Study of Eye Problems among Long Term Computer users in Ahmedabad City

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Abstract

Background: India being the forerunner in the cyber world the occupational health problem is slowly awakening to this group of modern occupational diseases, which are slowly taking its roots among the information technology (IT) professionals. Studies have also shown that computer users are at greater risk of developing eye problems and visual fatigue.

Methodology: Cross sectional study was carried out over a period of one year time among 800 participants to study the eye problems among computer users.

Results: Out of 800 participants; 70.25% participants had any computer related eye problem. If participants work more than four hours in a single spell prevalence of eye problems was 84.49%. Prevalence of visual problem was maximum (76.67%) who use computer for seven to nine hours per day.

Conclusion: It is observed that occurrence of visual problems are related more to number of hours spent gazing at the screen than number of years of work.

Keywords: Eye Problems, Long term computer use, Visual fatigue,

Introduction

Contemporary technology revolution has made our life with so much convenience that people would hardly imagine life without computer, internet, cable TV, cellular phones, various tools and gadgets. Computers are one of the main tools in businesses, educational institutes, offices, homes and even in cars. The increasing use of personal computer in homes has become an integral part of life. Together with all above factor and dwindling prices, India stands 5th among highest computer user in the world with 57 million users which is 3.56% of world computer users.[1] According to census 2011 data 9.4% households in India had a computer. In Gujarat 8.8 % households owned a computer out of which 3.1% had internet access.[2] Ahmedabad is not out of this development and its proof is in survey done by TCS on students of higher secondary school which indicates that students of Ahmedabad use home PCs (72.56%) and laptops (72.87%).[3] The application of computer technology and the accompanying use of Video display terminals are revolutionizing the work places in India and their use will continue to grow in the future.[4] On one hand, these technologies including computers have made lives so much easy but on the other hand have created many risks for human health. The negative risks associated with the usage of these technologies are increasing with their growing demand day by day.

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India being the forerunner in the cyber world the occupational health problem is slowly awakening to this group of modern occupational diseases, which are slowly taking its roots among the information technology (IT) professionals. These problems if ignored can prove debilitating and can cause crippling injuries forcing one to change one's profession.[5,6] The work environment constitutes an important part of man's total environment, so health to a large extent is affected by work conditions.[7] Physical environment plays an important bearing on health. Occupational environment too plays a major role on the health of the exposed. The health hazards get more severe when the duration of the exposure increases. The more time spent on this type of activity, the higher the risk of developing visual, musculoskeletal and psychological problems.[8-9] Studies have also shown that computer users are at greater risk of developing eye problems and visual fatigue.[10]

Material and Methods

The present study titled "Study of Eye problems among computer users in Ahmedabad City" was conducted at government and private offices of Ahmedabad city.

Study Design: Cross sectional study.

Study Period: The study was carried out over one year time duration.

Sample Size: In the pilot study the prevalence of eye related problems among computer users was found to be 67%. Considering this prevalence sample size was calculated with allowable error of 5%. Calculated sample size was 788 but for the convenience of study, the sample size was decided to be 800. The study subjects were drawn from software development workers, call center workers and data entry workers to have an adequate representation from all sectors of Information Technology industry.

Inclusion Criteria

- Duration of computer use is more than 1 year.
- Uses computer for more than 3 hours/day or 21 hours/week.

Exclusion Criteria

- Any disease of eye
- Any acute injury related to eye

Data Collection: List of offices was procured from internet. Offices from this list were randomly selected and prior permission of the proprietor of selected offices was taken. All the selected offices were visited with prior appointment convenient to proprietor and study participants. Verbal consent from each employee, who were using computer as per inclusion criteria was taken and he/she was given predesigned, pretested questionnaire to fill up the questions regarding their, Demographic profile, Job profile; Work duration, Work distribution, Work environment, eye problems and its severity with its duration.

Each part of questionnaire was explained to participants in detail. Filled up questionnaire was collected and checked for completeness of information.

