Prevalence of Cumulative Trauma Disorders of the Upper Extremity and Identification of Risk Factors among Non-Medical Personnel in the University of the Philippines – Philippine General Hospital

Hiyasmine Dizon-Mangubat, Primavera B. Galinato and Jose Bonifacio S. Rafanan

Department of Rehabilitation Medicine,
College of Medicine and Philippine General Hospital, University of the Philippines Manila

ABSTRACT

Objectives. This cross-sectional study aimed to determine the prevalence of cumulative trauma disorders (CTDs) of the upper extremity among non-medical personnel of the University of the Philippines – Philippine General Hospital (UP–PGH) and to identify risk factors that may have contributed to their development.

Methods. A total of 87 participants from five different administrative divisions of the UP–PGH were included in this study. Three assessment tools were administered, namely: 1) symptom survey form, 2) Rapid Upper Limb Assessment, and 3) ergonomic workstation evaluation checklist.

Results. The study showed that the prevalence of CTDs of the upper extremity was 47.1%. The highest prevalence of CTDs was noted in the Budget division (75%), which was composed mainly of budget officers and clerks. The most common CTD identified was myofascial pain syndrome. Among the socio-demographic factors, only handedness was significantly related to the development of CTDs (p=0.022).

Conclusion. This study did not show a significant relationship between the identified risk factors and the development of CTDs. Awareness of the existence of CTD cases as documented in this study, however, should raise concern from the authorities to implement corrective measures to reduce or prevent CTDs and to improve the general health and thus, productivity of the non-medical personnel at the UP–PGH.

Key Words: cumulative trauma disorders, repetitive strain injury, occupational overuse syndrome, upper extremity, office workers, administrative personnel

Presented at the University of the Philippines – Philippine General Hospital Department of Rehabilitation Medicine Annual Residents' Research Forum, November 11, 2005, Philippine General Hospital, Manila. (3rd Place, Oral Paper Category)

Corresponding author: Hiyasmine Dizon-Mangubat, MD
Department of Rehabilitation Medicine
Philippine General Hospital
University of the Philippines Manila
Taft Avenue, Ermita, Manila, Philippines 1000
Telephone: +632 5548400 local 2403
Telefax: +632 5548494
Email: hiyasdizon@yahoo.com

Introduction

Cumulative trauma disorders (CTDs) are also called repetitive strain injury (RSI), occupational overuse syndrome, and repetitive motion syndrome. These are preventable disabilities caused by work tasks that are repetitive, causing body strain and eventual injury. Cumulative trauma disorders of the upper extremities include various conditions such as trigger finger, De Quervain's tenosynovitis, Dupuytren's contracture, carpal tunnel syndrome and other entrapment neuropathies, myofascial pain syndrome (MPS), shoulder impingement, adhesive capsulitis, ganglion cyst, and epicondylitis.

Many risk factors that contribute to the development of CTDs have been identified. Punnett and Wegman noted that the physical ergonomic features of work frequently cited as risk factors for musculoskeletal disorders include rapid work pace and repetitive motion, force exertions, non-neutral body postures, and vibrations.[1] Similar findings were noted in the study of Dane et al. in which office work-related upper extremity symptoms and disorders were associated with static work posture, repetition, and inadequate recovery in the anatomic structure of the neck and upper extremities.[2]

Ortiz-Hernandez et al. also identified certain tasks that were more predisposed to the development of upper extremity musculoskeletal disorders.[3] In this study, the authors noted that the use of a personal computer increased the risk of developing musculoskeletal disorders.

