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GUEST EDITORIAL

Sleep and stroke: A bidirectional relationship with clinical implications

Sleep disorders and stroke are frequent medical problems which are associated with significant morbidity and mortality. Following the seminal description of Cheyne in 1818 of respiratory irregularities in a patient with acute stroke, research from the last 20 y has shown that sleep disorders and stroke are frequently associated and that their relationship may be causal and bidirectional [1–3].

On the one hand, sleep disorders such as sleep disordered breathing (SDB) were found to represent an independent risk factor for stroke [4]. On the other hand, SDB, excessive daytime sleepiness/hypersomnia, insomnia, and restless legs syndrome (RLS) were observed to appear "de novo" after stroke [2,5,6]. Furthermore, SDB has been found to negatively affect stroke outcome and risk of recurrence [7,8]. Finally, experimental and clinical studies give increasing support to the hypothesis that sleep (or its disruption) may influence both the acute ischemic cascade and the neuroplasticity processes underlying stroke recovery [9–12].

Most available literature focused on the relationship between SDB and stroke. In this issue of Sleep Medicine Reviews, Gottlieb et al. offer a first systematic review on studies that assessed the bidirectional impact of non-apnea sleep and circadian rhythm dysfunction in ischemic stroke.

The analysis was conducted in accordance with the PRISMA guidelines and included a total of 67 studies (published until August 7, 2018). All studies were observational with all but three published after 2000, and 70% of them examined sleep and circadian dysfunction after stroke. Noteworthy, most studies were considered to be of moderate to high quality. The main results of this review are the following:

1) long sleep duration (≥8 h) and non-apnea sleep disorders such as RLS, hypersomnia, insomnia, and self-reported REM sleep behaviour disorder increase the risk of stroke
2) stroke leads to sleep EEG and circadian rhythm changes which are associated with post-stroke severity and a worse functional outcome
3) no studies examined the effect of circadian rhythm dysfunction on risk of stroke

As also pointed out by the authors, the review has limitations including methodological heterogeneity, poor stroke characterization, and (often) limited sample sizes of the studies included. In addition, tools used in some studies to assess sleep disorders are unconventional or of limited value (e.g., self report questionnaire for insomnia and RLS, sleep logs and medical records to assess sleep quality, melatonin used in isolation to assess circadian rhythms). Finally, stroke risk was convincingly increased only for a few of the associations analysed.

Future studies addressing the link between sleep and stroke should incorporate assessments of stroke types (ischemic and hemorrhagic strokes, transient ischemic attacks), topography, severity and etiology. More accurate methods are also needed to assess post-stroke changes of sleep (e.g., high density EEG), arousal (e.g., vigilance tests) and circadian functions (e.g., a combination of both melatonin and actigraphy) [13–15]. Post-stroke sleep and circadian changes should be assessed not only in terms of risk of recurrence and outcome, but also of their impact on quality of life and related outcome measures. Last, but not least, intervention studies in the field of stroke were essentially limited to CPAP treatment for SDB [16–21]. For non-apnea sleep and circadian disturbances only case reports and small series have so-far been published [2,22–24].

In conclusion, the review of Gottlieb et al. tells us that in addition to SDB [8,25,26], long sleep duration and other non-apnea sleep disorders likely increase the risk of stroke and possibly have an impact on stroke outcome. More data, including interventional studies, are needed to assess the impact that a systematic management of sleep and circadian disorders may have on stroke prevention and post-stroke outcome. While still incomplete, the evidence of a significant link between sleep and stroke is sufficiently strong to call for more awareness and stronger interdisciplinary collaborations between sleep, circadian and stroke scientists and clinicians in this emerging field of medicine.

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