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Computer-Related Health Problems among White-Collar Employees: Communicating a Blueprint

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Abstract

Objective: To analyze the existence of computer-related health problems among white-collar employees; and to suggest a blueprint for prevention. **Methods/Statistical Analysis:** A study was conducted across segments among white-collar employees from South India with a participant volume of 259. The chi-square test in SPSS version 22 was used for analyzing the results. **Findings:** The existence of visual problems in the participant set was 65% (168/259), and musculoskeletal problems were conveyed by 67% (173/259) whilst 32% (84/259) experienced stressful signs. The study established that there was a steady upsurge in visual complaints as the total hours working on computers added day by day. Similar link was discovered for musculoskeletal complications. **Improvements/Applications:** A lot of research on the topic has been done already. The blueprint that should be communicated to the employees to tackle the computer-related health concerns makes it exclusive. The evidence can be used by employers to cultivate a practice and very essentially, will navigate them in building a well-informed workforce. It will also facilitate them modify the workplace to augment employer branding.

Keywords: Action Plan, Health Problems, Standardized Nordic Questionnaire, White-Collar Employees

1. Introduction

Various articles[1–3], have indicated that the harms that are related with computers include a varied health problems triggered by or added by using computer, which can all be prevented[3]. The commonest informed medical problems are eye strain, neck and back strain, Carpal Tunnel Syndrome, Conjunctivitis (itchy, bloodshot eyes) and Dermatitis[4].

The amplified computer usage in the offices has resulted in the growth of several health apprehensions. Several people who work at a computer share a lot of job-related grievances and indications, including ocular distress, muscular pressure and stress. Researchers pointed out that the level of distress seems to grow with the extent of computer usage[5,6]. WHO[7] clearly suggested that visual distress and associated indications occurring in individuals working with computers must be acknowledged as a mounting health problem. The multifarious eye and vision problems related to close work with computers has been termed "computer vision syndrome".

In wake of above, a study was conducted, the outcomes of which have been reproduced in this article.

2. Materials and Methods

2.1 Study Design and Setting

A 4-month duration study was conducted across segments among white-collar employees from South India. Two hundred fifty nine white collar employees from Southern India, which included teachers/professors, doctors, engineers, lawyers, IT professionals, and Finance and Accountancy professionals amongst others.

2.2 Selection of Participants

Random sampling was done and subjects were identified based on their profession- teachers, professors, lawyers, doctors, engineers, accountants, IT professionals and others.

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2.3 Methods of Measurement

Study subjects were administered four survey questionnaires after ensuring their privacy.

2.4 Data Collection

Data was collected using questionnaires. The first questionnaire comprised particulars about socio-demographic information in addition to specifics regarding working hours, hours spent on computer at an average per week, any problems faced while working on computer, and the kind of problem faced.

A self-health assessment questionnaire for vision acuity was also administered for understanding the visual problems. The study used different tools; the standardized Nordic questionnaire was run to gauge musculoskeletal problems. Zung's self-rating depression scale was used to measure depression.

2.5 Statistical Method

SPSS version 22 was used for at a entry and statistical analysis. The significance of association at *P* value of 0.05 and 0.01 was tested using the chi-square test. This was done to gauge the relationship between socio-demographic factors and visual/musculoskeletal/vision diseases. Frequency distributions were estimated, Anova was conducted, and Factor analysis was done based on Zung's self-rating depression scale to identify which factors had more effect on the subjects.

3. Results

The study participants' mean age was found to be 34.6 with 37.8% of participants in the age group of 25-34 years and 28.2% in the age group of 35-44 years. 68% of the subjects were married while 31.7% were unmarried. The female subjects constituted 42.1% of the total sample size while the male participants were 57.9%. From our example, it is evident that Cronbach's alpha is **1.777,** which denotes a high level of internal reliability for the scale with this set of definite participants (Table 1). Table 2 shows the gender-wise distribution of visual complaints. Total hours spent using the computer shows a difference in blurred vision, double vision, dry eyes, strain in the eyes, headache, altered Color perception, and watering of eyes (Table 3). Table 2 shows the gender-wise distribution of musculoskeletal problems.

