Study on the risk factors and pattern of musculoskelatel disorder in neck and upper extremity among the computer users who attended the selected rehabilitation center of Guwahati City of Assam

[1]Dr. A K M Rezwan, Ph.D., Gono Bishwabidyalay, Dhaka, Bangladesh

[2]Professor Dr. Bhaben Chowdury. Ph.D., Mahatma Gandhi University, Meghalaya, India

Corresponding Author: Dr. A K M Rezwan, Ph.D., Gono Bishwabidyalay, Dhaka, Bangladesh

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Introduction: Neck & upper extremity musculoskeletal disorders (MSDs) creating of occupational illness with annual cost and value related to treatment and desertion formwork. It is the most regular causes of long term pain and physical dysfunction.

Objective: The focus of the study was to decide the risk factors and pattern of musculoskeletal disorders in neck and upper extremity among the computer users who attended the selected rehabilitation center of Guwahati city of Assam, India.

Materials and method: It was descriptive types of cross sectional survey based study. Sample size was 180 and a pretested, semi structured questionnaire was used to assembly of data. Data were analyzed and interpretation by used of SPSS software version 29.

Results: Most of the respondents (32.8%) belonged to age group were (31-40) years. Mean ± SD of age were (40.18 ± 1.08) years. Male respondents were (57.2%) and (81.7%) were married, (35.6%) were graduates and (31.1%) were service holders mostly computer used; this study also found that more of the respondents were used desktop (51.7%) and used key board (38.3%). The duration of computer used were 1 to 5 years and average in a day were 1 to 3 hours, more of the respondent feel pain in neck region (55%) and duration of pain feel were near about 6 month (37.2%). This study also revealed that (52.8%) of the respondent complained continuous types of pain and (31.7%) were burning nature of pain and (37.2%) were complained moderate types of pain. Most (87.8%) of the respondent had no history of trauma. Pain increase during use of computer (53.4%) and (46.1%) didn't know about any others physical problems and (51.1%) didn't visit any doctor and (58.3%) didn't do any investigation for their physical problems. (45%) didn't know about their health problem and (35%) didn't take any types of self-treatment. (62.2%) didn't know about health hazard of computer

use and more of the respondents (67.7%) didn't take any types of preventive measure. There was statistically significant association found between ages with daily use of computer (P<0.045) and age with taken preventive measure during computer use (P <0.038) and sex with educational status (P<0.012) and sex with years used computer (P<0.006) and educational status with information about health hazard of computer use (P< 0.015) and daily used of computer with severity of pain (P <0.007) and years used computer with types of pain (P <0.042) and history of trauma with nature of pain (P<0.025) and there were also highly significant several associations found between sex with occupation (P <0.000) and same association found in marital status with years used computer (P<0.00) and educational status with occupation of the respondent (P< 0.00) and educational status with daily used of computer (P <0.00) and occupation with years used computer (P< 0.00) and occupation with daily used computer (P< 0.00) and control of computer with types of computer use (P< 0.00) and visit of doctor with pain investigation of the respondents (P<0.00).

Conclusion: Musculoskeletal dysfunction in the neck & upper extremity among the computer users are very common in innovative society. This study discloses that there were various correlations within the computer user and musculoskeletal disorders (MSDs) in the neck & upper extremities. Computer ergonomics and knowledge about health hazard of computer use are both play an important role to reduce the musculoskeletal disorder in neck and upper extremity.

Keywords: Prevalence, Musculoskeletal disorder; Pain; Computer users; Upper Extremity

Introduction

Computer related musculoskeletal disorders (MSDs) continue to a substantial public health problem. The computer has been recognize as a tool that has distinctive potential to improve the quality of health care system of the health workers both in the developed & developing countries [1]. The facts of information and communication technology are being use to better quality of life and there may be connected health hazard with the use of these devices. Musculoskeletal disorders (MSDs) act on millions of computer users in developed nations and expansion of computer systems in the developing nations [2].Now a day's computer is one of the most widespread work tasks in the world. In some developed countries more than half of the work force use a computer station for more than half of their working day. Work with computer has been associated with a high currency of musculoskeletal complaints among computer users in many developed countries. [3]. Computer connected musculoskeletal disorders (MSDs) continue to extension in developing nations as a result the numeral of computer users gradually increase. Common complaints of computer operators include discomfort during uses, whole body pain and pains in the neck and shoulder joints in both upper extremity and sometime eyestrain [4]. Two third of the peoples having neck pain at some times in their lives. Neck pain may be appear due to injury of muscle, ligament and tendon, more commonly seen in nerve root compression. Currently neck and shoulder pain is a very common symptom among office workers [5]. Musculoskeletal disorders (MSDs) carried out almost all profession and sectors creating serious physical and economic problems for the person like workers, families, businesses, and governments. These problems cause huge absences,

