Welcome to the second issue of Sleep Medicine Research Review.

I recently attended the 2014 Associated Professional Sleep Societies meeting in Minnesota and wanted to highlight two important areas of research in this issue: the obesity-promoting effects of sleep deprivation and the real world (on the road) awareness of sleepiness when driving. My co-reviewer Dr Karen Falloon has also selected a number of interesting studies, with particular emphasis on sleep in adolescents.

We hope you find the current issue interesting and look forward to receiving any feedback you might have.

Kind regards,

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Impact of CPAP on activity patterns and diet in patients with obstructive sleep apnoea (OSA)

Authors: Batool-Anwar S et al.

Summary: This analysis of data from the APPLIES trial evaluated the impact of CPAP treatment on activity levels and diet in patients with severe OSA. Outcomes for 117 patients randomised to CPAP and 114 patients randomised to sham CPAP were evaluated after 4 months. No changes in consumption of total calories, protein, carbohydrate or fat were noted but there was a modest increase in recreational activity in women. In conclusion, OSA patients treated with CPAP do not substantially change their diet or physical activity habits.

Comment (AH): Sadly CPAP treatment for OSA does not in itself promote weight loss. This US study shows no clear changes in activity level occurred with CPAP therapy although average use was far from ideal, particularly for women. Total energy expenditure is in fact lower when OSA is successfully treated with CPAP which, in the absence of a change in diet or activity levels, will promote weight gain. Obesity needs to be separately managed with effective and sustained dietary and lifestyle changes.


Abstract

Modavigil significantly improves patient’s ability to STAY AWAKE in:

- Narcolepsy (FULLY FUNDED)
- Obstructive Sleep Apnoea adjunct to continuous positive airway pressure (CPAP)
- Chronic shift worker sleep disorder
Effects of experimental sleep restriction on weight gain, caloric intake, and meal timing in healthy adults

Authors: Spath E A et al.

Summary: This study investigated the effects of sleep restriction on weight gain, caloric intake, and meal timing. 225 healthy adults aged 22–50 years were assigned to 5 nights of either sleep restriction (only 4 hours in bed each night) or normal sleep (10 hours in bed each night). Sleep-restricted individuals gained more weight than controls (mean 0.97 vs 0.11kg; p=0.007) because they ate more meals and consumed 552.9 additional calories late at night. The percentage of calories derived from fat was greater during late-night eating.

Comment (AN): We have all snacked high-energy foods in the hope of staving off the effects of reduced sleep. There is a growing body of evidence that chronic sleep deprivation promotes obesity by increasing hunger and food intake. This important study provides clear evidence for this showing that in healthy adults experimental sleep restriction promotes weight gain by increasing calorie intake during the evening.

Reference: Sleep 2013;36(7):981-990

Abstract

Changes in children’s sleep duration on food intake, weight, and leptin

Authors: Hart C et al.

Summary: This study examined the effect of experimental changes in children’s sleep duration on food intake, weight and appetite-regulating hormones. 37 children aged 8–11 years (27% were overweight/obese) slept their typical amount at home for 1 week and were then randomised to either increase or decrease their time in bed by 1.5 hours per night for 1 week, before crossing over to the alternate schedule for the third week. Compared with the decrease sleep condition, children consumed a mean 134 kcal/day less (p<0.05) and had lower fasting morning leptin values (p<0.05) during the increase sleep condition. Mean bodyweight was 0.22kg lower during the increase sleep than the decrease sleep condition (p<0.001).

Comment (AN): Our children/tamarki are similarly at risk. In this study increasing sleep by 1.5 hours/night in comparison to sleep deprivation in children aged 8–11 years reduced average calorie consumption and weight gain despite an increase in morning levels of the hunger-promoting hormone leptin. Real world intervention studies are needed to help reinforce this novel paradigm.


Abstract

Subjective sleepiness is a sensitive indicator of insufficient sleep and impaired waking function

Authors: Akerstedt T et al.

Summary: This review examined whether subjective ratings of sleepiness measure sleep sensitively and reliably. The focus of the review was the KSS, a nine-point Likert-type scale. Sleepiness has a U-shaped diurnal pattern, with high KSS values in the morning and late evening, and with great stability across years. KSS values increase sensitively during acute total and repeated partial sleep deprivation and night work, with effect sizes ranging between 1.5 and 3. The relation of KSS values to driving performance or EEG/EOG indicators of sleepiness is highly significant, strongly curvilinear and consistent across individuals. High KSS values are associated with impaired driving performance and sleep intrusions in the EEG, as well as sleep apnoea, depression and burnout. The context can strongly influence KSS ratings, with values decreasing during physical activity, social interaction and light exposure but increasing during monotonous tasks.

