Sleep Disorders

20

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20.1 Introduction

Sleep is the physiological state of the nervous system that allows for the regulation of a number of life functions. Adults spend nearly 30% of their life asleep.

Despite many decades of the scientific debate linking sleep disorders and sexual dysfunctions, it is still poorly understood how sleep and sexual functioning influence each other. The founder of psychoanalysis—Sigmund Freud—in the early years of the twentieth century suggested a close relationship between sexual dysfunctions and sleep disorders in his work *Interpretation of Dreams*. He pointed out that the attenuation of the physiological manifestations of libidinal energy can cause neurotic reactions and, among them, disturbed sleeping, or insomnia [1]. The phenomenon of "hysteria" which was widespread among women was often discussed in the literature of the nineteenth century. According to those publications, hysteria could be manifested in a wide range of symptoms and among them "weakness, nervousness, excessive sexual desire, insomnia, shortness of breath, lack of appetite, and a decreased libido" [2].

In modern neurophysiological studies, the relationship between physiological sexual responses and sleep stage has been confirmed. It was found that during rapid eye movement (REM) sleep, the brain bioelectric activity (electroencephalographic activity—EEG) is no longer dominated by slow waves; rather it resembles the EEG

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of active wakefulness. During REM sleep tachypnea, irregular breathing, increased heart rate, and rapid eye movements under closed eyelids are observed. Also, during REM sleep, signs of sexual arousal (respectively, penis erection in men and increased vaginal lubrication and erection of clitoris in women) can be observed. Genital arousal during REM sleep has no connection to the presence or absence of sexual dreams. Studies of cyclic sexual responses during sleep were conducted beginning in the 1970s. They were concentrated on searching for the links between sleep stages determined by EEG and erections of the penis or clitoris, in order to detect the variety of vegetative function changes during sleep. Physiological reactions of the body during sleep are also recorded by means of the plethysmography (in women—clitorography and colpography), electroencephalography, electrocardiography, electrooculography, electromyography, respirography, and electrodermatography. The most important observation from the pioneering research by Fisher et al. was that spontaneous erections occurring during sleep begin and end in close temporal association with the REM sleep, and their intensity and frequency are not dependent on the frequency of prior sexual contacts or the duration of the period of sexual abstinence prior to polysomnographic recording [3].

The morning erections observed in men reflect the genital arousal corresponding to the last stage of REM sleep. This phenomenon coincides with the peak of the circadian rhythm of secretion of androgens. The serum concentration of androgens is highest in the morning and the lowest in the evening, with a difference of about 30%. So, rhythmic physiological changes in genital reactivity occurring during the nocturnal sleep correspond both to the rhythmic electrophysiological changes and reflect the rhythm of hormonal cycle.

The recent publication of the third edition of the *International Classification of Sleep Disorders* (ICSD) by the American Academy of Sleep Medicine [4] represents another step forward in the evolution of the nosology of sleep disorders. According to this classification, seven sections of sleep disorders are distinguished (Table 20.1).

Among a number of disorders co-occurring with sleep disturbances, sexual dysfunction in this context seems to be the least understood, despite the fact that the coexistence of both groups of disorders is very common. In a study of patients referred to the Sleep Medicine Center at the Institute of Psychiatry and Neurology in Warsaw, about 30% rated their sleep disorders as not affecting sexual functioning at all; 30% and 26% rated that their sexual functioning is slightly or moderately

Table 20.1 Major diagnostic sections of international classification of sleep disorders (ICSD-3) [4]

Section
Insomnia
Sleep-related breathing disorders
Central disorders of hypersomnolence
Circadian rhythm sleep disorders
Parasomnias
Sleep-related movement disorders
Other sleep disorders

impaired, respectively; and 12% claimed that the sleep disorder significantly affected or completely prevented their sexual functioning [5].

In this chapter we will present clinical cases of patients suffering from insomnia, obstructive sleep apnea (OSA), and sexsomnia as the sleep disorders mostly related to disturbances in sexual functioning. However, also other sleep disorders may be the reason for seeking the professional sexologist's advice. The clinical symptoms and the most important sexual issues related to sleep-related movement disorders, circadian rhythm sleep-wake disorders (CRSWD), and central disorders of hypersomnolence will be also briefly characterized.

