

Use of biofeedback in occupational risk prevention

Jan Seghers, Hans Ponnet, & Arthur Spaepen
KULeuven, Department of Kinesiology
Laboratory of Ergonomics and Occupational Biomechanics
Leuven, Belgium

Abstract

Surface electrode EMG signals can be used to estimate muscle activity and even fatigue. In the present study, surface electromyography (sEMG) is used as a biofeedback training tool. The purpose of this pilot study is to investigate the usability of this method in real working environments and to study the effect of biofeedback on the neck-shoulder muscle activity.

Five female subjects (mean age : 42 years; mean height: 1.63 m; mean weight: 58 kg) participated in the study. Each subject received four training sessions on four separate days. Each session consisted of a Maximum Voluntary Contraction (MVC) and a sEMG biofeedback training. During the training the subjects performed their normal working tasks. Muscular activity of m. Trapezius pars descendens and the m. Deltoid pars anterior was measured with a portable surface EMG device.

Results indicate that surface EMG can be used as a biofeedback tool in occupational settings to reduce unnecessary muscular activity. The results also show beneficial effect of sEMG biofeedback on the neck-shoulder muscle activity.

Introduction

European studies provide substantial evidence that neck and upper limb musculoskeletal disorders (MSDs) are a significant problem with respect to ill health. Every year millions of workers in all types of jobs and employment sectors are affected by musculoskeletal disorders through their work (Agency report, 2000). Although precise figures are not known, estimates from Member States of the economic costs of MSDs range from 0.5% to 2% of Gross National Product (Agency report, 2000). Also, the problem is increasing as workers are more and more exposed to workplace risk factors for these disorders. Putz-Anderson (1988) postulates a 'risk model' for MSDs, based on the interaction of four main workplace risk factors: repetitiveness, forceful movements, awkward postures and lack of recovery. In the literature, additional risk factors such as vibrations, velocity and accelerations of movements are also mentioned (Colombini, 1998). Besides the work-related physical risk factors, there is also increasing evidence that psychosocial workplace stressors (i.e. low job satisfaction, low job control, etc.) are related to the development of musculoskeletal disorders of the upper extremities and low back (MacDonald *et al.*, 2001).

In D. de Waard, K.A. Brookhuis, J. Moraal, and A. Toffetti (2002), *Human Factors in Transportation, Communication, Health, and the Workplace* (pp. 335 - 341). Maastricht, the Netherlands: Shaker.