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Comparison of Alpha Attenuation Test with Maintenance of Wakefulness Test
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Introduction: There is a clear need for simple objective sleepiness tests to evaluate e.g. daytime somnolence. Most commonly used tests are Multiple Sleep Latency Test (MSLT) and Maintenance of Wakefulness Test (MWT). There are also other tests based on known physiological effects of sleepiness. One test is Alpha Attenuation Test (AAT) where the ratio of alpha power is calculated between eyes closed and eyes open. Smaller Alpha Attenuation Coefficient (AAC) ratio indicates greater sleepiness. AAT has been compared e.g. with MSLT in sleep deprivation and in narcolepsy but not with MWT to our knowledge.

Methods: We measured AAT and MWT from 79 traffic safety workers after a baseline night by using the Somnologica software. AAT was administered at 13:30 and MWT at 14:00. MWT was scored according to Rechtschaffen and Kales in 30 s epochs. Subjects were instructed by handheld computer to close and to open eyes in 1 minute periods during the 6 minute AAT test. O2-A1 channel was analysed in 2.56 s artefact free and 50% overlapped epochs with custom Matlab program. Data was detrended and Hanning windowed before discrete Fourier transform to give power spectrum epochs. For both eyes closed and eyes open the mean, median and standard deviation of power spectrum epochs were calculated.

Results: We compared the spectrum of groups having at least a single sleep epoch in MWT to a group with no sleep epochs in MWT. AAT sensitivity is decreased with subjects of high eyes closed alpha, so six subjects with eyes closed alpha power above 80 % were excluded. From the remaining 73 subjects there were 24 males and 6 females who had at least a single sleep epoch. 37 males and 6 females had no sleep epochs. The spectrum of eyes closed and eyes open was different between these groups. The main effect was seen in alpha band 7.8-12.1 Hz, Figure 1. Calculated AAC were 4.0 ± 2.1 and 6.8 ± 4.7 ($p < 0.0014$) respectively indicating a correlation between AAT and MWT. Our data shows the feasibility of easily administered AAT in screening daytime somnolence.

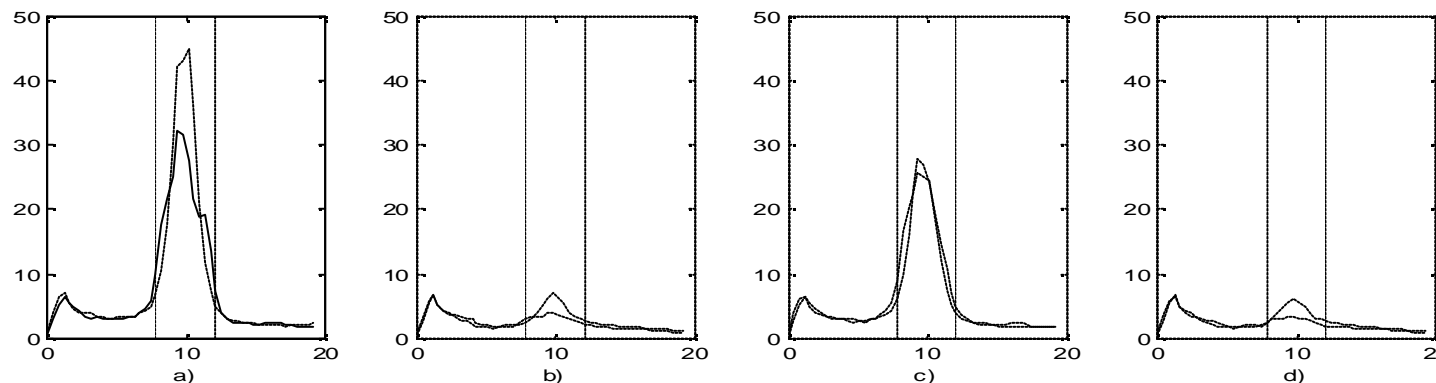


Figure 1. Mean of power spectrum ($\mu V^2/Hz$) of O2-A1 of all the subjects, $n=79$ a) eyes closed b) eyes open and subjects without high alpha, $n=73$ c) eyes closed d) eyes open. The dashed line indicates a mean from subjects with at least a single sleep epoch in the following MWT session.

KEYWORDS: AAT, MWT, SLEEPINESS

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