer sciences.

Methodology: In a descriptive-analytic study, we evaluated 150 students (58 males and 92 females) 18 to 30 years of age who worked with computers for two to twelve hours a day. The designed questionnaires were handed out to the students and the data collected were analyzed by the chi-square test.

Results: In these young adult computer users, the complications were evident when duration of using computer exceeds two hours a day. Ophthalmic complications and other complications (musculo-skeletal) were present in 26% and 14% of the computer users, respectively. The most frequent ophthalmic complication was ocular pain (41%) while the least common one was blurred near vision (5.1%). The most common non-ophthalmic complications were low back pain (42.9%) and headache (38.1%) and the least frequent one was shoulder pain (19%).

Conclusion: Young adult computer users who work on computers for more than two hours daily experience ophthalmic and musculo-skeletal complications and frequency of the complications tends to increase in those who work with computer daily.

KEY WORDS: Computers users, Ophthalmic Complications, Musculo-skeletal disorders.

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INTRODUCTION

Information technology has greatly developed and has been widely integrated in all aspects of our daily life. After introduction of computers in offices around twenty years ago, common activities in an office including typing, reading, writing and archiving were replaced with sedentary computer operating that increased the pace and efficacy of employees.¹ Following this trend, 15% of American families had household computers in 1990, while this rate has increased to 50% presently.² Moreover, 75% of offices had computers in 2000.³

Thompson WD,⁴ reported the frequency of ocular complaints to be 25-93% in computer users. The symptoms resulted from working

with computers are called computer eye syndrome (CES). These manifestations include visual, ocular and general symptoms. In addition, the study performed by Hales *et al*,⁵ showed that musculo-skeletal complications were present in 22% of the patients. Musculo-skeletal manifestations are also called cumulative trauma disorders (CTD) or repetitive strain injuries (RSI).⁶ The most common manifestations of computer users are ophthalmic complications⁷⁻¹⁰ resulting from stimulation and sensitivity of the eyes is ending in blurred vision, diplopia, and headache. These symptoms are as common as 70-75% based on the report of Association of Optometrists of the United States in 2003.^{11,12}

The main cause of ophthalmic complications is tiredness of ciliary and extra-ocular muscles. The other cause contributing to these complications is ocular dryness due to long opening of eyes and central concentration. Moreover, factors related to office design, lighting, computer screen and its contrast, the distance with the screen and its angle are influential in development of these symptoms, Psychiatric factors are also important in developing these symptoms.^{12,13} Disorders of accommodation and binocular vision, diplopia and retarded focusing are more common in computer users in comparison with normal population.¹⁴ Khan & Siddiqui¹⁵ emphasized on musculoskeletal problem in computer user and they have reported that low back pain is a common condition in computer users.

Since most common users of computers are students of computer sciences, we decided to evaluate ophthalmic and other related complications in these non-professional specific groups of population.

METHODOLOGY

This descriptive-analytic study conducted in 2006 was performed enrolling one-hundred and fifteen computer sciences students of Meybod Azad University in Iran Their age ranged from 18 to 30 years and they were working on computers from two to twelve hours a day. The subjects did not show any

previous musculo-skeletal and eye problems. Evaluated ophthalmic complications included ocular pain, lacrimation, blurring of vision (far and near), burning and itching. Evaluated musculo-skeletal complications included headache, backache, and shoulder pain. Each student was given a questionnaire and the data collected were assessed separately for males and females. The data were also assessed based on the working hours with computers. Statistical analysis were performed with the SPSS for Windows. Data were analyzed by the chi-square test. A P-value of <0.05 was considered significant.

RESULTS

One-hundred and fifteen computer science students (aged 18 to 30 years) including 92 females (61.3%) and 58 Males (38.7%) were enrolled in this study. Duration of working with computers varied from two to twelve hours. Sixty students (40%) showed the complications while the remaining 90 students (60%) did not manifest with any complications (Table-I). Ocular pain (41%) was the most frequent ophthalmic complication and near- vision blurring was the least frequent one (5.1%). Non-ophthalmic complications included low back pain (42.9%), headache (38.1%) and shoulder pain (19%). (Table-II & III)

Relative frequency of ophthalmic complications (26%) was significantly (P<0.05) higher than non-ophthalmic complications (14%) in the computer users. (Table-I). Males and females subjects did not show significant difference (P>0.05, $\alpha=0.05$); as regards frequency of complications. However, the differ-

Table-I: Frequency of complications of working with computers.

Gender	Male	Female	Total
Complication	No. (%)	No. (%)	No. (%)
Ophthalmic	20(34.5)	19(20.7)	39(26)
Non-Ophthalmic	12(20.7)	9(9.8)	21(14)
None	26(44.8)	64(69.5)	90(60)
Total	58(100)	92(100)	150(100)

Chi_square=9.268 df =2 p=0.01

Table-II: The frequency of different ophthalmic complications.

Gender	Male	Female	Total
<i>Ophthalmic Complications</i>	No. (%)	No. (%)	No. (%)
Ocular Pain	10(50)	6(31.6)	16(41)
Lacrimation	3(15)	4(21.1)	7(18)
Far Vision Blurring	3(15)	5(26.3)	8(20.5)
Burning & Itching	4(20)	2(10.5)	6(15.4)
Near Vision Blurring	0(0)	2(10.5)	2(5.1)
Total	20(100)	19(100)	39(100)

ence between ophthalmic and non-ophthalmic complications in females was significant ($P < 0.05$).

