



## “CORRELATION OF POTENTIAL RISK FACTORS OF NECK PAIN WITH NECK DISABILITY IN COMPUTER PROFESSIONALS”

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### ABSTRACT

**BACKGROUND:** The prevalence of musculoskeletal problems increasing among computer professionals in India. Neck pain is the leading musculoskeletal problem with high prevalence rate among computer professionals. Neck pain leads to decreased work performances, absenteeism from work or increased sick leaves, disability which affects activities of daily living. **OBJECTIVE:** Aim of our study is to correlate the risk factors of neck pain with neck disability among IT professionals in software companies in Hubli and Dharwad. **METHOD:** 250 IT professionals were interviewed. 235 subjects met the inclusion criteria. They were assessed on various scales like RULA (Rapid Upper Limb Assessment), Visual Analogue Scale (VAS) and Neck Disability Index (NDI) for working posture, neck pain and neck disability respectively. Data was analyzed using Chi Square test. **RESULT:** Results of the study revealed that total percentage of neck pain was 31%. And percentages of moderate and severe disability were 6.4% and 2.1 % respectively. Percentages of subjects with moderate neck disability having RULA score 'acceptable' were 1.7%, 'investigate further' were 9.3% and 'investigate and change soon' were 27.3%. Percentages of subjects with severe neck disability having RULA score 5 & 6 were 45.4%. Percentages of subjects having moderate neck disability with the habit of taking breaks were 3.9% and without the habit taking breaks were 25%. Percentages of subjects having severe neck disability with the habit of taking breaks were 0.4% and without the habit taking breaks were 14.3%. **CONCLUSION:** RULA score and habit of taking breaks during working hours were positively correlated with both neck disability and neck pain. Gender, BMI, Days of computer work in a week and type of computer were positively correlated with neck pain. Hence posture correction, overall fitness maintenance and other appropriate ergonomic measures must be followed to prevent musculoskeletal problems of neck region in computer professionals.

### KEYWORDS :

### INTRODUCTION

In the modern era of technology computer use have been amplified to greater extent. Computers are utilized by 56% of people at occupational level and 62% at personal level.<sup>1</sup> Today as India is becoming the predecessor in the cyber world the health workers are gradually arousing to this group of modern work related diseases, which are slowly sprouting among computer professionals. If such problems are snubbed, it can invite troublesome injuries and even disability; sometimes one might have to change his profession.<sup>2,3</sup> The recent increase in computer-related work as a consequence of rapid industrialization has considerably increased the prevalence of CANS (complaints of arm neck and/or shoulder) among computer office workers not only in western developed countries but also in developing countries.<sup>5</sup> Workstation modification should be based on observed risk factors such as awkward postures. There are various techniques, available to evaluate posture in computer workers, such as OSHA ergonomics solutions, MUEQ (Maastricht Upper Extremity Questionnaire) etc. Most of the questionnaires are lengthy, time consuming and filled by participants themselves. RULA on the contrary is most rapid, easy to administer, less time consuming and is a postural assessment tool administered by the therapist or examiner. It is reliable and valid for evaluating the posture which involves upper limb. It is a technique, which evaluates people's exposures to postures, forces and muscle activities. It was designed to identify the risk factors which require further attention.<sup>5</sup> Later RULA was modified to increase the suitability for computer work evaluation.<sup>6</sup> According to this method a score is calculated for the posture of each body part. Scores of 1 or 2 indicate that the work posture is acceptable, score of 3 or 4 indicate further investigation and changes if required, prompt investigation and changes for scores of 5 or 6 and immediate investigations and changes for a grand score of 7.<sup>3,4</sup> If faulty postures are habitual and assumed continually on a daily basis, the body will not recognize these faulty postures as abnormal, and over time, structural adaptations such as ligamentous and muscle shortening or lengthening will occur.<sup>6,7</sup> It is evident, if earnest long term preventive measures are not taken than these occupation-related painful problems will be amplified further. An integrated approach must be

followed as early as possible to improve the working posture and to reduce the static load. Certain positive interventions also should be done to reduce the influence of job-stress to improve the work performance.<sup>7</sup> Neck pain has not been correlated with ergonomic risk factors in terms of disability. So the awareness is required about ergonomic risk factors in order to prevent and overcome neck pain and disability in upcoming computer professionals who are at risk of developing neck pain. No study has been reported on neck pain prevalence among computer professionals in twin cities of Karnataka state till date. Hence a strong need arises to find out prevalence of neck pain and neck disability and to identify risk factors associated with neck pain and neck disability in computer professionals.

**METHODOLOGY:** The present study is a cross sectional study in which computer professionals working in software companies of twin cities were interviewed and examined for the posture. Computer professionals who fulfilled the inclusion criteria were briefed about the study and written consent was taken from them.

**MATERIAL:** Rapid Upper Limb Assessment (RULA) sheet, Self reported questionnaire – Neck Disability Index, Visual Analogue Scale (VAS) 100mm.

