

## COMPUTER RELATED HEALTH PROBLEMS AMONG SOFTWARE PROFESSIONALS IN MUMBAI - A CROSS-SECTIONAL STUDY

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### ABSTRACT

**Background:** Computers have become an epitome of modern life, being used in every aspect of life. This has also ushered in a new genre of occupational health problem i.e. of computer related health problems. Hence the study was aimed at exploring the magnitude and pattern of computer related health problems.

**Objectives:** To estimate the prevalence of various health problems among the software professionals and to study its association with their working environmental conditions.

**Method:** A cross-sectional study of 4 months duration was undertaken with 200 Software professionals working with a private firm as subjects. Professionals working in different departments were identified and out of which five departments were selected randomly using lottery method and a sample of 40 from each was then drawn using random number table. Inclusion criteria: - working in current job since past 6 months and on computer for at least 4 hours/day. The questionnaire included socio-demographic details and details regarding working hours, working environment, experiencing any problem while working on computer. Standardized Nordic questionnaire (musculoskeletal), Zung's self rating depression scale and Hamilton's depression rating scale (depression) and Snellen's - Jaeger's chart (visual acuity) was used. Analysis was done by SPSS 17.

**Results:** The proportion of visual, musculoskeletal and stress was found to be 67%, 63% and 44% respectively. It was also found that visual symptoms increased with increase in working hours on computer. Statistically significant association was found between subjects with visual and musculoskeletal complaints using antiglare screen and soft keypads and those not using them respectively.

**Conclusion:** IT professionals faces a tough time tackling the occupational health problems requiring a multidisciplinary action. Since it was observed in the study that use of antiglare screen, cushioned chairs and soft keypads had resulted in lowered health problems, application of ergonomics and better technology is also required. There is also an immediate need to sensitize the management of the organizations employing computer professionals about their problem and enforce suitable preventive measures.

**Keywords:** - computer, software professionals.

### INTRODUCTION

Computers have become an epitome of modern life, being used in every aspect of life. India has been in the forefront in cyber world with IT industry developing into a major service provider. There are approximately six-computers/1000 population with an installation of 18 million Personal Computers (PCs) and their number

increasing all the time <sup>(1)</sup>. This has also ushered in a new genre of occupational health problem i.e. of computer related health problems. The proliferation of video display terminals (VDT), in the modern office setting has generated concern related to potential health hazards associated with their use <sup>(3)</sup>. Using the wrong chair or just sitting improperly in front of a computer for long time can lead to chronic debilities such as stiffness, headache, and backache. Muscles and tendons can become inflamed due to greater periods of sitting on PC's. Carpal tunnel syndrome is a common example of an overuse injury associated with computer work. This painful disorder of the hand is caused by pressure on the main nerve that runs through the wrist. The fingers are also prone to overuse injury, particularly the finger that clicks the mouse buttons <sup>(2)</sup>. Surveys of computer workers reveal that vision-related problems are the most frequently reported health-related problems, occurring in over 70% of computer workers <sup>(4)</sup>. Computer vision syndrome is related to the unique aspects of the task. Working at a computer is more visually demanding than doing other standard office work such as reading printed documents. Aspects of the design of the computer video display such as screen resolution and contrast, image refresh rates and flicker, and screen glare, as well as working distances and angles all may contribute to worker symptoms <sup>(5, 6)</sup>. Hence, there is an urgent need to understand the dynamics of these problems and prevent it with the use of ergonomics from assuming epidemic proportions. Various studies have been done in the developed countries focusing this problem but only a few studies have been done in India. A study done by Giri et al reported one or more computer related health problem in 93.3% of the study subjects, the commonest complaint being musculoskeletal (73.3%) followed by ocular (65.3%) and psychosocial (46.0%)<sup>(7)</sup>. Sivaraman G. et al in their study observed musculo-skeletal discomfort in 75.5% respondents and computer vision syndrome in 59.4% subjects <sup>(8)</sup>. Prevalence of Carpal Tunnel Syndrome was found to be 13.1% in a study done by K. Mohamed Ali and B.W.C. Sathiyasekaran <sup>(9)</sup>.

The present study was thus aimed at exploring the magnitude and pattern of computer related health problems among the software professionals and to study its association with their working environmental conditions.

