

Myofascial trigger point development from visual and postural stressors during computer work

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Abstract

The mechanism of musculoskeletal pain underlying low level static exertions, such as those experienced during computer work, is poorly understood. It was hypothesized that static postural and visual stress experienced during computer work might contribute to trigger point development in the trapezius muscles, resulting in myofascial pain. A study was conducted to observe the development of myofascial trigger points while 16 female subjects used a computer under conditions of high and low postural and visual stress. Trigger point development was monitored via expert opinion, subject self-report, and electromyographic activity. Only the high visual stress conditions resulted in greater trigger point sensitivity as reported by subjects and the myofascial specialist. Cyclic trends in median frequency of the EMG signal were assessed for the trapezius muscle. When high visual stress was combined with low postural stress condition there were significantly fewer cycles (1.6 cycles) as compared to the condition of low visual and low postural stress (2.8 cycles), and the condition of high visual and high postural stress (3.5 cycles). These significant differences between conditions were found for the right trapezius but not for the left. The findings suggest that high visual stress may be involved in the development of the myofascial pain response.

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1. Introduction

Musculoskeletal disorders (MSDs) continue to represent a major source of pain and discomfort as well as a significant source of lost workdays and workers' compensation costs. This trend has persisted despite changes in the nature of work driven by a shifting economic base. Over the past decade the manufacturing sector has shrunk in much of the industrialized world and the manufacturing that remains has shifted from heavy to light manufacturing. In addition, service sector jobs have become more prevalent as well as information-based tasks that have made computers virtually ubiquitous in

industrialized countries. The World Health Organization [43] estimated that over 60% of the North American workforce used computers. The percent of households in the United States with computers increased from 42% in December 1998, to 51% by August 2000.

Computer work often involves both physical and mental demands. Physical demands are characterized by low force exertions and static postures that are sustained for long durations [8]. Elevated shoulder postures, supported loads, prolonged static contractions and task duration have been identified as computer-related risk factors for neck and shoulder problems [9,21,17,38]. Sustained and repeated muscle activity such as stereotypic computer postures may be responsible for complaints of occupational muscle pain even at very low force levels [19].

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In addition to the physical demands of the job, muscle tension may increase as a subconscious reaction to a stressful situation. Muscle tension may arise from psychological factors or psychosocial stress factors [7]. Psychological factors such as job stress or mentally demanding work has been found to induce sustained muscle activation, particularly in the trapezius muscle [39]. Sustained muscle tension has been associated with the development of clinical disorders such as fibromyalgia [37] or myofascial pain syndromes [44].

Mental stress has been found in computer work [41]. Mental stress may increase the level of muscle tension beyond what is needed for postural stability and motor control of the task. Several studies have linked mental stress with visual discomfort [16,1,2]. Visual discomfort in computer workstations can arise from glare, inadequate lighting, poor screen resolution or text legibility, and flicker/refresh rates of the computer monitor.

Much of the load on the shoulder and neck during computer work, whether from postural or mental demands, can be classified as low level static exertions (LLSEs). LLSEs have been implicated as a risk factor for MSDs [40,34,12,32,42]. There is growing appreciation that the LLSE component imposed upon the shoulders during computer based work may be an important factor in MSD causality. However, little is known about this potential causal pathway.

Traditional ergonomic research has employed a load-tolerance model to understand how injuries occur. This model predicts an injury can occur if the load imposed upon a tissue exceeds the tolerance of that tissue. However, such load-tolerance logic may not apply to the LLSE situation because the muscle as a whole is not functioning near maximum capacity. Skeletal muscle is composed of different fiber types which may not be equally loaded in under low-exertion levels [33]. For this reason, other injury pathways should be considered.