Table 1. Reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
1.777E-16	9.629E-17	6

Table 2. Gender-wise distribution of visual and musculo-skeletal complaints

Visual Complaints	Male (%)	Female (%)	Total (%)
Blurred Vision	13.1	11.6	24.7
Double Vision	2.3	2.3	4.6
Dry Eyes	10.8	5.4	16.2
Strain in eyes	22.8	17.8	40.5
Headache	19.7	19.7	39.4
Altered Color Perception	2.7	2.7	5.4
Watering of eyes	15.4	9.7	25.1
Musculo-skeletal Complaints			
Neck	23.6	22.9	46.5
Shoulders	21.4	19.4	40.7
Upper Back	19.4	14.3	33.7
Elbows	12.4	6.2	18.7
Lower Back	18.2	17.1	35.3
Wrist/Hands	10.9	5.5	16.3
Hips/Thighs	6.6	4.7	11.2
Knees	9.7	7.4	17.1
Ankles/Feet	6.2	6.2	12.4

Table 3. Relationship between numbers of hours spent on the computer and visual complaints

Asymp.Sig (*p*)	Blurred Vision	Double Vision	Dry Eyes	Strain in eyes	Headache	Altered Color Perception	Watering of Eyes
	0.000	0.000	0.000	0.002	0.001	0.001	0.001

4. Empirical Analysis

Depression was present in 32% by Zung's self-rating scale. Factor analysis was done on the components of Zung's self-rating scale to study the effect of usage of computers on stress and depression. The KMO measures the sampling adequacy which should be greater than 0.5 for a satisfactory factor analysis to continue (Table 4). PCA was performed on the data and as a result, six components were identified (Table 5).

Eigen Value: It is the most commonly used index for determining how many factors to take from a factor analysis. The thumb rule says variables with Eigen value greater than one should be chosen. Thus in this study only those variables were considered where Eigen value was greater than 1.

Variance: The history of derived component is outlined by total variance explained value. Here the identified six components together account for 56.310% variance.

Scree Plot: This aids in deciding how many factors (or components) to select. It plots the Eigen values on the vertical axis and factor number on the horizontal axis. It shows a transition from large transition from large Eigen value to small value. In the current study the graph indicated clear six factor solutions.

Iterations: They help to specify the maximum number of steps the algorithm can take to perform the rotation. In the current study the number of iterations was seven.

4.1 Factor Analysis

Six factors were extracted. These are related to the stressful condition of the subjects. The factors are as follows:

Table 4. KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.821
Bartlett's Test of Sphericity	Approx. Chi-Square	1066.655
	df	190
	Sig.	.000

Table 5. Details of PCA and SSL

PCA	Values	Components	SSL
Eigen Value	>1	C1	3.352
Variance	56.310	C2	2.094
Scree Plot	6 components	C3	1.724
Iterations	7	C4	1.471
		C5	1.422
		C6	1.199

Factor No. 1: Pessimism
It is the most important factor which explains 27.697% of the variation and this factor has nine significant variables such as we can see that feel downhearted (0.557), have crying spells (0.616), have trouble sleeping (0.642), am losing weight (0.516), feel constipated (0.640), heart beats faster (0.681), get tired for no reason (0.579), am restless (0.583), feel more irritable (0.533).

Factor No. 2: Optimism
This factor has four significant variables which account for 10.440% and the variables are: Feel hopeful (0.492), easily make decisions (0.722), feel useful (0.759), still enjoy as usual (0.468).

Factor No. 3: Clarity of Thought
This factor has two significant variables which account for 6.208% and the variables are: Have clear mind as usual (0.745), find it easy to do things (0.803).

Factor No. 4: Full of Energy
This factor has one significant variable which accounts for 6.044% and the variable is: Feel best in morning (0.694).

Factor No. 5: Sense of Enjoyment
This factor has two significant variables which account for 5.761% and the variables are: Eat as usual (0.694), still enjoy sex (0.708).

