A method for risk assessment within Visual Ergonomics

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Introduction

Insufficient visual ability can lead to increased work load and contribute to eyestrain and musculoskeletal discomfort, since "the eye leads the body" (Anshel, 2005). It has been shown that visually demanding work, such as computer work, is associated with eye discomfort, headaches and muscle pains in mainly the neck and shoulders (Rosenfield, 2011).

Although the relation between eyestrain and musculoskeletal discomfort is not fully understood, studies have shown that straining the eyes increases the musculoskeletal activity in neck and shoulders (trapezius), and an association between visually demanding work, eye problems, headache and/or muscle problems have been found (Aarås et al., 2001; IESNA, 2011, Richter et al., 2008; Zetterberg et al., 2013). Problems due to insufficient visual ergonomics not only exist in computer intensive jobs, but in other professions as well. For example, surgeons and other surgical personnel that report eyestrain also report twice as much musculoskeletal discomfort from the upper part of the body (Hemphälä et al., 2011). In an intervention study among postmen, both eyestrain and musculoskeletal discomfort decreased after a visual ergonomic intervention. The intervention included providing customized eyeglasses and optimal lighting conditions (Hemphälä et al., 2012). Apart from health and well-being being affected by a poor visual ergonomic work environment, quality and productivity may also be reduced (Eklund, 2009).

The aim of this paper is to present the first version of a practical, easy-to-use, and time-efficient risk assessment method for visual ergonomics. The development of the method including the evaluation will also be described. With such a method, risk factors within the visual environment can hopefully be detected, and interventions implemented in order to reduce the prevalence of symptoms related to poor visual ergonomics among workers.

Methods

A first version of the method has been developed, mainly based on existing checklists and instruments (Colon et al. 1999; Børsting et al., 2008, Knave et al., 1985, Sheedy and Shaw-McMinn, 2002; Wilson & Corlett, 2005). During spring 2015, 30 ergonomists will be updated about visual ergonomics and introduced to the risk assessment method. Each ergonomist will thereafter use the method in 10 workplaces, yielding data and practical experiences from 300 risk assessments. These data will then be used to test the validity and reliability of the method, and if necessary to further develop it.

Results

The first version of the risk assessment method for Visual Ergonomics will be presented at IEA 2015, together with results from the approximately 300 risk assessments made by the ergonomists. So far, the factors included in the method are objective measurements such as illuminance, luminance contrast, uniformity values, expert assessment of the risk for glare, and subjective ratings of the visual ability, eyestrain and musculoskeletal discomfort.

Discussion

The presented method will be compared to other similar methods. The used method for development will be discussed in relation to validity and reliability. Finally the presented risk assessment method will be discussed in relation to usefulness in prevention of discomfort and work related disorders at work places.

Keywords: eyestrain, illuminance, lighting, glare, risk assessment

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