

POJ003: General platform presentation

Physiological effects of wearing respiratory protective equipment

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Abstract:

Objectives: There are a few studies on the physiological effects of wearing respiratory protective equipment in Japan. The aim of this study was to evaluate the physiological effects of wearing a dust proof mask and a respiration protector with an electric fan for workers' health management.

Methods: 15 non-smoking male subjects who were 20 to 39 years old without present medical history participated in this study. We randomly divided the subjects into three groups and conducted a comparative crossover study. The subjects conducted approximately 5.5 METs (Metabolic equivalents) exercise tests when they were not wearing masks, wearing a dust proof mask (SHIGEMATSU WORKS Co., Ltd., Model; DR77SR2-RL2, Performance; RL2), or wearing a respiration protector with an electric fan (SHIGEMATSU WORKS Co., Ltd., Model; Sy11G2, Performance; PL1). We measured several physiological indicators, such as blood pressure, pulse rate, double product (DP, the product of systolic blood pressure and heart rate), blood oxygen saturation, and subjective fatigue. These indicators were measured every 3 minutes before, during, and after the exercise test. We analyzed them with a repeated analysis of variance (ANOVA).

Result: We observed a marginal significant difference ($p < 0.1$) in DP, and the highest values were obtained when a dust proof mask was worn (DP=23897), followed in order by when a respiration protector with an electric fan was worn (DP=22678) and when a mask was not worn (DP=21008). The differences in blood pressure, pulse rate, or subjective fatigue were not significant; however, the pattern was similar to that of DP.

Conclusions: We suggest that wearing a respiration protector and variations in the types of respiration protectors might produce a burden on physiological condition, particularly cardiac function. Personalized selection of respiration protectors and arrangement of the worksite based on a worker's biological characteristics and health condition is possibly required.