Factor No. 6: Cynicism
This factor has two significant variables which account for 5.143% and the variables are: Life is pretty full (0.036), feel others would benefit if I were dead (0.843).

4.2 Factor – Demographic Relationship

By performing K – S test on the data (Table 6), it was found that factors 2 (Optimism), 5 (Sense of Enjoyment), and 6 (Cynicism) are not normally distributed where factor 2 ($p = 0.041$, $p < 0.05$), factor 5 ($p = 0.026$, $p < 0.05$), and factor 6 ($p = 0.000$, $p < 0.05$). But factors 1 (Pessimism), 3 (Clarity of Thought), and 4 (Full of Energy) seem to be normally distributed where factor 1 ($p = 0.957$, $p > 0.05$), factor 3 ($p = 0.204$, $p > 0.05$), and factor 4 ($p = 0.053$, $p > 0.05$), which let us know that non-parametric tests have to be used for factors 2 (Optimism), 5 (Sense of Enjoyment), and 6 (Cynicism) and parametric test for factors 1 (Pessimism), 3 (Clarity of Thought), and 4 (Full of Energy).

Age group 1 (18-24) shows the maximum difference in factor 2 (Optimism), and factor 5 (Sense of Enjoyment). Age group 3 (35-44) shows maximum difference in factor 6 (Cynicism) (Table 7). Age does not show any difference

on factors 1 (Pessimism: $p = 0.702$), 5 (Clarity of Thought: $p = 0.215$), and 6 (Full of Energy: $p = 0.245$) (Table 8).

Profession 4 (Engineer) shows the maximum difference in factor 2 (Optimism), Profession 7 (Others) shows the maximum difference in factor 5 (Sense of Enjoyment). Profession 6 (IT) shows the maximum difference in factor 6 (Cynicism) (see Table 9). Profession does not show any difference on factors 1 (Pessimism: $p = 0.128$), 5 (Clarity of Thought: $p = 0.122$), and 6 (Full of Energy: $p = 0.567$) (Table 10).

Marital Status shows significant difference on the three factors (Optimism, Sense of Enjoyment, and Cynicism). According to the mean rank, unmarried people show more difference in opinion on factors 2 (Optimism), and 5 (Sense of Enjoyment). However, married people convey more difference on factor 6 (Cynicism) (Table 11). Marital Status does not show any difference on factors 1 (Pessimism: $p = 0.512$), and 6 (Full of Energy: $p = 0.365$). However, it does show a difference on factor 5 (Clarity of Thought: $p = 0.034$) (Table 12).

Work experience 1(<5 years) shows the maximum difference in factor 2 (Optimism), 5 (>20 years) shows the maximum difference in factor 5 (Sense of Enjoyment). Work experience 4 (15-20 years) shows the maximum difference in factor 6 (Cynicism) (Table 13). Work experience does not show any difference on factors 1 (Pessimism: $p = 0.148$), 5 (Clarity of Thought: $p = 0.646$) and 6 (Full of Energy: $p = 0.976$) (Table 14).

Total hours spent on the computer (more than 30 hours) shows the maximum difference in factor 2 (Optimism), and factor 5 (Sense of Enjoyment). Total hours spent on the computer (up to 10 hours) shows the maximum difference in factor 6 (Cynicism) (Table 15). Total hours spent on the computer does not show any difference on factors 1 (Pessimism: $p = 0.835$), 5 (Clarity of Thought: $p = 0.348$) and 6 (Full of Energy: $p = 0.334$) (Table 16).

Table 6. One-sample Kolmogorov-Smirnov test

	Pessimism	Optimism	Clarity of Thought	Full of Energy	Sense of Enjoyment	Cynicism
Kolmogorov-Smirnov Z	0.511	1.392	1.069	1.347	1.477	2.402
Asymp. Sig. (2-tailed)	0.957	0.041	0.204	0.053	0.026	0.000

Table 7. Kruskal-Wallis test and rank (Grouping variable: age group)