Minimizing exposure to the identified risk factors and environmental modification have been associated with a decrease in the incidence of CTDs. The study by Robertson and O'Neill showed that self-reported work-related musculoskeletal disorders were significantly decreased in the group who had a workplace change and had received ergonomic training compared with a workplace change-only group and a no-intervention control group.[4]

In the field of ergonomics, which is the study of the individual within the work environment, the occurrence of CTDs in the work force has received much attention in the past years due to its effects on productivity. Amell and Kumar stated that work-related musculoskeletal disorders

are of serious concern to many organizations, including industry, insurance, and healthcare.[5] These disorders are also of immediate concern to the workers and their families who are adversely affected by them. Work-related musculoskeletal disorders are a substantial source of economic drain to these organizations. Economic losses incurred are due to lost or decreased productivity, cost of medical treatment, and indemnity costs. It was reported that between 1991 and 1994, the yearly rate of CTDs increased by a factor of four, totaling to 332,000 cases. According to the Bureau of Labor statistics in the United States, the total cost to business for that year due to these conditions was US$10 billion.

Various methods have been used to investigate work places where upper limb disorders were reported. The Rapid Upper Limb Assessment (RULA) is used by the European Community Directive as a guide in the minimum safety and health requirements for work with display screen equipment. It is also used in the United Kingdom to help establish guidelines for the prevention of work-related upper limb disorders.[6] This tool requires no equipment in assessing the postures of the neck, trunk and upper limbs along with muscle function and the external loads experienced by the body. The workstation evaluation checklist is designed to help evaluate an existing workstation in order to identify possible ergonomic hazards and aid in the prevention of musculoskeletal disorders.[7]

This study aimed to investigate CTDs in the hospital setting but focused on the non-medical personnel who are not directly involved in patient care, such as secretaries, clerks, budget officers, administrative staff, and computer programmers. They provide the backbone of the work force to ensure the smooth operations of the hospital. While medical care can easily be accessed, these employees may not be aware of the existence of certain conditions which can impact their productivity. The University of the Philippines–Philippine General Hospital (UP-PGH) is the country's largest tertiary government hospital, having a significant number of non-medical employees. Identification of common preventable disease entities in such settings is of utmost importance. As such, the study was conducted in this institution.

The general objectives of this study were: 1) to determine the prevalence of CTDs of the upper extremity among non-medical personnel in the UP-PGH, and 2) to identify ergonomic risk factors contributing to the development of CTDs of the upper extremity.

Specific objectives were as follows: 1) to identify socio-demographic factors that may contribute to the development of CTDs, 2) to identify which division or specific job has the highest prevalence of CTDs of the upper extremity, 3) to identify which particular activity or activities in the work contributed to the development of CTDs of the upper extremity, 4) to identify environmental risk factors in the workplace that could contribute to the development of CTDs of the upper extremity, and 5) to demonstrate the impact of CTDs on productivity.

Methods

Study design

A cross-sectional design was employed in this study.

Subjects

The study was conducted from March to August 2005. The participants for this study consisted of adults, non-medical personnel of the UP–PGH, permanent and contractual workers, whose jobs mainly involved desk work and the use of the upper extremity. These job classifications include: clerks, administrative assistants, administrative officers, budget officers, communications equipment operators, data machine operators, computer programmers, human resource management officers, and records officers. There were five divisions in the UP–PGH which were included; namely, the Medical Records Division (MRD) in the Out-Patient Department, Information Systems Office (ISO), Public Assistance and Auxiliary Services (PAAS), Budget Services Division (Budget), and Personnel Services Division (PER). All of the personnel who were currently working in the said five divisions were included in the study.

Sample Size

The number of employees working in each of the five divisions during the study period were as follows: MRD (37), PER (22), PAAS (14), Budget Division (8), and ISO (6). All personnel who were currently working in these divisions during the study period participated in the study.

Study Procedure

Only one examiner evaluated each of the employees in the five different divisions. Prior to the evaluation, a consent form was secured from each participant. During the evaluation, a symptom survey form was accomplished by the participant to collect the pertinent socio-demographic data and to screen or determine the presence of musculoskeletal symptoms.[8] The participants were then evaluated while performing their work using the Rapid Upper Limb Assessment (RULA) to determine the exposure to risk factors of CTDs specific to their tasks.[6] The physical work environment was also evaluated by the same examiner using the ergonomic workstation evaluation checklist.[7] The symptom survey form, RULA, and ergonomic workstation evaluation checklist were used in full version and were not adapted to this study.

