

Sleep and Weight Control

A Wake-up Call

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Jill's case



- Jill, 35, is a single, full-time waitress.
- She presents with a five-year history of 50-pound weight gain and daytime fatigue.
- Jill believes the weight is gained in the winter and she can not lose the weight in the summer.

- She does not eat breakfast; her largest daily meal is supper.
- She feels best at night and her low mood and fatigue worsen during the fall and winter.

Discussion

- Jill is a night owl, which delays her sleep phase.
- Night owls are more likely to suffer from Seasonal Affective Disorder (SAD), tend to be chronically sleep deprived and complain of fatigue.
- Winter weight gain is a function of SAD-associated food cravings.
- Jill's weight gain pattern is classic and her preference for night work is typical—these are factors that will hinder weight loss.

Management Point

Stabilizing Jill's sleep phase and SAD with light therapy is critical to addressing the major barrier to sustained weight loss. The management of SAD also includes antidepressant therapy, since response to light therapy is limited to 60% of SAD patients.

Chronic sleep restriction or sleep deprivation is a common phenomenon of modern life. It has been suggested that since 1910 the average total sleep time for humans has decreased from nine hours to seven hours a night.¹ The human body is designed to sleep at night and get seven to eight hours of sleep per night to function normally during the daytime. As North Americans push the limits of human capacity and attempt to cope with the demands of a “twenty-four/seven” society, physicians are seeing the emergence of new epidemics that can be linked to this phenomenon.²

A tremendous amount of basic research in the fields of sleep, obesity, metabolic and vascular disease is unraveling the relationship of sleep to metabolism and weight control. Clinically, physicians are faced with the outcomes of obesity, metabolic syndrome, Type 2 diabetes and vascular disease. This article discusses these relationships in an effort to help the primary-care physician apply this knowledge to every day clinical practice.

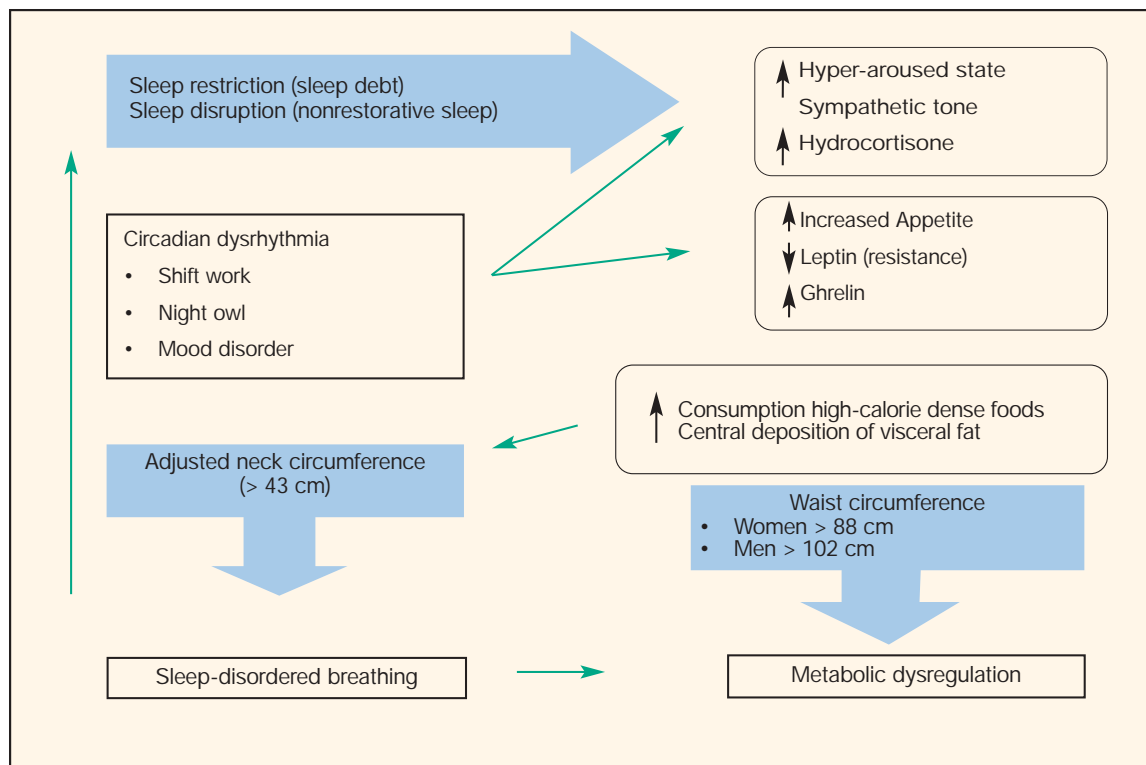


Figure 1: Relationship between sleep, state of arousal, eating behaviour, adipose tissue deposition and metabolic dysregulation.

What's the background and current state of evidence?

