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Musculoskeletal discomfort and use of computers in the university environment

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ABSTRACT

This cross-sectional study investigated musculoskeletal discomfort and computer use in university staff, through the use of online questionnaires. Results showed a high prevalence of staff reported musculoskeletal discomfort during the preceding year (80%), with neck (60%), shoulder (53%) and lower back discomfort (47%) being the most common. Most believed discomfort was caused by work, although neck discomfort was significantly less in those reporting excellent mental health (OR 0.44, $p < 0.01$). Computer navigation was performed primarily by mouse (77%); however, using a touch pad increased the odds (OR 1.17, $p < 0.01$) of wrist discomfort and the belief it was caused by work (OR 1.19, $p < 0.01$). Few staff attended ergonomic training (16%) or requested workstation assessments (26%). However, high rates of staff reporting musculoskeletal discomfort sought professional treatment (range: 35.2% wrist/hand to 65.0% shoulder). Strategies are needed to address uptake of preventive measures and reduce reliance on medical treatments following musculoskeletal discomfort in universities.

1. Introduction

In Australian universities, the use of computers and electronic administration systems has increased exponentially in the last decade (National Tertiary Education Union (NTEU), 2009) leading to a marked increase in the number of hours academics and administrative staff spend on computers. Academic core activities of teaching and research are increasingly being conducted using computing software and the internet, and academics, as well as administrative staff, are sitting for long hours with potentially deleterious health effects. Prolonged computer use is recognised as an occupational risk factor for musculoskeletal disorders (Gerr et al., 2004). Whilst the association between musculoskeletal symptoms and increased hours of computer use, including mouse use has been previously studied within the general office environment (Klussmann et al., 2008; IJmker et al., 2007), there is very limited research specifically related to musculoskeletal symptoms associated with computer based tasks undertaken by academics in context with an extended range of operational environments. Academics are more likely to work in diverse operational environments, and therefore the relationships between their musculoskeletal symptoms and computer use may be different to what is observed in standard office environments (Gornall and Salisbury, 2012). Prolonged sitting at computers has also raised concerns about the impact of a lack of variation in working postures and activity on worker health and wellbeing (Straker and Mathiassen, 2009).

The rapid development in communication technologies, including the availability of smart phones, tablets and laptop computers, has provided opportunities for working away from the office workstation. This is increasingly commonplace among office workers (Ciccarelli et al., 2011). Academics have very variable work environments and use computers within offices, laboratories, at home and when travelling. They are expected to be 'mobile' and available to respond to queries, regardless of location. The expectation of availability outside of office hours has been identified as a concern for many professionals and a range of reasons for completing work at home has been identified, including working unpaid overtime to complete the demands of the job (Ciccarelli et al., 2011). In many instances academics therefore may not be working at designated workstations purposely set up for them. Potentially they are less likely than university administrative staff to use single fixed workstations designed to minimise ergonomic risks and the extent to which academics apply design recommendations to alternate workstation and equipment configurations is also unknown.

Numerous studies have investigated methods of reducing musculoskeletal pain associated with using computers. Prevention strategies found to be effective include adjusting equipment to individual requirements, using ergonomic keyboards and taking regular breaks

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(Schlossberg et al., 2004; Levanon et al., 2012). Data on the prevalence of musculoskeletal disorders among computer users are published (Gerr et al., 2002). However, the data are largely self-reported, with few clinical diagnostic data available and there is a paucity of government-reported lost time injury data specifically related to computer use (Straker and Mathiassen, 2009). Although there has been considerable interest in the health effects of computer work on office workers (IJmker et al., 2007), findings relating work posture to upper limb and neck symptoms have been inconsistent (Jensen, 2003; Juul-Kristensen et al., 2004).

The Australian academic population is changing and academics are leaving the profession (National Tertiary Education Union (NTEU), 2009). In Australia, academics include all research, teaching and clinical educator staff who are involved in a range of teaching and research activities. There are however, differences in the naming and definition of academic staff in other countries (European Universities Institute, 2015). Workload has been cited as a possible reason, but the development of musculoskeletal symptoms and/or other health concerns may also be contributing factors. Whilst there is little published research investigating potential health effects of computer use specifically in academics, one study on academics in a university in Hong Kong did demonstrate a significant association between head posture and neck pain when computer processing (Chiu et al., 2002). However, it is unclear whether these findings can be generalised to other musculoskeletal symptoms. The Australian academic profession is also rapidly ageing (Bradley et al., 2008) and with symptoms such as neck pain being more prevalent in older Australians (Blyth et al., 2001), the potential problem of musculoskeletal disorders is likely to worsen.