## METHOD

### Study Design

A cross-sectional study of 4 months duration was undertaken with 200 Software professionals working with a private firm as subjects. Permission for conducting the study was obtained from the Managing Director of the firm office prior to the initiation of the study. Professionals working in different departments were identified and following 5 departments – Human Resource, Sales, Marketing, Software development and Content development were selected randomly using lottery method. A sample of 40 IT professionals from each department was then drawn using random number table to reach the required sample size.

**Inclusion criteria** for selection as study subjects were - a) Subject should be working in the current job since past 6 months. b) Subject should be working on computer for at least 4 hours/day.

Study subjects were then interviewed face to face using a pre-tested questionnaire after taking their informed consent. The days and time were fixed according to the convenience of both study subjects as well as investigator.

### Measures

The questionnaire included socio-demographic details as well as details regarding working hours, working environment, experiencing any problem while working on computer and the kind of problems perceived. Standardized Nordic questionnaire was administered to assess musculoskeletal problems <sup>(10)</sup>. Depression was measured using Zung's self rating depression scale and Hamilton's depression rating scale <sup>(11)</sup>. Stress was defined by the presence of at least 3 of the following symptoms – Insomnia, Loss of mental concentration, Anxiety, Absenteeism, Depression, Substance abuse, Extreme anger and frustration, Family conflict, headache, migraine. Visual acuity was also assessed using Snellen's chart and Jaeger's chart.

### Analysis

Analysis was done using SPSS software version 17.

## RESULTS

Mean age of study subjects was **28.23**+/- 4.3 with 58.5% of subjects being in the age group of **20-29** years. The male : female ratio was **3:2**.

**Table 1.** Age and sex wise distribution of study participants according to their complaints

Parameters		Type of complaints			
		Visual	Musculo-skeletal	Stress	Any complaint
Age	20 – 35 (n=61)	39(63.9%)	37(60.7%)	47(77%)	51(83.6%)
	35 – 50 (n=67)	54(80.6%)	28(41.8%)	17(25.4%)	58(86.6%)
	>50 (n=72)	38(52.8%)	61(84.7%)	24(33.3%)	69(95.8%)
Sex	Male (n=124)	81(65.3%)	73(58.8%)	58(47.3%)*	109(87.9%)
	Female (n=76)	53(69.7%)	51(67.1%)*	30(39.9%)	69(90.7%)
<b>Total(n=200)</b>		134(67%)	124(62%)	88(44%)	178(89%)

\* p < 0.05

Table 1 shows the age and sex wise distribution of visual, musculoskeletal complaints and stress among the study participants. Visual 54(80.6%), musculoskeletal 61(84.7%) and stress 47 (77%) were the most common complaints identified in 35 – 50 years, > 50 years and 20 – 35 year age groups respectively. Stress was found to be more common in male 58 (47.3%) than in females while musculoskeletal complaints were more common in females 51 (67.1%) than in males.

**Table 2.** Distribution of stress according to marital status of study participants

Marital status	Stress		Total
	Present	Absent	
Married	20(22.7%)	47(42%)	67(33.5%)
Unmarried	68(77.3%)	65(58%)	133(66.5%)
<b>Total</b>	88(100%)	112(100%)	200(100%)

Df 1

chi 8.186

**p < 0.01**

The cross table 2 shows the distribution of stress among the software professionals depending on their marital status. It was observed that the percentage of stress related to work was much higher among the unmarried 68 (77.3%) professionals than in the married 20 (22.7%) professionals and this distribution was found to be highly significant (p < 0.01) on applying chi square test.

**Table 3.** Department wise distribution of complaints among study participants

Department (n = 40 each)	Type of complaints			
	Visual	Musculo-skeletal	Stress	Any complaint
Software development	31(77.5%)	26(65%)	19(47.5%)	37(92.5%)
Human resource	27(67.5%)	21(52.5%)	18(45%)	34(85%)
Sales	24(60%)	23(57.5%)	21(52.5%)	35(87.5%)
Marketing	21(52.5%)	27(67.5%)	14(35%)	35(87.5%)
Content development	31(77.5%)	29(72.5%)	16(40%)	37(92.5%)
<b>Total (N=200)</b>	134(67%)	126(63%)	88(44%)	178(89%)

Table 3 shows the distribution of complaints among the five departments which were selected for the study randomly using lottery method. Out of the 200 study participants, 178 (89%) had one of the three complaints which were assessed during the study. Visual complaints were mostly observed in the participants working in department of software development 31 (77.5%) and content development 31 (77.5%). Software professionals working in the content department 29 (72.5%) and marketing department 27 (67.5%) were having musculoskeletal complaints. Stress related to work was most common in professionals working in the sales department 21 (52.5%) followed by software development 19 (47.5%). Depression was present in 8% by Zungs self-rating scale and in 6% by Hamilton depression-scale and most of these had minimal to mild depression. On use of Snellen's - Jaeger's chart, 39 (19.5%) were found to be both myopic and hypermetropic, 44 (22%) were only myopic and 67 (33.5%) hypermetropic.

