International Journal of Clinical & Biomedical Research
Vol 8, Issue 4, 2022.

Sumathi Publications
Review Article

Sleep disorders, Diagnosis, treatment and A Dentist's role in early diagnosis and treatment of sleep disorders: A Review

Devarathnamma MV[1], Geeta Bhat[2], Shreya Hunakunti[3], Manohar Bhat[4], Deepak Sharma[5], Janavathi Rangappa[6]

[1]Reader, Dept. of Periodontology, S.B Patil Dental college, Bidar, India
[2]Prof. & HOD, Dept. of Periodontology, Jaipur Dental college, Jaipur, India
[3]Senior lecturer, Dept. of Orthodontics and dentofacial orthopaedics, Navodaya Dental College, Raichur, India
[4]Prof. & HOD, Dept. of Pedodontics, Jaipur Dental college, Jaipur, India
[5]Principal, Dept. of Endodontics & Conservative dentistry, Jaipur Dental college, Jaipur, India
[6]Reader, Dept. of Endodontics & Conservative dentistry, Albader dental college, Gulbarga, India

Abstract

Objective/Background: Sleep disorders are interdisciplinary and involve a number of specialties such as respiratory medicine, neurology, psychiatry, otolaryngology, and Dentistry. 87.5% of the patients with loud snoring suffer from sleep-disordered breathing, of which 72% complain of excessive daytime sleepiness. Controversial evidence exists on the association of sleep disorders as a primary or secondary risk factor for many common systemic conditions. Yet, sleep medicine is not given emphasis in medical school education. In addition, dentists now participate in the recognition and treatment of sleep disorders, Dentist's role and involvement in the treatment and management of a sleep-disordered patient may be indirect or direct. Hence, this review explains sleep disorders, diagnosis and treatment, and the role of dentists in early diagnosis and treatment.

KEYWORDS: sleep disorders, dentists, sleep, sleep medicine

Introduction

Sleep is a biological process essential to life and optimal health. Sleep plays a critical role in brain function and systemic physiology, including metabolism, appetite regulation, and the functioning of the immune, endocrine, and cardiovascular systems [1]. The peak metabolic rate occurs during sleep. Therefore, sleep has intrigued scientists around the world. Millions of Indians are plagued by sleep disorders.

It's a serious public health risk that too many doctors ignore [2]. Normal healthy sleep is characterized by sufficient duration, good quality, appropriate timing and regularity, and the absence of sleep disorders and disorders [1]. Sleep disorders can often be a symptom of an illness, or can also be an indicator of a future illness such as depression. For these reasons, sleep assessment is an essential part of any health check-up. For this reason, many healthcare systems have put mechanisms in place to prevent sleep disorders by providing specific plans related to education and awareness of good sleep habits, knowing that their role and involvement in the management and management of a patient with sleep disorders can be indirect or direct. Therefore, this review focuses on the emerging branch of medicine, sleep medicine, its multidisciplinary approach, and the role of dentists in the early detection, treatment, and care of affected patients.

SLEEP DISORDERS CLASSIFICATIONS

The classic clinical phenomenological

Correspondence: Dr. Devarathnamma MV, Reader, Dept. of Periodontology, S.B Patil Dental college, Bidar, India.
Email id: mvdevarathna@yahoo.co.in

eISSN: 2395-0471
pISSN: 2521-0394

classification of sleep disorders is based on phenomena that deviate from the usual course and duration of sleep, as well as on the subjective complaints of patients, and includes 4 types of sleep disorders:

1. Difficulty falling asleep (initial insomnia)
2. Oversleeping (transition disorder)
3. Early morning wakening (terminal insomnia), and
4. Mixed disorders (1,3,4).

In addition to clinical observation, assessment of these disorders includes nighttime sleep monitoring i. e. Polysomnography (PSG).

The clinical classification of Roth [4], which took into account quantitative and qualitative features of sleep, is similar and includes 3 groups:

1. Changes in length (duration) of sleep,

2. Changes in the structure (profile) of sleep, and

3. Specific quantitative disorders of sleep (e. g. sleep paralysis, etc).

Finke and Schulte [5] gave etiological classification separating:

1. Functional sleep disorders (dyssomnia) from
2. Organically caused sleep disorders (hyposomnia, insomnia, agrypnia)

Functional disorders are divided into:

a) Exogenous - (physical causes) and

b) Psychoreactive sleep disorders

Organically caused disorders are divided into:

a) Specific hypersomnia syndromes (narcolepsies, Kleine-Levin syndrome, Pickwick syndrome, Rosenthal syndrome)

b) Sleep disorders caused by primary diseases CNS (infectious, toxic, traumatic brain injuries)

c) Sleep disturbances induced by organ and system diseases (heart insufficiency, respiratory disorders, etc.)

