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Musculoskeletal Problems and Preventive Measures Adopted by Computer Users

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ABSTRACT A survey was conducted in Hisar district of Haryana state to find out the musculoskeletal problems of computer users and the preventive measures adopted by the users.The sample comprised of 200 computer users ranging from 25-40 years of age, using computer at least for the last one year and for a minimum of 4-6 hours daily. Working profile of the respondents revealed that on an average, 6-8 hours daily were spent by private computer users whereas it were 4-6 hours by public computer users. Maximum of the respondents were doing data entry as main work on the computer. Workstation use highlighted that more than half of respondents (54%) were using the specially designed tables while nearly one- third (32.0%) were using specially designed chairs. Majority of the respondents (81.5%) reported musculoskeletal problems as they were working long on the computer at a stretch. The magnitude of pain was highest in neck and lower back. Reasons mentioned for pain in different body parts by computer users were, watching the screen at a stretch, holding neck more or less in the same position for a long time, and sitting in poor posture for a long time. Relaxation in terms of rest and exercise were the measures frequently adopted by computer users to reduce pain.

INTRODUCTION

An increasing trend of using computers is undoubtedly a positive sign of our development but has a grey side, too. A huge proportion of human resource is working on computers. Hisar, the educational hub of Haryana state, is an upcoming city where the government as well as private institutions are engaging a number of computer users. Increased use of computers in the work place is causing a corresponding rise in health concerns directly related to their use. Musculoskeletal problems associated with computer use are widespread and account for more than 50 per cent of occupational injuries (Hedge et al. 1996). Over the years, computer related injuries have increasingly weighed down the modern office workplace weakening hundreds of thousands of workers, causing pain, impairment and in some cases disability (Kahan et al. (2002). It is estimated that 70 % of the people suffer from back pain at some time (Chadha (2003). There was a need to study common musculoskeletal problems faced by computer users even in small towns. Therefore, the present study was planned to know the musculoskeletal problems of computer users and preventive measures adopted by the users.

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METHODOLOGY

A survey was conducted in Hisar district of Haryana state. A sample of 200 respondents, ranging from 25-40 years of age using computer minimum 4-6 hours daily and at least for the last one year, were selected from four public and four private organizations. The data were collected during the month of March 2004 to September 2004 .An interview schedule was administered comprising information, viz. general profile of computer users, their existing working conditions and musculoskeletal problems related to computer use. Incidences of musculoskeletal problems were identified by using Nordic checklist consisting of human figure indicating different body parts. Five-point scale was used to record the intensity of pain in various body parts, viz. 0, 1, 2, 3 and 4 for intensity of pain as no discomfort, mild, moderate, se-

vere and unbearable discomfort, respectively. Mean scores were calculated to draw meaningful inferences.

RESULTS AND DISCUSSION

Profile of Computer Users

General profile of the respondents revealed that majority of the respondents were males (73.0%) and maximum were in the age group of 25-33 years (54.5%). Majority of the respondents (95%) were doing service and only 5 percent were self- employed doing computer work privately owned by them, viz. thesis and other typing work. Working profile of the respondents revealed that average time spent by private computer users was 6-8 hours whereas by public users average time spent was 4-6 hours daily. One- fifth of the private user respondents were also spending more than 8 hours on computers daily. Majority of the respondents from both the categories were doing data entry as main work on the computer.

A perusal of Table 1 exhibits that more than half of the respondents (53%) were keeping keyboard on keyboard tray and amongst them, maximum belonged to private-user category (63%). Only 21 percent of respondents were using source document holder, 47.6 percent of respondents kept source document holder on left side of screen followed by 33.3 percent of respondents who kept it on right side of screen. Little less than one-fifth of respondents (19.0%) were keeping source document holder on table, in between the key board and the monitor. Table 1 further reveals that nearly three-fifth of respondents (58.5%) was keeping their feet flat on the floor followed by 32.5 percent who kept it on swivel of chair. It was observed that only nine percent of respondents were having footrest facility as it was not considered as important part of furniture by users as well as managers. More than half of the respondents (55%) positioned their head in the middle of the screen followed by 31.0 percent of respondents who positioned it at top of the screen while working.

