

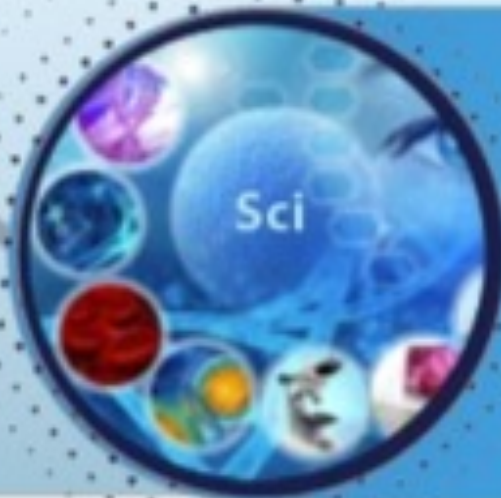


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A systematic review of the relationship between migraine and sleep disorders

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ABSTRACT

Migraine and sleep disorders are prevalent chronic conditions that have a significant socioeconomic impact and can be burdensome. The exact nature of the relationship between these conditions and the underlying mechanisms is not completely understood. Recent research has identified central nervous system structures and neurotransmitters that play a role in both migraine and normal sleep architecture, indicating a possible causal role in the pathogenesis of both conditions. This systematic review aims to evaluate the existence of a causal relationship between migraine and sleep disorders, as well as to identify influencing factors. Identifying specific sleep disorders associated with migraine can help clinicians systematically assess their presence in migraine patients and implement combined treatment strategies.

Keywords: Headache, Migraine, Sleep disorders, Insomnia, Sleep apnea, Circadian rhythm sleep-wake disorders.

INTRODUCTION

Migraine and sleep disorders are chronic conditions that are prevalent in the general population [1-3], and often coexist, leading to the hypothesis of an association beyond chance occurrence. Studies show that migraineurs have poorer sleep quality compared to non-migraineurs [4-16], self-reported poor sleep quality is linked to increased frequency of attacks or chronification of migraine [17-20], and preventive migraine treatments may improve sleep quality [4, 12].

However, the exact nature and direction of the association remain uncertain, as migraine may result from sleep disruption, sleep disruption may trigger migraine, or the two conditions may be unrelated symptoms or in-

trinsically related phenomena with shared pathophysiological mechanisms [21].

Recent studies have identified central nervous system structures and neurotransmitters involved in the pathophysiology of migraine and normal sleep regulation, suggesting a possible causative role of dysregulation in these common nervous system pathways [21, 22].

Evidence suggests that diencephalic and brainstem regions play a major role in both migraine pathogenesis and sleep-wake cycle regulation and molecules such as orexins, melatonin, pituitary adenylate cyclase-activating polypeptide, serotonin, dopamine and adenosine may mediate the relationship between the two conditions [21, 22].

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The aim of this review is to examine the current evidence of the association between migraine and sleep disorders in order to enhance treatment strategies and the understanding of the shared pathophysiology.

METHODS

The methodology used for this review followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [23].

STUDY SELECTION

The study selection process involved the inclusion of clinical trials, observational studies, and case series that included subjects of both sexes, aged 18 years or older, and of all ethnicities. To be included, studies had to diagnose migraines according to the International Classification of Headache Disorders (ICHD) and provide a clear description of the criteria used for the diagnosis of the sleep disorder under consideration. Studies that lacked a clear description of diagnostic criteria for migraine and the sleep disorder being studied, included subjects with headaches other than migraine, lacked a clear definition of study design and setting, were case reports, letters to the editor, published erratum, abstracts, studies not performed on humans, studies not written in English, or unpublished studies were excluded.