Table-IV shows the frequencies of complications based on daily working hours with computers. Students who worked with computers for less than two hours a day did not manifest any complications, while both ophthalmic and non-ophthalmic complications tend to increase with increase in daily working hours with computers. However, this difference was not significant in any of ophthalmic or non-ophthalmic complications ($P < 0.1$, $P > 0.05$ respectively).

The ratio of ophthalmic to non-ophthalmic complications was not significantly different based on different daily working hours ($P > 0.05$). Frequency of ophthalmic complications, burning and itching ($P > 0.05$), and lacrimation ($P > 0.05$) were not significantly different in males and females. However, gender difference was significant in frequencies of backache ($P < 0.05$), blurred vision ($P < 0.05$) and headache ($P < 0.05$).

The prevalence of ophthalmic complications was 260 in 1000 (133 in 1000 in males and 127 in 1000 in females) and the prevalence of non-ophthalmic complications was 140 in 1000 (80 in 1000 in males and 60 in 1000 in females).

DISCUSSION

Our study showed that 26% of computer user who worked on computers for more than two hours daily developed ophthalmic complica-

Table-III: The frequency of non-ophthalmic complications.

Gender	Male	Female	Total
<i>Complication</i>	No. (%)	No. (%)	No. (%)
Headache	5(41.7)	3(33.3)	8(38.1)
Low back pain	5(41.7)	4(44.4)	9(42.9)
Shoulder Pain	2(16.6)	2(22.3)	4(19)
Total	12(100)	9(100)	21(100)

tions while 14% developed musculo – skeletal disorders.

Many researchers have studied complications of working with computer.^{1,3-5,9,15-18} In some studies,^{1,3,4,7,11,17,18} ophthalmic complications and in others,^{5,15} musculo-skeletal complications have been reported. A few studies have focused on both the complications.^{8,16} We tried to evaluate both ophthalmic and non-ophthalmic complications of working with computer in a young adult population. Clayton *et al.*¹ who investigated 70 million Americans working with computers for more than two hours daily showed that ophthalmic manifestations were present in 90% of the cases. In our study, 26% of the computer users with daily working more than two hours had ophthalmic symptoms. Thompson WD,⁴ has reported the prevalence of ophthalmic complaints to range from 25 to 93% while in our study ophthalmic complications were 26%.

American Society of Optometrists (ASO) has reported that ophthalmic complications were present in 70-75% of computer users.¹¹ The study of Talia and Bruce,¹⁷ investigating 2700 radiologists showed that ophthalmic complaints were present in 36% of them. The study of Biljana *et al.*,¹⁸ investigating 690 cases for eye dryness and its risk factors (e.g. watching TV, working with computers, etc.) showed that a third of the cases (32-90 years of age) suffered from eye dryness with odds ratio of 3.37 (95% CI of 2.11-5.38 with $P < 0.01$). In our study, Eye dryness was not considered as an ophthalmic symptom. Although we have not assessed severity of ophthalmic symptoms and its correlation with daily duration of working with computer, the computer users with daily working

Table-IV: The frequency of complications based on daily working hours

Daily Working Hours	<2	2-4	4-6	>6
Complications	No. (%)	No. (%)	No. (%)	No. (%)
Ophthalmic	-	8(47)	13(50)	13(52)
Non-Ophthalmic	-	5(29.5)	10(38.5)	7(28)
Healthy	82(100)	4(23.5)	3(11.5)	5(20)
Total	82(100)	17(100)	26(100)	25(100)

less than two hours showed no complications but those who work for more than two hours had more ophthalmic and non-ophthalmic complications as shown in our study.

The prevalence of musculo-skeletal complications was 22% in the study of Hales *et al*⁵ which is comparable with our result 14%. Khan and Siddiqui evaluated computer user for low back pain in patients 12-65 years. According to their results, low back pain was reported in 44% of VDU user which developed after four hours and in 35% after three hours.¹⁵ This is also similar to the present study result (42.9%).

Study by Gunnarsson and Solderberg showed that the intensity of complications due to working with VDU correlates with daily working hours with computers.¹⁶ The etiology of these complications is widely diverse including underlying ophthalmic problems and inappropriate ergonomic situation of offices.⁷ A study in 1992 showed that two third of these complications are due to underlying ophthalmic conditions and the remaining third are because of environmental factors.^{7,17} Another study in 1991 indicated that computer users experience more medical problems in the same environment as others.⁷

From epidemiologic point of view, the prevalence of ophthalmic complications as a result of working with computers was 260 in 1000 in our study (133 in 1000 in males and 127 in 1000 in females). The prevalence of non-ophthalmic complications was 140 in 1000 (80 in 1000 males and 60 in 1000 females). In view of the increasing use of computer in world,^{2,3} it is recommended that to prevent these complications computer users have to be thoroughly trained regarding ergonomics of the office

(including lighting, chairs, desks, etc.), proper use of computers (e.g. distance with the screen, view angle of the screen, sitting position, etc.) and underlying ophthalmic situations that can be aggravated by working with computers. Computer users should also be instructed to visit a physician as soon as they experience any complication.

Considering the importance of complications of working with computers, more extensive studies evaluating these complications in both genders, in different age groups and in different occupations are recommended.

CONCLUSION

Young adult computer users working for more than two hours daily experience various ophthalmic and musculo-skeletal complications.

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