Table 1: Working profile of computer users

Categories	*Private (n=100)*	*Public (n=100)*	*Total (N=200)*
Placement of Keyboard			
On lap	15 (15.0)	8 (8.0)	23 (11.5)
On table in front of computer	22 (22.0)	49 (49.0)	71 (35.5)
On keyboard tray	63 (63.0)	43 (43.0)	106 (53.0)
Placement of Document Holder	(n=19)	(n=23)	(n=42)
Left side of screen	8 (42.1)	12 (52.1)	20 (47.6)
Right side of screen	10 (52.6)	4 (17.3)	14 (33.3)
Between the keyboard and monitor	1 (5.2)	7 (30.4)	8 (19.0)
Position of Feet			
Flat on the floor	60 (60.0)	57 (57.0)	117 (58.5)
On the foot rest	5 (5.0)	13 (13.0)	18 (9.0)
On swivel of chair	35 (35.0)	30 (30.0)	65 (32.5)
Position of Head			
Below the screen	15 (15.0)	13 (13.0)	28 (14.0)
Middle of screen	61 (61.0)	49 (49.0)	110 (55.0)
Top of the screen	24 (24.0)	38 (38.0)	62 (31.0)

Figures in parentheses indicate percentages

Workstation Used by Computer Users

Workstation consists of appropriate table and a chair for computer work. Data in Table 2 reveals that maximum respondents were using upholstered chair (39.0%) for computer work. Wooden as well as plastic chair each was used by 14.5 percent of the respondents, the percentages of these were more in public computer users defining that public institutions did not have proper working facilities. Whereas specially designed chairs were used by 32 percent of the respondents having support at the lumbar region (Table 2). This was available more with private (41%) than public (23%) computer users. The back of the chair is a crucial parameter in determining comfort of the users. Table 2 further elucidates that majority of the respon-

Table 2: Workstation used by computer users

S. No.	*Parameters*	*Private (n=100)*	*Public (n=100)*	*Total (N=200)*
A)	*Type of Chair*			
	Ordinary wooden	23 (23.0)	6 (6.0)	29 (14.5)
	Upholstered	25 (25.0)	53 (53.0)	78 (39.0)
	Specially designed	41 (41.0)	23 (23.0)	64 (32.0)
	Plastic chair	11 (11.0)	18 (18.0)	29 (14.5)
B)	*Type of Back of Chair*[*]			
	Straight back	59 (59.0)	81 (81.0)	140 (70.0)
	Lumbar support	30 (30.0)	13 (13.0)	43 (21.5)
	Cervical support with head rest	29 (29.0)	16 (16.0)	45 (22.5)
	With lean back facility	22 (22.0)	13 (13.0)	35 (17.5)
	Type of Table			
C)	Office table	32 (32.0)	60 (60.0)	92 (46.0)
	Computer table	68 (68.0)	40 (40.0)	108 (54.0)

[*] Multiple response
Figures in parentheses indicate percentages

dents (70.0%) had straight back of chair which is not considered comfortable for computer users, whereas more than one-fifth of the respondents had chair with cervical support and with head rest (22.5%) followed by 21.5 percent of the respondents with lumbar support. This was also evident that the percentage of the chairs having lumbar support and cervical support with head rest was more in private computer users than the public users. Further, amongst these, less than one-fifth of the respondents (17.5%) had chair with lean back facility, which is considered as the best feature of the computer chair. A further perusal of Table 2 reveals that more than half of the respondents (54%) had specially designed tables for computers in their offices. Among public computer users, 60 percent were using the office table for computer work which was not comfortable, however, in private sector 68 per cent were using specially designed computer tables.

On the whole, workstation for the computer users revealed that private computer users had better work facilities in terms of computer table, specially designed chair having lumbar support and cervical support with head rest and lean back facility than the public users.

Musculoskeletal Problems

Musculoskeletal problems were reported by 81.5 percent of the respondents. Figure1 highlights various musculoskeletal problems reported by computer users. Amongst these a huge majority of the respondents reported neck as the most painful body part (97.5%) followed by lower back (89%), fingers (60.7%), upper back (54.6%) and buttocks (51.5%). Severity of the musculoskeletal problems is exhibited in Figure 2. Results show that computer users reported severe pain in lower back (M.S. = 3.02), neck (M.S. = 3.01) and hands (M.S. =2.95) as they were sitting in front of a computer continuously. Severe to moderate pain was reported in upper back (M.S. = 2.53) and shoulders (M.S. = 2.5) due to sitting for longer hours doing typing.

The findings get support from the results given by Grant et al. (1995) that pain in lower back is the most common musculoskeletal problem. This was mainly due to prolonged use of computers on improper workstation causing aches and pain in specific parts of the body. Retaining a fixed posture for long periods of time causes muscle fatigue and leads to pain and injuries (Grandjean 1988).