The evidence about the association between migraine and sleep disorders was organized according to the major diagnostic sections of the ICSD-third edition, a comprehensive classification system of sleep disorders designed as a diagnostic and coding tool for clinical and epidemiological purposes. The ICSD-third edition includes seven major diagnostic sections: insomnia, sleep-related breathing disorders, sleep-related movement disorders, central disorders of hypersomnolence, circadian rhythm sleep-wake disorders, parasomnias, and other sleep disorders. Each disorder is presented in detail with specific diagnostic criteria. The ICSD-third edition also includes two appendices that list sleep-related medical and neurological disorders and the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes for substance-induced sleep disorders.

INSOMNIA

Insomnia is a common sleep disorder that affects individuals of all ages and races, with prevalence estimates varying according to study design and the adopted definition of insomnia. About one-third to

two-thirds of adult's report insomnia symptoms, and about 10% to 15% meet the criteria for chronic insomnia [33-38].

Several epidemiological studies have evaluated the association between migraine and insomnia [39-48].

Studies have shown that patients with migraine have a higher prevalence of insomnia and insomnia complaints compared to those without headaches, and a higher prevalence of migraine has been reported in subjects with insomnia compared to those without [39, 43, 47].

The Nord-Trondelag Health (HUNT-2 and HUNT-3) prospective population-based study showed that the association between migraine and insomnia may be bidirectional. Individuals with insomnia had a higher risk of developing migraine, and individuals with migraine had a 2-fold increased risk of developing insomnia compared to those without, especially those with at least 7 migraine days/month and those with comorbid chronic musculoskeletal complaints [40, 41].

Insomnia is also associated with increased migraine pain intensity, impact, attack frequency, and risk of chronification, and this association is not solely attributable to anxiety and depression [39, 43-46, 48].

Nonetheless, it is unclear if the association between insomnia and migraine is specific to migraine, as the prevalence of insomnia complaints did not differ between headache subtypes [39, 42].

Conversely, a study by Kim et al. found a higher prevalence of insomnia in individuals with migraine (25.9%) compared to those with non-migraine headache (15.1%) [43].

Longitudinal cohort studies also suggest that insomnia may be generally associated with headache, as the risk of insomnia was found to be similar in individuals with both migraine (OR, 1.9) and non-migraine headaches (OR, 1.7) [41], and individuals with insomnia had the same risk of developing any type of headache (RR, 1.4 for any headache; RR, 1.4 for tension-type headache; RR, 1.4 for migraine; RR, 1.4 for nonclassified headache) [40].

A double-blind, placebo-controlled, parallel-group study [49] aimed to investigate the role of insomnia in migraine frequency and severity by randomizing patients with migraine and insomnia to receive eszopiclone 3 mg at bedtime or placebo. The study failed to answer the question of whether insomnia is a risk factor for increased headache frequency and intensity in migraineurs, as active treatment did not lead to improvement in total sleep time compared to placebo. Furthermore, no differ-

ences were found in headache frequency, intensity, and duration, while only a reduction in nighttime awakenings as well as in daytime fatigue in favor of eszopiclone were reported.

Cognitive behavioral therapy, including sleep hygiene, relaxation training, stimulus control therapy, sleep restriction therapy, and cognitive therapy, has been proven effective in improving both insomnia complaints and comorbid symptoms and is the recommended first-line treatment for chronic insomnia in adults [50].

Recent clinical trials suggest that cognitive behavioral therapy for insomnia is effective in improving migraine attack frequency [51, 52] and pain intensity [52]. A sequential Bayesian analysis of the results of these trials showed that cognitive behavioral therapy for insomnia decreased headache frequency by 6.2 (95% CI, - 9.7 to - 2.7) days more in patients with chronic migraine than in the control group, supporting the effective role of cognitive behavioral therapy as a non-invasive adjunctive treatment for chronic migraine [53].

