

Examining the association between insomnia and the risk of obesity among North American adults



Sora Abdul-Fattah, Sarina Ly, Mariam Ibrahim
Faculty of Health Sciences, University of Ottawa

Abstract

Background: Approximately 30% of the adult population report at least one symptom of insomnia.¹ Given the rising epidemic of adult obesity, it is important to investigate risk factors that are not well established. If insomnia is found to increase the risk of obesity, it could have significant impacts on one's quality of life.

Objective: The literature was reviewed to assess the evidence regarding the association between insomnia and the risk of obesity among North American adults.

Methods: A structured literature review was conducted through database searches in PubMed and ScienceDirect using the keywords "insomnia", "obesity", and "risk of obesity".

Results: The findings suggest that insomnia is associated with an increased risk of obesity. Shorter sleep durations are linked to lower leptin levels and higher ghrelin levels. Decreased hours of sleep are linked to increased body mass index. Individuals may also increase their caloric intake after a duration of inadequate sleep.

Conclusion: There is a positive association between insomnia and the risk of obesity among North American adults.



Introduction

Although sleep is vital for an individual to maintain proper function, many suffer from a lack of adequate sleep (≤ 5 h) each night.

Obesity is a serious epidemic with extensive negative implications, and more than 1 in 3 adults are obese.³

This study explores if a relationship exists between insomnia, a type of sleep deficiency, and obesity.

Research Question: In North American adults, is insomnia a risk factor for obesity?

Methods

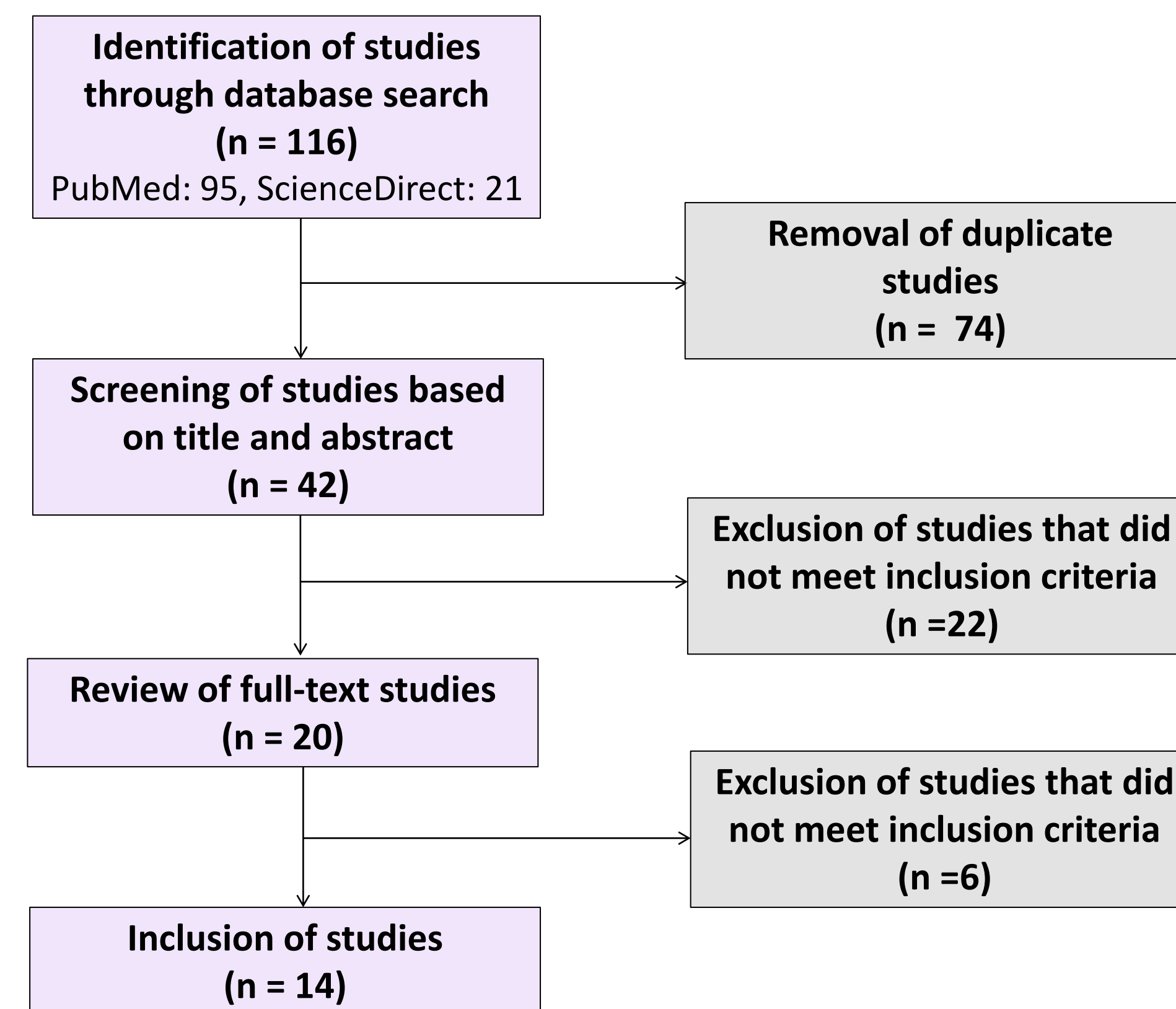


Figure 1. Flowchart illustrating the process of identifying studies for inclusion in the structured literature review. Databases were selected based on accessibility through the University of Ottawa.