One such pathway may involve myofascial trigger points (MTrPts). Neck and shoulder muscle pain have been attributed to MTrPts [36,31,28]. In particular, the trapezius muscle has been identified as a common site for trigger points [35]. Trigger points are small circular areas of hyperirritability and can be easily felt as small nodules within muscles and fascia [31]. They may contain multiple contraction knots within a taut band of skeletal muscles [36]. Each contraction knot comprises maximally contracted sarcomeres that are much shorter and wider than sarcomeres in normal muscle fibers [31]. Myofascial pain syndrome (MPS) is the term used to refer to the regional muscle pain that is caused by trigger points. Clinical characteristics of MPS include trigger points in a taut band of skeletal muscle, local twitch response, referred pain, restricted movement, weakness and autonomic dysfunction [15]. These symptoms resemble many of the MSD symptoms that result from LLSEs. It is possible that MPS may represent a pathway to pain associated with

LLSE tasks. MPS has been studied in the fields of dentistry [29], headache research [23,22,20,4,10], and physical medicine [6] but has been largely overlooked as a potential source of pain by ergonomists.

Despite the fact that MTrPts are “clearly an electrophysiological phenomenon” [15], little electromyography has been performed on the trigger points themselves in either the ergonomic or biomechanical literature. Although many EMG studies have been performed on the trapezius muscle, no studies have focused on trigger points. In a review of 74 EMG studies of the trapezius muscle, none had indicated that the surface electrodes were placed in the vicinity of known trigger points [25]. Furthermore, the exquisitely sensitive nature of trigger points posed a technical challenge for recording their electrical activity using traditional EMG methods.

An innovative technique that measured cyclic changes in EMG median frequency was pioneered by McLean and colleagues [26,27]. Spectral shifts to lower frequency have traditionally been attributed to fatigue of the entire muscle that is extrapolated from the electrode pick-up window. However, contemporary theories of muscle fatigue suggest that the load may not be uniformly distributed over all muscle fibers. Rather, some fibers, the so-called “Cinderella fibers” may be selectively overloaded [18]. In order to detect the EMG changes associated with these fibers, a different form of spectral processing was needed. McLean et al. [27] described cyclic trends in the median frequency of postural muscles while the subjects performed computer tasks. They suggested that the median frequency cycles may be due to regulation of motor unit recruitment in order to prevent fatigue. In a related study, they found that more cycles in the median frequency occurred when subjects were given microbreaks during computer work [27].

The purpose of this study was to examine the development of muscle pain and injury under LLSE task conditions. We hypothesized that postural factors, mental stress (represented by visual stressors), and their interaction might impact the development of trigger points. The study focused on MTrPts in the trapezius muscle during the type of low level static exertions that are associated with computer work. Trigger point development was monitored via electromyography (EMG) using frequency cycling, and established independently by responses of the test subjects and by objective evaluation by a myofascial specialist.

2. Methods

2.1. Subjects

Sixteen healthy women (mean = 22.8 years, range = 19–29 years) with no current history of upper extremity disorders were recruited by word-of-mouth

to participate in the experiment. They were selected to be touch-typists (either by self-report or a timed typing test) capable of at least 40 words per minute (wpm). Occupations included graduate and undergraduate students as well as working professionals. Subjects were paid \$50 upon completion of the last session. The experimental procedure was reviewed and approved by the University’s Human Subjects Institutional Review Board.

2.2. Experimental design

The independent variables were two levels of visual stress and two levels of postural stress. For the high visual stress condition (VH), a glare source was placed within the subject’s visual field during typing, and the contrast and brightness of the monitor were reduced. In the low visual stress condition (VL), no glare was present, and the brightness and contrast settings were at the highest level. Table 1 summarizes the high and low visual stress conditions.

Table 1
Description for high and low visual stress conditions

	Low visual stress (VL)	High visual stress (VH)
Monitor brightness setting	100/100	50/100
Monitor contrast setting	100/100	50/100
Luminance	58 cd/m ²	25 cd/m ²
Task light (glare source)	Off	On

Cd = candela.

Two postural stress levels, low (PL) and high (PH) were created by adjusting the height of the table, chair, footrest and monitor, and also the horizontal distance of the keyboard and monitor from the front edge of the table. The high and low postural stress conditions are described in Table 2 and depicted in Fig. 1.

