Cervical Spondylosis among Group of Computer Users in Erbil City

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ABSTRACT

Background and Objectives: Neck pain due to poor posture, if neglected for long time, can lead to development of the cervical spondylosis. This study was designed to analyze the relation between symptoms and signs originating from the cervical spine and the duration of computer use.

Methods: A comparison of a group of male subjects who work on computer with those who do not work on computer whose ages range between (30 - 50) years was done for liability of cervical spondylosis. Any subject whose BMI is more than 25Kg/m2 was excluded. Likewise any subject with recognized evidence for predisposition to develop spondylosis was excluded.Employee from different establishments in Erbil City (200 Subjects), over a period of six months from January / 2008 were included in the study.Ninety nine subjects who use computer and hundred and one non-computer user. Subjects were subdivided into: First group: Computer user. Second group: Non-computer user. In both groups the duration of occupation ranges between four to sixteen year and hours of working/week range between (22-32 hours). The (99) subjects who work on computer each of them was evaluated for computer work station and asked about his posture during use of computer and asked if he takes a break time when he work for long hours.The difference between comparable subdivisions of the studied subjects was tested by the Chi-square test concerning the frequency of spondylosis in each of them.

Results: Cervical spondylosis was statistically significant among those who use computer ($P< 0.05$).

Conclusions: Long term use of computer with bad posture and with out break time increase liability for developing cervical spondylosis in comparison of (same age group, same duration of occupation ,and same hours of working) but not using computer. Proper posture and take a break time when using computer for long time is necessary.

Key words: Cervical spondylosis, computer users.

INTRODUCTION:

Cervical spondylosis, which involves degenerative changes in the cervical spine, including sponyloarthrosis, apophyseal joint osteoarthritis, and disc degeneration, is extremely common. It is estimated that (90) percent of males over the age of 50 and (90) percent of females over the age of 60 have radiographic evidence of degeneration in the cervical spine not necessary symptomatic[1]. Radiographic of the cervical spine observed in 25 percent of individuals by age 50 years[2,3]. Three overlapping syndromes can result from spondylitic osteophytic neural or vascular encroachment: nerve root compression (radiculopathy), spinal cord compression (myelopathy), and vertebral artery compression (Lee and Bennett, 2002)[4]. The cause is unknown but may be accelerated by trauma, overuse, or genetic predisposition. In many cases, this degenerative process remains

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others, symptoms develop spontaneously or after postures involving sustained extension or flexion[5]. Degenerative changes appear early in the life in the cervical spine, often during the (third decade). The condition in fact may never attract attention, but unfortunately in many cases symptoms do occur, sometimes being triggered off by minor trauma[6]. Accumulated micro trauma causes changes in subchondral bone that likely affect the ability of a joint to absorb the force of impulse loading, thus leading to degeneration of cartilage. This factor may account for occupational osteoarthritis[(7)]. Micro trauma can result from postural position (e.g., poor ergonomics such as prolonged computer use) An exaggerated dorsal kyphosis (round back) places the head ahead of the center of gravity increasing the cervical lordosis .The weight of the head in this position is borne by the zygopophyseal joints (facets) and causes pain[8]. Clinically neck pain is diffuse and may radiate to the shoulders, occipital area, or the interscapular muscles. Physical examination may reveal midline tenderness and pain at the limit of motion with extension and lateral flexion[9]. Osteoarthritis of cervical spine resembles osteoarthritis elsewhere in the body. Findings include osteophytosis, joint space narrowing, subchondral sclerosis, and subchondral cyst formation[10,11]. Years ago, work-related musculoskeletal injuries industrial settings were most commonly found in the lumbar spine. However, modern industrial design has changed this. The neck and shoulders now appear to be the critical area for injury and discomfort[12]. A number of occupational factors have been identified as probable causes of ergonomic illness including awkward and / or static posture, repetitive, prolonged trunk or upper limb intensive activities such as clerical workers (e.g., computer users)[13].