heavy economic losses and reductions in productivity [6]. Musculoskeletal injury resulting from a work related event is termed work related musculoskeletal disorder (WMSD). It is an effect of over exertion which occurs when workers are repeatedly exposed to forceful and prolonged activities in awkward postures or unsympathetic environments. The bankers commanded the use of computer for data collection, processing and programming; consequently they are exposed to risk factors for the development of musculoskeletal disorders in the computing industries [7]. In 21st century world. The computers have become essential parts in every aspect of life and they have become an epitome of modern life [8]. Computer is now one of the most widespread work tasks in the world. Negative effects of the computer could thus have a large impact on public health. Musculoskeletal Disorders (MSDs) are one of the vital causes of injuries has a considerable effects on health and an enormous burden of cost on the healthcare system [9]. Near about 1.7 billion population in worldwide complain musculoskeletal disorders. All the diseases condition in whole world the MSDs influence on the one fourth general health of the world regard to either death or disability. This types of burden increase rapidly if we see previous 20 years it increased fourth five percent (45%), if this condition will continue long time without take any action it will be creates different types of disability and country will loss big amount of economy [10]. Computer work creates stress and strain on muscles of the body as well as joints by continuous and repetitive movements of joints [11]. Computer uses are increasing rapidly in different country. Among computer users, the bank worker have high prevalence of musculoskeletal disorders in many developed countries, There is computer related musculoskeletal discomfort

ultimately leads to increased treatment value, decrease productivity and increase absenteeism from work and also increased health expenditure [12].

Methodology

It used a cross-sectional survey based on pretested, modified questionnaires is distributed to musculoskeletal disorders in neck and upper extremity among the computer users who attended the selected rehabilitation centers of Guwahati city of Assam. Non randomized purposive sampling technique was applied to collect the data in 2 years of time & Slovin sample size formula were used and 180 respondents of both males and females selected based on the inclusion & exclusion criteria. Statistical Package for Social Science (SPSS 29.0 version software Chicago) was used for data analysis, and 0.05 was set as the significant level.

Data Analysis and Interpretation

Descriptive type of cross sectional study was conducted in Guwahati city of Assam, in order to determine the Risk Factors and Pattern of musculoskeletal disorders in neck and upper extremity among the computer users who attended the selected rehabilitation center pretested, modified, semi structure questionnaire was used to accumulation the information. A total 180 computer users were interviewed to collect the information.

Table 1: Distribution of respondents by Type of computer used (n=180)

Type of computer	Frequency	Percentage
Desktop	93	51.7
Laptop	87	48.3
Total	180	100
Mean $\pm$ SD = 1.48 $\pm$ 0.50		

The table 01 revealed that the mean of the types of computer uses of respondents were 1.48 ± 0.50 and It was found that 51.7% were used desktop and 48.3% laptop.
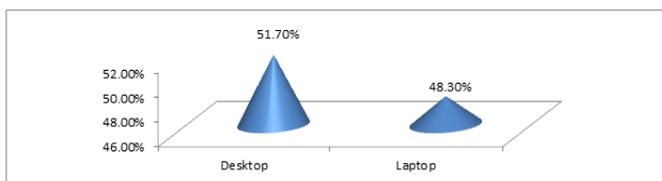
Figure 1: Distribution of respondents by type of computer used.

Control of computer	Frequency	Percentage
Mouse	56	31.1
Key board	69	38.3
Mouse pad	55	30.6
Total	180	100
Mean $\pm$ SD = 1.99 $\pm$ 0.78		

Table 2: Distribution of respondents by Control of computer during computer used (n=180)

The table 02 revealed that the mean of control of computer of the subjects were 1.99 ± 0.78 and It was found that 31.1%, 38.3% and 30.6% of the respondents related to use mouse, key board and mouse pad separately.
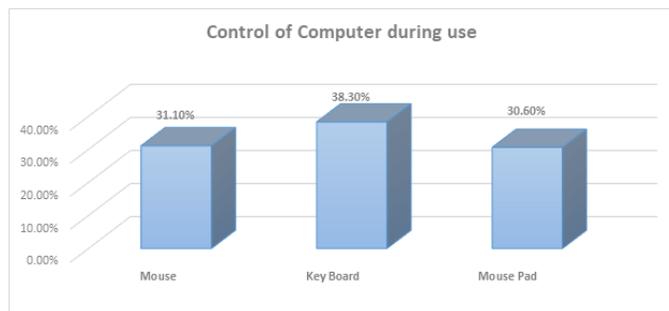

