



Reduction of Neck Disability Among Computer Professionals. an Experimental Analysis

KEYWORDS

Neck Disability, Modified workstation, Information Technology Professionals

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ABSTRACT

Pain and functional impairment affecting the neck, shoulders, elbows, wrists, and hands. The present study aims to examine workstation modification reduces the neck disability among the computer professionals. The study was adopted experimental design. 100 samples were taken from Pondicherry by using simple random sampling technique. Pre-test assessment was taken by administering the neck disability index from participants. After pre-test the workers underwent workstation modifications and neck exercises for 12 weeks in experimental condition. The results revealed that the IT professionals had experienced neck pain problems with pre-test assessment and after workstation participants feel comfortable, meanwhile post-test assessment revealed that neck disability reduced neck pain by the practice of workstation exercise. The study concluded that commonly neck pain are widely reported among the IT professionals working in the IT industry's at Puducherry and an appropriate prevention strategy and neck exercises needs to be carried out in order to enable them to work comfortably.

Introduction

Ergonomics is the sciences of designing the job, equipment and workstation to fit the workers. Work-Related Muscular-Skeletal Disorders (WRMSDs) commonly neck pain is common among computer professionals. Musculoskeletal disorders are work-related when the work environment and performance of work are significant contributors to their development or exacerbation, but are not the sole determinant of causation. Thus disorder is work-related when work procedures, equipment, or environment contribute significantly to the cause of the disorder (WHO, 1985). The WRMSDs describe a wide range of inflammatory and degenerative disease conditions that result in pain and functional impairment affecting the neck, shoulders, elbows, wrists, and hands. Moreover, the WRMSDs are defined differently in different studies; some investigators restrict the case definitions based on Clinical Pathology, some due to the presence of symptoms, and some due to 'objectively' demonstrable pathological processes, and some due to work disability (such as lost work time status). The most common health outcome has been the occurrence of pain, which is assumed to be the precursor of more severe disease (Riihimaki, 1995).

The need for a reduction in physical and psychological stresses has been recognized and the techniques for combating them are found in the science of ergonomics. Ergonomics is often called as a multidisciplinary activity. Because of learning cooperatively and separately contribute of the body knowledge of the following disciplines. Engineers, psychologists, medical practitioners, physiotherapists, architects, and other contribute the individual knowledge of anatomy, biomechanics, anthropometry and kinesiology to solve the workstation problems. Physiotherapists contribute pricelessly in this study of man-machine task relationship because of the skill to analyse the body movement in details, and to evaluate postural abuses during dynamic situations. The therapist role in workplaces is broad and intends such responsibility as a job analysis, work postures monitoring, measurements, design, education, and rehabilita-

tion. It suggested that ergonomic intervention can help to prevent and decrease the symptoms resulting in less absenteeism and higher efficiency using modifications make it feasible for workers to modify the own workstation to gain benefit from recommended ergonomic modifications. The various neck disabilities in relevance to the industry are tension neck syndrome, repeated strain injury, and musculoskeletal problem of the neck, which is the straight spine syndrome caused by repeated strain injury. It is a high frequency health problem, which affects the quality of life.

The common musculoskeletal symptoms reported were pain (55%), and stiffness (14.8%) and the common sites affected with musculoskeletal problem were neck (44%), low back (30.5%), wrist/hand (19%) and shoulders (12.5%). Another study investigated the prevalence of self-reported musculoskeletal symptoms in all the body regions in the general population of office workers (n=1428) using a self-reported questionnaire showed the following 12 months prevalence rates: head/neck (42%), low back (34%), upper back (28%), wrists/hands (20%), shoulders (16%), ankles/feet (13%), knees (12%), hips (6%) and elbows (5%) (Janwantanakul et al., 2008). Approximately, 76% of computer professionals from India reported musculoskeletal discomfort in various epidemiological studies (Richa Talwar et al., 2009; Bhandari et al., 2007). Video Display Terminal (VDT) workers are particularly susceptible to the development of musculoskeletal symptoms, with prevalence as high as 50% (Gerr and Marcus, 2002).

Commonly neck pain are limited and lessened down to the symptoms consisting of general ache, discomfort and pain related to nine body segments. The term 'IT professional' is applied to those belongs to the programming and software development division only. Thus, the present objective of this study was documented that the prevalence of the musculoskeletal health disorders among the IT professionals working at selected IT industries located at Puducherry in India.

Aim of the Study

The central aim of the study is to examine workstation modification reduces the neck disability among the computer professions.