Aim of this study: To evaluate the following points:

1. Explore the relations between symptoms and signs originating from the computer.
2. The effect of workplace station on cervical spine because discomfort and pain in the neck region are related to computer work that lasts for long period with poor ergonomic organization.

SUBJECTS AND METHODS:

The present study is a comparative study between a group of male employee who use computer with those who do not work on computer for frequency of clinical and radiological evidence of cervical spondylosis. The period of data collection was six months, started at the first of January 2008 to June 2008.The different establishments in Erbil city were visited for collection of subjects. Co-operative Kurdish male employee subjects, (30-50) years old from different establishments (two hundred subjects) group of them use computer and other group not using computer constituted the source of the sample of subjects included in the present study. Data were obtained from participants including: The name, age, address, computer working or not, No. of hours working / week, and duration of occupation in years. Each subject was weighted while wearing light cloths and the height was measured without shoes. Plain X-ray antero-posterior (AP) and lateral view for cervical spine was done with search for evidence of spondylotic changes as: A. Anterior and/or posterior osteophytes formation. B. Disc space narrowing. C. Vertebral body sclerosis. The X- ray analysis was done by a senior radiologist. Finally, C-reactive protein **(**CRP**)**, rheumatoid factor (RF), serum uric acid, and erythrocyte sedimentation rate (ESR) were done. Subjects were subdivided into two groups those who use computer and those did not use computer. Both of groups are further subdivided according to **(**age, duration of occupation and hours of working / week. Diagnosis of cervical spondylosis was in accordance with the clinical and radiological manifestation. The diagnosis of spinal osteoarthritis (OA) should be

apophyseal joints, and not only disk degeneration. Symptoms of spinal (OA) include localized pain, referred pain (occipital, between the shoulder blades, upper limbs), and stiffness[14, 15,16]. Exclusion Criteria:

1. Any subject with body mass index (BMI) more than 25 kg /m^2 (i.e. over weight). BMI calculated by following equation BMI = (weight kg / height m^2) according to authors [17].Obesity one of the factor in the etiology of the degenerative disease[18].
2. Subject having history of previous trauma. History of trauma to neck predispose to cervical spondylosis[19].
3. Those with known history of inflammatory disease and positive CRP or positive Rheumatoid factor or raised serum uric acid more than 7mg/dl according to (Davidson's,2002) normal range for male between (2.0-7.0)mg/dl or ESR value more than that calculated by following equation ESR= [age (year) / 2] according to (John et al, 2008) were also excluded. To rule out possible secondary cause for developing cervical spondylosis[20].
4. Those having congenital anomaly like cervical rib, which is one of the cause of nerve entrapments in upper limbs which present with varying features of brachial plexus compromise[21].

The verbal consent was obtained from all participants, all of them informed about the investigation required for the study requirement and the purpose of the study. The data have been processed by the use of statistical package of social science version 11 for windows (SPSS) software. The different groups and subgroups computed for statistical evaluation as the number and percent of affected by cervical spondylosis by utilizing the Chi-square test. The age factor, duration of occupation in years, and number of working hours / week also evaluated by Chi-square test for comparing those who use computer and those who do not use computer. Chi-square test (observed versus expected frequencies)[22].

RESULTS:

(subjects) divided into two main groups:1. Those who use computer 99 (subjects). 2. Those who don't use computer 101 (subjects). Both groups are subdivided according to:1- Age for four groups. 2- Occupation duration for three groups. 3- Time of working for three groups. The age groups of 99 computer users group and 101 non-computer users group shows in the (table 1).

Table (1): Age groups distribution of the study sample computer user group and non-computer user group.

Age group (years)	Computer users		Non-Computer users	
	Number	%	Number	%
30-35	25	25.25	25	24.75
36-40	25	25.25	25	24.75
41-45	25	25.25	25	24.75
46-50	24	24.25	26	25.75
Total	99	100	101	100

Table (2): The occupational duration groups distribution of the study sample computer user group and non-computer user group

Occupational duration (years)	Computer user		Non-Computer user	
	Number	%	Number	%
4-8	33	33.33	33	32.67
9-12	33	33.33	34	33.66
13-16	33	33.33	34	33.66
Total	99	100	101	100

The time working groups of 99 computer users group and 101 non-computer users group shows in the (table 3).