There is a category of sleep disorders connected with symptomatic and endogenous psychosis, as well as a subset of specific kinds of sleep disorders, such as somnambulism and pavor nocturnus, which are situated between functional and organic disorders.

The American Sleep Disorders Association, led by H. P. Roffwarg [6] classified sleep and wakefulness disorders into 4 categories:

1. Disorders of initiating and maintaining sleep (insomnia, DIMS),

2.Disorders of excessive somnolence (hypersomnia, DOES),

3. Disorders of sleep-wake rhythm and,

4. Disorders associated with sleep, sleep stages or incomplete wakefulness (parasomnia)

Williams and Karacan [7] classified sleep disorders into 1. Primary, 2. Secondary, 3. Parasomnias and 4. Disorders caused or modified by sleep.

The DSM-IV(Diagnostic and Statistical Manual of Mental Disorders) [8] classification of psychiatric disorders (2) classifies sleep disorders as follows: 1. Primary (Dissomnias – primary insomnia, primary hypersomnia, narcolepsy, breathing-related sleep disorder, circadian rhythm sleep disorder, non-specific sleep disorders; and Parasomnias – nightmares, night terrors, sleepwalking); 2. Disorders related to other mental disorders (insomnia (insomnia, hypersomnia, parasomnia, mixed disorder – related to a general medical condition). Psychoactive substance-induced sleep problems are characterized by drug abuse.

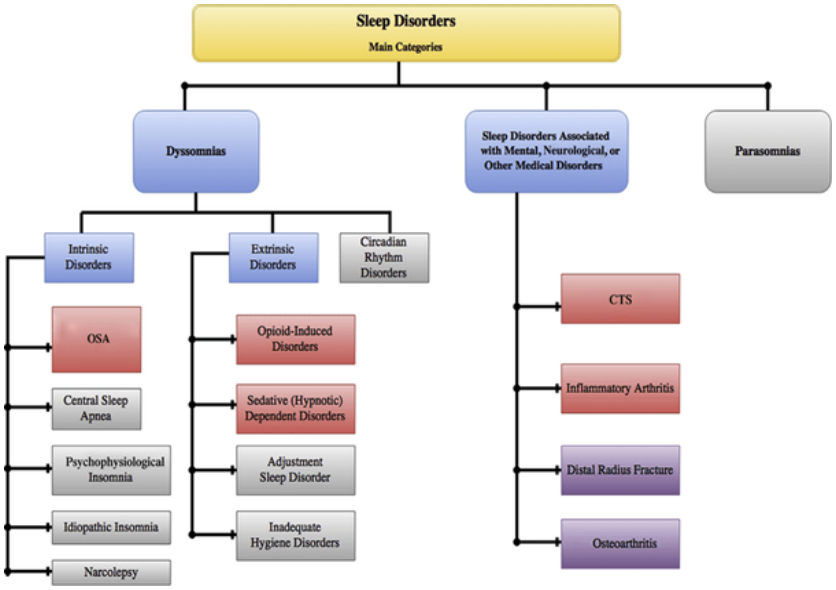

Figure 1. Common sleep disorders

DEFINING NORMAL AND DISORDERED SLEEP

Sleep is necessary for good health. A healthy sleep duration, quality, timing, and regularity are required, as well as the absence of sleep disruptions or disorders. Non-rapid eye movement (NREM) sleep and rapid eye movement (REM) sleep are the two types of sleep. Stages 1, 2, 3, and 4 of NREM sleep form a continuum of relative depth. Each has distinctive properties, such as distinct brain wave patterns, eye movements, and muscular tone. (Loomis et al., 1937; Dement and Kleitman, 1957a) [9]. Non-rapid eye movement sleep (NREM) is A state of deep, usually dreamless, sleep that occurs regularly during a normal period of sleep with intervening periods of REM sleep and is characterized by delta waves and a low level of autonomic physiological activity—called also non-REM sleep or slow-wave sleep. Rapid eye movement (REM) Rapid and simultaneous movement of both eyes and associated with REM sleep.