	Age Group	N	Mean Rank	Chi-Square	df	Asymp. Sig.
Optimism	18-24 years	41	157.82	11.087	4	0.026
	25-34 years	98	127.81			
	35-44 years	72	122.32			
	45-54 years	36	107.92			
	Above 55 years	11	156.64			
	Total	258				
Sense of Enjoyment	18-24 years	41	156.74	7.492	4	0.112
	25-34 years	98	125.02			
	35-44 years	72	119.26			
	45-54 years	36	127.44			
	Above 55 years	11	141.64			
	Total	258				
Cynicism	18-24 years	41	115.35	3.299	4	0.509
	25-34 years	98	125.48			
	35-44 years	72	139.50			
	45-54 years	36	135.22			
	Above 55 years	11	133.82			
	Total	258				

Table 8. ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Pessimism	Between Groups	2.200	4	.550	.546	.702
	Within Groups	254.800	253	1.007		
	Total	257.000	257			
Clarity of Thought	Between Groups	5.803	4	1.451	1.461	.215
	Within Groups	251.197	253	.993		
	Total	257.000	257			
Full of Energy	Between Groups	5.443	4	1.361	1.368	.245
	Within Groups	251.557	253	.994		
	Total	257.000	257			

Table 9. Kruskal-Wallis test and rank (Grouping variable: Profession)

	Profession	N	Mean Rank	Chi-Square	df	Asymp. Sig.
Optimism	Teaching	66	130.98	6.262	6	0.395
	Medical	14	115.32			
	Legal	30	123.50			
	Engineer	29	152.17			
	Finance & Ac.	24	134.48			
	IT	34	139.78			
	Others	61	115.63			
	Total	258				
Sense of Enjoyment	Teaching	66	128.42	8.071	6	0.233
	Medical	14	134.32			
	Legal	30	125.57			
	Engineer	29	123.97			
	Finance & Ac.	24	95.85			
	IT	34	132.81			
	Others	61	145.52			
	Total	258				
Cynicism	Teaching	66	141.88	25.561	6	0.000
	Medical	14	147.46			
	Legal	30	135.57			
	Engineer	29	126.69			
	Finance & Ac.	24	87.48			
	IT	34	167.57			
	Others	61	105.65			
	Total	258				

Table 10. ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Pessimism	Between Groups	9.882	6	1.647	1.673	.128
	Within Groups	247.118	251	.985		
	Total	257.000	257			
Clarity of Thought	Between Groups	10.030	6	1.672	1.699	.122
	Within Groups	246.970	251	.984		
	Total	257.000	257			
Full of Energy	Between Groups	4.852	6	.809	.805	.567
	Within Groups	252.148	251	1.005		
	Total	257.000	257			

Table 11. Kruskal-Wallis test and rank (Grouping variable: Marital status)

	Marital Status	N	Mean Rank	Chi-Square	df	Asymp. Sig.
Optimism	Married	175	124.15	2.339	1	0.126
	Unmarried	82	139.36			
	Total	257				
Sense of Enjoyment	Married	175	120.45	7.249	1	0.007
	Unmarried	82	147.24			
	Total	257				
Cynicism	Married	175	132.17	0.997	1	0.318
	Unmarried	82	122.24			
	Total	257				

Table 12. ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Pessimism	Between Groups	1.345	2	.672	.671	.512
	Within Groups	255.655	255	1.003		
	Total	257.000	257			
Clarity of Thought	Between Groups	6.723	2	3.362	3.425	.034
	Within Groups	250.277	255	.981		
	Total	257.000	257			
Full of Energy	Between Groups	2.023	2	1.012	1.012	.365
	Within Groups	254.977	255	1.000		
	Total	257.000	257			

Table 13. Kruskal-Wallis test and rank (Grouping variable: Work experience)

	Work Experience	N	Mean Rank	Chi-Square	df	Asymp. Sig.
Optimism	<5 years	83	142.59	8.216	4	0.084
	5-10 years	70	130.70			
	10-15 years	40	125.55			
	15-20 years	31	100.48			
	>20 years	32	117.97			
	Total	256				
Sense of Enjoyment	<5 years	83	138.73	6.422	4	0.170
	5-10 years	70	116.04			
	10-15 years	40	119.28			
	15-20 years	31	122.03			
	>20 years	32	147.00			
	Total	256				
Cynicism	<5 years	83	125.23	6.627	4	0.157
	5-10 years	70	114.79			
	10-15 years	40	130.08			
	15-20 years	31	149.94			
	>20 years	32	144.25			
	Total	256				