**Table 4.** Distribution of visual and musculoskeletal complaints among study participants

Complaints		Male (%)	Female (%)	Total (%)
Visual	Pain	11(13.5%)	16(30.8%)	27(20.1%)
	Irritation/Itching	7(8.6%)	9(16.9%)	16(11.9%)
	<b>Redness</b>	<b>24(29.6%)</b>	<b>30(56.6%)</b>	<b>54(40.2%)</b>
	Blurring of vision	8(9.8%)	4(7.5%)	12(8.9%)
	Decreased vision	7(8.6%)	8(15%)	15(11.1%)
	Burning sensation	24(29.6%)	15(28.3%)	39(29.9%)
Musculo-skeletal	<b>Pain/stiffness in neck</b>	<b>33(45.2%)</b>	<b>24(47.0%)</b>	<b>57(45.2%)</b>
	Pain/stiffness in shoulder	7(9.5%)	8(15.6%)	15(11.9%)
	Pain/stiffness in lower back	22(30.1%)	17(33.3%)	39(30.9%)
	Pain/stiffness in hands/wrist/fingers	12(16.4%)	14(27.4%)	26(20.6%)

Table 4 depicts the distribution of visual and musculoskeletal complaints among the software professionals. Redness in the eyes was the most common visual complaint cited by 54(40.2%) participants followed by burning sensation 39(29.9%) and pain in eyes 27(20.1%). Amongst the musculoskeletal complaints 57(45.2%) participants recorded pain/stiffness in neck as the most common complaint followed by pain/stiffness in lower back 39(30.9%) and pain/stiffness in hands/wrist/fingers 26(20.6%).

**Table 5.** Distribution according to duration of work and type of complaint

Work duration		Type of complaints				p value
		Visual	Musculo-skeletal	Stress	Any complaint	
Hours on computer per day	6-8 (n = 45)	28(62.2%)	30(66.6%)	21(46.6%)	39(86.6%)	< 0.05
	<b>8-10 (n = 73)</b>	<b>52(71.2%)</b>	<b>54(73.9%)</b>	35(47.9%)	65(89%)	
	> 10 (n = 36)	<b>27(75%)</b>	<b>24(66.6%)</b>	14(38.8%)	33(91.6%)	
<b>Total</b>		134(67%)	126(63%)	88(44%)	178(89%)	
Duration of work (years)	< 3 (n = 57)	31(54.3%)	29(50.8%)	34(59.6%)	51(89.4%)	< 0.05
	3-6 (n = 72)	52(69.2%)	44(61.1%)	26(36.1%)	65(90.2%)	
	<b>6-9 (n = 43)</b>	<b>30(69.7%)</b>	<b>34(79%)</b>	17(39.5%)	39(90.6%)	
	> 9 (n = 28)	<b>21(75%)</b>	<b>19(67.8%)</b>	11(39.2%)	23(82.1%)	
<b>Total</b>		134(67%)	126(63%)	88(44%)	178(89%)	

Table 5 shows the distribution of number of hours of work on computer per day and duration of work of the study participants in the software company with respect to the occurrence of the visual, musculoskeletal and stress complaints. It was observed that as the number of working hours on computer or duration of work increased, the frequency of visual, musculoskeletal and stress complaints also increased simultaneously. 71.2% of the subjects working for 8 – 10 hours on computer had visual complaints, 73.9% had Musculo-skeletal complaints and 47.9% complained of stress while those working > 10 hours per day had 75% visual and 66.6% Musculo-skeletal complaints. Similarly, visual complaints, Musculo-skeletal complaints and stress were observed in 54.3%, 50.8%

and 59.6% subjects working for < 3 years respectively while for those working for > 9 years it was 75%, 67.8% and 39.2% respectively. The differences were found to be statistically significant.