A sleep episode begins with a brief period of NREM Stage 1, progressing through Stage 2, followed by Stages 3 and 4, and finally to REM. However, individuals do not remain in REM sleep for the rest of the night but instead alternate between the states of NREM and REM throughout the night. NREM sleep accounts for about 75 to 80 percent of total time spent asleep, and REM sleep accounts for the remaining 20 to 25 percent. (Carskadon and Dement, 2005) [10].

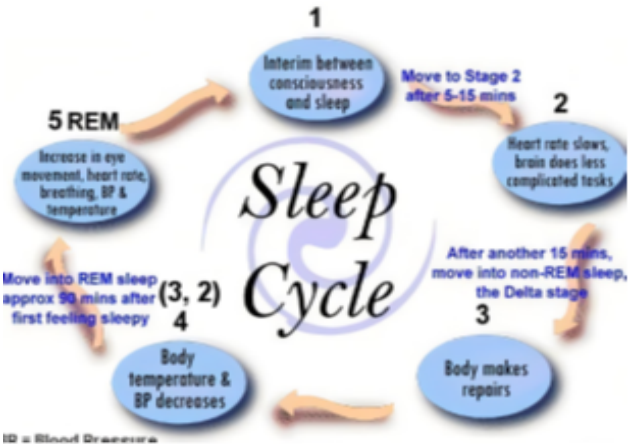

Figure 2. The sleep cycle

Figure 3. Circadian Rhythm

Table 1. Normal sleep-in different age groups [11-13]

Age Group		Recommended Hours of Sleep Per Day
Newborn	0–3 months	14–17 hours (National Sleep Foundation)[1] No recommendation (American Academy of Sleep Medicine)[2]
Infant	4–12 months	12–16 hours per 24 hours (including naps)[2]
Toddler	1–2 years	11–14 hours per 24 hours (including naps)[2]
Preschool	3–5 years	10–13 hours per 24 hours (including naps)[2]
School Age	6–12 years	9–12 hours per 24 hours[2]
Teen	13–18 years	8–10 hours per 24 hours[2]
Adult	18–60 years	7 or more hours per night[3]
	61–64 years	7–9 hours[1]
	65 years and older	7–8 hours[1]

The purpose of alternations between these two forms of sleep is currently unknown, however irregular cycling and/or the absence of sleep stages are connected with sleep disorders (Zepelin et al., 2005) [14]. Individuals with narcolepsy, for instance, enter sleep immediately into REM sleep rather than NREM sleep, as is common. (Carskadon and Rechtschaffen, 2005) [15].

Table 2. Physiological Changes During NREM and REM Sleep [16]

Physiological Process	NREM	REM
Brain activity	Decreases from wakefulness	Increases in motor and sensory areas, while other areas are similar to NREM
Heart rate	Slows from wakefulness	Increases and varies compared to NREM
Blood pressure	Decreases from wakefulness	Increases (up to 30 percent) and varies from NREM
Sympathetic nerve activity	Decreases from wakefulness	Increases significantly from wakefulness
Muscle tone	Similar to wakefulness	Absent
Blood flow to the brain	Decreases from wakefulness	Increases from NREM, depending on the brain region
Respiration	Decreases from wakefulness	Increases and varies from NREM, but may show brief stoppages; coughing suppressed
Airway resistance	Increases from wakefulness	Increases and varies from wakefulness
Body temperature	Is regulated at a lower set point than wakefulness; shivering initiated at a lower temperature than during wakefulness	Is not regulated; no shivering or sweating; the temperature drifts toward that of the local environment
Sexual arousal	Occurs infrequently	Greater than NREM

A sleep disorder or somnipathy is characterized by sleep pattern alterations in an individual or animal and produced due to disruption in sleep functions. This Disruption of sleep may be caused by a different factors and conditions which are serious enough in causing difficulties in normal physical and mental health.