Myofascial dependent variables consisted of the presence and severity of myofascial tension in the form of trigger points for the left and right sides of the upper trapezius muscle. A myofascial specialist (clinician) and the subjects independently rated the trigger points in terms

Table 2
Description of workstation elements

Workstation elements	Posture: low stress (PL)	Posture: high stress (PH)
Horizontal location of monitor	Directly in front of subject, at distance of 61 cm	At 45° to right side of subject at distance of 61 cm
Vertical location of monitor	Top of screen at eye level	Bottom of screen at eye level
Table height	At elbow height Elbow angle >90° Forearms fully supported, shoulders relaxed	Above elbow height Elbow angle <90° Forearms unsupported, shoulders loaded
Chair height	Knees and hips at same level; Knee/thigh angles ~90°	Knees higher than hips; knee/thigh angles <90°
Keyboard location	Away from front edge of table, to allow full forearm support	At front edge of table, no forearm or wrist support

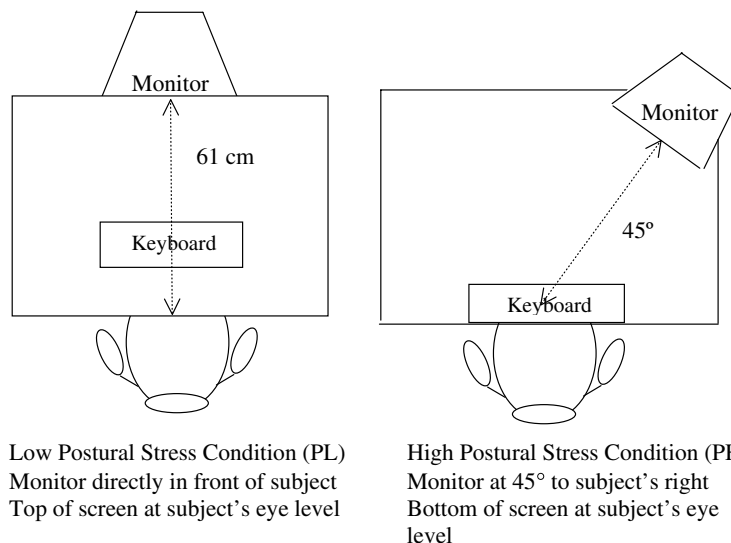


Fig. 1. Diagram of layout of computer workstation in low postural stress (PL) and high postural stress (PH) conditions.

of tenderness or pain, on a 0–5 scale. The specialist used the following trigger point rating criteria:

- 0 = no palpable nodule within muscle, no pain or discomfort with compression.
- 1 = palpable nodule within muscle, no pain or discomfort with compression.
- 2 = palpable nodule within muscle, discomfort but not pain with compression.
- 3 = palpable nodule within muscle, mild pain with compression.
- 4 = palpable nodule within muscle, distinct pain with compression but no referred pain.
- 5 = palpable nodule within muscle, distinct pain with compression, distinct referred pain.

The subject was asked to provide a verbal rating during palpation, with 0 = no pain at all, and 5 = worst imaginable pain. Ratings were taken before (pre) and after (post) each experimental session. A difference score (post–pre experiment ratings) was calculated for specialist and subject ratings.

The EMG dependent variables were cyclic changes in the median frequency. This was based on work pioneered by McLean and colleagues [26,27]. The current research utilized cyclic changes in median frequency in assessing the development of trigger points in the trapezius.

The subject's perceptions of fatigue or discomfort were obtained by a visual analog scale (VAS) questionnaire for neck or backache, and headache. The difference between the pre- and post-experiment responses was calculated for each question.

The study was a 2×2 repeated measures design with two levels of postural stress and two levels of visual stress. The order of testing was randomized. The four test conditions were conducted on different days with a minimum separation of two days to minimize carryover effects between conditions. Whenever possible, subjects were tested at approximately the same time of day to minimize diurnal effects.

