

Effects of Partial Sleep Deprivation on Prefrontal Cognitive Functions in Adolescents

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Abstract : Restricted sleep is common in young adults and adolescents. The results of a few objective studies of sleep deprivation on cognitive performance were not clarified. In particular, the effect of sleep deprivation on the cognitive functions associated with frontal lobe such as attention, executive functions, working memory is not well known. The aim of this study is to investigate the effect of partial sleep deprivation experimentally in adolescents on the cognitive tasks of frontal lobe including working memory, strategic thinking, simple attention, continuous attention, executive functions, and cognitive flexibility. Subjects of the study were recruited from voluntary students of Cukurova University. Eighteen adolescents underwent four consecutive nights of monitored sleep restriction (6-6.5 hr/night) and four nights of sleep extension (10-10.5 hr/night), in counterbalanced order, and separated by a washout period. Following each sleep period, cognitive performance was assessed, at a fixed morning time, using a computerized neuropsychological battery based on frontal lobe functions task, a timed test providing both accuracy and reaction time outcome measures. Only the spatial working memory performance of cognitive tasks was found to be statistically lower in a restricted sleep condition than the extended sleep condition. On the other hand, there was no significant difference in the performance of cognitive tasks evaluating simple attention, constant attention, executive functions, and cognitive flexibility. It is thought that especially the spatial working memory and strategic thinking skills of adolescents may be susceptible to sleep deprivation. On the other hand, adolescents are predicted to be optimally successful in ideal sleep conditions, especially in the circumstances requiring for the short term storage of visual information, processing of stored information, and strategic thinking. The findings of this study may also be associated with possible negative functional effects on the processing of academic social and emotional inputs in adolescents for partial sleep deprivation. Acknowledgment: This research was supported by Cukurova University Scientific Research Projects Unit.

Keywords : attention, cognitive functions, sleep deprivation, working memory

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