Figure 4. Sleep disorder and its complications

DIAGNOSIS OF SLEEP DISORDERS [17-19]

Complex and often an interdisciplinary diagnosis of sleep disorders has two main goals:

1. To establish if the sleep disorder is an acute (transient, reactive) disturbance, or a chronic (repeated, permanent state); and

2. To determine the extent to which psychogenic i. e. somatogenic factors have an effect on the etiopathogenesis of the sleep disorder. Therefore, it is necessary to:

a). Study sleep habits in detail, starting from childhood,

b). Obtain data on the frequency, duration, extent, and consistency of the sleep disorder.

c). Consider precipitating, causal psycho-social, and biological factors that contribute to disorder genesis

d). Consider both objective data and subjective assessment of the quality and quantity of sleep

e). Analyze the symbolic or existential importance of the disorder for the individual and his or her social environment

f). Find out the chronology and content of daily activities

g). Give a psychiatric evaluation of an emotional or mental disorder

h). Perform a complete physical examination and necessary consultative examinations – neurological, general medicine, Otorhinolaryngology, ophthalmological, gynaecological, rheumatological etc.

i). Perform laboratory analyses and functional investigations of organic systems (respiratory, cardiovascular, Central Nervous system, endocrine, locomotor) in accordance with the present disturbances and physical findings.

j). Perform a special clinical and neurophysiological diagnosis of the sleep disorder i. e. circadian rhythm disorder (polysomnography – PSG, ACPSG)

Figure 5. Sleep deprivation and its consequences

Diagnostic methods

Clinical exploration is based on 1. Standard psychiatric interview directed toward the stated diagnostic goals; 2. Standardized clinical scales for assessment of mental functioning (BPRS, HAMA, HAMD, etc.); 3. Special questionnaires for

assessment of sleep quality; 4. General somatic, neurological and psychiatric examination; 5. Consultative examinations [General Physician, ORL(Otorhinolaryngology), etc.]; and 6. Psychological examination.

Biochemical tests of blood and urine are the first step in laboratory study, followed by biochemical analyses and functional investigations of organic systems (especially hepatorenal, respiratory, cardiovascular, cerebrovascular, etc.). Radiological procedures (native and contrast-enhanced scans, CT, NMR, etc.), toxicological tests, microbiological examinations, etc. are also available as complementary diagnoses.

Clinical neurophysiological diagnostics are based on standardized polygraphic recordings of nocturnal sleep – polysomnography (PSG = EEG EOGEMG) or on the 24-hour monitoring of the circadian and ultradian rhythm of the sleep-wake cycle via Ambulatory Cassette polysomnography – ACPSG (known as Holter-EEG). Visual or automatic (computerized) study of the polysomnogram yields sleep (and wake) parameters that constitute the so-called Electrophysiological Sleep Profile (EPS). [17,18]

Characteristic modifications of sleep profiles, specific occurrences during sleep (many nocturnal awakenings, incomplete awakenings, discharges), and mathematically developed diagnostic models are crucial in the diagnosis of sleep disorders as well as other psychical and organic problems. [19]

SLEEP DISORDER TREATMENT [20]

• A well-executed diagnostic procedure is a suitable beginning point for developing an effective therapeutic treatment plan for sleep disturbance (insomnia, hypersomnia).

Fundamentals of insomnia treatment

• Consider seriously any patient concerns regarding sleep disruptions (and subjective evaluation!).

• Evaluate the benefits and disadvantages of the treatment for the patient.

• Treat the underlying disorder or disease, as insomnia or hypersomnia are frequently the only symptoms (hypersomnia should be taken as a symptomatic disorder).

• Sleep disorders should be addressed during the day using natural, psychological, physical, and pharmacological therapies to restore total wakefulness (the better the wakefulness - the better the sleep).

• Sleep is an involuntary, vegetative occurrence; one does not sleep voluntarily but of its own accord.

• All treatment interventions should aim to restore the sleep-wake cycle, i.e., they should facilitate normal sleep and a pleasurable awakening.

• During diagnostic and treatment procedures, certain sleep disorders such as narcolepsy, parasomnia, insomnia in depressive disorder (masked depression), and so-called "chronic pain syndrome" sleep disorders should receive special attention.

• Treatment of sleep disturbances must be interdisciplinary and methodical; it should involve the entire family, particularly pediatric patients.

• Medical treatment must target the underlying physical or mental issue. The treatment of this condition will indirectly result in the synchronization of the sleep-wake cycle.

Therapeutic procedures

General therapeutic measures

General therapeutic measures refer to advice and instructions on the elements of sleep hygiene, and they include:

• Providing satisfactory conditions and comfort for sleep – ventilation, temperature, and bed;

• Natural and physiotherapeutic procedures necessary to establish and maintain wakefulness during the daytime – getting up immediately upon awakening, morning shower, gymnastics, walk, avoidance of daytime naps;

• Relaxation procedures and rituals in the afternoon and evening in order to get ready for sleep (afternoon and evening walks, relaxation techniques, avoidance of excitement, not taking stimulation drinks – coffee, Coca-Cola, Indian tea);

• Application of the so-called "conditioning ritual" before the bedtime (personal hygiene, cup of warm milk, mild tea, etc.).

