

The effects of workplace stressors on muscle activity in the neck-shoulder and forearm muscles during computer work: a systematic review and meta-analysis

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Abstract

Purposes

Workplace stressors may have a role in the development of neck and upper extremity pain by increasing sustained (low-level) muscle activity. Many, mainly experimental laboratory studies, report conflicting results in support of this hypothesis. Therefore, we aimed to summarize the effects of workplace stressors on muscle activity in the neck-shoulder and forearm muscles during simulated or realistic computer work by performing a systematic review and meta-analysis.

Methods

A systematic literature search identified studies investigating the relationship between simulated or realistic workplace stressors and neck-shoulder and forearm muscle activity. Included studies were published in English, German, or French as peer-reviewed full text papers, included data of healthy subjects, and reported on muscle activity (measured by electromyography) in the neck-shoulder or forearm muscles, during a simulated or realistic computer task with versus without induced workplace stressors. For these studies a risk of bias assessment was performed. Results of muscle activity data were pooled into a meta-analysis when possible.

Results

Twenty-eight articles met the inclusion criteria, reporting data from 25 different studies. All but one were conducted in the laboratory with simulated stressors. Data of 19 articles could be pooled and revealed a statistically significant, medium increase in neck-shoulder and forearm muscle activity as a result of workplace stressors (Hedges' $g=0.35$; $p<0.01$). The level of heterogeneity was high and significant ($I^2=80\%$, $Q=73.46$, $p<0.01$), indicating that underlying moderating variables were present within this group of experimental manipulations. All laboratory studies that were not included in the meta-analysis also reported increased muscle activity with induced stress, while this effect was not observed in the one study conducted in the field.

A sensitivity analyses revealed larger effects in studies with a higher risk of bias.

Conclusions

Simulated workplace stressors in laboratory settings resulted in increased neck-shoulder and forearm muscle activity. To test the effects of real workplace stressors on neck-shoulder and forearm muscle activity in a realistic work setting, future field studies need to be conducted. The large heterogeneity of the studies indicated that moderating variables were present within this group of experimental manipulations.

Therefore, it would be valuable to conduct further subgroup analyses and compare the effects of different types of workplace stressor and/or to examine the effects on muscle activity per body region (i.e. neck-shoulder and forearms).

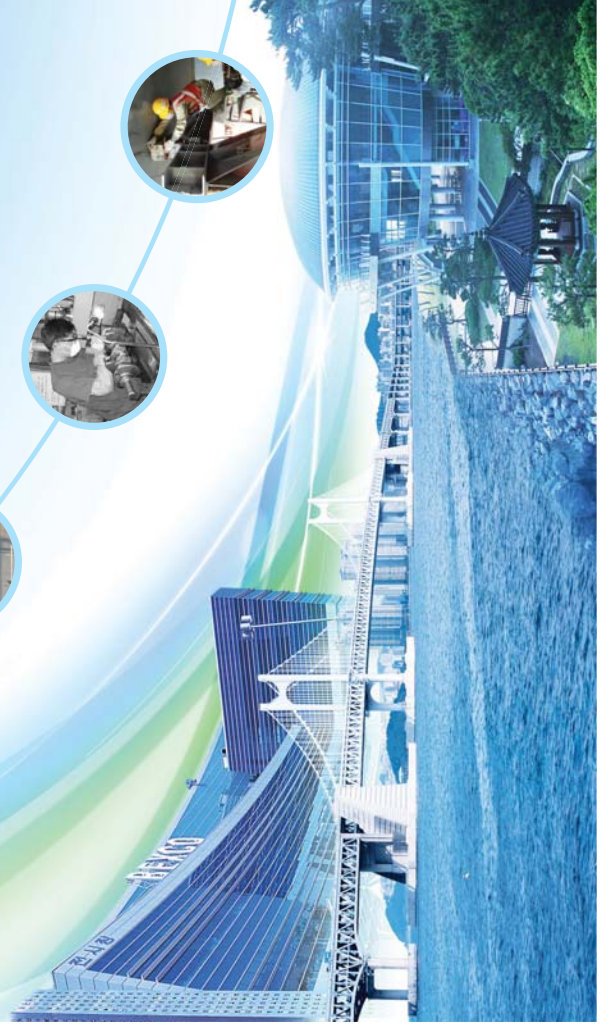
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ABSTRACTS



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