20.2 Clinical Manifestations and Management

20.2.1 Insomnia

Insomnia is among the most prevalent health complaints, with approximately 10–15% of the general population suffering from chronic insomnia and about 25–35% presenting its transient or occasional types [6]. It is defined as a difficulty falling asleep or staying asleep, even when a person has the chance to do so. People with *insomnia* usually feel dissatisfied with their sleep and experience one or more of the following *symptoms*: fatigue, low energy, difficulty concentrating, mood disturbances, and learning or occupational difficulties.

The ICSD-3 criteria for insomnia disorder include:

1. A report of sleep initiation or maintenance problems
2. Adequate opportunity and circumstances to sleep
3. Daytime consequences

The short-term insomnia lasts for less than 3 months and is related in time to an identifiable cause (psychological, physical, environmental). The diagnosis of chronic insomnia requires the duration of symptoms of at least 3 months and the frequency at least 3 times/week, while the trigger is difficult to identify [7, 8].

Primary insomnia is the psychophysiological state of the difficulties of falling asleep or maintaining sleep, while the secondary insomnia is caused by the other mental (i.e., affective or anxiety) disorder, medical condition, or other sleep disorder (e.g., restless leg syndrome, OSA). Decades of research have identified hyperarousal (nonsexual) as the key physiological factor related to chronic insomnia, but underlying mechanisms remain elusive. The hyperarousal can result from an inadequate resolution of emotional distress. Its accumulation may promote the development of chronic hyperarousal [9] and probably negatively affects the regulation of the sexual response. Risk factors of insomnia include female gender, advanced age, presence of chronic disorders, lower income, poor sleep environment, bad sleep hygiene, and lifestyle habits (e.g., low physical activity).

Though insomnia is not associated with specific complaints concerning sexual functioning, daytime activities and sexual activity of people suffering from

insomnia may be strongly influenced. It makes it difficult for an individual with insomnia to perform well at work or to carry out their usual daily tasks. The irritability associated with sleep deprivation can cause problems in a person's social and personal life, often affecting those close to the sufferer. It can make relationship maintenance difficult and also (indirectly) influence sexual activity of the couple.

For most adults, sleep is a dyadic issue. Some studies explored the dynamic association between sleep and relationship functioning among bed partners. Male and female circadian rhythms differ. Men have a circadian cycle that is 6 min longer than in women. It means that they may feel less tired in the evening. In women, the internal clock is more likely to be shorter than a full 24-h cycle, making it more likely that they will awaken earlier, which may also increase their susceptibility to early-waking sleep disturbances like insomnia. The bidirectional associations between changes in insomnia severity and changes in marital quality over time were observed. In couples participating in marital therapy, improving sleep may be an added benefit of improving the marital relationship. Among husbands, improvement of marital satisfaction was associated with a 36% decreased risk of insomnia at follow-up [10].

The older literature on sleep and female sexuality is limited to studies on REM sleep and nocturnal vaginal vasocongestion. More recent studies explore the role of hormones in sexual function and sleep and sleep-disordered breathing (e.g., OSA) as a risk factor for sexual problems [11]. Contemporary research suggests that short sleep duration and poor sleep quality lead to poor female sexual response. Kalmbach's study examined the influence of nightly sleep duration, sleep quality, and sleep onset latency on daily female sexual response and activity [11]. The results from this longitudinal study of 171 women free of antidepressants suggest that obtaining sufficient sleep is important to the promotion of healthy sexual desire and genital response, as well as the likelihood of engaging in partnered sexual activity. These relationships seem to be independent of daytime affect and fatigue. Future directions may investigate sleep disorders as risk factors for sexual dysfunction.