If there was note of any symptoms pertaining to possible presence of CTDs among the participants, appropriate diagnostic procedures such as electromyography – nerve conduction velocity (EMG-NCV) studies and radiograph studies were performed to document

the condition and to rule out other underlying causes.[9,10,11] Participants who complained of pain were also given etoricoxib 120 mg/tablet once a day for five days unless contraindicated. Patients who presented with symptoms were reevaluated after two weeks. Reasons for drop out were noted.

Outcome Measures

The presence of CTDs of the upper extremity was based on the symptoms reported by the participants in areas affecting the shoulder and scapula to the fingers.[9,10,11] These symptoms may include pain, numbness, tingling sensation, stiffness, cramps, and sensation of swelling, which were included in the symptom survey form.

The RULA was used to determine the risk of developing CTDs while performing specific tasks. This assessment tool was accomplished by the examiner to evaluate the posture of the neck, trunk and upper limbs, and the associated force and repetitions that may contribute to muscle fatigue. From the individual scores of the arm and wrist, and neck, trunk and leg analysis, a final score was computed based on the tables in the evaluation form. The final score served as a guide to prioritize subsequent ergonomic evaluations. A final score of 1 or 2 suggests an "acceptable" working condition during the time of evaluation. On the other hand, a final score of 3 to 7 indicates "unacceptable" working condition, suggesting that further investigation of the posture and workstation should be done; the higher the score, the more urgent the need to investigate and implement changes to the workstation in question.

The ergonomic workstation evaluation checklist assesses the work posture, seating, computer keyboard or input device, monitor, work area, and general work station. The examiner accomplished the checklist while observing the participants do their work. Any item with a "no" response indicated the presence of ergonomic hazards in the workplace and served as a guide to further intervention.

To demonstrate the impact of CTDs on productivity, the study also looked into the number of absences filed by the participants and the number of consultations made directly due to the presence of symptoms.

Data Analysis

For analysis of the socio-demographic data, frequency, percentage, mean and standard deviation were computed. The prevalence of CTDs in general was computed by dividing the total number of documented CTD cases by the total number of participants. The prevalence of CTDs per division was calculated by dividing the number of cases in a particular division by the total number of employees examined from that division. To determine the most common CTD, the frequency of a particular diagnosis was divided by the total number of CTDs identified.

Pearson chi-square test was used to determine the relationship between the socio-demographic factors, the RULA score and the risk for CTD, the ergonomic workstation evaluation checklist score and the development of CTD. To determine the relationship between handedness and the development of CTDs, Fisher's exact test was used. Logistic regression analysis was used to determine the relationship among the socio-demographic data, RULA scores and ergonomic workstation evaluation checklist scores, and the development of CTDs. The level of significance was set at $p<0.05$.

Results

Socio-demographic Factors and CTDs

A total of 87 participants were included in this study, consisting of 52 (59.8%) females and 35 (40.2%) males. Fifteen (42.9%) male participants and 26 (50.0%) female employees were noted to have CTDs. The age range of the participants was from 22 to 63 years old with a mean age of 39.3 years (± SD 10.8). Five out of 87 participants (5.7%) were left-handed, all of whom were diagnosed with CTDs. There were 28 participants (32.2%) who were single while the rest of the 59 employees (67.8%) were either married, separated or widowed. Thirteen out of 28 (46.4%) employees who were single had CTDs while 28 employees (47.5%) who were either married, separated or widowed had CTDs. In terms of years of work in the UP-PGH, 27 (31.0%) participants worked for less than five years, 17 (19.5%) from six to 10 years, 21 (24.1%) from 11 to 20 years, and 22 for more than 20 years. Those who worked for more than 20 years were noted to have the highest percentage of participants who had CTDs (54.5%). Seventy-six (87.4%) of the participants worked in the morning (AM) shift while the rest worked either in the afternoon or night (PM) shift. Each shift lasted from 8 to 8 ½ hours, and the majority of the participants worked five days a week. Those who worked in the AM shift were noted to have a higher frequency of CTDs with 36 cases (47.4%) as compared with those in the PM shift (45.5 %).

