

Insomnia as a predisposing factor for medical conditions

Ana Maria Alexandra Stanescu¹, Oana Nicolescu¹, Alexandru Mihai Stefanescu²,
Gabriela Carmen Obilisteanu², Cristian Gabriel Bejan¹, Anca Angela Simionescu^{3,4}

¹Department of Family Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania

²"Nicolae Malaxa" Clinical Hospital, Bucharest, Romania

³Department of Obstetrics and Gynecology, "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania

⁴"Filantropia" Clinical Hospital, Bucharest, Romania

ABSTRACT

An essential aspect of human health is sleep. Sleep, among others, interacts with the immune system, plays a role in restoring the body's energy, healing and brain function. Insomnia is often noticed in medical practice, is considered a public health problem. Acute sleep deprivation can alter cognitive performance, and chronic sleep deprivation can lead to disease development. Lack of sleep affects all major systems in the human body, and the major changes that occur in chronic insomnia have been associated with many conditions such as type 2 diabetes, cardiovascular disease, asthma, thyroid disease and gastroesophageal reflux disease.

Keywords: insomnia, sleep, medical conditions

INTRODUCTION

An essential aspect of human health is sleep. Sleep, among others, interacts with the immune system, plays a role in restoring the body's energy, healing and brain function (1). Acute sleep deprivation can alter cognitive performance, and chronic sleep deprivation can lead to disease development (2). Insomnia is often noticed in medical practice, is considered a public health problem.

Difficulties in initiating sleep represent sleep disturbance, difficulties in maintaining sleep, low quality of sleep, followed by low functioning during the day (3). In adults, 33-50% have frequent signs of insomnia, with a prevalence of 10-15% in the general population, with a higher frequency in women and the elderly (4,5). Along with chronic sleep disorders increases the risk of anxiety, suicide, depression, risk of accidents. Although initially considered a symptom, insomnia is now considered a disorder.

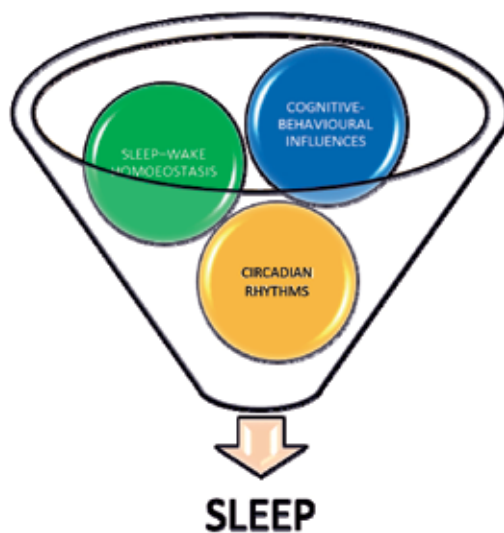


FIGURE 1. The essential factors that regulate sleep

At the genetic level, the genes associated with insomnia are apolipoprotein E4, period circadian regulator 3, clock circadian regulator and 5 seroto-

nin transporter linked polymorphic region genes, being also a close association between insomnia and HLA-DQB1 * 0602 (6).

TABLE 1. International classification of sleep disorders (7)

| | |
|-------------------------------------|--|
| Chronic insomnia disorder | Sleep disturbances for the last three months affecting nighttime sleep at least three times a week. |
| Short-term insomnia disorder | Sleep disturbances experienced within three months. |
| Other insomnia disorder | Sleep disturbances that do not meet the criteria for chronic insomnia or short-term insomnia disorder. |

Behavioral determinants and poor sleep quality were associated with stress, anxiety, smoking, alcohol consumption, increased sugar consumption, workplace pressures, regular work schedule, physical activity, regular sleep and travel time (8). The associations between diet, physical activity and sleep are bidirectional.

TABLE 2. Subtypes of insomnia (7)

| | |
|---|---|
| Psychophysiological insomnia | Increased levels of cognitive and somatic arousal at bedtime |
| Idiopathic insomnia | Sleep disturbances occurring early in childhood and persisting over a lifelong period. |
| Paradoxical insomnia | The patients underestimate the total amount of sleep they obtained. |
| Inadequate sleep hygiene | Sleep hygiene highlights the effect of daily activity on the quality of sleep. |
| Behavioral insomnia of childhood | In children may be affected by their dependency on certain stimulations, objects, environmental settings, disruption of which can significantly delay falling asleep or may show resistance to go to bed or both. |

Chronic sleep changes have been associated with many conditions such as obesity, diabetes and neuropsychiatric disorders.

THE RELATIONSHIP BETWEEN INSOMNIA AND OTHER CONDITIONS

Type 2 diabetes mellitus

Chronic insomnia increases by 16% the risk of developing type 2 diabetes in adults, and the duration of insomnia is proportional to the risk of developing type 2 diabetes (9,10). Several mechanisms contribute to pathogenesis, such as disorder of the hypothalamic-pituitary axis with an increase in cortisol levels, impaired glucose metabolism, imbalance in the leptin-ghrelin system that increases appetite and the risk of obesity causing insulin resistance and unstable blood sugar (11).

Asthma

Chronic insomnia increases the risk of developing asthma and allergic rhinitis, having as a possible mechanism the release of inflammatory mediators such as interleukin 6, the cellular kappa-B nuclear factor in chronic insomnia resulting in allergic airway inflammation (12-14). Epithelial inflammation of the airways in chronic insomnia may be caused by reduced production of interferon- γ , increasing the risk of reactive airway disease.

Cardiovascular disease

Cardiovascular morbidity and mortality may be higher in people with insomnia due to the hypothalamic-pituitary axis's disorders with increased release of the hormone adrenocorticotropin, increased sympathetic nervous system activity, increased inflammatory cytokines and increased levels of C-reactive proteins (15,16). In patients with insomnia, the risk of myocardial infarction increases by 27-45% and also increases the risk of hypertension (17,18).

Gastroesophageal reflux disease

There is a two-way association between gastroesophageal reflux disease and insomnia, with gastroesophageal reflux disease having negative effects on sleep (19). Mody et al. reported that people with gastroesophageal reflux disease reported 88.9% sleep disorders and 49.1% difficulty maintaining sleep (20). Proton pump inhibitors, a treatment used in gastroesophageal reflux disease, improve sleep disorders (21). It increases three times the risk of developing insomnia in patients with esophageal reflux disease (22).

Thyroid disorders

Disorder in the hypothalamic-pituitary axis in chronic insomnia increases the level of corticotropin-releasing hormone, thyrotropin-releasing hormone and cortisol, resulting in fluctuations in thyroid hormone levels (23).

CONCLUSIONS

Lack of sleep affects all major systems in the human body, and the major changes that occur in chronic insomnia have been associated with many conditions such as type 2 diabetes, cardiovascular disease, asthma, thyroid disease and gastroesophageal reflux disease. Several studies are necessary to determine precisely all the diseases that can be caused by insomnia and the concrete mechanism.