Specifically, chronic insomnia disorders as a whole are typically associated with maladaptive cognitions and behaviors that represent major perpetuating factors. Worrying about sleep loss and its potential negative daytime effects is frequently present and increases the physiological arousal and distress. The abovementioned mechanisms are similar to those accompanying psychogenic erection disorders when the worrying about the loss of erection causes the performance anxiety and the activation of the sympathetic nervous system. These cognitive mechanisms must be addressed therapeutically to achieve a successful long-term outcome. Beyond the clearly important management of comorbid disorders such as major depression or chronic pain, treatment approaches to chronic insomnia are essentially the same (i.e., cognitive-behavioral and/or pharmacologic), regardless of the presence or type of comorbidity [7]. According to the current guidelines of American Academy of Sleep Medicine, the pharmacological treatment of chronic insomnia covers orexin receptor antagonists (suvorexant), hypnotics (eszopiclone, zaleplon, zolpidem), and short-acting classical benzodiazepines (temazepam, triazolam) and with lower degree of certainty in the outcome: sedative antidepressants (doxepin) and

melatonergic drugs (ramelteon) [12]. In case of comorbid anxiety and depressive symptoms, insomnia treatment with antidepressive drugs (agomelatine, doxepin, mirtazapine, trazodone) instead of hypnotics is more beneficial. However sexual side effects of some antidepressants have to be considered (for more details, see Chap. 24).

The constitutional increased of sympathetic nervous system activity in patients suffering from insomnia can be relieved by successful sexual intercourse followed by the experience of orgasm. That results in a parasympathetic discharge connected with psychological and physical relaxation and promotes sleep. From physiological studies, it is known that the experience of full cycle of sexual response—with the refraction phase—induces a state of relaxation (especially in men), whereas the persistent excitation of the sympathetic nervous system with the sense of discomfort if the sexual contact is not completed with orgasm can lead to a persistent arousal state (especially in women). For this reason, it can be assumed that some factors concerning sexual behavior or some sexual dysfunctions may also be classified as factors causing insomnia. Considering the high prevalence of sleep disorders and sexual dysfunctions, the prevention of problems associated with inadequate sleep hygiene and the promotion of satisfactory quality of sexual life seems to be not only a medical intervention but belong to important priorities for the public health of modern societies [13].

For Sexual Medicine Practitioners:
Symptoms of insomnia are common in many medical and psychiatric conditions. A diagnosis of chronic insomnia disorder is justified when coexisting mental disorders and medical conditions do not adequately explain the predominant complaint of insomnia. The constitutional increase of the sympathetic nervous system activity could be responsible for both insomnia and sexual dysfunctions. For that reason, insomnia patients should be screened for mood and anxiety disorders as well as the coexisting sexual dysfunctions. The treatment of insomnia-related sexual dysfunctions requires the stabilization of the underlying mental disorder or medical condition and sexual therapy if needed.

Case Report 1
The 34-year-old patient referred for psychiatric/sexological consultation due to the symptoms of chronic insomnia, erectile dysfunction, and performance anxiety. He was single but trying to engage in a new relationship. In the initial phases of his two previous long-term relationships, he presented very similar symptoms. Previously he was using sildenafil citrate for several months to prevent the loss of erection during sexual activity with a new partner and to reassure his self-confidence in the field of his sexual performance.

He presented at the office with the symptoms of long-lasting anxiety and depressed mood, though he was complaining just of severe insomnia and erectile dysfunction that occurred in the context of his sexual activity in the new relationship.

The psychiatric and sexological examination revealed a depressed mood that persisted for several years with the intensification of depressive ruminations concerning both the symptoms of insomnia and the erectile problems in the last several months. He was never previously seen by a psychiatrist. The symptoms of depressed mood seriously influenced his sexual response with reduced libido and subjective arousal and erectile dysfunction. Despite the unsatisfactory mental state, he tried to get involved in a new relationship and get engage in sexual activity without sufficient sexual desire. An inadequate sexual arousal resulted in erectile dysfunction.

The physical exam and laboratory testing were normal. The patient was diagnosed with dysthymia, non-organic sleep disorder (insomnia), and secondary erectile dysfunction.