Figure 2: Distribution of respondents by control of computer during use

Nature of pain	Frequency	Percentage
Tingling	45	25
Numbness	51	28.3
Burning	57	31.7
Radiating	27	15.0
Total	180	100
Mean $\pm$ SD = 2.36 $\pm$ 1.01		

Table 3: Distribution of respondents by nature of pain (n=180)

Table 03 revealed that the mean of the nature of pain were 2.36 $\pm$ 1.01 and types of pain 25% tingling, 28.3% numbness, 31.7% burning and 15% radiating.
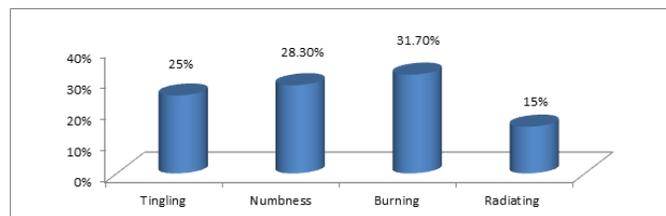

Figure 3: Distribution of respondents by nature of pain.

Diagnosis of problems	Frequency	Percentage
Cervical Spondylosis	21	11.7
Supraspinatus Tendinitis	8	4.4
Tennis Elbow	15	8.3
De-Quervain Disease	9	5.0
Carpal Tunnel Syndrome	12	6.7
Muscular Spasm	23	12.8
Cervical Radiculopathy	11	6.1
I don't know	81	45.0
Total	180	100
Mean $\pm$ SD = 5.78 $\pm$ 2.54		

Table 4: Distribution of respondents by diagnosis of physical problem (n=180)

Table 04 revealed that the mean of the diagnosis of physical problem were 5.78 ± 2.54 and 11.7% were cervical spondylosis, 4.4% supraspinatus tendinitis, 8.3% tennis elbow, 5.0% de-quervain disease, 6.7% carpal tunnel syndrome, 12.8% muscular spasm, 6.1% cervical rediculopathy and 45% respondent didn't know there problem.
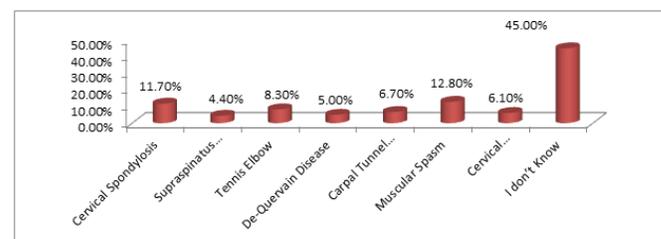

Figure 4: Distribution of respondents by diagnosis of problem

Educational Status	Occupation					Total	P-value
	student	House wife	Service holder	Business	Retired person		
Illiterate	0	7	4	1	0	12	
Secondary	3	4	6	2	0	15	
HS	12	11	10	3	2	38	0.000
Graduate	5	5	23	23	9	65	
PG	0	2	13	17	18	50	
Total	20	29	56	46	29	180	

Table 5: Distribution and association of respondents between educational status and occupation

P value acquired by Pearson Chi-square (x^2) test

The table 05 manifested that P = 0.000 and this number is lower than 0.05 so it also revealed that was statistically significant highly relation between educational status and occupation.

Daily Used Computer	Severity of pain				Total	P-value
	Mild	Moderate	Severe	Intolerable		
1 to 3 hours	18	22	18	3	61	
4 to 6 hours	10	9	14	3	36	
7 to 9 hours	13	15	9	1	38	0.007
Above 9 hours	14	21	8	2	45	
Total	55	67	49	9	180	

Table 6: Distribution and association of respondents between daily used computer and severity of pain

P value acquired by Pearson Chi-square (x^2) test

The table 06 manifested that P = 0.007 and this number is lower than 0.05 so it also revealed that was statistically significant relation between daily used computer and severity of pain.