### METHOD OF DATA COLLECTION:

**INCLUSION CRITERIA:** Computer professionals between the age of 25 -35 years<sup>3</sup>, working on computer as the part of their profession for more than at least 4 hours in a day for at least 5 days a week for more than 6 months.<sup>13</sup> **EXCLUSION CRITERIA:** Subjects with recent neck injury due to any trauma, Cervical spine fracture, Ankylosing spondylosis Pregnant women.

**STUDY DESIGN:** Cross sectional study.

**SAMPLE:** computer professionals, who met the inclusion criteria, were taken for the study.

**SAMPLE SIZE:** A prevalence study done in an Asian country showed

neck pain prevalence of 64% among computer office workers. Based on that study sample size was calculated with 10% allowable error of prevalence. Estimated sample size is 225.

**PROCEDURE:** Ethical clearance was obtained from the Ethical committee of S.D.M. College of Medical Sciences and Hospital, Dharwad. Detailed explanation about the study procedure, need for the study, benefits and limitations of the study was given to the CEO/administration in charge of the companies. As the study demanded unaware postural assessment of the employees to prevent any kind of bias in the results, the study began with the posture assessment without prior information to the employees i.e. IT professionals. The employees were assessed by principle investigator for their working posture with RULA (rapid upper limb assessment). RULA assessment is an observation method and it does not require any special tool but a pen and the assessment sheet. According to this method a score is calculated for the posture of a subject in working position. Posture assessment was done in working hours of the companies and employees were unaware of the observation being done by the investigator to avoid intentional correction of the working posture. 250 employees were included initially in the study. Working experience of 10 employees at the current place was less than 6 months and 5 employees were exceeding age criteria, so total 15 employees were excluded from the study. Total 235 subjects met the inclusion criteria. They were explained about the study and written consent was obtained from them. All the participants were assessed on Visual Analogue Scale (VAS) for neck pain intensity. Then NDI (neck disability index) questionnaire, which assesses the disability associated with neck, were given to the participants to fill. Here the participants rated their perceived disability on 10 different items: pain intensity, personal care, lifting, reading, headaches, concentration, work, driving, sleeping and recreation. The items scored from 0 to 5, giving a total score of 50. The score was converted in to percentages. The NDI scores of participants were divided into categories: having minimal or no disability (0-20%), moderate disability (20-40%), severe disability (40-60%), crippled (60-80%), or bed-bound or exaggerating the symptoms (80-100%). After completion of the study all employees were explained about correct and incorrect posture, hazards of wrong working posture, importance of frequent breaks from the work. They were advised for correction of poor posture and taught some basic neck exercises to be done regularly at home as well as at workstation. Participants with high BMI score were explained about hazards of obesity and advised for weight reduction. Statistical analysis was done using SPSS software, version 20.0. Chi Square test was used to find the prevalence of neck pain and neck disability and association of various risk factors with neck pain and neck disability.

**Results**

**Table 1: Distribution of study subjects by different characteristics**

Factors	No of subjects	% of subjects
<b>AGE (IN YEARS)</b>		
25- 27	86	36.5
28-31	87	37
32-35	62	26.4
<b>GENDER</b>		
MALE	170	72.3
FEMALE	65	27.6
<b>BMI</b>		
< 18.5 (UNDER WEIGHT)	15	6.4
18.5-24.9 (NORMAL WEIGHT)	140	59.6
> 24.9 (OVER WEIGHT)	80	34
<b>DURATION OF COMPUTER USE IN A DAY (IN HRS)</b>		
<8	95	40.4
8 to 10	127	54
> 10	13	5.5
<b>DAYS OF COMPUTER USE PER WEEK</b>		
5	133	56.6

6	77	32.7
7	25	10.6
<b>Habit of taking breaks</b>		
Yes	207	88
No	28	12
<b>Computer type</b>		
Desktop	155	66
Laptop	20	8.5
Both	60	25.5
<b>RULA</b>		
Acceptable	117	49.8
Investigate	107	45.5
Investigate & change soon	11	4.7
Change immediately	0	0
<b>Neck pain</b>		
Yes	73	31
No	162	69
<b>Neck disability index</b>		
Minimal	215	91.5
Moderate	15	6.4
Severe	5	2.1
Crippled	0	0
Bed bound	0	0
Total	235	100

**Table 2: Correlation between RULA and neck pain**

RULA	Neck pain				Total	Chi square	P value
	Yes	%	No	%			
Acceptable	18	15.4	99	84.6	117	42.89	0.00
Investigate further	44	41.1	63	58.8	107		
Investigate & change soon	11	100	0	0	11		
Change immediately	0	0	0	0	0		
Total	73	31	162	69	235		