Investigation of the present study

In the light of the existing literature suggested that various neck disabilities in relevance to the industry are tension neck syndrome, repeated strain injury, and musculoskeletal problem of the neck, which the straight spine syndrome is caused by repeated strain injury. It is a high frequency health problem, which affects the quality of life. It is relevant to ask here the pertinent question as to whether people practicing different alternatives for removing different physical disability like neck pain intensity, headache and back pain with many other pain related problems are significantly different each other. In the present study, we attempted to investigate the effect of modified workstation and neck disability among the computer professions in Puducherry

Method

Research Design

The experimental research design was adopted for this present study. This 100 subject allocated through using simple random sampling technique. Pre-test assessment was taken using neck disability index questionnaire. After pre-test the participants underwent workstation modifications for 12 weeks, in a similar fashion as that of pre-test, post- test measurements was taken.

Participants

The sample was consisted of 100 participants in working the private IT industries located at Puducherry in India. The participants were collected from four IT industries and from each IT corporates was 25 subjects participated in this present study and the sample was selected through simple random sampling technique. The pertinent criteria of sample includes: gender, age (i.e., 25-35 years), duration of working hours (at least 4 h a day or 20 h per week); working in specific IT division (programming and software division); working only on day shifts and those who are willing to participate in the study. Prior to the administration of test the investigator detail elaborated purpose of the study and their role in the investigation. Instruction in connection with the testing procedure of selected variables was also explained to the subjects. The investigators personally demonstrated and familiarize the subjects with techniques in various tests used to collect the data.

Research Instruments

Neck Disability Index

The Neck Disability Index (NDI) was developed in 1989 by Howard Vernon. The Neck disability Index has become a standard instrument for measuring self-rated disability due to neck pain. This questionnaire has been designed to give us information as to how your neck pain has affected your ability to manage in everyday life. Each of the 10 items and the scoring ranging from 0 - 5. The maximum score is therefore 50. The obtained score can be multiplied by 2 to produce a percentage score. Occasionally, a respondent will not complete one question or another. The average of all other items is then added to the completed items. A higher score indicates more patient-rated disability against lower score. The original report provided scoring intervals for interpretation were; no disability (0-4), mild (5-14), moderate (15-24), severe (25-34) and complete disability (35-50). The

internal consistency of the test was a sensitivity of 0.78 and a specificity of 0.80.

Workstation Modification

The workstation modifications mainly include adjustments of the screen, mouse, keyboard, forearm supports, and chair at the time of working period. These modifications changed the head and neck and upper arm posture and movements. It is possible that the health effects were brought about these changes.

Isometrics Neck Exercise

For neck flexion, extension, lateral rotation and rotation.

Subjects will be asked to perform isometric exercises which will be performed with 10 repetitions of each exercise, holding for 3-6 seconds, 3 times a week for 2 weeks.

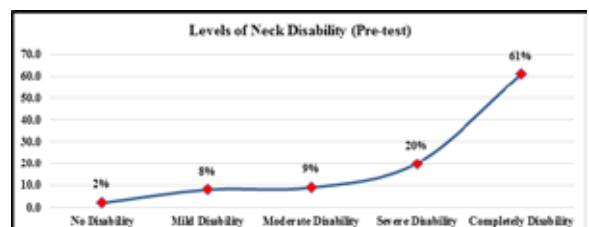
Perfect positioning for the good ergonomics

- Adjust the height of your seat so that your feet are resting firmly on the floor. Use a footrest if you feel that your feet are not supported properly.
- The depth of your seat should allow the back of your knees to extend beyond the edge of your seat. Thighs should be approximately parallel to the floor.
- Your forearm should be open at least 90-100 to your upper arm.
- Your wrist should not be angled up or down.
- Set the height of the work surface so that you can work without straining or bending. Arrange commonly used items (stapler, phone etc.) so that they are within easy reach.
- The top of one-third of your computer screen should be at or below the eye-level; the distances between your eyes and the monitor should be 18 or more typically arm's length.
- Document holder in line with front of the monitor. Height and angle adjustable for the comfort of the users.
- Back is fully supported with appropriate lumbar support when sitting vertical or leaning back slight.
- Shoulders are relaxed and upper limbs hangs normally at the side of the body.
- After the treatment periods, all the individuals were reassessed for neck pain and collected the data. The obtained data were documented and analysed.

Statistical treatment of data.

Under the study aim to achieve the objectives, the descriptive statistics like, Mean, Standard Deviation and t-ratio were used. The descriptive statistics was used to see the different levels of neck disability among computer professionals in IT centres of Puducherry comprised by pre-test and post-test respectively. The t-ratio was determined significant difference between pre-test and post-test on neck disability.

