

THE COMBINED EFFECT OF REPETITIVE WORK AND COLD ON MUSCLE STRAIN AND FATIGUE

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Musculo-skeletal disorders cause considerable human suffering and financial losses. In epidemiological studies, both repetitive work and cold have been identified to be risk factors in the development of musculo-skeletal disorders. One reason to consider them as risk factors is that they can increase the strain of the working muscles and cause early fatigue. When exposure to those factors is frequently repeated, it may lead to overuse injuries and eventually musculo-skeletal disorders. To our knowledge, there is no information in the literature on the combined effect of low-intensity repetitive work and cold on muscle strain and fatigue. If they are additive, they may be a source of increased health risk. Thus, the purpose of this study was to evaluate and compare the amount of strain and fatigue caused by repetitive work in thermoneutral condition and repetitive work in cold condition. Eight healthy men volunteered as test subjects for the study. They were exposed once to 25°C (thermoneutral control) and 5°C. During the exposures the subjects performed six 20-minute work bouts, doing 10% maximal voluntary contraction (MVC) wrist flexion-extension repetitive work. During the work bouts the electromyogram activity from the wrist flexors was measured (indicating the strain of the muscles). In addition, their maximal wrist flexion force was measured (indicating muscle fatigue) every 20th minute. The results show that during repetitive work in cold conditions the strain of the working muscles is approximately 20% higher in comparison to work in thermoneutral conditions. In both conditions the forearm flexor muscles got fatigued. However, in cold condition the fatigue was almost twofold as compared to thermoneutral condition. In conclusion, when compared to thermoneutral condition, repetitive work in cold induces higher strain and higher rate of fatigue and in the long run may be considered as an increased risk for overuse injuries and musculoskeletal disorders.

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