Reasons for Musculoskeletal Discomfort

Data in Table 3 unveil different reasons perceived by computer users for musculoskeletal discomfort in different body parts. Main reasons mentioned for pain in different body parts were repetitive movement, localized pressure, sitting in poor posture for a long time and uncomfortable and non-adjustable seats. Regarding reason for pain in neck, majority of the computer users mentioned holding neck more or less in same position (57%) for a long duration, inappropriate positioning of screen (54.7%) and watching screen at a stretch (52.2%). A large majority of computer users mentioned pain in lower back due to absence of lumbar support (81.4%), sitting in poor posture for a long time (78%), holding similar position (71.7%) for lon-

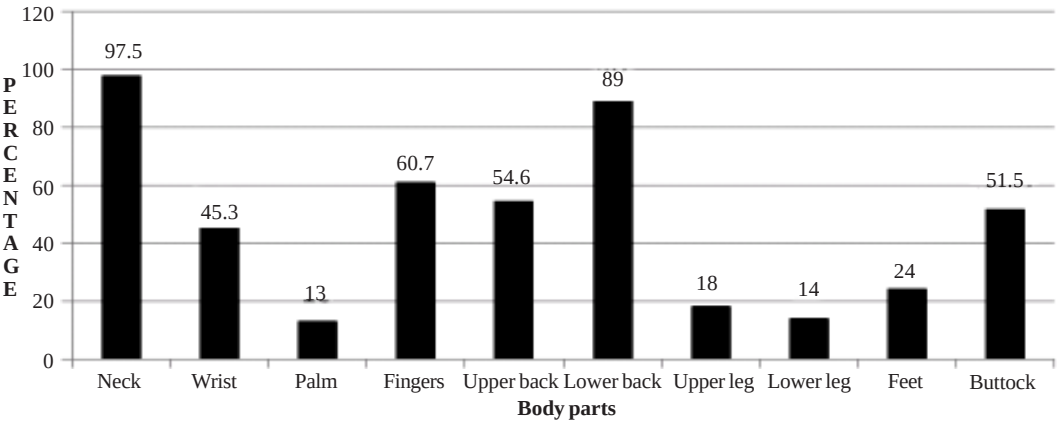

Fig. 1. Musculo-skeletal problems in computer usage

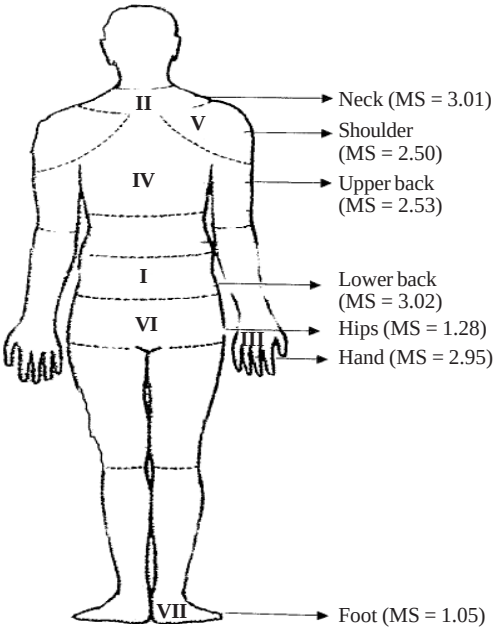

Fig. 2. Severity of musculoskeletal problems in computer users

ger duration and uncomfortable seat (58%) was also indicated as one of the main reasons for problem in lower back by computer users.

Reasons mentioned by respondents for pain in upper back were localized pressure (75.3%), holding one position (48.3%) and sitting in poor posture for a long time. Main reason for discomfort in buttocks (51.5%) was uncomfortable seat (92.8%) and sitting in poor posture for a long time (54%). Hence, the main reasons for pain in different body parts were repetitive movements, localized pressure, sitting in poor posture for a long time and uncomfortable and non-adjustable seats. Burdorf and Zondervan (1991) and Godrej survey (2008) also reported that poor body posture was the major cause of musculoskeletal disorders. The discredit goes to the poor workstation which was not designed according to anthropometric measurements of the users.

Measures Adopted for Prevention of Discomfort

Figure 3 exhibits the preventive measures adopted by respondents for discomfort in different body parts. Relaxation, break up of repetitive work and exercising were the main preventive measures adopted by respondents to get rid of pain. Most cases of musculoskeletal pain were relieved by relaxation in case of fingers (78.7%), upper back (75.2%), wrists (56.7%), lower back and neck (49.6% each). Break up of repetitive work was also one of the main preventive measures adopted to get relief from the pain in case of fingers (91.9%), wrists (62.1 %) and eyes (61.3%). A considerable number of respondents were also doing exercise to prevent pain in fingers (52.5%), neck (36.4%) and eyes (27.0%). More than half of the respondents (57.5%) were changing postures and activities to get rid of the pain in lower legs, hips (52.3%), lower back (38.6%) and neck (37.1%).

