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Original Research Paper

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A STUDY TO ASSESS THE PREVALENCE OF THORACIC HYPO-MOBILITY IN MECHANICAL NECK PAIN AMONG COMPUTER USERS IN CENTRAL INDIA.

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ABSTRACT

Background and purpose: MNP is a very common and significant health problem in computer users. Yet there remain much to be elucidated with respect to their Patho-physiology, mechanism of pain and choice of treatment. Proposed mechanism for development of MNP is repetitive strain and psychological stress, which leads to micro trauma in connective tissue leading to muscle imbalance which alter the biomechanics of joint and finally results in pain. The human spine is composed of different segments namely cervical, thoracic, lumber, sacral, Coccygeal. These all are biomechanically linked with each other. Dysfunction at one segment accompanied at another segment. In terms of mobility thoracic segment influence cervical as well as lumber segment. The Purpose of study was to assess the prevalence of thoracic hypo-mobility in mechanical neck pain among computer users.

Objective: The main objective was to assess the prevalence of thoracic hypo-mobility in mechanical neck pain among computer users.

Method: Cross sectional study was carried out at various banks of a City of central India. Sample was taken from bank of India, Punjab and Sindh bank, Yes bank, bank of Karnataka, Axis bank. The assessment form involved information on the respondents' personal information name, age, sex duration of work and NPRS, THORACIC ROM, CERVICAL ROM.

Result -The study was analysed using statistical software, EPI INFO 7.and the result of study was shows that the prevalence of thoracic hypo-mobility in neck pain in total population is (45.9%).

Conclusion: The result of this study shows that the prevalence of thoracic hypo-mobility in mechanical neck pain is high among computer users. The present study shows that the thoracic spine contributes significantly to overall neck mobility and impaired thoracic mobility is associated with neck pain.

KEYWORDS : Work related musculoskeletal disorder, Work related neck pain, Numerical pain rating scale, Mechanical neck pain, Range of motion, Musculoskeletal disorder.

Introduction

Computers have became an epitome of modern life, being used in every aspect of life from calculating grocery bills, telecommunications, banking operations, name any sphere and one will find computer. With use of Internet technology distances carry little meaning and information anywhere in the world is accessible just with a click of mouse[1]. As the computer is a vital tool in many different occupations, the number of users has increased rapidly and so is the time spent in front of the computer. However, long periods of working at computers can increase the chance of development of an injury. Muscle and joint pain, overuse injuries of the upper limbs, low back pain, neck pain, eyestrains and headache can result from inappropriate computer use. Neck pain is a common complaint, with a point prevalence of nearly 13% [3,4] and lifetime prevalence of nearly 50% [5,6].Neck pain causes considerable personal suffering due to pain, disability, and impaired quality of work and life in general, which can be a great socioeconomic burden on patients and society[7, 8].

Work-related musculoskeletal disorders (WRMSD) (Bureau of labour statistics, 2005) are injuries or disorders of musculoskeletal tissues associated with workplace risk factors and are known by a variety of terms, including cumulative trauma disorders repetitive strain injuries, and overuse injuries[9]. For people who spend a great deal of time using computers, WRMSDs of the neck are a common problem[10]. The term work related neck pain (WRNP) is employed in this article; "computer" refers to desktop and laptop or notebook personal computers, video display units, and video display terminals to include the use of keyboards and pointing devices (i.e., mice, trackballs). Mechanical neck pain has been described as having no detectable/specific etiology (such as inflammation, infection or tumor) and it may be reproduced by provocative stimuli such as excessive physical strain or psychological stress that ultimately leads to increased muscular tension.[11] In most cases, precise cause of pain is unknown, This is known as Non specific pain.[12]) One of the most common reasons of neck pain is the faulty posture assumed in front of the computer. Computer users have forward-head-posture which causes strain on the neck and back which results in mechanical neck pain. Postulated factors in this occupational group include: individual factors (e.g. sex) work environment factors (e.g. repetitive work, exposure level), psychosocial factors (e.g. stress, high job demands, low decision latitude) [13]. Physical risk factors (such as prolonged sitting and neck flexion) have been identified as predictive of neck pain in the study of a mixed population of workers from various industry, health and professional settings.[14]