He was offered the treatment with trazodone (max dosage 150 mg) and sexual therapy focused on the reduction of the obsessively high expectations toward his sexual performance. The patient was also encouraged to carefully observe his sexual desire and engage in sexual activity only if a noticeable sexual need is present. In the further 5 months, the patient's mood stabilized, and he was more prone to engage in sexual activity. He is still continuing the CBT treatment addressed to both types of false beliefs (concerning insomnia and erection problems).

20.2.2 Obstructive Sleep Apnea

Obstructive sleep apnea (OSA) is a disorder characterized by repetitive cessations of breathing due to a collapse of the upper airway during sleep. It is associated with clinical symptoms such as fatigue, increased daytime sleepiness and concentration difficulties, loud snoring and abrupt awakenings related with breathing cessations, headaches, depressive mood, irritability, etc. More recently, OSAS is also being recognized as a causative factor of sexual dysfunction.

In the USA estimates show an overall high and age-increasing incidence of sleep-breathing disorders with moderate to severe disorders (apnea-hypopnea index, AHI $\geq$ 15) ranging from 10% of men and 3% of women aged 30–49 to 17% of men and 9% of women aged 50–70 [14]. Predisposing factors other than age and sex are overweight (increased fat deposits around the upper airway), narrowed airway (enlarged tonsils, adenoids, etc.), chronic nasal congestion, brain injury, and neuromuscular disorders. OSA is also more common in people suffering from hypertension, diabetes, asthma, and smokers. The symptoms may be additionally exacerbated when sleeping in supine position and by the use of alcohol, sedatives, or other drugs that relax upper airways.

Observational studies provided some evidence of the relationship between OSA and increased risk for both male erectile dysfunction (ED) and female sexual dysfunction (FSD). According to a meta-analysis by Liu et al., pooled relative risk (RR) was 1.82 (95%CI: 1.12–2.97) for ED and 2.00 (95%CI: 1.29–3.08) for FSD in individuals with OSA [15]. In 401 males undergoing polysomnography for suspected OSA, twice-as-high prevalence of ED was found in OSA-confirmed vs. non-OSA individuals (68.8% vs. 34.4%, respectively), and the level of sexual dysfunction was related with the severity of OSA measured by the AHI and blood oxygen saturation (SaO_2) [16]. In one study of women with OSA, the use of psychopharmacological medications, rather than the severity of apnea, was related with more sexual dysfunction [17]. OSA is recognized as an independent risk factor of arterial hypertension, diabetes, endothelial dysfunction, and decrease in testosterone levels in men, which are all known as conditions related to sexual dysfunction (SD). A possible mechanism behind the relationship between sleep apnea and cardiovascular, metabolic, and hormonal disorders as well as SD is the oxidative stress related to chronic intermittent hypoxia and impairment of the hypothalamus-pituitary-gonadal axis. This is in particular important for ED in men. Moreover, the deficiency of the REM periods results in decreased nocturnal erections supporting penile tissue oxygenation which normally supports the maintenance of erectile function.

Continuous Positive Airway Pressure (cPAP) is currently seen as a first-line treatment in OSA. Other therapies include surgery (uvulopalatopharyngoplasty and maxillomandibular advancement) and use of mandibular advancement devices (MAD). The best evidence of the improvement of erectile function in OSA patients has been documented for the combination treatment including cPAP and oral phosphodiesterase-5 (PDE-5) inhibitors. Results from a lower-quality, non-randomized study of the surgical treatments in OSA suggest moderate improvements of erectile function, while benefits of the use of MAD were not demonstrated yet [18, 19]. Also, the effects of OSA treatments on sex hormones have not been evidence-supported and need further investigation. The impacts of OSA treatments on female sexual functioning are poorly studied, and the results remain conflicting (evidence for the stable improvement in overall sexual functioning but not for particular sexual function during cPAP treatment was demonstrated in a non-controlled, non-randomized clinical trial) [20].

