Abstract

Title:

Effect of lighting conditions on fine hand motor skills in sleep deprived soldiers

Objectives:

Determination of the effect of sleep deprivation performed during blue light exposure and during blue light blocking on fine motor skills of the hands.

Methods:

This theoretical-empirical work was conducted on a research cohort of 8 young men (n = 8) with an average age of 22,6 ± 1.6 years, height of 181,1 ± 3,7 cm and weight of 76,9 ± 4,9 kg. The participants were volunteers from the Military Physical Education Department at the Faculty of Physical Education and Sport (FPE) of Charles University (UK). The participants were induced into total sleep deprivation for 36 hours in two interventions. During this time, they followed established rules to avoid bias in the results and the course of the intervention was conducted according to standardized conditions. The first sleep deprivation intervention was performed in light and the second in darkness with blue light blocking. Disassembly and machine gun collection took place at fixed times and conditions, always at 7:30 am and 7:30 pm. Before each measurement, probands completed the Epworth Sleepiness Scale (ESS) questionnaire, which monitored the subjective level of sleepiness. In total, four measurements were taken with sleep deprivation and one measurement was taken after 8 hours of restorative sleep. A total of five measurements were taken in the intervention in light and five in darkness, each time following the same design. The data obtained were then statistically processed in the JASP program using a two-way repeated measures analysis of variance.

Results:

No condition × time interaction was found for the subjective sleepiness measure ($p = 0,925$), nor was there a statistically significant difference between light and dark (mean difference = 1,925; $p = 0,197$). Conversely, a statistically significant difference was found for time ($p < 0,001$) independent of whether the intervention was delivered in light or dark. Namely, between measurements of 0 h and -24 h (mean difference = 10,56 s; $p = 0,001$), 0 h and -36 h (mean difference = 7,63 s; $p = 0,046$), -12 h and -24 h (mean difference = 9,25 s; $p = 0,017$), -24 h and +8 h (mean difference = 10,38 s; $p = 0,001$), and between -36 h and +8 h (mean difference = 7,44 s; $p = 0,041$). A statistically

significant effect of condition was found for the analysis. Parsing in the light intervention was slower than in the dark intervention (mean difference = 0,436 s; p = 0,048), but no statistically significant effect of time (p = 0,283) or condition × time interaction (p = 0,170) was found. A statistically significant effect of condition (mean difference = 2,708 s; p = 0,027) and a statistically significant effect of time (p = 0,050) were found for choir. Post hoc analysis showed a significant difference between 24hrs and 36hrs of deprivation (mean time = 3,152 s; p = 0,027). No condition × time interaction was found (p = 0,385).

Keyword