The use of computers has increased dramatically over the past decade in various offices so that staffs spend a lot of time sitting behind the computer. These rapid changes may be accompanied by increased prevalence of poor posture and resultant neck pain. FHP (forward head posture) and rounded shoulders are defined as protrusion of the head and shoulders in the sagittal plane [15,16]. The relation between FHP, rounded shoulders and neck pain is still debatable. Even though some researches claim a significant difference in head, shoulders and thoracic posture between patients and pain-free participants [17], the forward head posture has not always been associated with neck pain in literature [18]. Need of study- As spinal segments are biomechanically linked, dysfunction or lack of mobility at one segment compensated on another segment. In neck dysfunction, motion at thoracic segment is also compromised, so need of our study is to find out prevalence of thoracic hypo-mobility in cervical pain.

Objectives

1. To find out the prevalence of Thoracic hypo-mobility in neck pain.
2. To find the relationship between NPRS and thoracic hypo-mobility.
3. To find out relationship between cervical ROM and thoracic hypo-mobility.

Methodology

This study was a Cross sectional study conducted over 6 months of duration. Study was conducted on the workers of Bank considering there continuous work on computers. Bank of India, Punjab and Sindh bank, Yes bank, bank of Karnataka, Axis bank were randomly selected from the list of banks in the city. Study participants were

selected conveniently from different branches of banks of city according to the inclusion and exclusion criteria. Inclusion criteria - Age 25-40 years, Gender both male and female, Persons who were using Laptop or desktop for at least 6 months, minimum 2 hours a day, Persons having neck pain. Exclusion criteria -Any previous history of neck surgery, Whiplash injury, Subject who had any thyroid problem, Who had cancer problem, Any Structural deformity like scoliosis, Any other pathological problem. As present study is on computer users, the data has been gathered from different banks. The computer users were working at banks and account section candidates were selected who met the inclusion criteria of age and complaints of neck pain. Assessment of neck pain and thoracic mobility had taken, which included their demographic data like Name, Age, Sex, Working hours and working duration in years. Their neck pain was rated on NPRS. Inspection, palpation carried out to examine posture, spasm, range of motion (Cervical, Thoracic ROM) cervical ROM was measured by Goniometer for flexion, extension, side flexion, lateral rotation in sitting posture. Thoracic ROM was measured by tape measure, flexion, extension, side flexion in standing posture and lateral rotation in sitting position on chair.

Results

A total of 85 computer users, 61 were responded and deemed fit as a sample for the study were purposively selected from different branches of bank further considered as subjects for the study. 61 computer users were responded against a total of 85, thus given a response rate of 71.76%. The age of all subjects were obtained in the ranges from 25 to 40 years. The spread of mean age of computer users was 32.23±4.50 years with a standard error of 0.58 years. 17 (27.9%) computer users were most commonly had belonged to age groups of 25-29 and 33-37 years followed by 15 (24.6%) had within middle age group of 29-33 years. Out of 61 subjects, 40 (65.6%) were male while rest 21 (34.4%) were female.

The duration of years of using computers among subjects is shown in table 1 and the spread for number of years of working was 5.33±3.59 years. The duration of working on computers in most of the computer users was 0 to 5 years noted in more than half (50.8%). 14.8% subjects revealed that the duration of their working on computers was between 10 to 15 years. A long duration of work of more than or equal to 20 years was observed only in one (1.6%) computer user.