2.3. Apparatus

EMG data were collected from bipolar silver–silver chloride surface electrodes (In Vivo Metrics, Healdsburg, CA). The skin surface was prepared according to accepted EMG practice [24]. Electrodes were 12 mm wide with a 4 mm cavity that was filled with electrolytic gel to ensure good electrical contact with the skin surface. The center-to-center spacing was approximately 3 cm, with each electrode pair bracketing the ink marks overlying the trigger points. Electrodes were placed over the trigger points on both left and right trapezius muscles (Fig. 2). Adhesive collars were used to attach the electrodes to the skin. The resistance of the electrodes

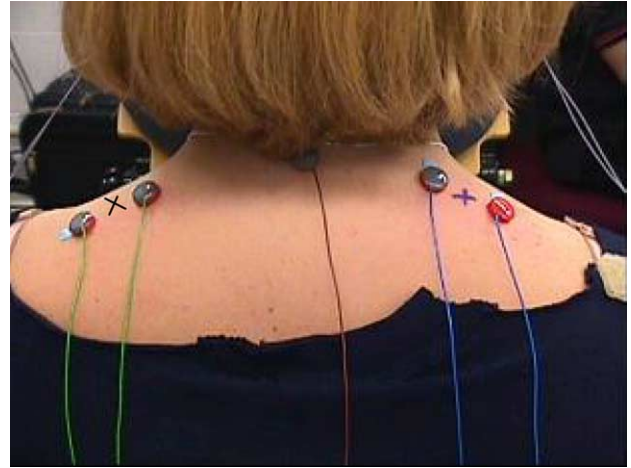


Fig. 2. Placement of surface electrodes over trapezius muscles. The X on the subject's shoulders denotes the trigger point locations marked by the myofascial specialist.

was tested with an ohm-meter to ensure good electrical contact with the skin surface.

The sampling rate for EMG data collection was 1024 Hz, with a 60-Hz notch filter, 15 Hz high-pass filter and 500 Hz low-pass filter. The data were recorded quasi-continuously during the experiment and stored on a computer for later analysis. Due to limitations of some of the software programs used to process the data, it was necessary to collect and save EMG data in 1 min increments before proceeding with additional data collection. This process usually required less than 5 s, after which the next data collection period immediately began.

The keyboard was placed on a height-adjustable table and a height-adjustable footrest was used as needed to establish the subject's knee/thigh angles according to the test condition. The computer display (NCR 3001) was placed on a separate stand that was vertically adjustable in 2.54 cm increments. The brightness and contrast settings of the display were easily changed by control buttons on the front side. The glare source was a 75 W incandescent task light, positioned immediately above the computer display and directed towards the subjects' eyes.

2.4. Myofascial screening procedure

An experienced myofascial specialist (DH) performed a myofascial screening immediately before and after each experimental session. This screening included manual palpation of trigger points in the upper trapezius muscle fibers (in the region approximately midpoint between 7th cervical vertebrae (C7) and the acromion). During manual palpation of each trigger point, the subject was asked to rank the intensity (tenderness/painfulness) on a scale from 0 (no pain) to 5 (greatest

imaginable pain). The myofascial specialist also ranked the trigger points on a 0–5 scale, based on his assessment of muscle fiber tautness and the subject's "jump" response to pressure or palpation. The locations of the trigger points were marked by ink marks to aid in electrode placement. All detected trigger points were released by a combination of percussion, stretch and relaxation techniques. The screenings typically lasted 10–15 min.

Although the trapezius muscle was the main focus of the experiment, from a postural perspective, the presence of trigger points in other muscles may interact with the trapezius through synergistic or agonist-antagonist actions. For this reason, any trigger points in rhomboid, levator scapula, sternocleidomastoid, scalene and deltoid muscles were released in addition those in the trapezius. In this manner, the subject was free of existing trigger points at the beginning of the experiment, had full range of motion and no pain or muscle tightness in the major neck and shoulder muscles.