In 1999 Spiegel, Leproult and Van Cauter published their findings of a well-designed study exploring the relationship of experimentally induced chronic sleep deprivation to alterations in metabolic function. The results of the study supported the assumption that glucose/insulin regulation and appetite control can be disrupted by chronic sleep restriction.³

More recent epidemiologic evidence has been presented and published supporting the hypothesis that sleep restriction/disruption is linked to weight control. Hasler *et al.* published a 13-year prospective study evaluating the relationship of total sleep time to obesity in young adults.⁴ The results of this study showed a relationship between chronic sleep

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Jack's case



- Jack, 43, is an accountant and father of three boys.
- Body mass index: 30
- Neck circumference: 45 cm
- Waist circumference: 110 cm
- Lipid Profile:
 - Total cholesterol: 6.2 mmol/L
 - Low-density lipoprotein: 3.9 mmol/L
 - Triglycerides: 3 mmol/L
 - High-density lipoprotein: 0.9 mmol/L
 - Fasting blood glucose: 6.3 mmol/L
- He presents with a three-year history of increasing fatigue and weight gain.
- He sleeps on the couch for one to two hours after supper.
- He has no energy for family activities on the weekend.
- His poor, restless sleep and loud snoring causes his wife to sleep elsewhere. Jack's blood pressure is 148/90 mmHg.

Discussion

Jack meets the criteria for metabolic syndrome and the World Health Organization criteria for Class I obesity with high cardiovascular risk. The fatigue associated with nonrestorative sleep and progressive obesity will continue to be a barrier to progressive weight loss.

Management Point

Investigation and management of the sleep-disordered breathing with a sleep study and proper treatment is critical to eliminating the major physical barrier to weight loss. Treatment of sleep apnea will improve Jack's ability to lose weight and maintain weight loss. Weight control requires behavioural changes that need to be reinforced and monitored over time. As Jack becomes more rested he must adjust his eating behaviour, increase activity and sleep enough to sustain the benefits.

FAQ

What basic advice can I give my patients who are struggling with weight loss?

- Get seven to eight hours of sleep every night and catch up on your sleep debt on the weekends.
- Eat breakfast like a king, lunch like a prince and supper like a pauper. Eat more protein in your morning meal and use sources of protein to suppress your appetite through the day.
- Get 30 minutes of activity (walking) a day, five days a week.
- Followup works to maintain patient motivation. See the patient regularly and encourage them to stay on track. Focus on how they feel, not how much weight they have lost.


restriction and weight gain. At the recent North American Association of the Study of Obesity annual meeting doctors Steven Heymsfield and James Gangwisch presented data from the National Health and Nutrition Examination Survey linking obesity to the number of hours of sleep per day. The data suggests that individuals between the ages of 32 and 59, who reported less than four hours of sleep per night were 73% more likely to be obese and those who reported sleeping six hours per night were 23% more likely to be obese.⁵ It is believed that this relationship is related to the neuroendocrinologic control of appetite.

The control of appetite and energy metabolism is complex and contradictory at best, but recent work in this area has provided sound biological evidence to support the clinical observation that physicians are seeing more overweight patients with disordered sleeping patterns, poor appetite control, difficulty losing weight and maintaining weight loss.⁶

The combined effect of stress the hormones (cortisol and adrenalin) and the secretion/activity of leptin and grehlin leads to the inappropriate, increased consumption of high-calorie dense foods, deposition of visceral adipose tissue and the outcome of insulin resistance (Figure 1).

Finally, extensive work in the area of sleep-disordered breathing, or sleep apnea, has led to substantial evidence that there is a biological link between the stress associated with obstructive sleep apnea and the development of metabolic and vascular abnormalities associated with insulin resistance.^{7,8}

Other work in the area of eating and mood disorders has looked at the relationship of delayed circadian sleep phase and seasonal affective disorder (SAD) to eating behaviour. It is common knowledge that “night owls” have altered eating habits and SAD patients tend to crave high-calorie dense foods late in the day.^{9,10}

These findings and common clinical presentations provide evidence to support the assumption that current trends toward an overweight, tired population with high risk for cardiovascular and metabolic disease are linked to stress, mood and sleep behaviour/patterns. 

 **FAQ**

How does light therapy work to treat SAD and circadian rhythm disorders?

The seasonal affective disorder (SAD) light is designed to deliver 5,000 lux to 10,000 lux of light in the 400 nm to 600 nm dosage range required to suppress melatonin secretion. Circadian sleep phase is adjusted by altering melatonin secretion. It is not clear how the light works to improve mood, fatigue, sleep and food cravings in SAD.

*Breakfast like a king,
lunch like a prince and
supper like a pauper.*

Take-home message



- Patients having trouble losing weight or maintaining weight should have a screening sleep history. The history should focus on total sleep time and the restorative quality of sleep.
- Treatment of a primary sleep disorder, such as obstructive sleep apnea, may improve a patient's ability to manage their weight.
- Patients who are having trouble losing weight or maintaining weight loss should be screened for SAD and preference for night owl sleeping pattern.
- Patients with metabolic syndrome or Type 2 diabetes mellitus who are not progressing or stabilizing should have a screening sleep and mood history to determine if there are other biological barriers to progress in the management of their condition.

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