

Pattern of night-time light exposure before sleep in young adult myopes and emmetropes

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Footnotes

Commercial Relationships **Ranjay Chakraborty** None; **Gorica Micic** None; **Nicole Lovato** None; **Michael Collins** None; **Leon Lack** None

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Abstract

Purpose : Several recent studies have demonstrated poor sleep quality in myopes. A recent study found that young myopes have significantly delayed melatonin circadian timing, delayed sleep onset, greater sleep onset latency, and shorter sleep duration compared to emmetropes (Chakraborty et al, PMID: 33030546). To better understand these sleep characteristics in myopes, this study examined the differences in the pattern of night-time light exposure before sleep in myopes and emmetropes.

Methods : 14 emmetropes (mean refractive error, -0.09 ± 0.13 dioptres) and 17 myopes (-4.99 ± 2.18 dioptres) with a mean age of 22.07 ± 2.38 years had objective measures of ambient light exposure collected over 7 days, using a wrist-worn

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actigraphy device (Actiwatch 2). Measures of visible light illuminance were captured

every 30 seconds, 24 hours a day over this period. The average daily light exposure, and light exposure for 1 hour (120 epochs), 3 hours (360 epochs) and 5 hours (600 epochs) before sleep onset, as determined by Actiwatch, were calculated. A linear regression was performed to examine the association between night-time light exposure and sleep onset, sleep latency and the total sleep duration reported in our recent publication (PMID: 33030546). All results are reported as average \pm standard error mean.

Results : Compared to emmetropes (507.24 ± 106.65 lux), the average daily light exposure was significantly less in myopes (261.79 ± 52.99 lux, Mann–Whitney rank sum test, $p=0.021$). The average night-time light exposure across the five-hour duration before sleep was significantly greater in myopes (52.24 ± 8.28 lux) than in emmetropes (25.21 ± 9.47 lux, two-way ANOVA, $p=0.014$). The average light illuminance between the two groups wasn't significantly different for 1 hour (myopes, 20.81 ± 8.28 lux; emmetropes, 9.31 ± 9.47 lux) and 3 hours (myopes, 45.52 ± 8.28 lux; emmetropes, 29.14 ± 9.86 lux) before sleep onset (both $p>0.05$). The night-time light exposure was positively associated with delayed sleep onset ($r^2 = 0.22$, $p=0.009$), but not with sleep onset latency and sleep duration.

Conclusions : Young adult myopes had greater night-time light exposure compared to emmetropes, which was particularly evident 3 – 5 hours before sleep onset and may contribute to delayed sleep and circadian timing in myopes. These findings in myopes may be related to greater screen time or academic work at night and require further investigation.

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