2.5. Experimental task

A commercial typing program (Typing Tutor V, Pearson Software, CA) was used to present the target text on the computer display and the subject's task was to type the text as accurately as possible. The subject's typing appeared directly below the target text; this arrangement obviated the need for hard copy and minimized the amount of head turning that is normally associated with hard copy. It also created a static neck posture since the subject's head remained in a fixed position relative to the display.

2.6. Procedure

Subjects were shown the experimental workstation, given a brief explanation of the research objectives, signed a consent form approved by the university's Human Subjects Committee and completed the pre-experiment VAS questionnaire. Subjects then changed into a test shirt with shoulder cutouts to provide easy access to the trapezius muscle.

The display location and height, chair and table height, keyboard location, task light, and footrest position were adjusted according to the subject's anthropometric dimensions and the experimental condition to be tested that day. Dimensions of the workstation elements were measured and recorded. Subjects then went to a separate room for pre-experiment evaluation by the myofascial specialist. In order to minimize bias in the specialist's evaluation of trigger point sensitivity, he was blinded to the experimental condition. The specialist assessed the level of myofascial tension and trigger point sensitivity as described above. The skin overlying the trigger points in the upper trapezius

was marked with ink. Following the trigger point ratings by specialist and subject and release of trigger points by the specialist, the subject returned to the experimental room.

The electrodes were affixed to the trapezius muscles, with each electrode pair bracketing the ink marks made by the specialist. After the electrodes had been affixed, the subject was seated at the computer workstation, the electrodes were connected to the preamplifiers, and the typing experiment began. Each subject typed continuously for approximately 32 min, following the typing protocol described above. At the end of the typing session, the post-experiment VAS questionnaire was administered. The electrodes were then removed, the skin was cleaned, and the subject returned to the other room for post-experiment evaluation and trigger point release by the myofascial specialist.

2.7. EMG analysis

Fast Fourier transforms (FTT) were performed on the EMG data in 1 s epochs for all of the data files. This yielded the median frequency for each epoch. Then running means of the median frequencies for 100 consecutive epochs were determined, with a 99-epoch overlap (1 epoch sliding window) between successive running means calculations. Although the data collection period lasted about 32 min, the 100-epoch running means calculations represented approximately 30 min of data, due to the elimination of the final 99 s of data.

The running means were graphed for each subject and each condition, for a total of 64 graphs. Each graph was analyzed manually for median frequency cycles. Changes in median frequency of at least 5 Hz but less than 30 Hz either upward or downward, followed by a reversal (i.e. change in median frequency in the opposite direction) of at least 5 Hz were classified as "cycles." This criterion was based on work by McLean and Tingley et al., [26,27] who attributed changes of 5 Hz or more to changes in conduction velocity rather than firing rate.

2.8. Statistical analysis

A repeated measures analysis of variance (ANOVA) model was used to test the main and interactions effects of vision and posture for each dependent variable. Paired *t*-tests were used to test the mean of each condition against each of the other conditions, for a total of six pairwise comparisons per variable. Due to the exploratory nature of this study, no corrections were made for the multiple statistical tests. Significance levels (α) of 0.05 and 0.10 will be reported, with the later referred to having lower significance.

3. Results

3.1. Trigger points

The post-experiment examination by the myofascial specialist revealed that trigger points had re-developed under many of the experimental conditions, despite being released prior to the experiment. There was good agreement between the specialist and subject ratings of trigger point sensitivity across all conditions, with the correlation coefficients ranging from 0.72 to 0.96. The correlation coefficients were statistically significant for all conditions for both the left and right trapezius muscles.