Result Analysis



Line Chart 1

Line chart showing Pre-test scores of different Levels of Neck Disability among Computer professionals in IT Centres

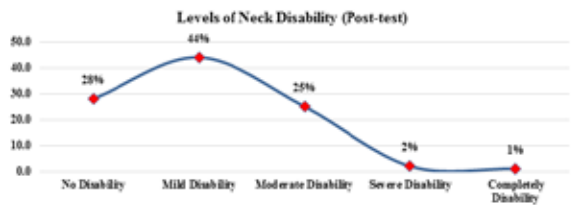
Table 1
Gender-wise Mean Comparison of Pre-test & Post-test scores (Neck Disability) among Computer professionals

| Neck Disability | Gender | Mean | SD | t-value | P-value |
|-----------------|--------|-------|------|--------------------|---------|
| Pre-test | Male | 35.93 | 9.57 | 0.48 ^{ns} | .62 |
| | Female | 35.05 | 7.77 | | |
| Post-test | Male | 11.50 | 7.74 | 2.51 ^{**} | .01 |
| | Female | 7.75 | 6.55 | | |

Note: **= Significant at 0.01levels & ^{ns}= Not Significant

Table-1 observed Gender-wise Mean Comparison of Pre-test & Post-test scores (Neck Disability) among Computer professionals. The neck disability of pre-test scores of male professionals shows (M= 35.93, SD= 9.57) and female professionals (M= 35.05, SD= 7.77). The t-value revealed no significant difference between male and female professionals of pre-test scores of neck disability. In addition, the neck disability of pre-test scores of male professionals shows (M= 11.50, SD= 7.54) and female professionals (M= 7.75, SD= 6.55). The t-value (t= 2.51, p=.01) revealed significant difference beyond 0.01 levels between male and female professionals of post-test scores of neck disability.

Line Chart 2



Line chart showing Post-test scores of different Levels of Neck Disability among Computer professionals in IT Centres

Table 2
Paired Comparison of Pre-test & Post-test scores (Neck Disability) among Computer professionals

| Neck Disability | Mean | SD | MD | t-value | P-value |
|-----------------|-------|------|------|---------------------|---------|
| Pre-test | 35.58 | 8.87 | 0.88 | 31.47 ^{**} | .00 |
| Post-test | 10.00 | 7.48 | 3.75 | | |

Note: **= Significant at 0.01levels

Table-2 observed paired comparison in Pre-test and Post-test scores of neck disability among computer professionals of IT centres in Puducherry. The paired comparison revealed that the t value (t= 31.47, p= .00) showed significant difference between pre-test and post-test scores of neck disability among computer professionals of IT centres in Puducherry. And the significant level was found 0.01.

Discussion and Conclusion

In the present study found that the subjects had one or more than one computer related health problem. The differences in the prevalence rates of computer related problems in various studies depended upon factors like workstation environment, degree of immobilization and levels of constrained postures, awareness levels and practices of workers. It is observed that musculoskeletal symptoms have a cumulative effect on the subjects with initial symptoms being mild and temporary and later with increasing years assuming more intense and permanent nature. Stress felt is seen more in initial years in the present study. It was further influenced by type of work and job content. It is evident that computer related morbidity had become an important occupational health problem and is a matter of great concern. The work station modification mainly by including adjustment of the screens, mouses, keyboards

forearms supports and chairs, these modifications altered the existing head, neck and arm postures and movements. Since the positive effect were seen primarily in the neck shoulder and upper arm and upper back, it is possible that the health effects were brought about these changes.

The modified work station calculated by a computer applied base on the anthropometry of the workers concluded that changes in work dimensions could help to reduce the discomfort level of the participants, which could be brought about by changing the work postures. The feeling of discomfort or fatigue was also reduced by the modified sitting postures. By modifying the head position directly over the shoulder without straining forward or backward, we can prevent excessive unwanted use of cervical musculature, the neck flexors and extensor will be incorrect balance thereby preventing early fatigue. According to Cote et al. (2008) who reported that office workers and computer users experienced the highest incidence of Neck pain of all workers with reported incidences ranging from 36 to 57.5% per 100 worker years where neck and upper limb symptoms were common among the computer users. Keeping the shoulder slightly depressed and retracted prevents tensed shoulder posture which in turn relaxes the upper extremities enabling effective use of wrist and hand.

Relaxing the elbow and wrist enables prolongation of work performance. It is important to maintain the neutral kyphosis of the thoracic spine, the lordosis of the lumbar spine and normal pelvic tilt to obtain upright posture. The feet must be firmly planted on the floor thus relaxing the lower extremities. Maintaining the recommended workstation posture modification will help bringing about balance in the body musculature, thereby reducing musculoskeletal symptoms and promoting work efficiency.

The studies concluded that effect of modified workstation and exercises can reduce the neck disability among the computer professions. Though the workstation modification provided in this study focused on the whole body, the outcome device used was focused only on neck disability. Further research can be proceeded by assessing the other regions of the body in addition to neck. This study has also brought into focus factors contributing to the occurrence of these problems. The high prevalence makes it imperative for the concerned personals to take a serious note of it. There is an immediate need for the concerned authorities to collaborate and enforce suitable preventive measures.

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