Table (3): the time working groups' distribution of the study sample computer user group and non-computer user group

Time working (Hours / week)	Computer user		Non-Computer user	
	Number	%	Number	%
22-24	33	33.33	34	33.66
25-28	33	33.33	34	33.66
29-32	33	33.33	33	32.67
Total	99	100	101	100

Over all comparison of cervical spondylosis frequency between computer users (99) subjects (30) (30.30%) of them had cervical spondylosis and non-computer users (101) subjects (18) (17.82%) of them had cervical spondylosis shows that statistically significant difference among those who computer users as compared with those who non-computer users. (P < 0.05 which is significant) as show in (Figure 1).

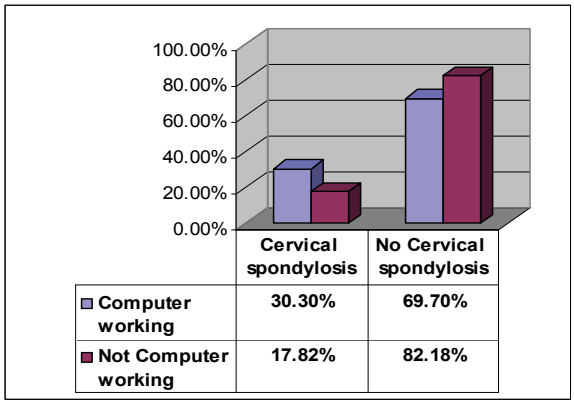


Figure (1): Overall comparison of cervical spondylosis frequency between computer user and non-computer user.

On splitting each group to four subgroups according to age ,and comparison each subgroup between two main groups computer users and non-computer users the difference was not significant for age groups [30-35, 36-40, 41-45] (P > 0.05) , but for age group [46-50] was significant (P < 0.05) as show in (Figure 2).

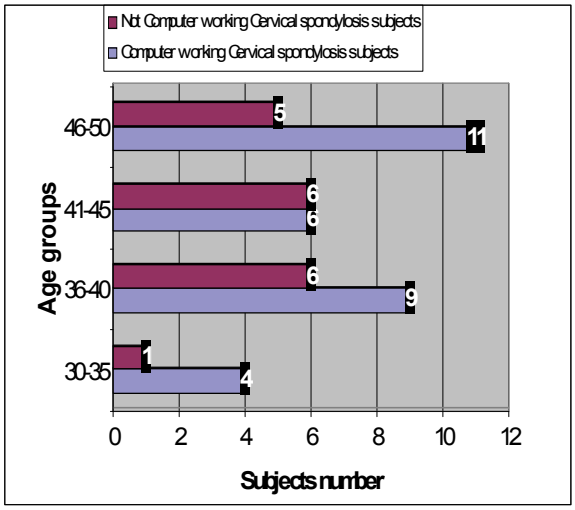


Figure (2): Comparison of cervical spondylosis frequency between computer user and Non-computer user according to the age group.

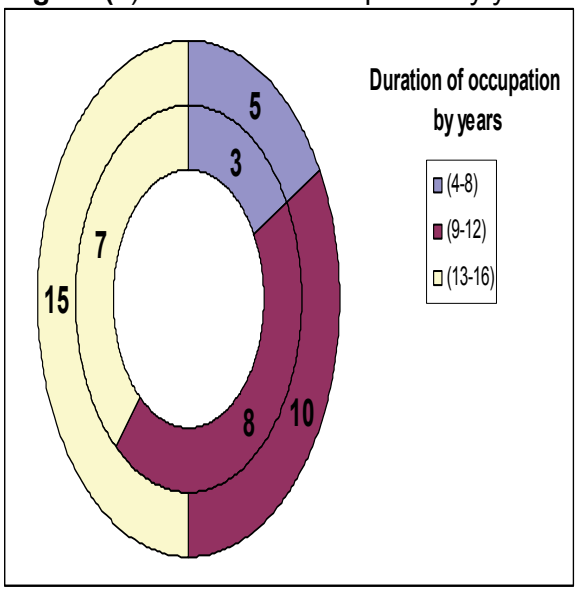
While the effect of age factor on cervical spondylosis frequency in two main groups computer user group and non-computer user group separately found that statistically not significant for both group (P > 0.05) (Table4).