The pathological mechanism underlying the association between migraine and insomnia is not yet fully understood. According to most available studies, migraine attack onset follows a circadian variation, with an early morning or late-night peak of migraine attack onset [54]. The observed circadian pattern of migraine attack onset may be related to a temporal relationship with rapid eye movement (REM) sleep stages. Nocturnal arousal from sleep with migraine has been found to be more likely during REM sleep [55, 56], and an increased REM sleep and REM latency have been documented by an electroencephalographic study [57]. Hypothalamic and brainstem dysfunctions have been hypothesized as common pathological mechanisms of migraine and insomnia. These structures are involved in both sleep-wake physiology and pain transmission and modulation, and their dysfunctional activity might explain the observed bidirectional relationship between migraine and insomnia.

In summary, the available evidence suggests the existence of a bidirectional relationship between migraine and insomnia that is independent of anxiety and depression. Insomnia is a risk factor for migraine onset and for increased migraine impact, pain intensity, and chronification. Additionally, individuals with migraine are at an increased risk of developing insomnia. Clinicians should always inquire about insomnia complaints in patients with headaches, particularly those with migraines, and manage this comorbid association by implementing specific insomnia treatment in their routine management,

including medications also approved for insomnia treatment, such as amitriptyline.

CONCLUSION

The relationship between migraine and sleep disorders is complex and multifactorial, involving shared anatomical pathways and neuropeptides. Despite advances in recent years, there is still much to learn about the underlying mechanisms and potential therapeutic approaches. However, the high prevalence of comorbid association and the mutual exacerbation between migraine and sleep disorders highlight the importance of routine assessment of sleep history and sleep quality in headache centres. Proper diagnosis and treatment of comorbid sleep disorders may improve the overall management of migraine patients by reducing headache frequency and severity.

REFERENCES:

1. Stang PE, Crown WH, Bizier R, Chatterton ML, White R (2004) The family impact and costs of migraine. *Am J Manag Care* 10:313–320
2. Lipton RB, Bigal ME, Kolodner K, Stewart WF, Liberman JN, Steiner TJ (2003) The family impact of migraine: population-based studies in the USA and UK. *Cephalalgia*. 23:429–440
3. Hu XH, Markson LE, Lipton RB, Stewart WF, Berger ML (1999) Burden of migraine in the United States: disability and economic costs. *Arch Intern Med* 159:813–818
4. Duman T, Dede OH, Uluduz D, Seydaoglu G, Okuyucu E, Melek I (2015) Sleep changes during prophylactic treatment of migraine. *Ann Indian Acad Neurol* 18:298–302
5. Engstrom M, Hagen K, Bjork MH, Stovner LJ, Sand T (2014) Sleep quality and arousal in migraine and tension-type headache: the headache-sleep study. *Acta Neurol Scand Suppl*:47–54
6. Karthik N, Sinha S, Taly AB, Kulkarni GB, Ramachandraiah CT, Rao S (2013) Alteration in polysomnographic profile in 'migraine without aura' compared to healthy controls. *Sleep Med* 14:211–214
7. Lee SH, Kang Y, Cho SJ (2017) Subjective cognitive decline in patients with migraine and its relationship with depression, anxiety, and sleep quality. *J Headache Pain*. 18:77
8. Leone M, Vila C, McGown C (2010) Influence of trigger factors on the efficacy of almotriptan as early intervention for the treatment of acute migraine in a prima-

ry care setting: the START study. *Expert Rev Neurother* 10:1399–1408

9. Song TJ, Cho SJ, Kim WJ, Yang KI, Yun CH, Chu MK (2018) Poor sleep quality in migraine and probable migraine: a population study. *J Headache Pain*. 19:58

10. Sengul Y, Sengul HS, Bakim B, Yucekaya SK, Yucel S, Akgun M (2015) Sleep disturbances and excessive daytime sleepiness in migraine: a comparison between comorbidities and disability. *Sleep Biol Rhythms* 13:76–84

11. Dikmen PY, Yavuz BG, Aydinlar EI (2015) The relationships between migraine, depression, anxiety, stress, and sleep disturbances. *Acta Neurol Belg* 115:117–122