Comment (AN): An individual’s subjective sense of sleepiness remains their best defense against fatigue-related accident. This recent review article summarises a decade of research into the evaluation of sleepiness. The KSS is a subjective rating of sleepiness that can be used in research and clinical settings. Higher values are associated with poor driving performance, and in the Auckland Traffic Accident Study (Connor J et al. BMJ 2002) were a better predictor of crash risk than the Epworth Sleepiness Score.

Reference: J Sleep Res 2014;23(3):240-52

Abstract

Having to stop driving at night because of dangerous sleepiness – awareness, physiology and behaviour

Authors: Akerstedt T et al.

Summary: This study evaluated the sleepiness indicators that cause a night-time driver to stop because of perceived imminent danger. 18 individuals participated in a day drive and a night drive on a motorway (both for 90 min). The night-time drive was terminated prematurely by an onboard driving instructor for 8 drivers (44%) after a mean 43 min because of sleep-related imminent danger. The results showed very high sleepiness ratings (8.5 units on the KSS) immediately before termination in these individuals, compared with <7 after a similar time for the 10 who completed the drive. The group who terminated the drive prematurely also showed more sleep intrusions during the first 40 min on the EEG/EOG than those who completed the drive. All sleepiness indicators were higher during the night drive than the day drive.

Comment (AN): The correct interpretation of impending sleepiness is a critical safety issue for all drivers. This remarkable study looked at real world motorway driving at night (1–4am) without a prior sleep. A large proportion of healthy adults became dangerously sleepy during night driving but in all cases they were aware of the level of impairment (high KSS). Healthy drivers are able to accurately detect increasing levels of sleepiness in real world motorway driving at night.


Abstract
One night’s CPAP withdrawal in otherwise compliant OSA patients: marked driving impairment but good awareness of increased sleepiness

Authors: Filtness A et al.

Summary: This study used a driving simulator to assess the impact of a missed night of CPAP on patient sleepiness and driving ability the following day. 11 long-term compliant CPAP-treated patients with OSA completed a simulated 2-h monotonous afternoon drive in an instrumented car once after a night of normal sleep with CPAP and again after a night without CPAP. Withdrawal of CPAP increased sleep disturbance and led to more incidents, a shorter ‘safe’ driving duration, increased alpha and theta EEG power, and higher subjective sleepiness. Increased EEG beta activity indicated that the patients were making a compensatory effort. In conclusion, patients should be aware that compliance with CPAP treatment is crucial for safe driving.

Comment (AN): There have been no previous studies examining whether untreated OSA patients have a normal ability to perceive their own levels of sleepiness. In this driving simulator study the withdrawal of CPAP treatment for one night increased the number of simulated incidents. There was no evidence of impaired subjective awareness of sleepiness. Whether this holds true for those with undiagnosed/untreated OSA where there might be more widespread neurocognitive effects is not known.

Reference: Sleep Breath 2012;16(3):865-71

Abstract

Does nighttime exercise really disturb sleep? Results from the 2013 National Sleep Foundation Sleep in America Poll

Authors: Buman M et al.

Summary: This analysis of data from the 2013 National Sleep Foundation Sleep in America Poll assessed the impact of exercise on sleep. 1000 adults stratified by age and geographical region were included. Moderate or vigorous exercise in the evening had no impact on sleep outcomes compared with no exercise. Those who exercised vigorously in the morning reported the most favourable sleep outcomes, including greater likelihood of good sleep quality (odds ratio 1.88; p<0.001) and less likelihood of waking unrefreshed (odds ratio 0.56; p=0.03). Most individuals who exercised vigorously in the evening believed that their sleep was of equal or better quality and duration on the days they exercised.

Comment (KF): As this study concludes, it is better to exercise than not to exercise in respect to better quality sleep (plus myriad other reasons). Morning may well be the optimal time for regular exercise, but evening exercise is fine too and may help reduce end of the day anxiety and tension. Whenever people can fit it in is the best time to exercise. There may be some who feel too energised after exercise to sleep. Such is the positive power of exercise – if it is a problem, just encourage them to harness this energy by exercising in the morning.


Abstract

Sleep restriction and serving accuracy in performance tennis players, and effects of caffeine

Authors: Reynier L et al.

Summary: This study assessed the effects of sleep restriction and caffeine on serving accuracy in semi-professional tennis players. Study 1 involved 16 men and women who served 40 tennis balls into a service box after either 5 h sleep (33% sleep restriction) or normal sleep. Study 2 (12 men and women) was similar to study 1 except 80 mg caffeine or placebo was given via a sugar-free drink 30 min before testing in the sleep restriction phase. Both studies showed that serving accuracy was significantly impaired after sleep restriction. The dose of caffeine had no beneficial effect. In conclusion, adequate sleep is essential for best performance in tennis players and caffeine is no substitute.