Among the socio-demographic factors identified, it was found that only handedness was statistically significant in the development of CTDs (Fisher's exact test = 5.827, $p=0.022$) (Table 1). Based on this study, employees with left hand preference were more susceptible to developing CTDs.

Prevalence of CTDs

Among the 87 participants, 47 (54.0%) were diagnosed to have CTDs based on signs and symptoms. Of these 47 participants, 41 (87.2%) were confirmed to have CTDs based on the diagnostic criteria provided for each of the identified CTDs,[9,10,11] while six (12.7%) failed to comply with the recommended diagnostic examination. Three (3.4%) of the participants were lost to follow-up because one had retired, one had resigned, and one was transferred to another department.

The most common CTD noted was myofascial pain syndrome (MPS) which comprised 26 cases (63.4%) of the total CTDs identified (Table 2). This was followed by trigger finger and De Quervain's tenosynovitis, each comprising 9.7% of all CTDs. Not all of the participants who presented with signs and symptoms of musculoskeletal disorder were diagnosed to have CTDs.

Prevalence of CTDs among Different Divisions

The highest prevalence of CTDs per division was noted in the Budget Services Division. Six out of eight (75.0%) personnel were diagnosed to have CTDs, mainly composed of budget officers and clerks (Table 3). This was followed by the Public Assistance and Auxiliary Section (57.1%) consisting of communications equipment operators and the Medical Records Division (51.4%) consisting of clerks and record officers.

RULA Scores and CTDs

In the RULA, the human body is divided into several subsets, namely, upper arm, lower arm, wrist, neck, and trunk. The wrist has a subcomponent labeled as wrist twist. Each of the subsets has a separate score which, when put together, will yield a final score. Those parts evaluated with a score of greater than 1 in each of the divisions are labeled as "not acceptable" activities or posture. The frequencies and percentages of participants with "acceptable" and "not acceptable" scores per body part were then compared with those participants who have and do not have CTDs. The scores in the wrist subset showed the highest percentage of participants with "acceptable" levels of activity and with diagnosed CTDs (52.9%). Also, this subset showed the highest percentage of participants with "not acceptable" levels of activity but without CTDs (54.3%). On the other hand, participants with "acceptable" upper arm scores showed the highest percentage of "no" CTDs (66.7%) while participants with "not acceptable" scores had the most number of CTDs (57.0%). Based on the distribution of the final scores of the participants, majority had 3 to 4 scores and only two had a score of either 2 or 6. These findings suggest that the majority of the activities of the participants, regardless of what division they belong to, warrant further investigation.

Analysis of the RULA scores in relation to the development of CTDs yielded no statistically significant relationship using Pearson chi-square test ($p>0.05$).

Ergonomic Workstation Evaluation Checklist Score and CTDs

The ergonomic workstation evaluation checklist was used to determine if the working area and work posture of the participants contributed to the development of CTDs. The items in the checklist were classified based on the body part to which they are targeted to evaluate such as the neck, back, arms, and general conditions of the working environment. Items that were given a "no" in the checklist were labeled as "not acceptable" working environment. The participants with the most number of "acceptable" scores and with the CTDs were evident in the back division (50.0%). Those participants with the highest percentage of "acceptable" scores and without CTDs occurred in the head division. Similarly, participants with the highest "not acceptable" scores and with CTDs were also seen in the head division. In contrast, those participants with the highest percentage of "not acceptable" scores but without CTDs were in the general division.

The results of the statistical analysis of the ergonomic workstation evaluation checklist scores and the development of CTDs showed no statistically significant relationship between the checklist scores and the development of CTDs among the participants using Pearson chi-square test ($p>0.05$).