The categorization for observed score according to Numeric Rating Scale (NRS-11) directed the higher score as greater pain intensity, is projected in table 2. None of the subject found without neck pain as per inclusion criteria. Moderate neck pain was most commonly identified in 40 (65.6%) computer users followed by 16 (26.2%) computer users who had mild neck pain. The neck pain was severe in 5 (8.2%) computer users that obtained score in between 7 to 10 according to NRS-11.The less cervical range of motion (ROM) was noted in more than two-third (68.9%) computer users was most common. The thoracic range of motion (ROM) of less than 2.7 centimeter was noted in 45.9% computer users that recognized with less thoracic ROM. The thoracic hypo-mobility was prevalent in 45.8% subjects may be the tool to identify the neck pain of subjects who had used computers for at least 6 months, minimum 2 hours a day and at least six month to one year of working experience of computers. The mean differences are highly significant for flexion and extension at the 0.001 level of significance with equal variances for flexion but unequal for extension. 17 (27.9%) computer users most commonly suffered with neck pain found in the age group of 33-37 years. Out of them, 16 (40.0%) had moderated neck pain. Another 17 (27.9%) computer users observed in the young age group of 25-29 years were complained the neck pain in which 2 (40.0%) diagnosed with severe neck pain. The neck pain among computer users was found to be dependent significantly on age of computer users. 12 (19.7%) computer users had neck pain found in the age group of more than or equal to 37 years in which 4 (25.0%), 5 (12.5%) and 3 (60.0%) computer users were reported the mild, moderated and severe neck pain respectively. Henceforth, these differences in the age of computer users were associated strongly with the categories of NRS was confirmed highly ($p<0.01$) significant concreted on statistical ground. Moreover, it is concreted on statistical ground that age of computer users is the strong significant factor that influences highly the neck pain. Therefore, the age of computer user is considered as the significant marker for the assessment of thoracic hypo-mobility in computer users suffering from mechanical neck pain.

The relationship of duration of working experience in years of subjects and intensity of their associated neck pain was significantly associated. 31 (50.8%) computer users most commonly suffered with neck pain found within duration of working years of 0-5. Out of them, 17 (42.5%) had moderated neck pain followed by 13 (81.3%) had mild pain. Another 20 (32.8%) computer users had 5-10 years duration of work were complained the neck pain in which 2 (40.0%) diagnosed with severe neck pain. It was reported that 40 (65.6%) computer users most commonly suffered with neck pain had worked 7-9 hours in a day and out of them, 11 (68.8%) had mild, 26 (65.0%) had moderated but 3 (60.0%) had severe neck pain. The cervical range of motion of subjects found to be significantly associated with the neck pain. 42 (68.9%) computer users most commonly had less cervical range of motion and out of them, 7 (43.8%) had mild, 32 (80.0%) had moderated but 3 (60.0%) had severe neck pain. 8 (20.0%) subjects had moderated but 9 (56.3%) had mild neck pain found with more cervical range of motion. These differences in cervical range of motion among subjects were associated ($p<0.03$) significantly with the categories of NPRS that was concluded statistically. Overall, the statistical agreement showed that the cervical range of motion of subjects is the significant factor that impacted the neck pain. Moreover, the cervical range of motion among computer users may be considered as a tool while dealing with neck pain.The thoracic range of motion of subjects was found to be significantly associated with the neck pain as detected with a significant relation with neck pain. Out of total (n=61) subjects, 28 (45.9%) computer users most commonly had less thoracic range of motion in which 3 (18.8%) had mild, 22 (55.0%) had moderated but 3 (60.0%) had severe neck pain. In subjects with more thoracic range of motion, 13 (81.3%) had mild, [18] (45.0%) had moderated while 2 (40.0%) had severe neck pain. These differences in thoracic range of motion among subjects were associated ($p<0.05$) significantly with the categories of NPRS that was concreted on statistical ground. Henceforth, the statistical agreement showed that the thoracic range of motion may be the significant factor among subjects that impacted the neck pain. Therefore, thoracic range of motion among computer users may be considered as a tool to assess the neck pain and the thoracic mobility examination may be a part of mechanical neck pain examination.