Statistics: Data entry and data analysis was done in Epi-Info software version 7.1.Odds ratio and Chi-Square tests were used to test the significance.

Results

Table 1: Sex wise distribution of visual problems among the study participants

	Male n=569 (%)	Female n=231 (%)	Total n=800 (%)	Odds Ratio (95% CI)
Visual problems	392 (68.89)	170 (73.59)	562 (70.25)	0.73 (0.56-1.11)
Eye pain	201 (35.33)	105 (45.45)	306 (38.25)	0.6 (0.4-0.6)
Eye strain	170 (29.88)	92 (39.83)	262 (32.75)	0.6 (0.46-0.88)

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Eye redness	75 (13.18)	24 (10.39)	99 (12.38)	1.3 (0.82-2.13)
Blurring of vision	115 (20.21)	45 (19.48)	160 (20.00)	1.04 (0.7-1.5)
Watery eyes	100 (17.57)	50 (21.65)	150 (18.75)	0.77 (0.52-1.12)
Dry eye	81 (14.24)	38 (16.45)	119 (14.88)	0.84 (0.55-1.28)
Difficulty in focusing	101 (17.25)	37 (16.22)	138 (17.25)	1.13 0.74-1.7
Double vision	16 (2.81)	9 (3.90)	25 (3.13)	0.71 0.31-1.63
Headache	291 (51.14)	137 (59.31)	428 (53.50)	0.71 (0.52-0.92)

Among study participants 71.12% were males and 28.88% were females. Prevalence of visual problems in the study participants was 70.25% (562/800). Prevalence of eye problems varies from 38.25% (eye pain) to 3.13% (double vision). All eye problems were more among females as compared to males except for eye redness, blurring of vision and difficulty in focusing. (Table No. 1)

Table 2: Prevalence of headache according to duration of single spell ofcomputer work

Work duration in single spell (hrs)	Visual problem*		Headache†		Total n=800
	Yes (%)	No (%)	Yes (%)	No (%)	
<2	26 (29.54%)	62 (70.46%)	33 (37.50%)	55 (62.50%)	88 (11%)
2-3	124 (55.85%)	98 (44.15%)	84 (37.84%)	138 (62.1%)	222 (27.7%)
3-4	194 (83.62%)	38 (16.38%)	138 (59.48%)	94 (40.52%)	232 (29.0%)
>4	218 (84.49%)	40 (15.51%)	173 (67.05%)	85 (32.95%)	258 (32.2%)

*, Chi square value = 136.67,df=3, P<0.001
†, Chi square value = 35.47,df=3, P<0.001

Table 2 shows that prevalence of visual problems and headache were more or less same in all the groups. Prevalence of visual problems among participants with less than 3 years of job was 67.78% while 75.44% in those with 3 to 5 years of job. These difference were statistically not significant.

Table 3: Prevalence of visual problems by duration of computerwork/day

Computer work (hrs/day)	Visual problem*		Headache†		Total n=800
	Yes (%)	No (%)	Yes (%)	No (%)	
3-5	33 (39.7)	50 (60.24)	14 (16.87)	69 (83.13)	83 (10.38)
5-7	108 (70.59)	45 (29.41)	52 (33.99)	101 (66.01)	153 (19.13)
7-9	230 (76.67)	70 (23.33)	176 (58.67)	124 (41.33)	300 (37.50)
>9	191 (72.35)	73 (27.65)	186 (70.45)	78 (29.55)	264 (33.00)

*, Chi square value = 43.39,df=3, P<0.001

†, Chi square value = 101.91,df=3, P<0.0001

Prevalence of visual problems was highest (76.67%) in those participants who use computer for 7 to 9 hours/day and lowest (39.76%) in those who use computer for less than 5 hours/day. This difference was statistically highly significant. Prevalence of headache among study participants was proportional to computer work/day. Highest prevalence (70.45%) was among the participants who were working for more than 9 hours/day. This difference was statistically highly significant. (Table No. 3)