All these procedures should be directed toward the restoration of the sleep-wake cycle. An important therapeutic measure lies in abstinence (or at least reduction) from the so-called "vegetative poisons" like nicotine and caffeine, and maintenance of a healthy diet (avoidance of strong, spicy, and canned food and alcohol).

Psychotherapeutic procedures

In addition to psychotherapeutic interventions directed towards solving daily conflicts (especially in acute conditions i. e. acute posttraumatic stress disorders) psychotherapy of the basic emotional or structural disorder is performed.

In treatment of insomnia (as with other psychosomatic syndromes), nonverbal, indirect psychotherapeutic procedures have a significant role in the removal of emotional arrest and harmonization of emotional and vegetative

functioning. Autogenous training and medical hypnosis are primarily used, but relaxation techniques, movement therapy, musical therapy, creative therapy, sensitive training, meditation, and yoga can also be recommended. Psychotherapy is also performed systemically – it includes all family members, especially with children and adolescent patients.

Specific therapeutic procedures

Both medication and specific therapeutic procedures are used only if natural and psychotherapeutic procedures are not sufficient to synchronize the circadian sleep-wake rhythm.

Sleep deprivation is used when the sleep/ wakefulness cycle is considerably disrupted, which is the case when wakefulness is shifted into the night and with a total in the version of the circadian sleep-wake rhythm. In addition to total sleep deprivation, partial sleep deprivation (deprivation of REM) is also performed and it is called the „sleep phase advance“ (as in the treatment of endogenous depression).

Paradoxical intention is a procedure during which a patient is suggested to stay awake (or not to fall asleep). It can be useful in chronic insomnias, structural disorders, and negativism that accompanies some mental disorders.

Sleep - either spontaneous, medicamentous, or “electrosleep”, gives certain results in frequent narcoleptic crises, psychotic syndromes, insomnia as an isolated symptom (psychosomatic syndrome), and organically caused sleep disorders.

Sleep restriction implies a strict restriction of the time patients spend in bed, which results in increased sleep efficiency and better subjective assessment of the night. [20]

Medication treatment

Medication treatment is always directed towards the treatment of the primary mental or somatic disease whose symptom is a sleep disorder. The primary disease can be respiratory, cardiovascular, cerebrovascular, or hepatorenal insufficiency, a pain condition, osteomuscular disturbance, affective disease, psychotic disorder, psycho-organic syndrome, etc.

Time distribution of medication is very important. Medications with stimulative properties are primarily administrated in the morning and afternoon, while sedatives are given in the afternoon and in the evening (highest doses).

If the sleep disorder is treated with basic medications (especially drugs that affect psychic functions), the administration should start after lunch and intensify after dinner. Taking medication should not be associated with going to bed.

With affective disorders, especially depression, a combination of anxiolytics and antidepressants (and sedative neuroleptics) should be administered in such a way as to enable restoration of the disturbed circadian rhythm and to ensure pleasant morning awakenings.

It is necessary to have knowledge of pharmacokinetics of sedatives and hypnotics in order to prevent a possible accumulation of active metabolites because their elimination half-times can be quite long.

An interdisciplinary approach in diagnosis and treatment of sleep disorders and complex clinical and neurophysiological examinations of patients require formation of highly specialized health units - centres, with adequate equipment and well-trained staff. Dentists also contribute with other medical disciplines in sleep medicine.

Role of dentists in Early diagnosis and treatment of sleep disorders. [21,22]

Dentists often see a large number of patients who exhibit behaviors indicative of possible sleep-breathing issues. Several instances are provided below:

- They fall asleep in the chair.
- They can’t “open wide” during exams.
- Their teeth reveal patterns of grinding at night.
- They complain of jaw ache in the morning.
- They have difficulty breathing in the dentist’s chair when it is reclined at a specific angle.

Dentists can use these possible “red flags” to send patients to sleep specialists for further evaluation. Dentists can easily screen for OSA (Obstructive Sleep Apnea). They have the extra advantage of collecting objective data from exams and x-rays to demonstrate physiologic changes that may support the diagnosis of a sleep breathing issue, as they frequently see patients more frequently than the patients’ sleep doctors.