Table 1. Association of CTDs and socio-demographic data

Variable	X^2	p-value
Age	0.727	0.867
Gender	0.428	0.513
Civil status	0.008	0.928
Section	4.873	0.181
Handedness	5.827	0.022*
Shift	0.014	0.905
Number of hours per day	0.280	0.597
Number of days per week	0.046	0.830
Years at work	0.807	0.848
Presence of symptoms	12.407	0.000

** Statistically significant ($p<0.05$) using Fisher's Exact Test*

Table 2. Distribution of confirmed CTDs

CTDs	Number of cases (N=41)	Percentage
Myofascial pain syndrome	26	63.4
Trigger Finger	4	9.7
De Quervain's Tenosynovitis	4	9.7
Ganglion Cyst	2	4.9
Carpal Tunnel Syndrome	1	2.4
Lateral Epicondylitis	2	4.9
Musculoskeletal Strain	2	4.9

Table 3. Distribution of CTDs per division

Section	Total no. of employees per division	CTDs			
		Without CTDs		With CTDs	
		No.	%	No.	%
Budget	8	2	25.0	6	75.0
ISO	6	4	66.7	2	33.3
MRD	37	18	48.6	19	51.4
PAAS	14	6	42.9	8	57.1
PER	22	16	72.7	6	27.3

ISO =Information Systems Office; MRD = Medical Records Division; PAAS= Public Assistance and Auxiliary Services; PER = Personnel Services Division

Relationship between CTDs vs. Socio-demographic Factors vs. RULA Scores vs. Ergonomic Workstation Evaluation Checklist Scores

Analysis using logistic regression was initially planned to determine if there is a relationship between the socio-demographic factors, the work activities of the participants (RULA score) and their work environment (ergonomic workstation evaluation checklist scores), and the development of CTDs. However, only one (handedness) out of 20 considered variables showed significant relationship with the development of CTDs. Thus, this analysis could not be done.

CTDs and Performance

The possible effect of CTDs on job performance can be seen by the number of absences due to the presence of symptoms or the number of days the employee was restricted in his job by either having a slower pace or avoidance of precipitating positions that would trigger the symptoms. Based on this study, it was noted that when symptoms of the CTDs occurred, seven out of 11 (63.6%) employees preferred to be absent from their work for no more than three days (Table 4). It was also noted that when affected employees became symptomatic, 11 out of 21 (52.3%) employees reported that their activities were restricted mostly for three to seven days.

This study also investigated if employees with CTDs sought consult for their illnesses. Among the 41 employees who were diagnosed with CTDs,[9,10,11] only 22 (53.7%) consulted a physician for their illnesses prior to the study.

Table 4. Absences and job restrictions due to CTDs

No. of days	Absences (No. of Employees)	Restricted activities (No. of Employees)
< 3 days	7	8
3 -7 days	4	11
8-14 days	0	1
> 14 days	0	1
TOTAL	11	21

Discussion

In this study, only handedness from among all the socio-demographic factors investigated showed statistically significant effect on development of CTDs. This finding is supported by the study of Kucera and Robins that investigated how handedness is associated with the development of upper extremity cumulative trauma disorder.[12] In their study, the authors found that majority of participants developed CTDs ipsilateral to their hand preference.

In the present study, all of the employees with left hand preference were diagnosed with CTDs. This can be attributed to the fact that the tools and equipment commonly used in the office are designed mainly for right-handed persons, which can therefore increase the risk for developing CTDs among left-handed employees. Werner and Franzblau studied the effect of hand dominance on the median and ulnar sensory nerve action potentials and grip strength of active workers, and reported that the median and ulnar sensory nerve latencies did not differ between side to side among right-handed individuals.[13] However, among left-handed individuals, there was note of shorter median and ulnar latencies in the left hand. In another study, Taras et al. investigated the relationship between hand dominance and the risk for major hand injury.[14] Their findings suggest that left-handed individuals have a relatively higher risk of sustaining injury than right-handed individuals. The authors also suggested additional safety measures and redesigning tools and workstations to help decrease the incidence of serious hand injuries among those with left hand preference. Such a recommendation is noteworthy. However, in the setting where the present study was conducted, such a recommendation may be more difficult to implement primarily due to financial constraints.