12. Aydinlar EI, Dikmen PY, Kosak S, Kocaman AS (2017) OnabotulinumtoxinA effectiveness on chronic migraine, negative emotional states and sleep quality: a single-center prospective cohort study. *J Headache Pain*. 18:23

13. Wang Y, Xie J, Yang F, Wu S, Wang H, Zhang X et al (2015) Comorbidity of poor sleep and primary headaches among nursing staff in North China. *J Headache Pain*. 16:88

14. Zhu Z, Fan X, Li X, Tan G, Chen L, Zhou J (2013) Prevalence and predictive factors for poor sleep quality among migraineurs in a tertiary hospital headache clinic. *Acta Neurol Belg* 113:229–235

15. Odegard SS, Engstrom M, Sand T, Stovner LJ, Zwart JA, Hagen K (2010) Associations between sleep disturbance and primary headaches: the third Nord-Trondelag health study. *J Headache Pain*. 11:197–206

16. Qiu C, Frederick IO, Sorensen T, Aurora SK, Gelaye B, Enquobahrie DA et al (2015) Sleep disturbances among pregnant women with history of migraines: a cross-sectional study. *Cephalalgia*. 35:1092–1102

17. Song TJ, Yun CH, Cho SJ, Kim WJ, Yang KI, Chu MK (2018) Short sleep duration and poor sleep quality among migraineurs: a population-based study. *Cephalalgia*. 38:855–864

18. Lucchesi C, Baldacci F, Cafalli M, Dini E, Giampietri L, Siciliano G et al (2016) Fatigue, sleep-wake pattern, depressive and anxiety symptoms and bodymass index: analysis in a sample of episodic and chronic migraine patients. *Neurol Sci* 37:987–989

19. Lin YK, Lin GY, Lee JT, Lee MS, Tsai CK, Hsu YW et al (2016) Associations Between Sleep Quality and Migraine Frequency: A Cross-Sectional CaseControl Study. *Medicine (Baltimore)*. 95:e3554

20. Sadeghniaat K, Rajabzadeh A, Ghajarzadeh M, Ghafarpour M (2013) Sleep quality and depression among patients with migraine. *Acta Med Iran* 51:784–788

21. Dodick DW, Eross EJ, Parish JM, Silber M (2003) Clinical, anatomical, and physiologic relationship between sleep and headache. *Headache*. 43:282–292

22. Holland PR, Barloese M, Fahrenkrug J (2018) PACAP in hypothalamic regulation of sleep and circadian rhythm: importance for headache. *J Headache Pain*. 19:20

23. Moher D, Liberati A, Tetzlaff J, Altman DG, Group P (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med* 6:e1000097

24. Headache Classification Committee of the International Headache Society (1988) Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. *Cephalalgia* 8(Suppl. 7):1–96

25. Headache Classification Committee of the International Headache Society (2004) The international classification of headache disorders, 2nd edition. *Cephalalgia* 24(Suppl. 1):1–160

26. Headache Classification Committee of the International Headache Society (IHS) (2013) The international classification of headache disorders, 3rd edition (beta version). *Cephalalgia*. 33(9):629–808

27. Headache Classification Committee of the International Headache Society (IHS). The International Classification of Headache Disorders, 3rd edition. *Cephalalgia*. 2018;38(1):1–211

28. American Academy of Sleep Medicine (2014) International classification of sleep disorders, 3rd edn. American Academy of Sleep Medicine, Darien

29. Sateia MJ (2014) International classification of sleep disorders-third edition: highlights and modifications. *Chest*. 146:1387–1394

30. Diagnostic Classification Steering Committee, Thorpy MJ (1990) International classification of sleep disorders: diagnostic and coding manual. American Sleep Disorders Association, Rochester

31. American Sleep Disorders Association (1997) International classification of sleep disorders (revised). Diagnostic and coding manual. American Sleep Disorders Association, Rochester

32. International Classification of Sleep Disorders: Diagnostic and Coding Manual. 2. Westchester: American Academy of Sleep Medicine; 2005