Table 14. ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Pessimism	Between Groups	9.467	6	1.578	1.600	.148
	Within Groups	247.533	251	.986		
	Total	257.000	257			
Clarity of Thought	Between Groups	4.259	6	.710	.705	.646
	Within Groups	252.741	251	1.007		
	Total	257.000	257			
Full of Energy	Between Groups	1.243	6	.207	.203	.976
	Within Groups	255.757	251	1.019		
	Total	257.000	257			

Table 15. Kruskal-Wallis test and rank (Grouping variable: Hours on computer)

	Hours on Computer (Average per Week)	N	Mean Rank	Chi-Square	df	Asymp. Sig.
Optimism	Up to 10 hours	42	124.07	1.636	3	0.651
	10-20 hours	85	125.85			
	20-30 hours	52	126.36			
	More than 30 hours	79	138.38			
	Total	258				
Sense of Enjoyment	Up to 10 hours	42	131.90	8.515	3	0.036
	10-20 hours	85	131.59			
	20-30 hours	52	104.22			
	More than 30 hours	79	142.61			
	Total	258				
Cynicism	Up to 10 hours	42	139.71	3.745	3	0.290
	10-20 hours	85	117.96			
	20-30 hours	52	127.99			
	More than 30 hours	79	137.48			
	Total	258				

Table 16. ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Pessimism	Between Groups	.867	3	.289	.287	.835
	Within Groups	256.133	254	1.008		
	Total	257.000	257			
Clarity of Thought	Between Groups	3.309	3	1.103	1.104	.348
	Within Groups	253.691	254	.999		
	Total	257.000	257			
Full of Energy	Between Groups	3.411	3	1.137	1.139	.334
	Within Groups	253.589	254	.998		
	Total	257.000	257			

5. Discussion

It was observed that the most familiar physical problems related to personal computer use are musculoskeletal disorders and eyestrains[8,9]. The most common visual and musculoskeletal complaints cited by white-collar employees in the present study were: strain in eyes (40.5%) and pain/stiffness in neck (46.5%) respectively. In a study in Hong Kong bank professionals, most common cited musculoskeletal problem was pain in neck (31.4%) followed by back (30.6%). Neck was the most common site affected in almost all studies maybe because of the static posture which a person has to maintain while working on the computer. This also highlights that most of the

people work for longer periods without taking recurrent relaxation.

According to various studies[10–12], computer usage is linked with a reduced occurrence of blinking and an increased frequency of tear evaporation, and individually each of these leads to dry eyes. Others[13,14] indicate that several aspects of posture are significant because the individual is required to maintain one position for prolonged durations. "Muscles are often held in static, awkward, or extreme positions." Further, researchers[15,16], point out that "the head may be tilted, the arms abducted and unsupported, shoulders elevated, and wrists flexed and deviated from a neutral position". "Frequent computer use is associated with an increase in musculoskeletal complaints of the neck/shoulder region as well as of the hands and arms"[17].

The outcomes of the current research for visual and musculo-skeletal health complications are persistent with the research done by[18]. Our study revealed that 29.2% participants experienced headache, which is in keeping with an earlier study conducted by Bhatt[19].

Although several people working at a computer encounter eye-related distress and/or visual issues based on existing evidence it is incongruous that the use of computers causes perpetual variations or harm to the eyes or visual system[20–23].

Research has proved that the majority of computer workers come across some eye or vision indications[5,6,24–27]. Nevertheless, it is indistinct whether these issues are present to a larger magnitude in computer users than in workforces in other highly visually challenging works. In a national assessment of doctors of optometry, it was found that more than of 14% of their patients approach them with eye or vision-related indication sensuing from computer work[28]. In[29] observed that the most common indications are eyestrain, blurred vision, headaches, and neck or shoulder pain.

