

EDITORIAL

Insomnia and Driving Ability

Commentary on Perrier et al. Impaired driving performance associated with effect of time duration in patients with primary insomnia. *SLEEP* 2014;37:1565-1573.

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There are inconsistent results as to whether insomnia is associated with an increased risk of motor vehicle accidents. Whereas some epidemiological studies reported increased risk of car crashes,^{1,2} other studies did not find a significant association.³ Interpretation of epidemiological data is however complicated by the fact that many people who have insomnia have (and are treated for) comorbid conditions, and some use hypnotic drugs. The impairing effects on driving ability of many hypnotic drugs is well documented,⁴ and this may confound the outcome of studies examining the risk of insomnia per se on motor vehicle accidents. Research on accident risk and daytime functioning of untreated insomnia patients is relatively scarce. Therefore, the paper by Perrier and colleagues⁵ in this issue of *SLEEP* is a welcome addition to the field of sleep medicine.

Perrier et al. compared driving performance of 21 insomnia patients and 16 healthy volunteers. All subjects performed a 1-hour monotonous highway driving simulator test and a 10-minute psychomotor vigilance task (PVT). Outcome measures of the driving test were the standard deviation of lateral position (SDLP),⁶ and the number of excursions out-of-lane. Results showed that insomniacs had significantly larger SDLP values ($P = 0.023$) and a significantly increased number of excursions out-of-lane ($P = 0.03$). However, self-evaluation of driving performance did not differ significantly between the groups. Also, no difference between the groups was found on the PVT.

A strength of the paper by Perrier is that it replicates aspects of driving found in normal volunteers in on-road driving studies. For example, Perrier noted that driving impairment in insomniacs occurred after 20 minutes of driving. This is commonly seen in on-road studies and underlines the importance of time on task when examining driving ability. Driving impairment usually increases over distance driven; however, in tests of short duration, participants may be able to counteract driving impairment by effort to attain baseline performance levels.⁷ This probably underlies the absence of impairment during the first 20 km of the driving test.

The findings Perrier et al.⁵ illustrate the sensitivity of SDLP relative to other outcome measures of the driving test such as standard deviation of speed (SD Speed).⁸ Relative high absolute

SDLP values in the simulator have been reported elsewhere, and can be explained by the fact that the simulator environment results in increased levels of sleepiness when compared to on-road driving, and increased risk taking.^{9,10} Although Perrier reported a significant increase in the number of excursions out-of-lane, it should be noted that this parameter is less useful than SDLP, as the number of excursions out-of-lane ultimately depends on the chosen lateral position within the traffic lane.¹¹

The fact that PVT performance was unaltered while driving was significantly impaired in insomniacs is consistent with previous research showing that psychomotor test performance poorly predicts SDLP.^{12,13} However, the difference in duration of the driving test (1 hour) and the PVT (10 minutes) may account for this incongruence. Therefore, it would be interesting to compare performance on a 1-hour PVT with the 1-hour driving test.

Finally, the fact that insomniacs were not aware of their driving impairment confirms that drivers are often poor in judging their own driving performance.¹⁴ The latter is worrisome in terms of traffic safety, as impaired drivers who presume they are unimpaired may operate a motor vehicle.

The finding by Perrier⁵ that driving performance of untreated insomniacs was significantly impaired is somewhat surprising. Although in general a substantial number of car crashes are related to driver sleepiness, most insomniacs do not report being more sleepy than healthy controls, a finding which has been confirmed by objective MSLT measurements.¹⁵ Interestingly, the findings of Perrier cannot be attributed to differences in total sleep time or daytime sleepiness scores, as these did not significantly differ between insomniacs and healthy controls. Hence, an important question arises as to what is the mechanism behind driving impairment among insomniacs, and if these findings can be replicated in on-road driving. The latter is essential, since on-road driving has higher ecological validity than a simulator test. For example, inherent to on-road driving is a potential risk of accidents, while simulator tests are often experienced as a game without real-world risks. Also, essential features of actual driving such as the presence of other traffic were not included in the driving simulator used by Perrier et al.⁵

One other on-road driving study has examined the effects of insomnia on driving ability. Leufkens et al. compared on-road driving performance of 22 frequent users of hypnotics (using hypnotics ≥ 4 nights per week for more than 3 months), 20 infrequent users (using hypnotics ≤ 3 nights per week), and 21 healthy, age-matched controls.¹⁶ At bedtime the day before driving, the frequent users group ingested their own prescribed hypnotic, whereas the infrequent users group and controls did

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not use sleep medication. This study showed no significant differences in driving performance between both groups of insomnia patients and controls. A single dose challenge with zopiclone (7.5 mg) in the same subjects produced significant driving impairment in both groups of insomniacs and healthy controls, but could not differentiate between frequent and infrequent users of hypnotic drugs.¹⁷

The discrepancy in outcomes of the studies of Perrier⁵ and Leufkens¹⁶ can be related to the fundamental differences between using the on-road test or a driving simulator discussed above. However, also the selection of included patients may have played a role. Only 7 out of 21 subjects of the infrequent hypnotic drug users group in the Leufkens study used no hypnotic drugs in daily life, while the other 13 patients used hypnotic drugs about 1 night per week. Hence, although untreated on the study night, most of them treated their insomnia complaints on an as-needed basis, which may have improved their sleep including their subsequent driving ability. Therefore, future on-road driving studies with truly untreated insomnia patients should be conducted to verify the findings by Perrier,⁵ in order to establish whether driving of insomnia patients is indeed impaired.

CITATION

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