For Sexual Medicine Practitioners:
It is important to screen patients suffering from sexual dysfunction for OSA in a simple way by asking questions about sleep quality, snoring, and daytime performance. Screening for OSA can be also easily performed with the use of simple validated questionnaires like STOP-BANG, NoSAS, and Berlin questionnaire. In case of identifying the OSA clinical symptoms and risks factors (f.i. snoring, obese, hypogonadal men with erectile dysfunction), patients should be referred for polysomnographic testing. In men with ED and OSA, cPAP and surgical treatments may be beneficial for their sexual function when successfully accompanied by the use of PDE-5 inhibitors.

Case Report 2
A 50-year-old male was referred to a sexologist due to progressive decrease in erectile function and sexual desire for more than 3 years. The patient was treated for arterial hypertension, well-controlled. Additional complaints were fatigue and irritability which were considered by the patient as possibly related to stressful job and his reaction to sexual difficulties. His BMI was 28 kg/m^2. When asked, he acknowledged that his wife often complains about his loud snoring and therefore prefers sleeping in a separate bedroom.

The patient was referred for routine blood tests (total testosterone in lower quartile, mild dyslipidemia) and exercise test (normal). Polysomnography was also advised, but the patient did not make it initially. Erections were improved on a satisfactory level with tadalafil 5 mg/day. After several reminders, the patient finally completed the polysomnographic testing almost 1.5 year later.

The findings were 195 apnea episodes during 8 h sleep, mean apnea time 30 s, and the longest 1:21 min, AHI 46.1. The patient was diagnosed with severe OSA syndrome, promptly started cPAP treatment and was referred to an otolaryngologist. After 3 months of cPAP treatment, a significant improvement in sleep quality, physical fitness, mood, and increased sexual desire was reported. Patient still used tadalafil to improve erections, but he could decrease the dose to 2.5 mg maintaining the efficacy of the medication.

20.2.3 Circadian Rhythm Sleep-Wake Disorders

Circadian rhythm sleep-wake disorders (CRSWD) are defined as sleep disorders caused by alterations of the circadian rhythm, its entrainment mechanisms, or a misalignment of the endogenous circadian rhythm and the external environment. The CRSWD are divided into intrinsic (endogenous) and extrinsic, caused by external factors. In intrinsic CRSWD circadian sleep rhythm is significantly delayed (delayed sleep-wake phase disorder, DSWPD), advanced (advanced sleep-wake phase disorder, ASWPD), irregular (irregular sleep-wake rhythm disorder, ISWRD), or non-entrained to the 24-h light-dark cycle (non-24-h sleep-wake rhythm disorder, N24SWD). Extrinsic include shift work disorder, caused by work schedules that overlap the usual time for sleep, and Jet lag, caused by rapid change in time zones.

DSWPD disorder is the most prevalent intrinsic CRSWD that affects mostly adolescents and young adults, with a reported prevalence of 7–16%. On the contrary, ASWPD can be found first of all in older people over 60 years. Its prevalence in the general population is estimated at 1%. ISWRD is mostly related to neurodevelopmental and neurodegenerative disorders, and N24SWD is typical for blind people, with reported prevalence of 50–70% in this population. The prevalence of shift work disorder among shift workers is estimated to be between 10% and 38%; it results in 2–5% prevalence of SWD in the general population [4, 21].

The diagnostic approach of CRSWD is based on careful clinical interview and diagnostic methods to assess circadian sleep rhythm. Each patient suspected of CRSWD should be asked to keep a sleep diary or sleep logs for at least 14 days, including at least 2 weekends or other work-free days. When available actigraphy can be also used. Other assessment methods include rating scales that describe the circadian sleep rhythm and circadian preferences. Most frequently used scales are Morningness-Eveningness Questionnaire (MEQ), Composite Scale of Morningness (CSM), and Munich Chronotype Questionnaire (MCTQ). Objectively circadian rhythm can be evaluated by the measurement of the onset of melatonin secretion in the dark (dim light melatonin onset, DLMO), daily changes in the concentration of 6-sulphatoxymelatonin (aMT6s) in the urine, and the circadian rhythm of a core body temperature.

CRSWD may have strong negative effects on quality of sex life, because daily circadian preferences regulate many areas of life, including preferred time for sexual intercourses.