The relationship between computer-based work and the grievances of numerous sorts of stress and strain have been widely reviewed since the early 1980s. "Today, computers are used by nearly every working person even though there are differences in the mode and intensity of computer usage among the different professions and occupational groups," stated[8,30].

According to[31], "Stress and mental and physical well-being in computer-based office work seem to be connected in a complex way to individual factors and to various characteristics of the organization, technology, jobs, and employees. Features of the organization and work tasks are important mediating factors in the experience of stress in work with computers. Information technology is only one element associated with stress in organizational settings".

6. Conclusion

It can thus be seen that ocular uneasiness, musculoskeletal problems and psycho-social complications constitute significant sort of computer-related health issues found among white-collar employees. The current research has also highlighted reasons contributing to the manifestation of these issues. The present study, on the basis of literature review, suggests a plan of action to minimalize the aforementioned issues and accentuates the requirement to communicate the plan of action frequently to the employees.

6.1 Towards an Action Plan

An article by[32a] , states, "Most health authorities agree that all the muscular-skeletal disorders brought on by sitting for hours on end crouched over a keyboard - from sore fingers, wrists and arms to aching buttocks and a stiff neck - can be easily countered by taking short breaks throughout the working day".

Research has shown that musculoskeletal symptoms can be minimized with the help of ergonomics and education. Research done by[33] proves that regular short breaks from computer work decreased musculo-skeletal distress and other computer-related grievances among adults. A randomized experiment conducted by[34] examined "the impact of an intensive ergonomics approach and education on workstation changes and musculoskeletal disorders among adult visual display unit users, and found that after two months, both the intensive ergonomics and the education groups had less musculoskeletal discomfort than the reference group".

In[35,36] opined, "The direction of gaze can also affect the eyes' focusing ability. Accommodative amplitude has been shown to be reduced with elevation of the eyes. The higher gaze angles at many computer workstations result in viewing conditions for which the amplitude of accommodation is reduced thus placing greater strain on the eyes' focusing mechanism. Also, as the direction of gaze moves downward, stress on the eye muscles is reduced. The eyes should be in a downward gaze of about 15 degrees when viewing a computer screen. As a result, the

top of the screen should be below the horizontal eye level of the operator and tilted back slightly (10-20 degrees) away from the operator".

In[37] pointed that "The staff involved in extensive use of computer keyboarding should be advised to condition themselves to take frequent very short breaks at short intervals and to use large font sizes and/or zooming function in order to correct the problems encountered while preventing themselves from further similar exposure risks. The screen should be kept 18-30 inches from one's eyes or about an arm's length." He added, "Letting wrists floating in the air is the best position or behavior of wrist while keyboarding".

Research results in articles[32a,32b], have advocated that a monitor kept at a lower height is more relaxing for eyes and neck. Computer Safety[37], endorses that "the monitor be placed below the level of the head, and be tilted slightly upwards, so that the user gaze slightly downward, putting the neck in a more natural relaxed position".

Another research[39], advocates a much broader hip angle with about 130 degrees as an ideal angle. "When the hips are straightened, the vertebrae of the lower spine are aligned with each other in a way that reduces and evens out the pressure on the in-vertebral discs".

6.2 Recommendations

Based on the review of literature above, the following recommendations add value to this study. These recommendations offer valuable insights to computer users on the preventive measures to be taken while working with computers to safeguard from probable hazards. It is important to educate the users on the potential health hazards related with computer usage along with certain precautionary actions.

6.2.1 Workstation Illumination

A significant environmental factor affecting computer work is lighting. Bright lights in the bordering field of view may trigger uneasiness and glare. Windows, overhead fluorescent lights and desk lamps add to this tricky situation. These bright light sources can be organized with proper workspace and/or room design and plan. There should be a balance between the computer screen brightness and the room. Generally, windows are a cause of glare at many workplaces. It is advisable for those working with computers to evade facing a window without a shade as the variance in brightness between the computer screen and the region behind it may be tremendously nerve-racking and full of uneasiness. Sitting with back to an unshaded window might result in irritating shadows on the computer screen. A judicious use of shades, curtains or blinds can very well control light levels during the day.