Table (4): The effect of age on cervical spondylosis frequency in computer users and non-computer users groups.

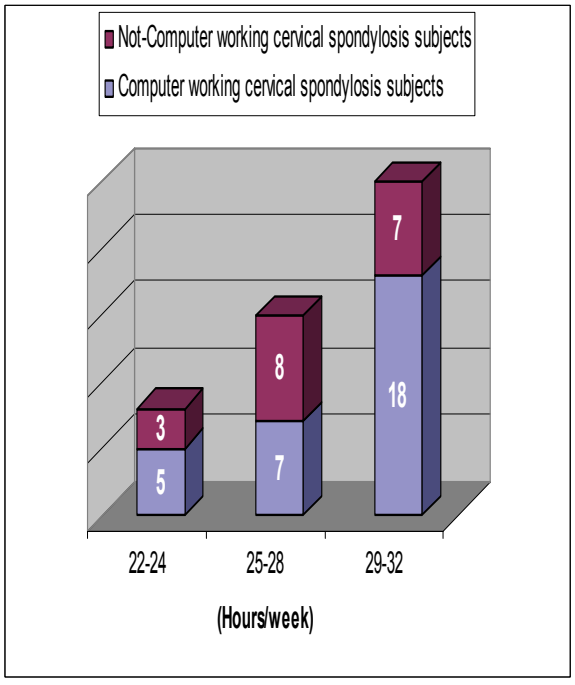
Subgroups	Age (30-35) years Cervical spondylosis %	Age (31-40) years Cervical spondylosis %	Age (41-45) years Cervical spondylosis %	Age (46-50) years Cervical spondylosis %	P-Value
Computer user	4.04	9.09	6.06	11.11	p>0.05
Non-computer	0.99	5.94	5.94	4.95	p>0.05

On comparison the frequency of cervical spondylosis according to the duration of occupation after dividing to three subgroups, found that the rate is higher with increase the duration of occupation. But statistically this increase in the frequency of cervical spondylosis was significant for the duration [13-16] years only ($P < 0.05$) ,while the result was not significant for the duration [4-8 and 9-12] years ($P > 0.05$) (Figure 3) Comparison of cervical spondylosis frequency between computer user and Non-computer user according to duration of occupation.

Figure (3): duration of occupation by years.



On comparison the frequency of cervical spondylosis according to the time of working (hours/week) when it was subdivided in subgroups found that whenever the time increase the statistical result become significant as shows in (figure 3,4) .Working time (hours /week) between (22-24 and 25-28) the result was not significant ($P>0.05$) while working time between (29-32) the result was



significant ($P < 0.05$).

Figure (4): Comparison of cervical spondylosis frequency between computer working and Non-computer user according

But when the frequency of cervical spondylosis according to duration of occupation evaluated for computer user group and non-computer user group each one alone found that the frequency of cervical spondylosis significantly related to duration of occupation in computer user group ($P < 0.05$) in contrast to non-computer user group ($P > 0.05$) (Table5).

To see the relation of time of working with the frequency of cervical spondylosis in computer user group and non-computer user group, each group evaluated alone. The result came like that significant among computer user ($P < 0.05$) , but not significant among non-computer user ($P > 0.05$) (table 6).