The VH/PL and VH/PH conditions resulted in differences in MTrPt development when the pre- and post-condition status was compared. The VH/PH condition showed significant increases in trigger point ratings from pre- to post-experiment in both left and right trapezius as rated by both the subject and the myofascial specialist (Table 3). The VH/PL condition also resulted in greater MTrPt pain after exposure to the condition. The VH/PL condition also showed statistically significant differences

Table 3

P-values from paired *t*-test comparing pre- to post-experiment trigger point sensitivity ratings, by specialist and subjects, for left and right trapezius, for the four conditions

Pre- vs. post-experiment trigger point ratings	Conditions			
	VL/PL	VL/PH	VH/PL	VH/PH
<i>Specialist rating</i>				
Left	0.2369	1.0000	0.1380	0.0034 ^a
Right	0.5090	0.5104	0.0047 ^a	0.0140 ^a
<i>Subject ratings</i>				
Left	0.2930	0.6667	0.0978	0.0038 ^a
Right	0.3070	0.3225	0.0040 ^a	0.0165 ^a

^a Significant at 0.05.

in MTrPt development between pre- and post-exposure for the right trapezius muscle but not in the left trapezius muscle. The VL/PL and VL/PH conditions did not exhibit any significant differences in MTrPt sensitivity between the pre- and post-experiment measures. It is interesting to note that the conditions associated with high visual stress (VH) generally resulted in greater MTrPt pain.

Fig. 3 shows the average difference in trigger point sensitivity (DiffTrPts) for the left and right trapezius muscles between all conditions, as rated by both the myofascial specialist and the subjects. The figure indicates that VH/PL had significantly more post-experiment pain when compared to the VL/PL condition for the right trapezius muscle. In addition, the major difference in response occurred when the experimental condition involved high visual stress (VH) compared to low visual stress (VL).

3.2. EMG median frequency cycling

The number of cycles recorded in the right and left trapezius muscle is presented in Table 4. The greatest number of cycles was seen in VL/PL and VH/PH, representing the best and worst conditions, respectively. In contrast, the two intermediate conditions (VH/PL and VL/PH) showed fewer cycles. In the right trapezius, the significant differences occurred between VL/PL and VH/PL, VH/PL and VH/PH, and VL/PH and VH/PH. There were no significant differences between any of the conditions for the left trapezius.

4. Discussion

This study showed that trigger points can develop in the upper trapezius during the type of low level exertions

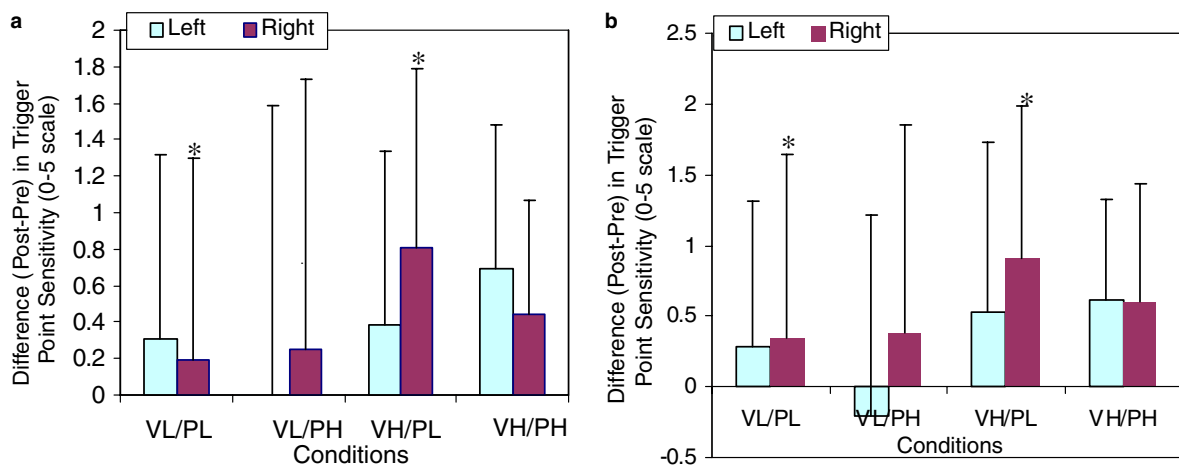


Fig. 3. Ratings of DiffTrPt (post-pre experiment difference) in trigger point severity, 0–5 scale as rated by: (a) the myofascial specialist and (b) the subjects (* significant at 0.10). Post hoc tests indicate significant differences between VL/PL and VH/PL for the right muscle in (a) and (b).