Sharing the bedroom with a partner with a different chronotype (different circadian rhythm) not only negatively influences the quality of sleep but can also have a negative impact on the frequency of sexual contacts, overall satisfaction with sexual life and the relationship. It is especially problematic when one of the partners (mostly male) because of delayed sleep rhythm stays active long in the night and disturbs his partner's sleep with his activity. Frequently subjects with DSWDP feel a sexual desire and initiate a sexual activity at a late hour, when the partner is already drowsy and tired and therefore rejects it.

The most effective methods of CRSWD treatment are melatonin administration and light therapy. Behavioral interventions are also highly recommended, for example, patients with DSWPD are asked to get up at the same time in the morning, even on days when they are away from school and work, to spend as much time as possible outdoors or in brightly lit rooms in the morning, to avoid being in brightly lit rooms in the evening, and to refrain from intensive physical and mental activity (including searching for interesting content on the Internet) within 3 h before going to bed. Importantly, although hypnotics may alleviate some symptoms, they do not improve disturbed sleep rhythm. Therefore, hypnotics are not a recommended method for CRSWD treatment.

For Sexual Medicine Practitioners:
CRSWD is a frequent group of sleep disorders present especially in adolescents and young adults. However, patients with endogenous CRSWD are often misdiagnosed and treated for insomnia or hypersomnia with hypnotics or stimulants, which can alleviate symptoms, but it is not an effective treatment. Therefore, each patient reporting sleep-wake disorders should be interviewed about the quality of sleep and its timing during free days (e.g., weekends, holidays).

The elementary questions in the diagnostic process, which allows a physician to differentiate CRSWD from other sleep disorders are:

1. What is the typical sleep pattern of the patient on weekends, holidays, and days off work?
2. Does the patient work in shifts, or have irregular or unconventional working hours (e.g., early work shifts)?
3. Does the patient often travel with crossing of time zones?

Treatment accompanying the CSRWD sexual disharmony should be focused on the psychoeducation about the different sleep patterns and negotiating sexual contacts independently from the different circadian rhythm in spouses. The most effective methods of CRSWD treatment are melatonin administration and light therapy. Behavioral interventions modifying lifestyle are also strongly recommended.

In order to protect the couple's disharmony concerning the sexual life, partners should be educated about the differences in their sleep patterns and encouraged to negotiate and arrange the sexual contacts regardless of their sleep patterns.

20.2.4 Other Sleep Disorders

We have characterized above the most common sexual problems accompanying the most frequent sleep disorders (insomnia, OSA, CRSWD). In the present subsection, we will discuss the other less frequent sleep disorders but characterized by very specific pattern of sexual dysfunctions or problematic sexual behaviors that can be reported at the sexologist's office. Such special disorders include central disorders of hypersomnolence, sleep-related movement disorders, and parasomnias.

20.2.4.1 Central Disorders of Hypersomnolence

The ICSD-3 has included a variety of disorders under the umbrella of "central disorders of hypersomnolence," where excessive daytime sleepiness (EDS) is a cardinal and common feature to all of them. The EDS is the condition of "inability to stay awake and alert during major waking episodes of the day," and the definition was introduced to better define this state. The section includes eight disorders divided into:

- Primary conditions—caused by intrinsic anomalies of the central nervous system (narcolepsy, idiopathic hypersomnia, Kleine-Levin Syndrome).
- Secondary forms—caused by medical/psychiatric disorders [4, 7].

Multiple factors are probably involved in the pathophysiology of central disorders of hypersomnolence. Nevertheless, reduced activity in wake-promoting neurons and disinhibited sleep-inducing transmission may be associated.

One of the most characteristic primary central hypersomnias is narcolepsy: a chronic sleep disorder characterized by excessive daytime sleepiness, cataplexy, hypnagogic hallucinations, and sleep paralysis. Some symptoms of narcolepsy depend on emotional stimuli; for instance, cataplectic attacks can be triggered by emotional inputs such as laughing, a pleasant surprise, anger, and sexual activity. Cataplexy during sexual intercourse is a distinct feature of narcolepsy and is called orgasmoplexy. It involves the loss of the muscle tone during sexual activity—especially in the last phase of sexual response. However, the cataplexy-like symptoms can be rarely reported also by patients with excessive daytime sleepiness of different origin (sleep apnea, behaviorally induced insufficient sleep syndrome—BIISS) [22, 23].