The aim of the current study is to determine the prevalence of musculoskeletal symptoms in university academic and administrative staff and to investigate the relationships between these symptoms and workstation configuration, working postures and ergonomic training.

2. Methods

A cross-sectional study design was used to survey University of Newcastle employees regarding the prevalence of musculoskeletal discomfort, workstation configuration, work postures, and ergonomic training. In this study, workstation refers to any environment or equipment in which university staff were using a computer, laptop or tablet device.

2.1. Participants

All staff members (teaching and research academics and administrative staff) from The University of Newcastle were invited to participate in the study. A staged approach to recruiting participants was used. Initially, a flyer notifying staff of the upcoming survey was distributed to all employees via the University internal mail and staff noticeboards. An “All Staff” email was also sent advising staff of the study. A second email was sent one week later which invited staff to participate in the study and provided a link to an online questionnaire. A participant information sheet was provided which explained the rationale for the study, the intended inclusion criteria of permanent full time and part time staff members employed for more than 19 h per week, and that participation was voluntary. Consent was implied by completion of the survey. Two reminder emails were sent to encourage participation.

Ethics approval was provided by the University of Newcastle Human Research Ethics Committee.

2.2. Design

A questionnaire was developed and consisted of 58 questions which covered the following areas: demographic information, workstation configuration and use, ergonomic training undertaken, musculoskeletal discomfort, and work-life balance. The questionnaire was developed from existing literature on workstations and musculoskeletal discomfort (IJmker et al., 2008; Kuorinka et al., 1987). The questionnaire was piloted by academics from a single teaching unit in the University, prior to distribution. Following piloting, the questionnaire was modified to improve the clarity of some items and reduce the time needed to complete the survey.

Permission was obtained to select specific items for working postures from the questionnaire used by IJmker et al. (IJmker et al., 2008). Specific sections from the standardised Nordic questionnaire were used (Kuorinka et al., 1987).

Participants were asked to indicate if they had ever experienced musculoskeletal discomfort and if they had experienced discomfort during the last seven days and during the previous 12 months. Musculoskeletal symptoms were defined as those causing discomfort in the neck, shoulder, upper back, elbow, low back, wrist/hand, hip/thigh/buttock, knee or ankle/foot. Participants were asked to rate the severity of discomfort in each body area on an eleven point numerical continuous rating scale (zero – 10 where 0 = ‘No pain’ and 10 = “Worse possible pain). They were also asked if they had visited a health professional because of their musculoskeletal discomfort, and whether they believed discomfort was caused by work.

Participants were asked to describe workstation configuration using selections that included the diagrams previously published by IJmker et al. (IJmker et al., 2008). They were asked whether they worked at multiple workstations including the type of workstation (desktop, laptop, tablet), although detailed questions describing the workstation were based on a single workstation, defined as the ‘main’ workstation or the one participants spent most time using. They were asked about the time they spent on computers (On average, how much time do you spend on a computer every week? and On average, how much time do you spend doing desk work per week?); also whether they used an irregular non-adjustable work position such as on the train, in a hotel, on the couch etc. Participants were asked about the position and height of the monitor and the position of the lower limbs in relation to the height of the desk. Participants were also asked about the postures they used

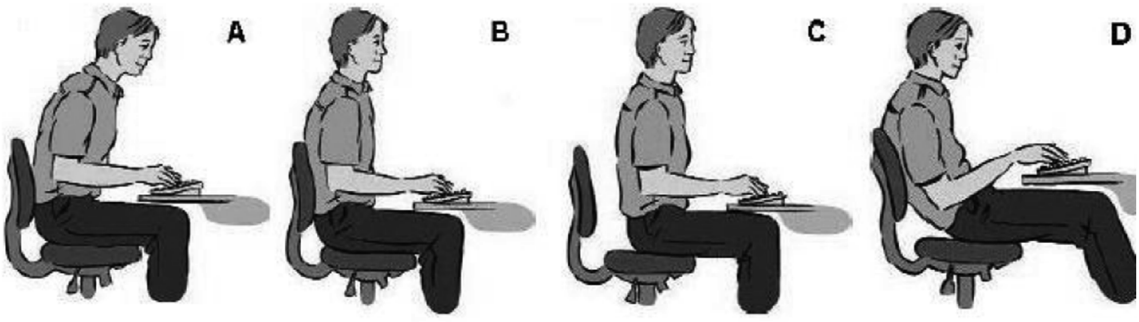

Fig. 1. Possible positions in which participants may sit, including variable (altering position at least once per half hour (Blyth et al., 2001).