

Light glasses versus light box administration

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Purpose

Exposure to artificial light improves subjective well-being, mood, cognitive performance and suppresses melatonin secretion; relative to the light administration and the exposure time. This photic influence might be especially useful to counterbalance the impact of prolonged wakefulness on sleepiness and performance. However, most people cannot be exposed to bright light therapy at the appropriate time in everyday life or working conditions. Thus, the use of light glasses might represent a powerful alternative. Here, we seek to evaluate the effect of early morning light administration on performance, mood, alertness melatonin, after one night of total sleep deprivation and to determine whether light glasses can be as powerful as light boxes administration.

Methods

24 healthy young (20-35 years old), men and women healthy subjects will participate. Each participant will undergo a balanced cross-over design with three investigation periods spaced more than one week. We propose a protocol in a laboratory setting, in order to control environmental parameters and specifically designed to estimate the differing effects of light under the aforementioned conditions. The participants will follow their habitual life rhythms, before their admittance to the research laboratory to undergo one night sleep deprivation. During the sleep deprivation, cognitive performance will be assessed every two hours. In the morning, the session will begin with a general medical examination, sleep and chronobiological questionnaires, as well as a cognitive test battery session, including mood, alertness and sleepiness questionnaires. The light exposure will last for 30 minutes starting at 4 am, a circadian time at which the performance and vigilance levels are especially decreased (subjects with chronotype within the normal range). The three following lightening conditions will be applied (1-in **blue**) Luminette® (Lucimed, Belgium), (2-in **red**) Philips Energy-Light (10000 Lux), (3-in **black**) control condition with dim light exposure (<8 lux). All throughout the testing period, melatonin levels will be measured every hour.

We anticipate early morning light to improve counteracting the negative impact of one night sleep deprivation. We also anticipate that both light administrations will have comparable enhancement effects.

Results

•Participants did not expect either light condition to have any effect on the visual comfort, mood, performance, alertness, vitality, concentration, sleep quality. Light enhanced performance characterized by number of right answer on the PVSAT and the reaction time at the PVT, and decreased sleepiness characterized by the KSS. The time course of the effect suggests that the effect of light on these variables is physiological and not due to a psychological expectation. Salivary Melatonin levels, after light exposure is reduce but is not significant as compared to dim light (p=0.09)

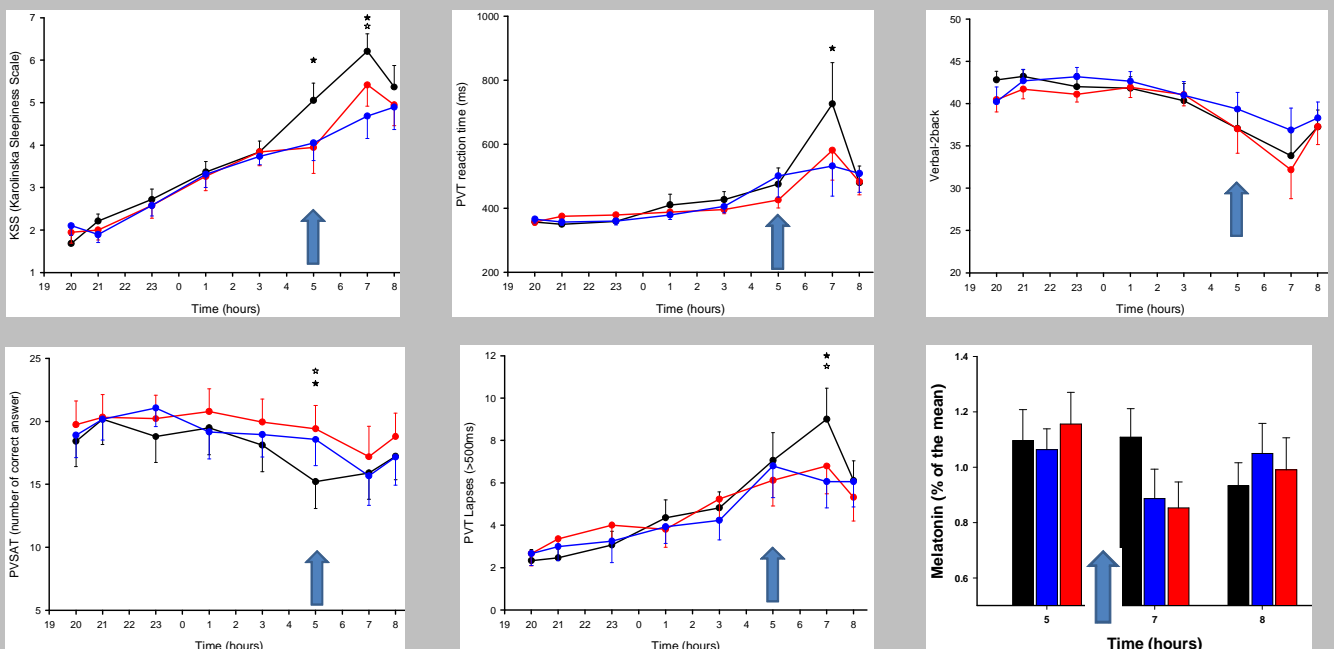


Figure . Effect of the (blue) Luminette®, Philips Energy-Light (10000 Lux), vs. control condition with dim light exposure (<8 lux) in 21 individuals. The arrow illustrate the 30min of light exposure. Error bars represent SEs. *Significant difference between the conditions (P < 0.05).

Conclusion

The results are of further relevance for ergonomical, societal as well as medical investigations. To demonstrate that light administration through light glasses is as efficient as conventional bright light therapy boxes may have direct societal and medical applications, notably for shift workers.