Inclusion criteria

- Studies based on the adult North American population
- Published after 2000
- Peer-reviewed
- Available in full-text and in English

Exclusion criteria

- Focus only on areas outside North America
- Focus only on child or adolescent age groups

Results

Table 1. Summary of results that examined the association between sleep and obesity.²

Author	Description	Study Results
Buxton and Marcelli	Cross-sectional	6% increase in the probability of obesity for self-reported sleep duration of < 7 h per night
Anic <i>et al.</i>	Cross-sectional	AOR of BMI ≥ 40 kg/m ² 3.12 for <6 h of sleep
Bo <i>et al.</i>	Prospective 6 years	30% decrease in the probability of obesity for every additional hour of sleep
Hairston <i>et al.</i>	Prospective 5 years	< 5 h of sleep associated with an increase in BMI (+1.8 kg/m ² , $P < 0.001$), in VAT (+13 cm ² , $P > 0.01$), and in SAT (+42 cm ² , $P < 0.0001$)
Hayes <i>et al.</i>	Cross-sectional	6% increase in leptin levels for each hour of decreased sleep
Wisconsin Sleep Cohort	Longitudinal	5 h of sleep associated with a 15% decrease in morning leptin levels and a similar increase in morning ghrelin levels
Brondel <i>et al.</i>	Crossover	Increased caloric intake and hunger after 4 h of night sleep
Tasali <i>et al.</i>	Cross-sectional	14% increase in caloric intake, particularly for carbohydrate-rich nutrients, during an ad libitum buffet, after four nights of 4.5 h sleep, compared with 8.5 h
Nedeltcheva <i>et al.</i>	Randomized crossover	Increase in ghrelin levels and hunger, but not leptin levels, after 2 weeks of sleep restriction (-1.5 h/night) vs. 2 weeks of sleep extension (+1.5 h/night).
Cappuccio & Miller	Meta-analysis of 18 studies	Pooled obesity OR of 1.55 (1.43–1.68; $P < 0.0001$) for < 5 h of sleep. Dose effect of sleep duration - for every additional hour of sleep, BMI decreased by 0.35 kg/m ²
Chaput <i>et al.</i>	Prospective 6 years	Short-duration sleepers were 35% more likely to experience a 5-kg weight gain, as compared with average-duration sleepers over 6 years. Risk of obesity increased by 27% for short-duration sleepers.
Moreno <i>et al.</i>	Cross-sectional	28.3% (n=1,379) of truck drivers had a BMI ≥ 30.0 kg/m ² (obesity). 26.9% with the greatest BMI had a short sleep length.
Kobayashi <i>et al.</i>	3 year cohort	Compared with those who slept 7 h, individuals who slept ≤ 5 h/night were more likely to experience weight gain (β coefficient = 0.03; 95% CI = 0.03–1.1) and become obese (OR = 1.5; 95% CI = 1.1–2.0)
Hasler <i>et al.</i>	Prospective 13 years	Age 27: OR = 7.4 and 95% confidence interval. $P = .08$ for negative association between sleep duration and weight gain

Note: cohort age groups ranged from 20-65 years old

Discussion

- Evaluation of the findings reveals that research supports a positive association between insomnia, a type of sleep deficiency, and the risk of obesity in North American adults.
- The studies demonstrate a statistically significant relationship between the two variables.
- Generally, when compared to other age groups, adults have increased responsibilities for themselves and others; as a result, they are more likely to experience sleep deficiencies.
- The findings bring attention to a risk factor that may otherwise be overlooked in obesity prevention; it emphasizes the importance of adequate sleep.

▪ **LIMITATIONS:** Exclusion of child and adolescent age groups limits generalizability to the overall population. In addition, geographical restriction of the study population limits generalizability to other locations.

▪ **RECOMMENDATIONS:** Further investigation of the synergistic effect between insomnia and the risk of obesity is suggested. Additional research involving prospective longitudinal studies with larger sample sizes is required to confirm the strength and direction of the association.

Conclusions

- There is a positive association between insomnia and the risk of obesity among North American adults.
- It is essential that adults obtain an adequate amount of sleep each night (approximately ≥ 5 h) in order to ensure full physical and mental health.
- Further research is recommended to confirm the strength of association between insomnia and the risk of obesity.
- Additional research on the association between insomnia in children and risk of obesity in adulthood may aid in the generalizability of these findings.
- Additional research regarding factors that contribute to insomnia may provide insight on how to address the problem of lack of adequate sleep.

Acknowledgments

- This opportunity was made possible through the Introduction to Epidemiology course at the University of Ottawa.

Contact

Sora Abdul-Fattah, Sarina Ly, Mariam Ibrahim

Interdisciplinary School of Health Sciences (Faculty of Health Sciences), University of Ottawa

Email: sabdu053@uottawa.ca, sly024@uottawa.ca, mibra094@uottawa.ca

References

- 1) Yazdi, Z., Sadeghniaat-Haghighi, K., Loukazadeh, Z., Elmizadeh, K., & Abbasi, M. (2014). Prevalence of Sleep Disorders and Their Impacts on Occupational Performance: A Comparison between Shift Workers and Nonshift Workers. *Sleep Disorders*, 2014, 870320.
- 2) Beccuti, G., & Pannain, S. (2011). Sleep and obesity. *Current opinion in clinical nutrition and metabolic care*, 14(4), 402.
- 3) Troiano et al. (2008). Overweight and Obesity Statistics. *National Institute of Diabetes and Digestive and Kidney Diseases*. Retrieved from <http://www.niddk.nih.gov/health-information/health-statistics/Pages/overweight-obesity-statistics.aspx>
- 4) Rob Brough. Avoid the cycle of chronic insomnia, poor sleep and exhaustion. *Expert Beacon*. Retrieved from <http://expertbeacon.com/avoid-cycle-chronic-insomnia-poor-sleep-and-exhaustion/#.V15yCq6rTq0>