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Commentary

# Effect of Ergonomic Intervention on Cognitive Function of Office Workers

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## DESCRIPTION

During the last 50 years, new technologies especially computer use has changed workstations and has led to increased number of sedentary jobs. It has been estimated that most of office workers in Australia spend about 75% of their workday in a sedentary position. Prolonged sitting (more than 4 hours a day) is associated with some adverse health effects, such as metabolic, cardiovascular and musculoskeletal disorders. Workplace interventions such as ergonomic modifications and posture change during a static position in the workplace may decrease some adverse effects of prolonged sitting. Recently, besides metabolic and musculoskeletal disorders, the effect of static or sedentary posture or non ergonomic situations on cognitive function has raised concern as well. Office work, in order to be performed perfectly, needs many aspects of cognitive function. Cognitive function consists of such domains as perception, attention, memory and decision making, which is probably affected by many factors, such as work tasks, time of work, shift work, some environmental factors and even body posture during work. The effect of body posture on cognitive function is important, especially in the tasks which require a high level of attention and concentration. Inappropriate body posture can lead to increased human errors and delay in information processing. Most office works are routinely performed in a sitting and mostly static position. Many office workstations lack the standards of an ergonomic workstation which may affect physical and cognitive aspects of health. Effects of ergonomic modifications and workplace exercises on physical health have been widely assessed, but its effect on cognitive function is controversial.

Workstation redesign especially using ergonomic and appropriate chairs may have an important role in the workers' performance and comfort. Ergonomic intervention in the workplace in order to design a better workstation, and workplace exercises may improve cognitive function and performance. Some studies have shown a better cognitive function in nonsitting work positions. Employees have reported less tiredness and higher concentration in non sitting positions 2018 in a systematic review didn't find a significant effect of reducing sedentary behavior on cognitive function. 2016 did not find a significant effect for intermittent sitting and standing positions on cognitive function, but in another study on telephone operators, standing position increased productivity found that body posture did not affect response time, concentration, and work pace, but found that cognitive function is affected by work posture. Baker, et al., in two different studies found that two hours of sitting computer work increased problem solving errors, but attention did not change, and two hours of standing computer work increased discomfort and deteriorated reaction time and mental state, while creative problem solving improved. So, due to inconsistent results in the previous studies, this study was designed to assess the effect of an ergonomic intervention program, including ergonomic modification of the workstation and training about ergonomic workstation standards and workplace exercises, on the cognitive function of office workers.

After initial evaluations of the workstation and performing cognitive tests, ergonomic intervention was performed. Intervention consisted of two parts: One session of training ergonomic principles of office work with emphasis on ergonomic risk factors of the participant's workstation which were extracted in the previous stage, including the standard arrangement of the workstation, adjusting the chair, appropriate posture during work, micro breaks and stretching exercises in the workplace. Trainings were performed by an expert occupational hygienist separately for each participant by face to face education. The training session lasted about half an hour for each participant; ergonomic modification of the workstation including adjusting the chair height, and standard positioning of mouse, keyboard and monitor. No change was done to workplace equipment. One month after the intervention, cognitive tests were performed again at the same situations. During this period, the workstations were checked every other day to answer the questions of the participants and seek any environmental or other confounding factors.

Data were analyzed by SPSS (ver. 24) using paired T-test and multiple regression linear models. Uni-variate analysis showed that some demographic factors affected the responses, so the effect of age, marital status, and working hours on the results of the tests were assessed in a regression model. In this model, the initial result of each test was used as a confounder in the model.

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This study was the result of a master thesis in occupational health and was approved by the ethics committee of Shahid Sadoughi university of medical sciences. An informed consent was obtained from each participant. Some demographic variables significantly affected various parameters of cognitive function. Marital status significantly affected working memory, but age and work experience did not significantly affect this cognitive parameter. Age, but not marital status and working hours, significantly affected test duration and response time after the intervention. Number of errors was significantly affected by working hours.