Table 4
Mean and standard deviation (SD) for number of cycles in the median frequency, by condition, for left and right trapezius muscles

	VL/PL	VL/PH	VH/PL	VH/PH
<i>Left trapezius</i>				
Mean	3.53	2.97	2.31	3.44
SD	4.27	4.06	1.78	4.99
<i>Right trapezius</i>				
Mean	2.8	2.5	1.63	3.5
SD	2.37	2.66	1.71	3.35
	A	B	A	B
			C	C

For right trapezius muscle only, conditions with the same letters (A, B, C) differ significantly from each other ($\alpha = 0.05$). There were no significant differences between any of the conditions for the left trapezius.

found in computer work. There was a noticeable interaction between the visual and postural stressors. It was expected that high postural demands would lead to the development of trigger points. However, to our surprise, only the conditions associated with high visual stress resulted in an increase in trigger point development regardless of the postural stress. Of particular interest was the VH/PL condition. This condition yielded the greatest difference in pre- vs. post-experiment trigger point development for the right trapezius muscle. This finding was unexpected since the PH conditions would be expected to stress the right trapezius muscle to a far greater degree than the PL condition. This suggests that some interactive effect occurs when visual stress is high and postural stress is low. Hence, it appears that visual factors may play a major role in trigger point development during computer work.

The VH/PH condition also resulted in significant developments of MTrPts. However, when high postural demand was combined with high visual demand, trigger point development was seen in *both* the right and left trapezius muscle, further indicating a complex interaction between visual and postural stress.

One might question how visual stress could result in sufficient musculoskeletal stress so as to initiate trigger point development. The visual stressors of glare and poor screen resolution as defined in this study may have imposed greater cognitive processing demands by making it hard to read the text on the screen. Since the task required the subjects to first read, then type the text, greater mental concentration was required in order to complete the task objectives. Mental concentration has been shown to increase muscle co-contraction [11] which would increase tension in the muscle tissue and presumably increase the chances of trigger point development. Hence, trigger points might present a feasible pathway to explain how low level stress results in musculoskeletal problems. Monitoring of trigger points presents a plausible means to monitor the effects of both physical and cognitive (specifically psychosocial) work demands.

We had hypothesized that EMG signals recorded over the MTrPt would enable us to quantitatively monitor the development of trigger points. We had assumed that the muscle contracture at the site of the MTrPt would fatigue the motor neurons and result in a reduction of median frequency cycling as described by McLean and Tingley et al. [26,27]. By comparing the conditions in which MTrPts were reported and the EMG cycling we were able to confirm that less frequency cycling occurred under the VH/PL condition. However, the same association did not hold for the VH/PH condition. In fact, no significant differences in median frequency cycling in the right and left trapezius muscles were observed among the VL/PL, VL/PH, and VH/PH conditions. Thus, here again, it appears that some complex interaction is at work under the VH/PL condition that is distinct from high postural demands alone. One possibility is that some other mechanism of MTrPt development occurred under the VH/PH condition. It may be the case that subjects compensated for the combination of high visual and postural stress by constantly cycling muscle recruitment patterns. Further analyses indicated that the VH/PH condition was the condition in which the fewest subjects exhibited no frequency cycling whatsoever.

This study also lends support for the theory that even exertions of low force levels can damage muscles. Muscle pain developed in the form of trigger points as a result of visual and postural stressors at a computer workstation that imposed LLSEs on the trapezius. VH/PH had the greatest number of cycles in the median frequency of the EMG of the right trapezius. It may be that the acute discomfort of this condition, with high levels of both postural and visual stress, caused the subjects to move more often than in the other conditions, thereby breaking up the static posture. This movement was not sufficient to overcome the deleterious effects of this condition, as evidenced by the greater post-experiment MTrPt sensitivity.