**Table 6.** Distribution according to working environment and complaints

Working environment		Visual complaints			p value
		Present	Absent	Total	
<b>Antiglare screen</b>	Used	31(53.4%)	27(46.6%)	58(29%)	<b>&lt; 0.05</b>
	Not used	<b>103(72.5%)</b>	39(27.5%)	142(71%)	
<b>Total</b>		134(67%)	66(33%)	200(100%)	
Working environment		Musculo-skeletal complaints			p value
		Present	Absent	Total	
<b>Cushioned chairs</b>	Used	28(35.9%)	50(64.1%)	78(39%)	<b>&lt; 0.01</b>
	Not used	<b>98(80.3%)</b>	24(19.7%)	122(61%)	
<b>Total</b>		126(63%)	74(37%)	200(100%)	
<b>Soft keypad</b>	Used	56(56%)	44(44%)	100(50%)	<b>&lt; 0.05</b>
	Not used	<b>70(70%)</b>	30(30%)	100(50%)	
<b>Total</b>		126(63%)	74(37%)	200(100%)	

Table 6 depicts the distribution of visual and musculoskeletal complaints and the working environment. It was found that the software professionals who were working on a computer having an antiglare screen had much lower frequency of visual complaints (53.4%) when compared with those who were not using it (72.5%). This distribution was found to be statistically significant. It was also observed that the study participants who were using cushioned chairs had lower frequency (35.9%) of musculoskeletal complaints in contrast to others not using cushioned chairs (80.3%) and it the association was found to be statistically significant on using chi square test. Similarly, it was also observed that the study participants who were using soft keypads had lower frequency (56%) of musculoskeletal complaints in contrast to others not using soft keypads (70%).

## DISCUSSION

The present study revealed coexistence of more than one form of discomfort among professional computer users. In the study as many as 89% (178) of the study subjects reported one or more than one computer related health problem. This observation is in accordance with the results obtained by Shah et al<sup>(12)</sup> and Sjogren-Rouka et al<sup>(13)</sup> who reported 93.5% and 91.8% among software professionals and computer operators respectively. Ocular discomfort (67%), musculo-skeletal disorders (63%) and psycho-social problems in the form of stress (44%) form the key category of health problems found among computer professionals. Visual 54(80.6%), musculoskeletal 61(84.7%) and stress 47 (77%) were the most common complaints identified in 35 – 50 years, > 50 years and 20 – 35 year age groups respectively. Stress was found to be more common in male 58 (47.3%) than in females while musculoskeletal complaints were more common in females 51 (67.1%) than in males. These results are in accordance with that of Sharma AK et al<sup>(1)</sup>. Percentage of stress related to work was much higher among the unmarried 68 (77.3%) than in the married 20 (22.7%) professionals. Stress related to work was most common in professionals working in the sales department 21 (52.5%) in contrast to a study done by Sharma AK et al<sup>(1)</sup> where it was found to be most common in software development department. The most common complaint cited were visual - Redness in the eyes by 54(40.2%), musculoskeletal - recorded pain/stiffness in neck 57(45.2%) while watering from eyes (62.6%) and neck pain (58% ) were the most common complaints observed by P.A. Giri et al<sup>(7)</sup>. Depression was present in 8% by Zungs self-rating scale and in 6% by Hamilton depression-scale and most of these had minimal to mild depression. It was also observed that as the number of working hours on computer or duration of work increased, the frequency of visual, musculoskeletal and stress complaints also increased simultaneously. Study participants who were working on a computer having an antiglare screen had much lower frequency of visual complaints (53.4%). Similarly, participants who were using cushioned chairs and soft keypads had lower frequency of 35.9% and 56% of musculoskeletal complaints respectively.

## IMPLICATIONS OF THE STUDY

IT professionals faces a tough time tackling the occupational health problems. Ocular discomfort, musculo-skeletal disorders and psycho-social problems form the key category of health problems found among constant computer users. The problem requires a multidisciplinary action. Since it was observed in the study that use of antiglare screen, cushioned chairs and soft keypads had resulted in lowered health problems, application of

ergonomics and better technology is also required. Health education and training of personnel is also recommended. There is also an immediate need to sensitize the management of the organizations employing computer professionals about their problem and enforce suitable preventive measures.

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