THE EFFECT OF FOREARM SUPPORT ON EMG ACTIVITY OF THE UPPER EXTREMITIES DURING COMPUTER WORK: A CHAIR INTERVENTION STUDY

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INTRODUCTION

The use of computer keyboards has been linked to a number of musculoskeletal symptoms of the upper extremities. While proper workstation setup is a key element to reducing the risk of developing musculoskeletal disorders, the use of forearm support has been shown to increase comfort as well as to reduce the muscular load of the neck and shoulders [1]. Most of these results, however, are based on laboratory experiments or on studies where the arm support condition is compared with a "floating" or no-support condition. There is a need for further exploration of this topic, specifically whether workers use arm supports when provided and whether there is a greater benefit of a highly adjustable chair in comparison with an office chair with fixed arms height.

METHODS

Thirty five participants were recruited from a medical insurance call centre and randomly assigned into either a control or intervention group (16 control, 19 intervention). The intervention consisted of supplying the workers with a chair with adjustable (both vertically and horizontally) forearm supports and office ergonomics training, while the control group remained with their existing office chair which had fixed forearm supports. Each participant took part in two, one-hour observation sessions before and after the intervention. During each of the four observations, the subjects were videotaped from the frontal and sagittal views while doing their usual office duties. The video was analyzed using commercial software (Observer Pro 5.0, Noldus Technology, Netherlands) to determine when participants were keyboarding, using a mouse or performing other office duties as well as whether the participants were using chair forearm supports. RMS EMG was collected at 10 Hz using a commercially available portable system (ME3000P8, MEGA Electronics, Finland) from the trapezius and extensor carpi radialis brevis (ECRB) muscles bilaterally. Changes in the static level of APDF[2] were analyzed. A 2 (pre, post) x 2 (control, intervention) repeated measures ANOVA was performed.

RESULTS AND DISCUSSION

There was an increase in left armrest use for both groups post intervention (Figure 1), However there was a significant (p=.02134) interaction term indicating that there was a much greater increase in armrest use with the highly adjustable arm rests. While the associated levels of the static EMG reflect these changes, the results were not significant.

The results for the right side reflect the more complex activity that occurs in the dominant arm. There was a small but not significant increase in armrest use on the right side. However at the same time there was an increase in mouse use post intervention (Figure 2). These conflicting results may be responsible for the lack of significant changes in the static EMG in the right trapezius.

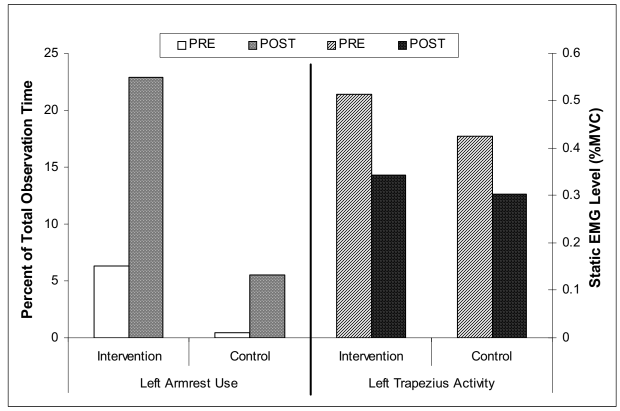

Figure 1. Left armrest use and associated static level EMG (left trapezius)

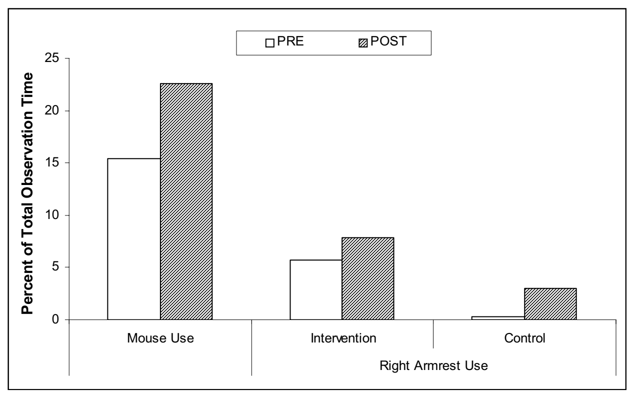

Figure 2 Mouse use (right hand) and Right Armrest use

CONCLUSIONS

Arm rest use on the left side in the workplace is significantly affected by chair design and training. However intervention use on the right is complicated by task changes. Further studies will isolate the EMG associated with arm rest use.

REFERENCES

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2. Jonsson B. *J. Human Ergl*. **11**, 73-88, 1982.