Collectively these findings suggest that trigger point may provide a useful explanation for muscle pain and injury that can occur from LLSEs. A potential pathway for LLSEs and trigger points is shown in Fig. 4. Myofascial pain is a complex type of chronic pain disorder [14]. MPS is reputed to be caused by activating factors such as muscle trauma, overload or repetitive strain [13,3,31]. Previous research had shown that biomechanical stress played an important role in the development of trigger points in the peroneus longus [30]. The current research has shown that work factors that result in muscle strain can play a role in the development of MTrPts in the trapezius muscle, a site of frequent complaints of muscle pain and discomfort in computer workers.

The concordance between the specialist's (clinical) and subjects' (subjective) ratings strongly suggests that

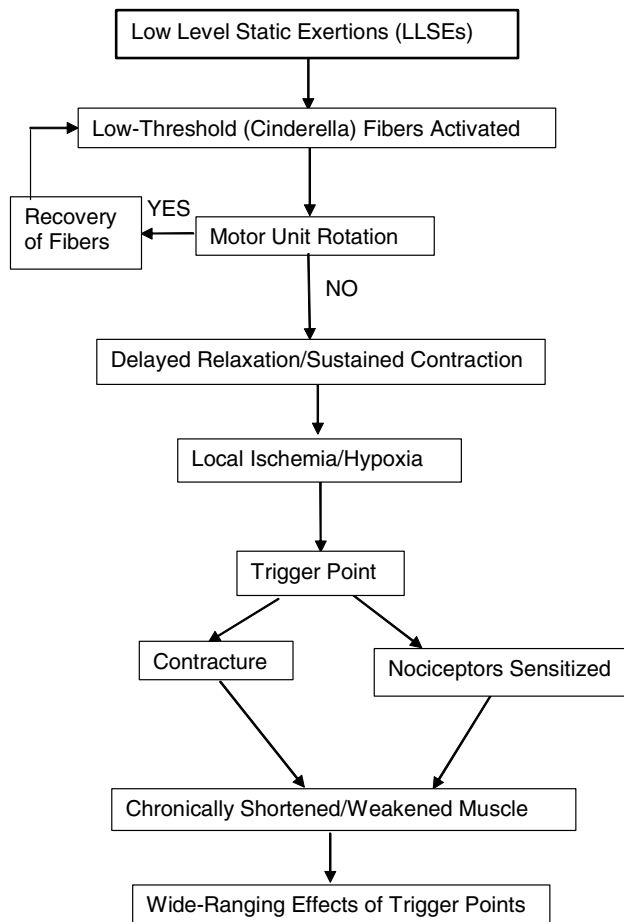


Fig. 4. Flow chart for LLSE injury mechanism.

both are tapping into the same underlying physiological phenomenon. This high correlation also rebuts some skeptics who charge that patients with MPS are engaging in pain magnification absent any clinical or objective evidence [5]. If both subjects and clinicians are equally capable of identifying trigger points, self-reports of trigger point development may be used in future studies without requiring the presence of an on-site myofascial specialist.

Finally, it is important to recognize the potential limitations in this study. Several issues should be considered when interpreting these findings. First, only one level of high physical load and visual load stress were presented and these loads may not be equal between dimensions. Thus, different levels of physical and visual loads might have resulted in different findings. Second, the level of exposure for these conditions was extremely short (30 min) whereas LLSE problems have been identified as chronic over long periods of time. Future studies might consider longer exposure periods. Third, a wider range of genders and ages in subjects might reveal some significant individual factor interactions in the development of trigger points.

5. Conclusions

This study demonstrated a relationship between visual and postural work demands, and trigger points. MTrPts developed after continuous typing for a time period as short as 30 min. In particular, the *interaction* of visual and postural stressors played a significant role in the formation of trigger points in the trapezius muscle. This represents a fundamentally new insight in the effect of visual factors on the musculoskeletal system.

MTrPt development may represent a potential pathway for understanding musculoskeletal disorders that are associated with LLSEs. Future work should focus on determining the exact nature of MTrPts through histological, biomechanical, and electromyographical means. This will further establish the understanding of MTrPts, how they develop, and lead to preventative measures. Visual factors and their influence on the musculoskeletal system should be explored in order to form a more comprehensive understanding of musculoskeletal disorders.

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