The other socio-demographic data did not show statistically significant effect on the development of CTDs. This finding was also observed by Silvertsein et al. in a study on hand–wrist cumulative trauma disorders in the industry.[15] Their study revealed significant association between hand–wrist CTDs and high force, high repetition jobs. However, these associations were independent of age, sex, years on the specific job, and plant. Another study investigating the relationship of age to signs and symptoms of upper extremity impairment was done by Higgs et al.[16] The authors found that age and gender did not have a significant relationship with the presence of signs and symptoms. They concluded that older workers hired for general tasks in the workplace do not have increased susceptibility to CTDs.

In the present study, the prevalence of CTDs in the investigated population was 47.1%. In the United States, the prevalence of occupational disease is 10% to 20%, 56% of which are cumulative trauma disorders.[17] In the study conducted by Premalatha on work-related upper limb disorders in the Malaysian telecommunications industry, the author noted a prevalence rate of 31.2% among the subjects investigated.[18]

Myofascial pain syndrome was found to be the most common type of CTD in the current study. Early recognition and treatment of this diagnosis is important because when it becomes a chronic condition, MPS tends to be generalized and may be more detrimental to the individual and more difficult to manage.

Cumulative trauma disorders were noted to be most prevalent in the Budget Services Division. In this division, employees are responsible for the preparation of financial reports and control, distribution and allocation of funds, among others. Most of the employees' time is spent on writing or using the computer. On review of their responses to the ergonomic workstation evaluation checklist, most of

Figure 1. Seating device

Figure 2. Computer station

Figure 3. Telecommunications console

the respondents had unacceptable seating equipment (chairs) (Figure 1), inappropriate or unavailable document holders, and unsupported wrists while working at computer stations (Figure 2). Aside from the regular stress from their jobs, the staff were also faced with the general lack of funding from the institution to be able to procure the proper equipment for their workstations. The lack of proper equipment and the demands from work can add psychosocial stresses to the employees aside from the physical stress that they experience with their jobs and the less than ideal environment they are working in. Devereux et al. investigated the potential interaction between the physical and psychosocial factors that may increase the risk of symptoms of musculoskeletal disorders.[19] The authors reported that workers highly exposed to both physical and psychological workplace risk factors were more likely to report symptoms of musculoskeletal disorders. The contribution of psychosocial factors in the development of CTDs should also be explored to form a clearer picture of the risk factors responsible for the development of CTDs.

The division with the second largest number of CTDs was the Public Assistance and Auxiliary Services (PAAS) consisting mainly of communications equipment operators. The employees of this division are mainly involved in operating telephone consoles and facilitating telephone connections between the caller and the party called. On review of the evaluation of the division's environmental risk factors, it was noted that the division was evaluated to have keyboard or input devices rated as "unacceptable" due to lack of height and tilt adjustability, and wrist support (Figure 3). During the eight-hour shifts, the employees were only allowed to take a break twice, 15 minutes for snacks and 30 minutes for major meals. It was not feasible for the division to allow more frequent and longer breaks especially during peak hours due to lack of manpower. Johnson mentioned that rotating work schedules and work pacing in addition to an exercise program and proper tool design can improve productivity and promote wellness.[20] In the study by Gangopadhyay et al., the authors concluded that high repetitiveness, prolonged work activity and static posture for a prolonged period of time may be regarded as causative factors in the occurrence of CTDs.[21] The problem of manpower in this division should be taken into account in order to help prevent further occurrence of work-related illnesses and to improve productivity.

Evaluation of the RULA and ergonomic workstation checklist scores and their relationship to CTDs revealed no statistically significant associations. The main purpose of these evaluation tools was to provide the examiner with a screening tool to evaluate possible ergonomic risk factors that would lead to the development of musculoskeletal problems not restricted to the development of CTDs. The number of participants with possible musculoskeletal problems identified in this study may be underreported because only employees with confirmed CTDs were included in the statistical analysis.

Another limitation in this study was the difficulty in securing consent from employees to undergo EMG–NCV studies to document carpal tunnel syndrome.