Table (5): The effect of duration of occupation on cervical spondylosis frequency in computer users and non-computer users groups

Subgroups	Duration of occupation (4-8) years Cervical spondylosis %	Duration of occupation (9-12)years Cervical spondylosis %	Duration of occupation (13-16)years Cervical spondylosis %	P-value
Computer user	5.05	10.10	15.15	P<0.05
Non computer user	2.97	7.92	6.93	p>0.05

Table (6): The effect of time working on cervical spondylosis frequency in computer users

Computer user or not	Time working (hours/week) 22-24 Cervical spondylosis %	Time working (hours/week) 25-28 Cervical spondylosis %	Time working (hours/week) 29-32 Cervical spondylosis %	P-value
Computer user	5.05	7.07	18.18	P<0.05
Non-computer user	2.97	7.92	6.93	p>0.05

and non-computer users groups.

DISCUSSION:

Neck pain due to (early spondylosis) is common in people whose occupation require persistent awkward head and neck postures[23]. Studies indicating that neck complaints are more than other complaints in the upper extremity in computer users such as study which was done by Shahla Al-Tayeeb, *et al*,[24]. Other one which was done by Lisińskip, *et al*,[25] found that many cases of discomfort and ultimately pain in the neck region are connected with computer work that last too long with poor ergonomic organization. In most studies which were done concentrate only on increase rate of neck complaints among computer users without explain the cause of these complaints. This study was done to find subjective evidence to explain this common neck problems among computer users. The studied sample of subjects has been selected with the aim to exclude most, if not all, recognized predisposing or risk factors of cervical spondylosis as much as possible for allowing conduction of the study it self, evident predisposing causes were excluded, and risk factors were avoided to a large extent. Exclusion of subjects older than (50 years) was dictated by the increase prevalence of cervical spondylosis in such age according to(1) it estimated that 90% of male over the age 50 have radiographic evidence of degeneration in the cervical spine and exclusion of subjects younger than (30 years) was because the spondyoltic changes in cervical spine due to aging process start normally from this age and above according to(26) degenerative changes appear early in life in the cervical spine often during the third decade. To make groups compatible as much as possible (age, duration of occupation, and time working (hours / week) all had been matched. The evidence from the study showed a significant effect of computer working for predisposing to cervical spondylosis (Figure 3,1). The persistent awkward head and neck posture during effect on the cervical spine and it will precipitate more cervical spondylosis which can be regarded as occupational risk factor to computer working due to repeated micro -trauma. Micro trauma can result from postural position such as computer working[6], and according to accumulated micro trauma causes changes in subchondral bone that likely affect the ability of a joint to absorb the force of impulse loading, thus leading to degeneration of cartilage . This factor may account for occupational osteoarthritis[16]. Furthermore, to see the risk of age in correlation with computer working the result optioned for comparing age subgroups between computer working group and non-computer working group found that it was significant for age group (46-50)years (Figure 3,2), but not significant for other three subgroups this mean their is two risk factors in this age subgroup (computer working as occupational risk factor for cervical spondylosis and age as aging process factor). One of the risk factor for work-related musculoskeletal disorders awkward and extreme postures e.g., computer working(27). Clinical and radiographic surveys suggest that the over all prevalence rise from about(1%) in people younger than 30 years to almost(10%) of those aged 40 and greater than (50%) in individuals older than age 60 years(28). Age and increasing number of years on the job are usually highly correlated. Age is a true confounder with years of employment, so these factors must be adjusted when determining the relationship to work (29). To see if the age alone gives same result as above statistical analysis for both groups computer working and non-computer working for age factor each group evaluated separately found that the result was not significant for both groups (Table 3,4). This explained that the aging process alone cause increase in the rate of cervical spondylosis but statically not significant. Regarding to duration of occupation by years comparison was done