33. Ohayon M (1996) Epidemiological study on insomnia in the general population. *Sleep*. 19(Suppl 3):7–15
34. Ohayon MM (2002) Epidemiology of insomnia: what we know and what we still need to learn. *Sleep Med Rev* 6:97–111
35. Morin CM, LeBlanc M, Daley M, Gregoire JP, Merette C (2006) Epidemiology of insomnia: prevalence, self-help treatments, consultations, and determinants of help-seeking behaviors. *Sleep Med* 7:123–130
36. Shochat T, Umphress J, Israel AG, Ancoli-Israel S (1992) Insomnia in primary care patients. *Sleep* 22(Suppl 2):359
37. Roth T, Roehrs T (2003) Insomnia: epidemiology, characteristics, and consequences. *Clin Cornerstone* 5:5–15
38. LeBlanc M, Merette C, Savard J, Ivers H, Bailargeon L, Morin CM (2009) Incidence and risk factors of insomnia in a population-based sample. *Sleep*. 32:1027–1037
39. Yeung WF, Chung KF, Wong CY (2010) Relationship between insomnia and headache in community-based middle-aged Hong Kong Chinese women. *J Headache Pain*. 11:187–195
40. Odegard SS, Sand T, Engstrom M, Stovner LJ, Zwart JA, Hagen K (2011) The long-term effect of insomnia on primary headaches: a prospective population-based cohort study (HUNT-2 and HUNT-3). *Headache*. 51:570–580
41. Odegard SS, Sand T, Engstrom M, Zwart JA, Hagen K (2013) The impact of headache and chronic musculoskeletal complaints on the risk of insomnia: longitudinal data from the Nord-Trondelag health study. *J Headache Pain*. 14:24
42. Lateef T, Swanson S, Cui L, Nelson K, Nakamura E, Merikangas K (2011) Headaches and sleep problems among adults in the United States: findings from the National Comorbidity Survey-Replication study. *Cephalalgia*. 31: 648–653
43. Kim J, Cho SJ, Kim WJ, Yang KI, Yun CH, Chu MK (2018) Impact of migraine on the clinical presentation of insomnia: a population-based study. *J Headache Pain*. 19:86
44. Kim J, Cho SJ, Kim WJ, Yang KI, Yun CH, Chu MK (2016) Insomnia in probable migraine: a population-based study. *J Headache Pain*. 17:92
45. Kelman L, Rains JC (2005) Headache and sleep: examination of sleep patterns and complaints in a large clinical sample of migraineurs. *Headache*. 45:904–910
46. Sancisi E, Cevoli S, Vignatelli L, Nicodemo M, Pierangeli G, Zanigni S et al (2010) Increased prevalence of sleep disorders in chronic headache: a casecontrol study. *Headache*. 50:1464–1472
47. Lovati C, D'Amico D, Bertora P, Raimondi E, Rosa S, Zardoni M et al (2010) Correlation between presence of allodynia and sleep quality in migraineurs. *Neurol Sci* 31(Suppl 1):155–158
48. Vgontzas A, Cui L, Merikangas KR (2008) Are sleep difficulties associated with migraine attributable to anxiety and depression? *Headache*. 48:1451–1459
49. Spierings EL, McAllister PJ, Bilchik TR (2015) Efficacy of treatment of insomnia in migraineurs with eszopiclone (Lunesta(R)) and its effect on total sleep time, headache frequency, and daytime functioning: a randomized, double-blind, placebo-controlled, parallel-group, pilot study. *Cranio*. 33:115–121
50. Riemann D, Baglioni C, Bassetti C, Bjorvatn B, Dolenc Groselj L, Ellis JG et al (2017) European guideline for the diagnosis and treatment of insomnia. *J Sleep Res* 26:675–700
51. Smitherman TA, Walters AB, Davis RE, Ambrose CE, Roland M, Houle TT et al (2016) Randomized controlled pilot trial of behavioral insomnia treatment for chronic migraine with comorbid insomnia. *Headache*. 56:276–291
52. Calhoun AH, Ford S (2007) Behavioral sleep modification may revert transformed migraine to episodic migraine. *Headache*. 47:1178–1183
53. Smitherman TA, Kuka AJ, Calhoun AH, Walters ABP, Davis-Martin RE, Ambrose CE et al (2018) Cognitive-behavioral therapy for insomnia to reduce chronic migraine: a sequential Bayesian analysis. *Headache*. 58:1052–1059
54. Baksa D, Gecse K, Kumar S, Toth Z, Gal Z, Gonda X et al (2019) Circadian variation of migraine attack onset: a review of clinical studies. *Biomed Res Int* 2019:4616417
55. Dexter JD, Weitzman ED (1970) The relationship of nocturnal headaches to sleep stage patterns. *Neurology*. 20:513–518
56. Goder R, Fritzer G, Kapsokalyvas A, Kropp P, Niederberger U, Streng H et al (2001) Polysomnographic findings in nights preceding a migraine attack. *Cephalalgia*. 21:31–37
57. Drake ME Jr, Pakalnis A, Andrews JM, Bogner JE (1990) Nocturnal sleep recording with cassette EEG in chronic headaches. *Headache*. 30:600–603