Hagberg suggested that the use of terms such as "CTDs" or "repetitive strain injuries (RSI)" should be avoided.[22] In addition, he recommended that if the musculoskeletal symptoms and signs do not completely comply with the criteria for a particular disease, the examiner should choose an International Classification of Disease (ICD) label that focuses on the symptoms rather than the pathology. Macfarlane et al. also suggested the avoidance of the use of "CTDs" or "RSI" as these terms tend to imply a single etiology and fail to recognize the importance of psychosocial and other somatic factors that are also responsible for the development of musculoskeletal symptoms.[23]

Aside from the limitation in documenting CTDs in employees with suspected CTDs, there may have been a higher prevalence of CTDs if the employees from all the divisions in the administration staff of the UP–PGH who are mainly performing office or desk work, were also included.

Conclusion

The prevalence of upper extremity cumulative trauma disorders among the non-medical employees of five divisions of the UP-PGH was 47.1%. The highest prevalence of CTDs was noted in the Budget Services Division, composed mainly of budget officers and clerks. Among the socio-demographic factors investigated in the study, only handedness and the presence of musculoskeletal signs and symptoms showed significant relationship to the

development of CTDs. This study, however, did not show significant relationship between the identified environmental and task-related risk factors, and the development of CTDs. Awareness of the existence of CTD cases as documented in this study should raise concern among authorities to implement corrective measures to reduce or prevent CTDs and improve the general health and productivity of the non-medical personnel at the UP-PGH. Employees presenting with musculoskeletal symptoms that are likely to be work-related should be evaluated promptly so that the specific diagnosis can be determined before initiating appropriate pharmacologic or rehabilitation medicine treatment. A delay in diagnosis can be detrimental to the employee's health and would defeat the purpose of prevention.

Cumulative trauma disorders are preventable and treatable disease entities. Employers should be encouraged to be more aware of disease prevention to promote wellness and to improve productivity in the workplace. In the setting of the UP-PGH, improved productivity may translate to better public service to the health community.

Recommendations

It is recommended that further investigations on work-related musculoskeletal disorders include participants even with mere presence of musculoskeletal symptoms, rather than limiting the participants to those with diagnosed CTDs. Having each of the three evaluation tools performed by independent examiners may reduce bias in future studies. Future investigations should include evaluation of all the administrative sectors of the UP–PGH, such as those in the clinical departments, who also perform desk work and to include cervical and low back symptoms to have a more comprehensive scope of the problem of CTDs. Psychological and psychosocial factors such as the work load and amount of stress should also be investigated to have a more complete analysis of the risk factors contributing to the development of CTDs. Another limitation of this study is the lack of exclusion criteria; some of which could have been confounding factors in the development of CTDs. With regard to the assessment tools used, all of these were not adapted to the study which might have affected the applicability of the tools to the population being studied. The symptom survey form was not limited to upper extremity symptoms. As such, it was unable to elicit certain signs and symptoms of CTDs. The RULA, though an easy tool to use, required the evaluator to be very familiar with its use so that each movement of the body being observed is accurately documented. The ergonomic workstation evaluation checklist is specific for people who work with video terminal devices or computers. However, in the present study, not all the participants worked with computers; some questions were not applicable to them. Other diagnostic or assessment tools such as the Job Strain Index (JSI) can be used; aside from the posture, the JSI also considers the speed of work and the duration of task per day among other factors not considered in the present study. Finally, the participants should be evaluated more than once at different times during their shift in order to get a more accurate account of their activities and work cycle or to subject the employees to task analysis.