Comment (AN): As we have just finished watching Wimbledon, the world’s most famous Grand Slam tennis tournament, this study is a “must read”. It is consistent with laboratory studies measuring reaction times and highlights the performance value of a good night’s kip. Elite athletes in preparing for competition need to optimise prior sleep and circadian alignment.

Reference: Physiol Behav 2013;120:93-6

Abstract

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Daily stress, presleep arousal, and sleep in healthy young women: a daily life computerized sleep diary and actigraphy study
Authors: Winkler K et al.
Summary: This study examined the relationship between daily stress and sleep in healthy young women. 145 women were assessed for subjective sleep quality and actigraphy-assessed sleep efficiency for 14 consecutive nights. Higher levels of daily stress were associated with higher levels of somatic and cognitive presleep arousal. Unexpectedly, the women showed higher sleep efficiency after days with above-average stress.
Comment (KF): No surprises in the finding that high daytime stress is associated with higher levels of arousal and worse sleep. What is worth noting though, is that stressors can be arguments, time pressure, work demands, daily hassles and the like. This may not necessarily be the same as anxiety. In assessing someone who has disturbed sleep it is important not to overlook daily stressors which may occur in the absence of clinical anxiety. Tailored intervention would then address minimising these stressors (e.g. reorganising life and coping strategies) and addressing the effects (e.g. by focussing on mindfulness and de-arousal strategies).
Abstract

Insomnia patients' help-seeking experiences
Authors: Cheung J et al.
Summary: This Australian study investigated the help-seeking experiences and behavioural patterns of patients with insomnia who were seeking or receiving specialist care. 26 insomnia patients from specialist sleep and mental health clinics completed a brief questionnaire, followed by an in-depth, semi-structured interview. The findings showed that daytime symptoms arising from insomnia are important illness cues for patients to seek medical help. Also, the patients' treatment pathways highlight factors preventing the widespread use of cognitive behavioral therapy for insomnia (CBT-I). These factors include limited awareness about CBT-I, tentative referral mechanisms, limited service providers, and the high cost of CBT-I.
Comment (KF): Communication is key. Patients expressed a sense of relief that at the specialist clinics their insomnia was adequately acknowledged. You don’t have to be a sleep specialist to do this. Patients expressed dissatisfaction with primary care treatment options (usually hypnotics and sleep hygiene). Knowing about behavioural treatment options, being aware of reputable websites to refer patients (or themselves) to for information (e.g. the Australasian Sleep Association www.sleep.org.au), and being aware of local referral pathways for CBT-I or specialist assessment are simple steps a doctor can take to provide a more comprehensive management plan to those with insomnia.
Abstract

Sleep problems and suicide attempts among adolescents
Authors: Koyawala N et al.
Summary: This case-control study compared sleep disturbances in 40 adolescents who attempted suicide with 40 never-suicidal adolescents. Logistic regression analyses adjusted for antidepressant use, antipsychotic use, affective problems, and being bullied showed that self-reported night-time awakenings were significantly associated with attempted suicide. Parent-reported total sleep problems also predicted suicide attempt status. There was no association between suicide attempts and other distinct sleep problems.
Comment (KF): Although this is a small, cross-sectional study, attempted suicide is such an important issue that insights into risk factors are worth taking note of. Trouble maintaining sleep appears to be a significant risk factor for adolescent suicide attempt. Focussed assessment of sleep problems (among other things) in those at risk for suicidal behaviour would therefore be a wise clinical practice. Asking about sleep should be a routine part of adolescent assessment. The BEARS questionnaire is a brief questionnaire to screen for sleeping problems in youth (along with asking about snoring which can have an association with depression).
Abstract

Association between short time in bed, health-risk behaviors and poor academic achievement among Norwegian adolescents
Authors: Stea T et al.
Summary: This Norwegian study investigated the prevalence of short time in bed (<8 h/day), and its impact on weight, health-risk behaviours and academic achievement in adolescents. 2432 adolescents were assessed by questionnaire. 32.3% of them reported short time in bed (<8 h/day) on an average school night. Health-risk behaviours that were associated with short sleep duration included not being physically active for ≥60 min for ≥5 days/week; using television/computer for >2 h/day; being a current smoker or snuffer; having an irregular meal pattern; eating sweets/candy ≥4 times/week; and poor academic achievement.
Comment (KF): Yet more evidence that being able to get enough sleep is important. More evidence that we should be aware as to how adolescents are sleeping as short sleep or poor sleep can have health and educational consequences. We won’t know unless we ask them.
Abstract