INTRODUCTION

Exposure to musculoskeletal loading at work depends on many factors, including tasks performed, workstation, equipment, technique, workload, and task-time organization (Wells et al, submitted). It is difficult to separate the effects of each factor on the overall level of musculoskeletal loading. Identifying tasks by time using the video record, allows for “chunking” of the electromyographic record by task, so the effects of a specific task can be identified. The goal of this paper was to test the ability of such a system to differentiate between tasks in an office setting even when these tasks are done within an environment of other tasks that may or may not be done simultaneously.

METHODS

Electromyographic (EMG) signals from thirty two participants were recorded bilaterally from sites overlying Extensor Carpi Radialis Brevis (ECRB) and trapezius on two different days. Participants worked at their regular jobs at their assigned workstations in a range of office jobs including clerical, administration, sales, finance and call center. RMS EMG was collected at 10 Hz using a commercially available portable system (ME3000P8, MEGA Electronics, Finland). Videotape of the participant at their workstation was simultaneously recorded. The EMG was started in the view of the camera and was later marked in the view of the camera to allow for synchronization of the EMG and video. The on/off times accurate to 0.1 sec for seven defined tasks were identified from the video using commercially available software (Observer Pro 4.0, Noldus Technology, Netherlands). After synchronizing the tasks and EMG in time, all samples of EMG corresponding to a particular task were concatenated together. If more than one task occurred at the same time, the EMG samples were added to all simultaneous tasks. The resulting EMG sample sets were described using APDF, and Gaps analyses (Jonsson, 1982; Veiersted et al, 1990). Statistical analyses for each output measure were done using a generalized linear model (SAS) with on/off state of a task, subject and day as independent variables.

RESULTS AND DISCUSSION

A significant increase in the 10th percentile static EMG level was recorded for time spent keying versus not keying for all muscles recorded (Figure 1). The gap time decreased significantly for both ECRBs. An increase in static EMG was also found for time spent using a mouse compared to not using a mouse, however that effect was most pronounced in the Right ECRB (Figure 2). It should be noted that all participants used their mouse on the right side. Peak EMG showed a significant decrease with mousing for most muscles (Figure 3). Combined with the results from the static analysis, these results suggest that mousing is associated with decreased resting time yet reduced peaks indicating a more constrained movement. It is important to remember that not mousing may indicate a range of office tasks at or away from the desk including tasks such as reaching that may require higher peak levels.

SUMMARY

Combining video and EMG over long term recordings in the workplace allows for differentiation of the muscle loading by task even within the context of the workplace where tasks may occur simultaneously and may switch frequently.

REFERENCES


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