was significant, but it was not significant for other two groups between (4-8 and 9-12) years (Figure3.3).This show that with increasing the duration of occupation the cumulative effect of working years on computer lead to increase the rate of cervical spondylosis among computer users. Then to know whether the duration of occupation give same consequence for each group computer working and non-computer working in-dependent to each other statically found that the result was significant for computer users, but not for non-computer users (Table 3,5).This proved that when duration of occupation increase the frequency of cervical spondylosis increase among the computer users. Long duration working with poor ergonomic status cause more cervical spondylosis. This consistent with a study done by Hocking (30) among keyboard users employed by one large company ,Telecom Australia ,the 5-year cumulative incidence of 'repetition strain injury' between 1981 and 1985 was as high as 343 per 1000. Lastly, when analyses was done according to time of working (hours / week). The result of subgroups comparing was significant for group(29-32) hours/week, but not significant for both groups(22-24 and 25-28)hours/week (figure3,4). Then to more clarifying the effect of time working on computer comparison was done for each main group alone computer working and non-computer working group the result was found that statistically significant for computer working but not significant for non-computer working (Table 3.6). This mean the time spending in front of computer without breaking increase the frequency of cervical spondylosis and whenever duration increase computer users are more labile to develop cervical spondylosis. According to Deepak(31) 15-25% computer users worldwide are estimated to have repetitive strain Injury which is referred to a constellation of work-related disorders that is common in computer users, one of the common risk factor for that temporal profile

CONCLUSIONS & RECOMMENDATION :

1. The study has confirmed that during working on computer forward head posture, when maintained over along period of time, can have harmful effect on the cervical spine of the computer users.
2. Longer work periods without a break time and total weekly work hours appear to place workers at risk to develop cervical spondylosis.
3. For any workers in who forward head posture occurs as a result of jobs it is important to assess how this may be correct.
4 . Modification of potential ergonomic exposure is important to prevent musculoskeletal illnesses.

REFERENCES :

1. Eric L. Hurwitz. Epidemiology of cervical spine disorders. In Donald R. Murphy, DC, DACAN. . Cervical spine syndrome. Copyright by the McGraw-Hill Companies. Printed in the United State of America ; 2000. 5: PP117.
2. Gordon R. Bell and Jeffery S. Ross. Imaging of the spine. In John W. Frymoyer, M.S., Sam W. Wiesel, M.D. Editors-in-chief, Howards, William C. Lauerman. Scott D. Boden, Lawrence G Lenke. Associate Editors. The Adult and Pediatric Spine. 3rd edition. Lippincott Williams & Wilkins. Pheladelphia. Baltimore. New York. London. Buenos Aries. Sydney. Tokyo; 2004. 5(1):pp70.
3. Randall L. Braddon .Hand book of physical medicine rehabilitation. Sanders company. United States of America; 2004. 36: 509-510.
4. William J. Koopman, Dennis W.Bonlware,Gustavo R.Heudebert . Clinical primer of rheumatology. Lippincott Williams & Wilkins. A Wolters Kluwer company. Philadelphia. Baltimor. New York. London; 2003. 2:16.
5. Darlene Hertling, BS, RPT, Rondolph M. Kessler. .Management of common musculoskeletal disorders; 2006. 19:739.
6. Ronald McRe. Clinical orthopedic examination. 4th edition. Churchill livingstone.London. NewYork. Philadelphia.ST Louis.Sydeny.Toronto; 1998. 3:27.
7. Stephen A. Paget, Allan Gibofsky, J. D, John F. Beary, Manuel of rheumatology & out patient orthopedic disorder diagnosis & therapy, 4th edition. Lippincott Williams & Wilkins. Philadelphia. Baltimor. New York. London. Buenos Aries. Hong Kong. Sydney. Tokyo; 2006. 20:383.
8. Bryan j. óyoung, Mark A. Yong, Steven A. stiens.