MIGREN VA UYQU BUZILISHI O'RTASIDAGI O'ZARO BOG'LIQLIKNING TIZIMLI TAHLILI.

Annotatsiya:

Migren va uyqu buzilishi keng tarqalgan surunkali kasalliklardan biri bo'lib, og'ir kechishga moyil va jiddiy ijtimoiy-iqtisodiy ta'sirga ega. Ushbu holatlar o'rtasidagi bog'liqlikning aniq tabiati va asosiy mexanizmlari hali to'liq o'rganilmagan. So'nggi o'tkazilgan tadqiqotlarda migren va normal uyqu arxitekturasida rol o'ynaydigan markaziy asab tizimi tuzilmalari va neurotransmitterlar aniqlanib, bu ikkala holatning patogenezdagi ishtirokini o'rgandi. Ushbu tizimli tahlilning maqsadi migren va uyqu buzilishi o'rtasida sabab-oqibat aloqasi mavjudligini baholash va ta'sir etuvchi omillarni aniqlashdir. Migren bilan bog'liq o'ziga xos uyqu buzilishlarini aniqlash migrenli bemorlarda ularning mavjudligini tizimli ravishda baholashga va kombinatsiyalangan davolash strategiyalarini amalga oshirishga yordam beradi.

Kalit so'zlar: bosh og'rig'i, migren, uyqu buzilishi, uyqusizlik, uyqu apnoeasi, sirkad ritmining buzilishi.

СИСТЕМАТИЧЕСКИЙ ОБЗОР ВЗАИМОСВЯЗИ МЕЖДУ МИГРЕНЬЮ И НАРУШЕНИЯМИ СНА

Аннотация:

Мигрень и расстройства сна являются распространенными хроническими заболеваниями, которые оказывают значительное социально-экономическое воздействие и могут быть обременительными. Точная природа взаимосвязи между этими состояниями и лежащие в ее основе механизмы до конца не изучены. Последние исследования выявили структуры центральной нервной системы и нейротрансмиттеры, играющие роль как в мигрени, так и в нормальной архитектуре сна, что указывает на возможную причинную роль в патогенезе обоих состояний. Целью данного систематического обзора является оценка наличия причинно-следственной связи между мигренью и нарушениями сна, а также выявление влияющих факторов. Выявление специфических нарушений сна, ассоциированных с мигренью, может помочь клиницистам систематически оценивать их наличие у пациентов с мигренью и реализовывать комбинированные стратегии лечения.

Ключевые слова: Головная боль, мигрень, расстройства сна, бессонница, апноэ во сне, нарушения циркадного ритма сна-бодрствования.