References

1. Punnett L, Wegman DH. Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. J Electromyogr Kinesiol. 2004;14(1):13-23.
2. Dane D, Feuerstein M, Huang GD, Dimberg L, Ali D, Lincoln A. Measurement properties of self-report index of ergonomic exposures for use in an office work environment. J Occup Environ Med. 2002;44(1):73-81.
3. Ortiz-Hernandez L, Tamez-Gonzalez S, Martinez-Alcantara S, Mendez-Ramirez I. Computer use increases the risk for musculoskeletal disorders among newspaper office workers. Arch Med Res. 2003;34(4):331-42.
4. Robertson MM, O'Neill MJ. Reducing musculoskeletal discomfort: effects of an office ergonomics workplace and training intervention. Int J Occup Saf Ergon. 2003;9(4):491-502.
5. Amell T, Kumar S. Work-related musculoskeletal disorders: design as a prevention strategy: A review. J Occup Rehabil. 2001;11(4):255-65.
6. McAtamney L, Nigel Corlett E. RULA: a survey method for the investigation of work-related upper limb disorders. Appl Ergon. 1993;24(2):91-9.
7. Ergonomic workstation evaluation checklist [Online]. 2005. Washington DC: Department of Labor (US); [cited 2005 Oct]. Available from http://www.osha.gov.
8. Cohen AL, Gjessing CC, Fine LJ, Bernard BP, McGlothlin JD. Elements of ergonomics programs. Cincinnati (OH): National Institute for Occupational Safety and Health (US); 1997 March. pp. 87-8.
9. Bloodworth D, Calvillo O, Smith K, Grabois M. Chronic pain syndromes: evaluation and treatment. In: Braddom RL, ed. Physical Medicine and Rehabilitation. 2nd ed. Philadelphia: W.B. Saunders Company; 2000. p. 943.
10. Silman AJ, Newman J. A review of diagnostic criteria for work related upper limb disorders. Manchester: University of Manchester Medical School, Arthritis and Rheumatism Council Epidemiology Research Unit; 1997. p. 45.
11. Cassidy C, Shubert S. Hand and wrist ganglia. In: Frontera WR and Silver JK, eds. Essentials of Physical Medicine and Rehabilitation. Philadelphia: Hanley and Belfus Inc.; 2002. pp. 164-5.
12. Kucera JD, Robins TG. Relationship of cumulative trauma disorders of the upper extremity to degree of hand preference. J Occup Med. 1989;31(1):17-22.
13. Wermer RA, Franzblau A. Hand dominance effect on median and ulnar sensory evoked amplitude and latency in asymptomatic workers. Arch Phys Med Rehabil. 1996;77(5): 473-6.
14. Taras JS, Behrman MJ , Degnan GG. Left-hand dominance and hand trauma. J Hand Surg Am. 1995;20(6):1043-6.
15. Silverstein BA, Fine LJ, Armstrong TJ. Hand wrist cumulative trauma disorders in industry. Br J Ind Med. 1986;43(11):779-84.
16. Higgs PE, Edwards DF, Seaton MK, Feely CA, Young VL. Age-related differences in measures of upper extremity impairment. J Gerontol. 1993;48(4):M175-80.
17. Melhorn JM. A prospective study for upper extremity cumulative trauma disorders of workers in aircraft manufacturing. J Occup Environ Med. 1996;38(12):1264-71.
18. Premalatha GD, Noor Hassim I. Work related upper limb disorders in telecommunication workers in Malaysia. Med J Malaysia. 1999; 54(2):247-56.
19. Devereux JJ, Vlachonikolis IG, Buckle PW. Epidemiological study to investigate potential interaction between physical and psychosocial factors at work that may increase the risk of symptoms of musculoskeletal disorder of the neck and upper limb. Occup Environ Med. 2002;59(4):269-77.
20. Johnson SL. Ergonomic hand tool design. Hand Clin. 1993;9(2):299-311.
21. Gangopadhyay S, Ray A, Das A, et al. A study on upper extremity cumulative trauma disorder in different unorganized sectors of West Bengal, India. J Occup Health. 2003;45(6):351-7.
22. Hagberg M. Clinical assessment, prognosis and return to work with reference to work related neck and upper limb disorders. G Ital Med Lav Ergon. 2005;27(1):51-7.
23. Macfarlane GJ, Hunt IM, Silman AJ. Role of mechanical and psychosocial factors in the onset of forearm pain: prospective population based study. BMJ. 2000;321(7262):676-9.