Dental Sleep Medicine

The American Academy of Dental Sleep Medicine (AADSM) describes dental sleep medicine as “the use of oral appliance therapy to treat sleep-disordered breathing, including snoring and obstructive sleep apnea (OSA)”

In 2015, the AADSM and the American Academy of Sleep Medicine (AASM) cooperated on a position paper establishing new rules for the use of dental services as both an alternative and a primary treatment for sleep disorders.

Treatment of sleep disorders by dentists

Dentists and physicians have always collaborated to assist patients with sleep-breathing disorders.

In the past, CPAP (Continuous Positive Airway Pressure) has been the treatment of choice for these conditions, but recent research indicates that OAT (Oral Appliance Therapy) can be just as effective and has a far higher compliance rate.

Figure 6. CPAP Machine Sleep Apnea Mask

Certain sleep problems (snoring, upper airway resistance syndrome, bruxism, and OSA) have been dentists' primary focus. They are trained to promptly detect risk factors at the bedside and to refer patients to sleep specialists when necessary.

Snoring has long been regarded as a major risk factor for OSA (Obstructive Sleep Apnea). Dentists pioneered the snoring mouthpiece as a therapeutic category to combat the problem thirty years ago. As more persons with severe snoring used them, it became obvious that, in some instances, their use also resulted in effective treatment for mild to moderate OSA.

For the construction of these mouthguards, researchers in the field of dentistry considered more intricate methods. The techniques permitted some manipulation of their movable components to manage the two sections of the upper airway most likely to collapse and produce apneas: the tongue (by sliding into the back of the throat) and the lower jaw (by recessing into the back of the throat).

Dentists have been able to create devices that not only remove snoring but also lower the likelihood of apneas by creating mouthpieces that avoid breathing blockages. When users obtain greater breathing space in the back of the airway, they also see improvements in the firmness of the upper airway's tissues, which frequently collapse due to laxity or enlargement.

Dentists can provide therapeutic treatments for sleep-breathing issues in two primary ways:

During sleep, dental appliances (also known as oral devices or mandibular advancement devices [MAD]) are used to prevent blockages of the upper airway. They are worn similarly to mouth guards and are custom-made to fit the patient's bite. These devices relocate the lower jaw and tongue forward, so altering the shape of the upper airway to permit clear breathing.

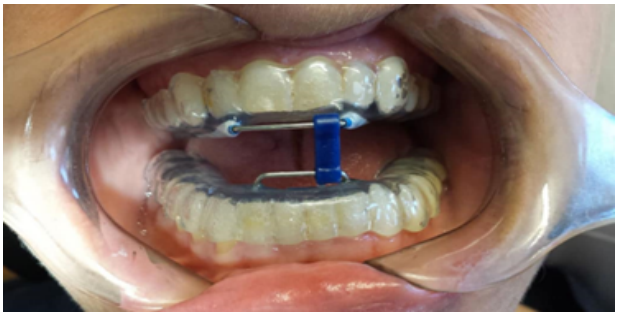

Figure 7. Mandibular Advancement Device

Typically, snoring mouthpieces (also known as snore guards) have a simpler design than dental appliances. This therapy aims to assist advance the lower jaw in order to lessen airway vibrations created by loose, superfluous tissues in the throat and mouth, which can cause friction that contributes to primary snoring.

Most of these devices may be constructed and fitted by dentists who are board-certified in dental sleep medicine, and the sleep clinic is the right location for testing and titrating them. As a result of a joint effort between the two medical areas, many patients are able to overcome their sleep-related breathing issues.

Figure 8. Snore Guards

Conclusion

Approximately one-third of a person's life is spent asleep, although the majority of people know little about sleep. Sleep is a requirement for all higher life forms, including humans, and its absence has severe physiological repercussions. Its role is still not entirely understood, although sleep is a requirement for all higher life forms.

Sleep medicine is evolving rapidly. Sleep medicine is a growing field, partly because of the obesity epidemic and partly because of an increasing recognition of how sleep disorders cause and/or exacerbate serious conditions such as heart disease, and how poor sleep increases societal costs (eg, decreased work/school productivity, and motor vehicle accidents from hypersomnolence).