Table 1:- The duration of years of working among subjects

Number of years of working	Frequency (N=61)	Percent (%)
0-5	31	50.8
5-10	20	32.8
10-15	9	14.8
≥20	1	1.6
Mean ± SD	5.33±3.59 years	

Table 2:- The severity of neck pain on numeric rating scale

Numeric Rating Scale	Computer Users		
Score	Category	N=61	%
0	No pain	0	0.0
1-3	Mild pain	16	26.2
4-6	Moderate pain	40	65.6
7-10	Sever pain	5	8.2
Mean ± SD	4.54 ± 1.35 points		

TABLE 3:- COMPARISON OF FLEXION AND EXTENSION IN SUBJECTS BETWEEN THORACIC HYPO-MOBILITY AND NON-HYPOMOBILITY N COMPUTER USERS

ROM	Mobility of Subjects	Range	95% CI of the Mean		t-value	LOS
		Mean±SD	**LB**	**UB**		
Flexion	**Non Hypo mobile**	3.65±0.43	3.50	3.80	**16.13**	p<0.001
	Hypo mobile	2.02±0.36	1.88	2.16		
	Mean Diff	1.63 centimeter				
Extension	**Non Hypo mobile**	3.67±0.40	3.53	3.81	**17.94**	p<0.001
	Hypo mobile	2.09±0.25	1.99	2.19		
	Mean Diff	1.58 centimeter				

Discussion

The aim of study was to check the prevalence rate of thoracic hypo-mobility in patients suffering from mechanical neck pain among computer users. 61 subjects of age group of 25-40 years were selected who had mechanical neck pain for at least 4 months. The thoracic mobility was evaluated by range of motion measurements by tape measure.

The result of study shows that there is 45.9% prevalence of thoracic hypo-mobility in neck pain patient. This study also found there were 68.9% computer users having cervical hypo-mobility. Study also found that there is strong association exist between cervical and thoracic range of motion.

The human body was designed for movement and with the advent of computers and as the number of sedentary jobs have increased; the number of musculoskeletal disorder risen dramatically. Jensen et al (2002)[19] studied that long hours of computer work can lead to development of neck and shoulder pain. The prevalence of neck pain among adults ranges from 12.1% to 71.5%. The point prevalence of neck pain is reported to be between 12 and 34%.

High prevalence of neck pain in computer users in our study is similar to that of previous study. The main complaint of computer users was pain which was spread in whole neck, shoulder region. This pain is the primary cause because of that person is not able to concentrate in the work, which in turn decreases his/her performance level.

Ergonomics were considered as major factors affecting the prevalence of work related musculoskeletal disorder. Physical factors such as sitting and neck flexion have been identified as predictive of neck pain in the study of a mixed population of workers from various industry, health and professional settings. (Ariens GM 2001.)[20]. Forward head posture and neck position may predispose to tension neck syndrome with associated symptoms of pain, stiffness and muscle spasm.

In this study we found that patient suffer with many problems like difficulty in reading, driving, lifting, sitting in front of computer for prolong periods of time puts abnormal stress on the joints which alter biomechanics and disturb the bony alignment because of that muscle imbalance occur and strength of muscle get decrease which finally leads to pain.

Numerous studies showed that pain and range of motion are inter-related to each other because of that ADLs are also affected. Our study also found lack of cervical mobility among neck pain patient which influence their activities of daily living.

Sharon,[21] studied and examined the interplay between the cervical and thoracic spine in a cohort of symptomatic participants and clearly demonstrated the contribution of the thoracic spine to neck mobility. The upper thoracic motion showed a sizeable contribution of overall neck mobility and the movements of cervical and thoracic spines were highly co-ordinated, as revealed by the cross correlation analysis

A recent study developed a clinical prediction rule for the use of thoracic manipulation or exercises for patient with neck pain. (Cleland JA)[22] clinical screening of thoracic spine may help identify neck patient who suffer thoracic dysfunction and may likely benefit from manual therapy.

Norlander, Rune Pearsson[23].The percentage of the upper thoracic contribution of overall neck mobility was highest for flexion and extension, lowest for rotation, right and left rotation.

The superior articular surfaces of the facet joint of the lower cervical spine are oriented poster laterally and vertebrae C7-T2 are inclined forwards and downwards.(Pal et al 2001)[24], thus both flexion and extension most around the transverse axis would be the predominant direction of movement available in the lower cervical region (Bogduk, Mercer 2000)[25]

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