9. John W. Frymoyer, M. S., Sam W.Wiesel. Editors-in-chief, Howards, William C. Lauerman, Scott D. Boden, Lawrence G. Lenke. Associate Editors. (2004).
10. David J. Sartoris. Musculoskeletal imaging. Copyright by Mosby-year book. Printed in the United State of America ; 1996. 3:120.
11. KV Krishna Das BSC MBBS. KV Krishna Das text book of medicine. 4th edition. Jaypee brothers medical publishers (P)LTD. New Delhi; 2002. 12(2):575
12. Donald R. Murphy, DC,DACAN. Cervical spine syndrome. Copyright by the McGraw-Hill Companies. Printed in the United State of America; 2000. 14:308, 17:410.
13. Rosemarie.Bowler, PH.D., M.P.H., James E. CONE, M.D., M.P.H. pational medicine secrets. Hanley & Belfus, INC./ Phladelphia; 1999. 24:153.
14. Dennis M.Marcgiori. Clinical imaging.2nd edition Elsevier's Health Science department in Philadelphia; 2005. 9:525-528.
15. Anthony S. Fauci, et.al. Editors. Harrison's rheumatology.16th edition. McGraw-Hill Medical publishing division. New York. 2006.
16. StephenJ. Mcphee, MaxineA. Papadakis , Lawrence M. Tierney. Current medical diagnosis & treatment.46th edition. Medical publishing division. New York; 2007. 20:835
17. Thomas E. Andreoli. Cecil essentials of medicine 6th edition. Sanders company. United state of America; 2004. 59:549
18. David E.Brown, Rondall D., Neumann.. Orthopedic secrets.1st edition. Hanley & Belfus , INC. Phladelphia. Mosby st. Louis. Baltimore. Boston.1995.
19. Dennis L.Kasper, William Ellery, Anthonys. Fuci, Stephenl. Hauser, Robert A., Danl. Longo, MD,J. Larry Jameson, EUGENE Braunwald. (2005)
20. Allen R.Myers. Medicine.4th edition. Lippincott Williams &Wilkin.Philadelphia. Baltimor. New York. London; 2001. 10:584
21. Margit L. Bleecker, and Thomas C. Bruff, M.P.H. .Nerve entrapments. In Rosemarie. Bowler, PH.D., M.P.H., James E.CONE ,M.P.H.(1999).
22. Wayne W. Daniel. Biostatistics.8th edition. Jon Wiley & sons in the united states of America; 2005. 12:569
23. Alan J.Hakim, Gavin P.R. Clunie, Inam Haq. Oxford hand book of rheumatology. 2nd edition. Oxford university press; 2006. 2:20
24. Shahla Eltayeb; J.Bart Staal; Janneke Kennes; Petra H.G. Lamberts; Rob A.de Bie (2007). Prevalence of complaints of Arm, neck and shoulder among computer.
25. Lisińskip, Sklepowiczk, strylaw. Computer work as a cause of neck pain. Orthopedic traumatology rehabilitation; 2005. 7(2): 204-8 www.Pubmed.com.
26. Jonthan Dropkin, M.S.P.T.C.I.E. and Ellen Kol ber, M.S , M.A., O.T.R., C.H.T., C.I.E. Work related Musculoskeletal disorders: Ergonomic&treatment options. In Rosemarie Bowler, Ph.D., M.P.H.,James E.CONE,M.D.,M.P.H. Occupational medicine secrets. Hanley & Belfus, INC./ Phladelphia; 1999. 41:PP253.
27. William N. Kelley,s Haun ruddy, Edward D., Harris, clement B., Sledeg. Textbook rheumatology.5thedition.W.B.S.saunders company A division of harcourt Brace &company Philadelphia. London. Toronto. Motreal.Sydney; 1997. 16(2):1384.
28. English, C. J., Maclaren, W.M., Court-Brown C., Hughes, S. P. E., Porter ,R.W., Wallace, W.A. Relations between upper limb soft tissue disorders and repetitive movements work. American industrial hygiene association journal: 1995. 27(1): 75-90.
29. Hocking B. Epidemiological aspects of "repetition strain injury" in telecom Australia Med J Aust. Sep 7;147(5): 218-22. Cited in Pubmed; PMID: 1897. 3670169.
30. Deepak Sharan. Repetitive stain injuries. Bango lore. The Time's of India. November 2003. 22;52(7):2, www.deepaksharan.com.