This review provides an overview of basic sleep, sleep disorders, classification, diagnosis, and its treatment. A brief review on dental sleep medicine that is How the dentist play their role with other medical faculty in early diagnosis and treatment

of sleep disorders. While CPAP (Continuous Positive Airway Pressure) continues to improve as a treatment for sleep breathing difficulties, dental alternatives (snoring mouth guards and oral appliance therapy, or OAT) have recently been licensed as first-line treatments for the same sleep disorders.

Dentists and physicians have collaborated for a long time to check for various health conditions, such as mouth cancer. Since they are already qualified to recognize and treat sleep breathing issues, it is a natural move for them to join the sleep medicine team.

References

1. Medic G, Wille M, Hemels M. Short- and long-term health consequences of sleep disruption. Nature and Science of Sleep 2017:9 151–161.
2. Meshram S, Meshram C, Mishra G, Bharshankar R. Behavior, Attitude and Knowledge of Sleep Medicine among Resident Doctors in University Hospitals of Central India: A Questionnaire Based Study. Indian J Sleep Med 2008; 2.4, 139-144.
3. Ibáñez V, Silva J and Cauli O. A survey on sleep assessment methods. PeerJ 2018:1-26.
4. Roth B. Narkolepse und hypersomiae vom stadpunkt der psychologie die schlafes. Berlin: VEB Volk und Gesundheit, 1962. (in German).
5. Finke J, Schulte W. Schlafstörungen – ursachen und behandlung. Stuttgart: Thieme, 1970. [in German].
6. Roffwarg HP, Muzio JN, Dement WC. Ontogenetic development of the human sleep-dream cycle. Science 1962; 152: 604–19.
7. Williams RL, Karacan I. EEG of human Sleep. New York: Wiley, 1974.
8. International statistical classification of diseases and related health problems. 10th ed. Volume 1. Geneva: World Health Organization, 1992.
9. Loomis AL, Harvey EN, Hobart GA. Cerebral states during sleep as studied by human brain potentials. Journal of Experimental Psychology. 1937;21(2):127–144.
10. Carskadon M, Dement W. Normal human sleep: An overview. In: Kryger MH, Roth T, Dement WC, editors. Principles and Practice of Sleep Medicine. 4th ed. Philadelphia: Elsevier Saunders; 2005. pp. 13–23.
11. Hirshkowitz M, Whiton K, Albert SM, Alessi C, Bruni O, et al. The National Sleep Foundation's sleep time duration recommendations: methodology and results summary. Sleep Health. 2015;1(1):40–43.
12. Paruthi S, Brooks LJ, D'Ambrosio C, Hall WA, Kotagal S, Lloyd RM, et al. Recommended amount of sleep for pediatric populations: a consensus statement of the American Academy of Sleep Medicine. J Clin Sleep Med. 2016;12(6):785–786.
13. Watson NF, Badr MS, Belenky G, et al. Recommended amount of sleep for a healthy adult: a joint consensus statement of the American Academy of Sleep Medicine and Sleep Research Society. Sleep. 2015;38(6):843–844.
14. Zepelin H, Siegel JM, Tobler I. Mammalian sleep. In: Kryger MH, Roth T, Dement WC, editors. Principles and Practice of Sleep Medicine. 4th ed. Philadelphia: Elsevier/ Saunders; 2005. pp. 91–100.
15. Carskadon M, Dement W. Normal human sleep: An overview. In: Kryger MH, Roth T, Dement WC, editors. Principles and Practice of Sleep Medicine. 4th ed. Philadelphia: Elsevier Saunders; 2005. pp. 13–23.
16. Sources: NHLBI (2003), Somers et al. (1993), Madsen et al. (1991b).)
17. Ilanković N: Spavanje i krizna stanja. Avalske sveske 1983; 6: 61. [in Serbian].
18. Ilanković N. Elektrofiziološki profil spavanja u depresivnih bolesnika. Doktorska disertacija. Beograd: Medicinski fakultet, 1983. [in Serbian].
19. Ilankovic N, Marinkovic D, Burgarski D, Ignjatovic M. Models of exogenous and endogenous sleep perturbation as diagnostic and therapeutic predictors in depression. Methods Find Exp Clin Pharmacol 1986; 8: 513-7.
20. Spielman AJ, Saskin P, Thorpy MJ. Treatment of chronic insomnia by restriction of time in bed. Sleep 1987; 10: 45–56.
21. American Academy of Dental Sleep Medicine. Internet source
22. American Academy of Sleep Medicine. Internet source