**DISCUSSION:**

Musculoskeletal problems in the neck region associated with computer work are widespread in the new era and day by day it is increasing. The prevalence of neck pain in the present study is in agreement with other studies. Table 1 explains about the distribution of subjects by different characteristics. Among 235 subjects, the percentages of males were 72.3% (170) and females were 27.6% (65). Subjects with BMI less than 18.5 kg/m<sup>2</sup> (under weight) were 6.4% (15), subjects with BMI ranging between 18.5 to 24.9 kg/m<sup>2</sup> were 59.6% (140) and subjects with BMI 25 kg/m<sup>2</sup> and above were 34% (80). Percentages of subjects who work for 5 days per week were 56.6% (133), percentages of subjects who work for 6 days per week were 32.7% (77), and percentages of subjects who work for 7 days per week were 10.6% (25) in the present study. In our study, percentages of subjects who used desktop were 66% (155), percentages of subjects who used laptop were 8.5% (20) and percentages of subjects who used both desktop and laptop were 25.5% (60). Percentages of subjects who has habit of taking breaks were 88% (207), and percentages of subjects who do not have habit of taking breaks were 12% (28) in the present study. In our study, RULA (Rapid Upper Limb Assessment) score system was used for postural analysis. Subjects with score 1 & 2 i.e. 'acceptable' were 49.8% (117). Percentages of subjects having score 3 & 4 i.e. 'investigate' were 45.5% (107) and percentages of subjects with score 5 & 6 i.e. 'investigate and change soon' were 4.7% (11). There were no subjects with the RULA score of 7 which is change immediately. In the present study, percentages of subjects having neck pain were 31% (73) where as percentages of subjects without neck pain were 69% (162). Disability was assessed with neck disability index (NDI) and in that percentages of subjects with minimal disability were 91.5% (215). Percentages of subjects with

moderate disability were 6.4% (15) and percentages of subjects with severe disability were 2.1% (5). No subjects were crippled or bed bound in our study. Table 2 depicts the distribution of study subjects according to RULA score and neck pain. Percentages of subjects with neck pain having RULA score 1 & 2 (acceptable) were 15.4% (18), score 3 & 4 (investigate further) were 41.1% (44), score 5 & 6 (investigate and change soon) were 100% (11). Percentages of subjects without neck pain having RULA score 1 & 2 (acceptable) were 84.6% (99), score 3 & 4 (investigate further) were 58.8% (63). There were no subjects in no neck pain group with RULA score 5 & 6. In our study not a single subject had RULA score 7 (change immediately). P value is 0.00 which is highly significant means there is positive correlation between RULA score and neck pain. It suggests that subjects, who assume wrong and awkward posture while working on computer, are prone for developing neck pain, which is in accordance to previous studies. In our study percentages of subjects with mild neck disability having RULA score 1 & 2 (acceptable) were 98.3% (115), score 3 & 4 (investigate further) were 90.7% (97), score 5 & 6 (investigate and change soon) were 27.3% (3). Percentages of subjects with moderate neck disability having RULA score 1 & 2 (acceptable) were 1.7% (2), score 3 & 4 (investigate further) were 9.3% (10) and score 5 & 6 (investigate and change soon) were 27.3% (3). Percentages of subjects with severe neck disability having RULA score 5 & 6 (investigate and change soon) were 45.4% (5). In our study not a single subject had RULA score 7 (change immediately). P value is 0.00 which is highly significant.

#### CONCLUSION:

The findings from this study revealed that there is less prevalence of neck disability among IT professionals working in software companies of twin cities. Among 235 IT professionals 73 subjects (31%) were having neck pain, 15 subjects (6.4%) were having moderate disability whereas only 5 subjects (2.1%) were having severe disability. From this study we can conclude that age was not the risk factor for developing neck pain or neck disability. But gender was not correlated with neck disability. BMI was strongly associated with neck pain which suggest that increase in BMI leads to more occurrence of neck pain. BMI was not associated with neck disability. The duration of computer use in a day was not associated with either neck pain or neck disability which might be due to self reported duration of computer use in a day. Days of computer use in a week was correlated with neck pain which meant as the days of computer use in a week increases the probability of developing neck pain also increases. Days of computer use in a week was not associated with neck disability. Habit of taking breaks during working hours was strongly correlated with both neck pain and neck disability. The subjects who are taking breaks while working were less prone to develop neck pain and neck disability compare to the subjects who are not having the habit of taking breaks. The subjects who used laptop had more neck pain compare to the subjects who used desktop or both. So the type of computer is positively correlated with neck pain but not with the neck disability. There was strong correlation between RULA score and neck pain as well as neck disability which means awkward working posture is strongly associated with both neck pain and neck disability. There were more incidences of neck pain and neck disability in the subjects with poor working posture. In order to prevent these problems, posture correction must be done, weight reduction strategies should be done, habit of taking small but frequent breaks should be developed and appropriate ergonomic measures should be followed.

#### SUMMARY:

Musculoskeletal symptoms of neck region are becoming foremost concern among computer professionals working in information technology sections now days. Among 235 subjects total percentage of neck pain was 31%. And percentages of moderate and severe disability were 6.4% and 2.1 % respectively. Gender, BMI, days of computer use in a week, habit of taking breaks, type of computer and working posture were positively correlated with neck pain. Habit of taking breaks and working posture only were correlated with neck disability. Correction of awkward postures is

very much essential to prevent neck pain among computer professionals. Ergonomic measures such as height of the chair, position of mouse and key board, monitor distance and proper arm and foot support should be taken to avoid neck pain. Computer professionals should develop the habit of taking small and frequent breaks while working and they should maintain overall body fitness.

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#### Conflict of interest: None.

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