CONCLUSION

Appropriate workstation was used only by 32 to 54 percent of the respondents, that is, using specially designed chair and table, respectively. Working on computer for long hours was one of the most important factors responsible for mus-

Table 3: Reasons mentioned by respondents for musculoskeletal discomfort in different body parts N= 163

S. No.	*Reasons*	*Body parts*						
		Upper back (n= 89)	*Lower back (n=145)*	*Neck (n=159)*	*Lower legs (n= 23)*	*Fingers (n= 99)*	*Wrists (n= 74)*	*Buttocks (n= 84)*
1.	Repetitive movement	-	6 (4.1)	37 (23.3)	-	84 (84.8)	39 (52.7)	-
2.	Localized pressure	67 (75.3)	71 (48.9)	18 (11.3)	-	10 (10.1)	24 (32.4)	12 (14.3)
3.	Holding one position	43 (48.3)	104 (71.7)	91 (57.2)	8 (24.2)	40(40.4)	50 (67.6)	21 (25.0)
4.	Position of accessories	-	24 (16.5)	65 (40.9)	2 (6.1)	-	-	-
5.	Continuous bending and twisting	7 (7.9)	48 (33.1)	78 (49.1)	-	-	7 (9.5)	-
6.	Long time sitting in poor posture	37 (41.6)	113 (77.9)	63 (39.6)	6 (18.2)	-	-	46 (54.8)
7.	Watching screen at stretch	11 (12.4)	29 (20.0)	83 (52.2)	10 (30.3)	-	-	-
8.	Uncomfortable seat	35 (39.3)	84 (57.9)	66 (41.5)	8 (24.2)	-	-	78 (92.8)
9.	Screen is too high or too low	3 (3.3)	25 (17.2)	87 (54.7)	2 (6.1)	-	4 (5.4)	9 (10.7)
10.	Absence of lumbar support	-	118 (81.4)	-	1 (3.0)	-	-	7 (8.3)

Figures in parentheses indicate percentages

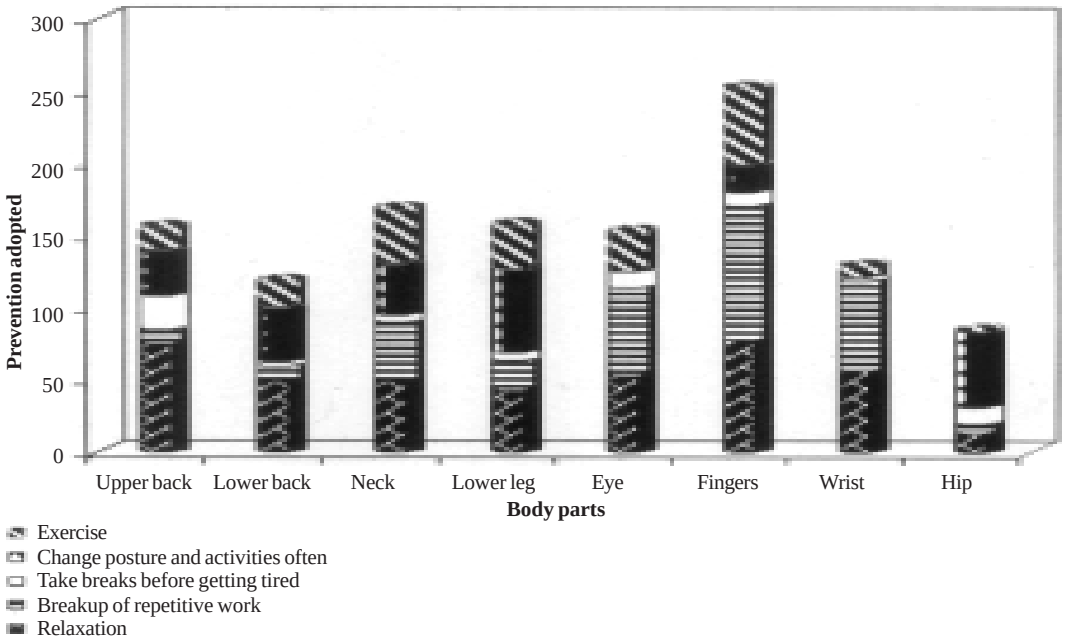

Fig. 3. Measures adopted for prevention of discomfort in different body parts

culoskeletal problems. The computer users were constrained to remain in same position for extended period of time, with repetitive small movements of the eyes, head and fingers due to type of work. A large majority of the respondents (81.5%) reported various musculoskeletal discomforts. Amongst them, magnitude of pain was found highest in neck (97.5%) and lower back (89%). Prolonged sitting in poor posture, holding one position and uncomfortable seat were major reasons for discomfort in neck, lower back and eyes. Relaxation and doing exercise were the main preventive measures along with change in postures as well as the activities and taking break in between to prevent body discomfort. Hence, there is a need to have appropriate workstation with specially designed chair for the computer users which would improve their work efficiency as well as for better health and safety of the worker.

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