

# Sleepy Drivers

## High time for action

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**A**LTHOUGH THE EXACT NUMBER OF HOURS spent sleeping may across our lifespan, adults require on average between six to eight hours of sleep per day.<sup>1</sup> While the true purpose of sleep is not yet fully understood, it appears to serve many important functions, including energy restoration, revitalisation, self-repair and growth; furthermore, research suggests that sleep plays a role in brain plasticity by promoting synapse formation and maintenance.<sup>2</sup> Sleep deprivation occurs when sleep cannot support adequate alertness, performance and health, either as a result of sleep of insufficient quantity (i.e. duration) and/or quality (i.e. depth). Poor sleep hygiene—which refers to habits and practices that are un conducive to sleeping well on a regular basis—is usually the cause of insufficient sleep duration, while sleeping disorders such as sleep-disordered breathing (SDB) and obstructive sleep apnoea (OSA) can result in poor-quality sleep.<sup>3</sup>

Identifying patients with chronic sleep deprivation can be challenging, especially those suffering from partial sleep deficit over longer periods of time.<sup>4</sup> One manifestation of sleep deprivation is excessive daytime sleepiness (EDS), defined as an inability to stay awake and alert during the major waking hours of the day, with sleep occurring unintentionally or at inappropriate times almost daily for at least three months.<sup>5</sup> In addition, patients may experience brief involuntary episodes of ‘microsleep’, in which there is a temporary lapse in consciousness that can last up to 30 seconds, during which the individual is unable to respond to sensory *stimuli*. In fact, most individuals are unaware of a microsleep episode and believe they have been awake continuously.<sup>6,7</sup>

Sleep deprivation can lead to numerous adverse health consequences. In a recent large prospective study by Deng *et al.*, short sleep duration was associated with the development of several cardiometabolic

conditions—including central obesity, elevated fasting glucose hypertension, low- and high-density lipoprotein cholesterol levels, hypertriglyceridaemia and metabolic syndrome—among over 160,000 healthy non-obese adults over an 18-year period.<sup>8</sup> Similarly, Baldwin *et al.* found that the health scores of subjects with severe SDB (in terms of difficulty initiating and maintaining sleep) and EDS were comparable to those of patients with hypertension, type 2 diabetes mellitus and clinical depression.<sup>9</sup>

Apart from physical manifestations, sleep deprivation can impair a number of important cognitive functions such as judgment, attention, executive function, cognitive processing speed, memory, reaction time and muscular coordination, all of which are critical when driving.<sup>10</sup> In a survey conducted by the Foundation for Traffic Safety in the USA, 41% of participants reported having nodded off or fallen asleep at the wheel at least once in their lifetime; of these, 11% admitted to having done so within the past year and 3.9% within the past month.<sup>11</sup> Unfortunately, sleep deprivation and associated daytime sleepiness increases the risk of being involved in a motor vehicle crash, which can be up to 2.5–7-fold higher compared to non-sleepy drivers.<sup>12–14</sup> Moreover, sleepy driving accounts for approximately one in six fatal crashes and one in eight crashes leading to the hospitalisation of the driver or passengers.<sup>11</sup> In the USA, an average of 83,000 crashes per year are due to sleepy driving, causing 886 deaths and 37,000 injuries.<sup>15</sup>

Sleepiness and fatigue can affect a driver to a similar extent to that of alcohol impairment.<sup>16</sup> Powell *et al.* noted that the reaction times of subjects who had stayed awake for extended periods of time were comparable to those of drivers with blood alcohol levels of 0.08%, with frequent lane deviations and simulated crashes.<sup>17</sup> Similar effects have been documented in patients with chronic sleep disruption due to untreated

sleep disorders, such as OSA.<sup>12,17,18</sup> Sassani *et al.* reported that 1,400 lives are lost annually due to OSA-related collisions, costing an estimated USD \$15.9 billion dollars; in comparison, encouraging early OSA treatment would save 980 lives and an estimated USD \$11.1 billion in collision costs.<sup>12</sup> Patients with OSA are also more likely to acquire injuries when involved in a motor vehicle crash. Mulgrew *et al.* compared objective crash data from the insurance records of patients with suspected OSA, a mean apnoea-hypopnoea index of 22 events per hour and a mean Epworth Sleepiness Scale (ESS) score of 10 with those of age- and gender-matched controls.<sup>18</sup> The results indicated that the rate of crashes causing injury was 3.0–4.8-fold higher for patients with OSA, with the rate of crashes increasing correspondingly with apnoea severity.<sup>18</sup>

Although there is a paucity of data about sleepy driving-related deaths in Oman, the annual number of deaths due to road traffic crashes was estimated to have increased from 23 to 30 per 100,000 individuals between 1995 and 2009.<sup>19</sup> Overall, this was a 50% increase in mortality, from 479 to 953 deaths per year, with half of the casualties being between 26–59 years old; this is alarming considering the fact that the majority of the population is below 50 years of age.<sup>19</sup> Extrapolating results from the USA, the rate of sleepy driving-related deaths in Oman would be five deaths per 100,000 individuals, or approximately 17% of the total death toll; these estimates are very similar to data reported from the UK.<sup>11,20</sup>

In this issue of *SQUIMJ*, Al-Abri *et al.* present novel and important findings regarding the prevalence of daytime sleepiness while driving and OSA in Muscat, Oman.<sup>21</sup> The authors observed that sleepiness while driving was common among Omani private motor vehicle drivers, with just over one-quarter of the drivers experiencing sleepiness while driving at least once per month. Unhealthy sleep habits appeared to be the major culprit, as almost two-thirds of the population sampled reported sleeping less than six hours per night, with evidence of a significant association between an inadequate night's sleep and feeling sleepy while driving.<sup>21</sup> Another alarming finding was the high rate of excessive daytime sleepiness, with 37.8% of the participants scoring greater than 10 on the ESS. The paper also reported an OSA prevalence of 10.6%, with a significant association between OSA and sleepiness while driving.<sup>21</sup> It is important to note that these data were subjectively collected using self-reported tools; it is therefore likely that the obtained results underestimate the true magnitude of the problem.

In conclusion, there is a need for similar studies confirming the actual magnitude of the problem of

sleepy driving in Oman using objective tools. The medical community should initiate nationwide campaigns advocating healthy sleep habits and raising public awareness of the numerous risks associated with sleep deprivation, both at the individual as well as societal levels. It is high time that sleep medicine professionals join hands with law enforcement authorities and non-governmental organisations in Oman to create a common platform and work on preventing and dealing with the critical health-related and socioeconomic consequences of sleep deprivation, especially on the roads.

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