Discussion

Epidemic survey have manifested that musculoskeletal disorders (MSDs) are widely prevalent among employees worked with computer [13]. Present study found that 32.8% of the respondents their age group were 31 to 40 years were mostly computers uses and male respondents 57.2% were more than female, most of the respondents were male 81.7% and graduate 35.6% more computer used there were similar to the findings of the study carried out by another study [14]. And service holder 31.1% were more computer uses, this study also found that more of the respondents were used desktop 51.7% , these findings are similar to different study in Bangladesh [15]. And key board 38.3%. The duration of computer use were 1 to 5 years 41.7% and average in a day were 1 to 3 hours of the respondent the similar type of findings found by another researcher [16]. This study also revealed the location of feeling pain were more in neck region that's was 55%, these findings were similar to the finding of study conducted out [17] and duration of feeling pain near about 6 month (37.2%) of the respondents, This study also revealed that more of the respondent were complained pain in continuous types (52.8%) and 31.7% burning nature of pain and 37.2% were complained moderate types of pain these was similar findings of the study carried out [18]. Most of the respondent had no history of trauma (87.8%) and pain increased during the use of computer (53.4%) and maximum respondent (46.1%) didn't know any other physical problems, This study also revealed that 48.9% visited doctor and 51.1% did not, 41.7 % of the respondent did investigation and 58.3% did not and most of the respondent (45%) didn't know about any others physical problem and more of the respondent (35%) didn't take any types of self-treatment , more of the respondent (62.2%) didn't know about health hazard and more of the respondent (67.7%) didn't take any preventive measure. There was statistically significant association between age with daily use of computer where P value was 0.045 which was less than 0.05 and age with taken preventive measure during computer use where P-value was 0.038 which was less than 0.05 and sex with educational status where P-value was 0.012 which was less than 0.05 and sex with years used computer where P- value was 0.006 which was less than 0.05 and educational status with information about health hazard of computer use where P-value was 0.015 which was less than 0.05 and daily used of computer with severity of pain where P- value was 0.007 which was less than 0.05, these findings were supported by a study [19]. Years of computer usage and types of pain where P-value was 0.042 which was less than 0.05 and traumatic history with nature of pain where P = 0.025 this number is lower than 0.05. There were also

statistical highly significant relation found between sex with occupation where P = 0.000 which was below than 0.05, and same types of association found in marital status with years of computer use where P-value was 0.000 which was less than 0.05 and educational status with occupation of the respondent where P-value was 0.000 which was less than 0.05 and educational status with daily used of computer where P-value was 0.000 which was less than 0.05 and occupation with years used computer where P-value was 0.000 which was less than 0.05 and occupation and daily used computer where P-value was 0.000 which was less than 0.05 and control of computer with types of computer use where P-value was 0.000 which was less than 0.05 and visit to doctor with pain investigation where P-value was 0.000 which was less than 0.05

Conclusion

This study come to an end that computer users hurt from dissimilar types of musculoskeletal disorders (MSDs) in neck and upper extremity for regularly use of computer and expose to different risk factors for long period of time. Used of computer in different abnormal position and prolong time continue computer work such as keying of long time without break or rest, forceful strike of keyboard, prolong bad posture work, maintain or carry on same position for long time , work without back support, work with anxiety & depression. This condition in all country of the world and it is growing rapidly. If this condition is continue for long time, country will fall in different problem such as Health and economic problem.

Recommendation

Based on the study findings the following recommendations are made with view to prevent and minimize the musculoskeletal disorders and set up adjustable accessories of computer desk of computer workstation through occupational health and safety services.

A. Recommendation for program implication

1. There will be a consensus among employers that computer related MSDs are a major problem leading to adverse health and economic consequences.

2. Because of the multi-factorial nature of MSDs an effective approach to deal with computer-related MSDs.

3. The computer workstation should be designed in such a way that it will fit the computer users in their works.

4. Awareness and knowledge about repeated stress injury.

5. There needs to focus on health planning and health education for computer users.

6. The following precautions should be followed during computer usage:

a**.** Practice some physical exercise regularly, such as- Stretching exercise

b**.** Maintain correct posture, such as back and neck should be straight

c**.** Use back and neck support during computer work

d. To use adjustable height of monitor, keyboard and mouse.

e. To use comfortable and adjustable chair.

f**.** Take rest during working time.

g. To reduce brightness of the monitor and increase front size more than 100%.

h. Keep the mouse and keyboard at the same level

i. Prefer mouse than mouse pad.

j. Avoid gripping the mouse too tightly, it is always recommended to hold lightly and click gently.

Compliance with Ethical Standards

Acknowledgement

The authors are grateful to all participants who provided assistance throughout the study.

Disclosure of conflict of interest

All authors contributed to the development of the study concept, the development of the study materials, and the interpretation of the results. There was collaboration among all authors. Collected and analyzed the data and wrote the manuscript. As a result of all authors reading and approving the final version of the manuscript, a consensus was reached on the order in which the authors should be presented.

Reference

1. Idowu Bayo, Ogunbodede Eyitope & Idowu Bimbo. Information and Communication Technology In Nigeria: The Health Sector Experience, Journal of Information Technology Impact.2003; 3(2): 69-76.