6.2.2 Mouse, Key Board, and Monitor

Inappropriate use of mouse and keyboard may lead to musculo-skeletal problems. Appropriate typing practice is the key to check it. While using the keyboard, the computer user should keep the wrist straight and in line with the forearms almost parallel to the floor; using a trivial touch on the keyboard, instead of hammering on it. Moreover, the mouse and keyboard should be placed adjacent to each other for an ideal posture while using the mouse. Besides, free movement of the hands on the keyboard ensures reduction in muscular stress. The mouse should be touched only when it is to be used. Constantly handling the mouse results in unnecessary strain on the wrist.

There should be enough distance from the monitor to ensure relaxed reading, and to avoid eyestrains. A preferable distance is 20 to 28 inches from the eyes. The computer monitor should be positioned in a way that its top is in the straight line of vision. This would help limit the need to lean the head backward to get a view of the screen, which in turn, would lead to a decrease in neck and shoulder muscles fatigue. Since the glare and reflection due to viewing the monitor may result in eye problems leading to blurred vision, it is advisable to use flat screens with appropriate setting of brightness and contrast control. Using appropriate font size on the screen, along with proper utilization of the zooming facility help in putting the shoulder at ease.

6.2.3 Ergonomic Manners

The feet need be firmly placed on the floor, with the hip somewhat stretched and the knees retained at 60-90 degree angle and this requires a proper adjustment of the chair. The best solution id the use of modifiable chairs with the backrest 6 to 9 inches high and at least 12 inches wide for providing comfort while sitting. One needs to avoid sitting erect since that leads to less movement of the muscles in the lower back and results in the spine to support less weight. In the words of Philip S Chua "Ergonomics in computer use is important to prevent back pains and CTS. The eyesight should be at the level of the upper part of the

monitor, the arm in horizontal level with the keyboard, the chair (height) properly adjusted and comfortably supporting the lower back, and the feet flat on the floor in a relax manner. A cushioned support for the base of both hands, while typing, helps reduce the risk for CTS. Taking a break and walking around every thirty minutes or so is also healthy and ambulation also reduce the risk for blood clots in the legs"[40].

6.2.4. General

Monitor, keyboard, and mouse need be positioned before the user to prevent turning the head sideways, thereby ensuring the neck muscles are relaxed. Short breaks (15-30 seconds) at frequent intervals (10-20 minutes) promises to do wonders for the user. During these breaks, the hands be away the keyboard and arms be at the side. Altering the siting position and doing neck, head and shoulder exercises is recommended.

Other factors related to employee well-being reduce stress resulting from working with computers. These include: Computer training, style of supervision, and employee motivating. Managerial methods like flexible working hours and selection of break time go a long way to boost the employee morale, thereby increasing their efficiency and a sense of ownership since these factors give them more control over their work. Employees working in shifts tend to benefit from this stress reduction technique.

According to a study funded by the Institution of Occupational Safety and Health, "simple plan of action could be an easy way for employers to ensure that workers take regular screen breaks"[41].

7. Limitations

The study has some limitations that should be reflected upon while interpreting its findings. A higher number of respondents could better justify the analysis. The data used in the present analysis derives from only one part of India (South), which may not allow generality of the results to other regions of the country although the responses are from different job and personnel profiles. Better understanding of the computer-related health concerns among white-collar employees would take place if the study is conducted across the country and better still if it is conducted across countries so that the cultural impact on the health issues could be scrutinized. Moreover, the study is based on the results of the questionnaires administered to the white-collar employees. The research could get another dimension if the employers are also probed into regarding their perception and experience about computer-related health issues and the effect on their employees.

8. Key Points

- Ocular discomfort, musculoskeletal problems, and stress lead to an effect on the well-being of employees, thereby affecting productivity.
- It is vital, therefore, to understand and identify the risks associated with the use of computers and take necessary precautions to mitigate the risks.
- Taking prevention action in this regard promises to enhance employer branding and trust.

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