0441

EVENING AND MORNING EEG TOPOGRAPHY AFTER ONE NIGHT OF SLEEP DEPRIVATION IN YOUNG ADULTS

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Introduction: Quantified analysis of morning EEG activity has been used to characterize the restorative value of the previous night. We used a full EEG montage to better characterize the respective sensitivity of cortical regions to sleep loss.
Methods: Thirty healthy young adults were recorded for two consecutive nights. On the second night, 18 were allowed to sleep while the 12 others were totally sleep deprived (TSD). EEG recordings with eyes closed were obtained for 5 minutes in the evening and in the morning. Spectral analysis was performed on 12 to 15 four-seconds epochs and four frequency bands were generated: Delta (0.75-3.75 Hz), Theta (4.0-7.75 Hz), Alpha (8.0-12.75 Hz), and Beta (13.00-30Hz). Data was grouped into two regions for statistical analysis: fronto-temporal (FT) = (Fz+Fp1+Fp2+F7+F8+T3+T4) and parieto-occipital (PO) = (P3+P4+O1+O2). For each participant, FT and PO morning values were expressed as percentage of evening values. This percentage was tested against the null hypothesis (no change from evening to morning) separately in each group, using single sample t-tests. Groups were then compared using T-tests on each frequency band for both cortical regions.
Results: TSD participants showed little significant differences between recordings, except for *increased* morning Theta activity at FT and PO relative to evening. In control participants, morning activity in FT region was *decreased* in Delta and Beta while in PO only Beta decreased. When groups were compared, we found in the FT region that percentage of change was greater in control participants for Delta and Beta and greater in Theta for the TSD group. For the PO region, control participants showed a greater change compared to TSD for Delta and Beta.
Conclusion: These results suggests that decreased morning Delta and Beta activity could reflect a normal restorative value of sleep while increased Theta could reflect an impaired restorative value of sleep.

0442

INCREASED PAIN RESPONSE DURING PROLONGED TOTAL SLEEP DEPRIVATION (TSD) IS INDEPENDENT OF FATIGUE OR DISSATISFACTION WITH THE EXPERIMENTAL IN-HOSPITAL ENVIRONMENT

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Introduction: The development and augmentation of pain under conditions of insufficient sleep duration and quality is increasingly recognized, but it is still an open question as to whether or not this is just due to a general dysphoric state, characterized by fatigue or dissatisfaction with the experimental environment of the in-hospital setting. It is well known that the experience of pain is comprised of not only sensory, but also emotional and cognitive components. Here, we investigate whether pain develops independent of general dysphoria in response to prolonged TSD.
Methods: Twenty-six healthy participants were randomly assigned to either 88 hours of TSD (N=20) or three nights of 8h-control sleep (23-07h; N=6) after two baseline nights with an 8h-sleep opportunity. Starting on the 2nd baseline day, participants were equipped with intensive recording devices to monitor blood pressure, temperature, EEG, and to collect blood. Computerized visual analog scales (VAS) were presented every 2 hours to assess regional (e.g. headache, backpain) and generalized physical symptoms (e.g. body pain, physical discomfort), as well as general dysphoria by asking participants about their levels of fatigue and satisfaction with the GCRC environment, research staff, study schedule, and food quality. Single self-rated pain items and satisfaction items were compiled to a global pain and satisfaction variable, respectively.
Results: Pain increased throughout three days of TSD by 8 ± 2%, compared to an increase of 3 ± 3% in the 8h-sleep condition ($p<0.05$ for interaction effect). In addition, the first two days in the GCRC introduced an additional pain increase of 5 ± 1% in both conditions, likely due to the environmental change and procedures ($p<0.05$ for time effect). Satisfaction with the study (N=11) was higher during TSD than the control sleep condition ($p<0.05$ for condition effect), thus opposing the pattern seen for pain. After controlling for fatigue, a trend towards increased pain in response to TSD still remained ($p=0.1$).
Conclusion: The development of painful physical symptoms in response to TSD might not be simply attributed to fatigue and dissatisfaction with the experimental environment and procedures.
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THE EFFECT OF EXTRA SLEEP ON MOOD AND ATHLETIC PERFORMANCE AMONGST COLLEGIATE ATHLETES

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Introduction: Although much research has established the detrimental effects of sleep deprivation on cognitive function, mood, and performance, relatively little research has investigated the effects of extra sleep over multiple nights on these variables, and even less on the specific relationship between extra sleep and athletic performance. The results we report herein are directed at illuminating this latter relationship.
Methods: In the first trials of this ongoing study, six healthy students (age 18 – 21) on the Stanford men´s basketball team maintained their typical sleep/wake patterns for a two week baseline followed by an extended sleep period in which they obtained as much extra sleep as possible. Sleep/wake activity was monitored by actigraphy and sleep logs. To assess improvements in athletic performance, indicators including sprint time, shooting percentages, and various rating scales were measured following every practice. Profile of Mood States (POMS) ratings were recorded weekly and the Epworth Sleepiness Scale was administered during baseline and at the end of sleep extension to monitor mood and daytime sleepiness.
Results: Significant improvements in athletic performance were observed including faster sprint time (16.3 ± 0.69 seconds at baseline, 15.3 ± 0.44 seconds at end sleep extension, $p<0.05$) and increased free-throws (7.9 ± 0.47 at baseline, 8.8 ± 0.46 at end sleep extension, $p<0.05$). Athletes also reported increased energy and improved mood during practices and games as indicated by increased POMS vigor ratings (45.5 ± 7.5 at baseline, 56.9 ± 8.5 at end sleep extension, $p<0.05$) and decreased POMS fatigue scores (44.1 ± 6.7 at baseline, 32.3 ± 7.9 at end sleep extension, $p<0.05$). Epworth scores decreased from 9.2 ± 4.0 at baseline to 2.8 ± 1.5, $p<0.05$ at end sleep extension.
Conclusion: Obtaining extra sleep was associated with improvements in indicators of athletic performance and mood among members of the men´s basketball team.