2. Rufus A. Adedoyin, Bimbo O. Idowu, Rotimi E. Adagunodo & Peter A. Idowu Musculoskeletal Pain Associated With The Use Of Computer Systems In Nigeria. The Internet Journal of Pain, Symptom Control and Palliative Care. 2004;3(2):1

3. D M Rempel, N Krause, R Goldberg, D Benner, M Hudes, and G U Goldner A randomised controlled trial evaluating the effects of two workstation interventions on upper body pain and incident musculoskeletal disorders among computer operators. Occupational and Environmental Medicine 2006; 63: 300-306.

4. N Yasmin, MFA Bhuiyan & S Lahiry . Work-Related Musculoskeletal Disorders among Computer Users, the 9th Southeast Asian Ergonomics Conference. 22 to 24 October 2008; Bankok. Thailand.

5. Mst Halima Khatun, Pradip Sen Gupta & Md Monowarul Hoque (2015), Proportion of Neck Pain and its Associated Risk Factors among Office Workers in Dhaka City. European Academic Research. 2015; 2(11)

6. Marta Gomez-Galan, Jose Perez Alonso, Angel Jesus Callejon Ferre & Javier Lopez. Musculoskeletal disorders: OWAS review.2017;55(4):314–337

7. Stanley M Maduagwu, Rebecca DW Maijindadi, Kunaba I Duniya, Adetoyoje A Oyeyemi, Ismaila A Saidu and Bukola J Aremu**.** Prevalence and Patterns of Work-related Musculoskeletal Disorders among Bankers in Maiduguri, Northeast Nigeria, Journal of Occupational Medicine & Health Affairs. 2014;2(169)

8. Dr. J S Prakash, Dr. Varun Singh, Dr. J Prakash, Dr. Shiraz Bhatty &, Dr. Anit Deane (2014) Computer Usage and Musculoskeletal Disorders [MSD's]. Journal Web med Central dic. 2014;5(1)

9. Sharma R. Epidemiology of Musculoskeletal Conditions in India. New Delhi, India: Indian Council of Medical Research (ICMR). 2012

10. Akinbinu TR and Mashalla YJ. Impact of Computer Technology on Health: Computer Vision Syndrome. Academic journal.2014; 5(3):20-30

11. Mishra M, Srivastava AK, & Srivastava VK. Prevalence and risk of musculoskeletal pain in rural homemakers of North India. Med J DY Patil University.2017;5 (10):138-42

12. S Arun Vijay. Work related musculoskeletal health disorders among the information technology professionals in India: A prevalence study. Int. J. Mgmt Res. & Bus. Strategy 2013;2(2)

13. Gintare Kaliniene   Ruta Ustinaviciene, Lina Skemiene, Vidmantas Vaiciulis and Paulius Vasilavicius, Associations between musculoskeletal pain and work-related factors among public service sector computer workers in Kaunas County, Lithuania, BMC Musculoskelet Disord.2016;17:420.

14. Rajagopal V, Rosli RM, Rintai P, Rustim M, Benadus. Usai W. The Prevalence of Computer Related Musculoskeletal Pain among College Students: A Cross Sectional Study American Medical Journal. 2012; 3 (1): 33-36

15. Md R Amin, Sarder M Hossain, Sumaiya Zabin Eusufzai, Sunam Kumar Barua and Nafij Bin Jamayet. The Prevalence of Computer Related Musculoskeletal Disorders among Bankers of Dhaka City. Chattagram Maa-O-Shishu Hospital Medical College Journal, 2016;15 (1):40-44.

16. McLean L, Tingley M, Scott RN and Rickards J. Computer terminal work and the benefit of micro breaks. Journal of Applied Ergonomics. 2001; 32:225–237

17. Oha K, Viljasoo V, Merisalu E. Prevalence of Musculoskeletal Disorders, assessment of Parameters of Muscle Tone and Health Status among Office Workers. International Scientific Conference Biosystems Engineering.Tartu, Estonia.2010; 8(1):192 - 200

18. Paula T Hakala,   Lea A Saarni,   Raija-Leena Punamäki,   Marjut A Wallenius,   Clas-Håkan Nygård and Arja H Rimpela Musculoskeletal symptoms and computer use among Finnish adolescents pain intensity and inconvenience to everyday life: A cross sectional study. BMC Musculoskeletal Disorders. 2012;13(41):1186-1471

19. Schlossberg EB, Morrow S, Llosa AE, Mamary E, Dietrich P, Rempel DM. Upper extremity pain and computer use among engineering graduate students. 2004;46(3):297-303.