Research Letter

The Impact of Sleep Disorders on the Incidence of Traffic Accidents

Yi-Ying Chiang\textsuperscript{ab}, Pang-Yao Tsai\textsuperscript{c}, Pei-Chun Chen\textsuperscript{ed}, Mei-Hui Yang\textsuperscript{e}, Chi-Yuan Li\textsuperscript{af}, Fung-Chang Sung\textsuperscript{d}, Kuen-Bao Chen\textsuperscript{ag}

\textsuperscript{a}Department of Anesthesiology, China Medical University Hospital, Taiwan

\textsuperscript{b}Department of Health Service Administration, College of Public Health, China Medical University, Taiwan

\textsuperscript{c}Management Office for Health Data, China Medical University, Taiwan

\textsuperscript{d}College of Public Health, China Medical University, Taiwan

\textsuperscript{e}Department of Anesthesiology, Lin Shin Hospital, Taichung, Taiwan

\textsuperscript{f}Graduate Institute of Clinical Medical Science, College of Medicine, China Medical University, Taiwan

\textsuperscript{g}College of Medicine, China Medical University, Taiwan

Correspondence

Kuen-Bao Chen

Department of Anesthesiology, China Medical University Hospital, 2 Yude Road, Taichung, 40447, Taiwan
Short title

Sleep disorders and traffic accidents

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To the Editor:

Sleep complaints are very common in the general population.\(^1\) A growing body of evidence indicates that inadequate sleep results in accumulative, dose-dependent cognitive impairment.\(^2\) Automobile accidents have been shown to be one of the most ominous consequences of insomnia.\(^3\) As many as 20% of traffic accidents were associated with sleep deprivation.\(^4\) Because some of the prior studies relied on self-reported information, or had small cohorts, or lacked a control group, we conducted the longitudinal nation-wide population-based study by analyzing the claim data of Taiwan NHI (National Health Insurance)\(^5\) to investigate whether primary insomnia contributes to the incidence and the severity of traffic accidents.

The study group was selected from individuals aged 20 years and older with at least one inpatient or three outpatient claims for primary insomnia (ICD-9-CM 780.5) during 2002-2006. Those with non-primary sleep disorders (ICD-9-CM 327) and sleep symptoms related with mental disorders (ICD-9-CM 307.4) were excluded. Those with sleep disorders or traffic accidents between 1996 and 2001 were also excluded. The study group was 1:2 matched, according to sex and age, with the randomly selected control group among those without sleep disorder. To determine the impact of sleep disorders on the incidence of admission due to traffic accidents, all subjects were followed up for two years or until admission due to traffic accident. To
determine whether sleep disorders increased the severity of traffic accidents, length of admission, the incidence of ICU admission, length of ICU stay and in-hospital mortality were calculated.

The study group comprised 59,940 patients and the control group comprised 119,880 individuals. The prevalence of sleep disorders requiring medical care rose gradually during the study period and approached 8% (7.57%) in 2008. Sleep disorders had a female predominance (62.1% vs. 37.9%) and peaked at the age of 40-49 years (24.1%).

The incidence of traffic accident-related admission was higher among men than among women. The annual incidence of traffic accident-related admission was 44.31 per 10,000 persons in 1996 and decreased gradually during the study period to 26.49 per 10,000 persons in 2008. Among all the traffic accidents resulting in hospital admission during the study period, 7.37% involved patients with sleep disorders.

We found traffic accident-related admission rates were 49.4 per 10,000 person-years with sleep disorders and 36.9 per 10,000 person-years without. Although patients with sleep disorders were generally at increased risk of admission due to traffic accidents, only patients aged 30-49 years had significantly increased traffic accident-related admission rates due to sleep disorders. However, the NHI claim data did not include information whether the patient was the driver or the passenger.
Therefore, our result probably underestimates the true impact of sleep disorders on traffic accidents. Except for the increased incidence of ICU admission in patients with sleep disorders aged 50-59 years, generally, we did not find adequate evidence to link the severity of traffic accidents to primary sleep disorders.

In the NHI claim data, patients with sleep disorders had received pharmacological interventions for an average of 20 days during the average follow-up period of 1.97 years. The impact of pharmacological sleep aids on the incidence of traffic accidents was not explored in this study and, therefore, should be investigated in a future study. 6

This study demonstrates that sleep disorders are associated with a significant increased risk of traffic accidents but are not associated with the severity of traffic accidents. The results obtained from our analyses of sleep disorder-related traffic accidents can provide a reference for actuarial calculation by national or commercial insurance companies. However, to initiate political changes regarding sleep disorders and driving regulations, further investigations on the influence of treatments are warranted.
References


5. Cheng T. Taiwan's new national health insurance program: genesis and experience so far. Health Affairs 2003;22(3):61.

Table. Incidence of admission due to traffic accidents and the impact of sleep disorders.

<table>
<thead>
<tr>
<th>Age (year)</th>
<th>Subjects with sleep disorders</th>
<th>Subjects in control group</th>
<th>Hazard ratios† (95% confidence intervals)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cases</td>
<td>Person-years</td>
<td>Incidence*</td>
</tr>
<tr>
<td>All</td>
<td>583</td>
<td>117972</td>
<td>49.4</td>
</tr>
<tr>
<td>20-29</td>
<td>79</td>
<td>15930</td>
<td>49.6</td>
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<tr>
<td>30-39</td>
<td>101</td>
<td>23904</td>
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<tr>
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<td>136</td>
<td>28576</td>
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<tr>
<td>50-59</td>
<td>113</td>
<td>21288</td>
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<tr>
<td>60+</td>
<td>154</td>
<td>28274</td>
<td>54.5</td>
</tr>
</tbody>
</table>

† adjusted for age and gender

*** p < 0.001

** p < 0.005

* per 10,000 person-years