Table 4: Prevalence of visual problems according to completed years ofcomputer related job

Work duration in single spell (hrs)	Visual problem*		Headache†		Total n=800
	Yes (%)	No (%)	Yes (%)	No (%)	
1-3	223 (67.78)	106 (32.22)	170 (51.67)	159 (48.33)	329 (41.13)
3-5	172 (75.44)	56 (24.56)	125 (54.82)	103 (45.18)	228 (28.50)
> 5 years	167 (68.72)	76 (31.28)	133 (54.73)	110 (45.27)	243 (30.38)

*, Chi square value = 4.16,df=2, P>0.05

†, Chi square value = 0.75,df=2, P>0.05

Prevalence of visual problems among participants with 3 to 5 years of job is 75.44% (x2 4.16, df =2, P > 0.05), statistically insignificant. Prevalence of headache among participants who worked more than 5 years is 54.73% . (x2 0.75, df =2, P > 0.05), statistically insignificant.

Table 5: Prevalence of computer related health problems by refractiveerror status of participants

Type of health problem	Refractive error		Total	Odds ratio(95% CI)	χ^2 df=1	P value
	Yes n=143 (%)	No n=653 (%)				
Visual problems						
Yes	123	439	562		13.25	< 0.001
	(82.55)	(67.43)	(70.25)	2.28 (1.45-3.59)		
No	26	212	238			
	(17.45)	(32.57)	(29.75)			

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Headache						
Yes	89	339	428	1.36 (0.95-1.96)	2.85	> 0.05
	(59.73)	(52.07)	(53.50)			
No	60	312	372			
	(40.27)	(47.93)	(46.50)			

Prevalence of computer related visual problems were 2.28 times higher who had refractive error, odds ratio 2.28, 95% CI (1.45-3.59), P < 0.001, statistically significant. Prevalence of headache was 1.36 times higher who had refractive error, odds ratio 1.36, 95% CI (0.95-196), P >0.05, statistically insignificant (Table 5)

Discussion

In the present study 70.25% of participants had visual problems (Table No. 1). Similar results were found in study by Suparna K. et al (76%) and Talwar R. et al (76.5%).[11-12] However it was lower (59.5%) in study by Bhanderi et al.[13] Also the prevalence of visual problems was higher in females (73.59%) as compared to males (68.89%). Similar results were observed in other studies.[11,13-14]

In the current study statistically significant association was found between the duration in single spell of work without break and visual problems and headache (Table No. 2). Similarly WHO and Chakarpani et al also found a significant association between duration of work without break and any computer related health problem.[5,15]

In the present study total hours of computer usage per day was significantly associated with visual problems and headache. (Table 3) Similar significant association was found by other studies.[12,14,16] However no significant difference was found between visual problems and job duration (Table No. 4). These results were in agreement with study findings of Sharma A. K. et al.[14]

In the present study 143 (18.63%) of participants had refractive errors which is lower than the findings of Bhanderi et al[13] (35.8%). A significantly higher proportion of participants with refractive error reported occurrence of visual problems. Study on visual problems by Bhanderi et al, Bergqvist et al and Nakaishi et al had shown similar relationship between computer related visual problems and presence of refractive error in the participants.[13,17-18] Potential explanation of increased risk of visual problems is that computer tasks is a type of near work that looks at letters on the screen which are formed by tiny dots called pixels, rather than a solid image. This causes the eyes which already have some corrective problem to work a bit harder to keep the images in focus.

Conclusion

From the findings of present study it was evident that very high morbidity attributed to computer work has already taken roots in information technology professionals and it is a matter of great concern. It is observed that occurrence of visual problems are related more to number of hours spent gazing at the screen than number of years of work.

Ethical clearance: Ethical clearance was taken from institutional ethical committee of GMERS Medical College, Himmatnagar

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Conflict of interest: Nill

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