Higher frequency of orgasmoplexy in hypersomnolent patients suggests that excessive daytime sleepiness and insufficient arousal may serve as a gating mechanism for the occurrence of cataplexy-like symptoms including orgasmoplexy. In patients with narcolepsy, anticataleptic drugs can be used as a treatment of orgasmoplexy. According to American Academy of Sleep Medicine and European Federation of Neurological Societies, sodium oxybate is recommended as the first-line treatment for the cataplexy based on high levels of evidence obtained from randomized controlled clinical trials. Suggested alternatives (though with limited evidentiary basis) include tricyclic antidepressants (TCAs) (particularly clomipramine), selective serotonin reuptake inhibitors (SSRIs), the serotonin norepinephrine reuptake inhibitor (SNRI) venlafaxine, and norepinephrine reuptake inhibitor reboxetine and the monoamine oxidase type B inhibitor selegiline [24]. In hypersomnolent patients, excessive daytime sleepiness should be addressed based on its cause. For example in patients with BIISS behavioral interventions, optimizing the sleep hygiene (regular bed and wake-up time, sufficient duration of the nighttime sleep) should be introduced [23].

Secondary hypersomnolence is particularly prevalent in psychiatric conditions and may interfere with achieving a proper remission of the primary disorder. Up to 75% of patients with major depressive disorder suffer from somnolence, but it is also frequently seen in bipolar, dysthymic, and seasonal affective disorders [25]. Sexual disinterests or arousal problems frequently exist in untreated depression and cover about the 50% of patients with depression of any kind [26].

For Sexual Medicine Practitioners:
The cases of central disorders of hypersomnolence are very rare but should be taken into account in any case of excessive daytime sleepiness or recurrent urges to fall asleep in the awake period, any symptoms of the sleep paralysis, or the unexpected occurrence of muscle weakness during sexual intercourse. Such patients should be referred to Sleep Medicine Departments or—if not available—to the neurologist.

On the other hand, the symptoms of excessive daytime sleepiness could be related to affective or anxiety disorders with the coexisting sexual desire decline that could lead to sexual disinterest, decrease in sexual responsiveness, and secondary SD (ED or FSIAD). The symptoms of hypersomnolence and excessive fatigue coexisting with sexual dysfunctions reported by the patient need screening for neurological or psychiatric conditions.

20.2.4.2 Sleep-Related Movement Disorders

The sleep-related movement disorders are characterized by simple often stereotyped movements occurring during sleep or urges to move before falling asleep. The most frequent are restless legs syndrome (RLS) and periodic limb movement disorder (PLMD). To diagnose RLS or PLMD, symptoms must be accompanied by sleep disturbance or other functional impairment. In case of RLS, a waking dysesthesia (burning, uncomfortable sensations in lower limbs) is the predominant symptom, although repetitive limb movement during sleep is often observed in association with RLS [7]. There are two forms of burning sensation in other parts of the body that are often considered as variants of RLS: restless genital syndrome (RGS) and burning mouth syndrome (BMS) [27, 28].

The sexual form of sleep-related movement disorders is the RGS. It refers to the uncommon experience of excessive and persistent sensations of genital and clitoral arousal, with either restless legs or symptoms of an overactive bladder, in the absence of conscious feelings of sexual desire. There is the hypothesis that RGS may be caused by a small fiber sensory neuropathy of the dorsal nerve of the clitoris (very often with preceding pelvic surgical interventions). To date, there is no consensus on the treatment for RGS [27]. The RGS should be differentiated from the persistent genital arousal disorder (PGAD) in which the patients (predominantly women) experience spontaneous genital arousal, unresolved by orgasms and triggered by sexual or nonsexual stimuli, eliciting stress and lasting hours or days, occurring constantly and with little or no relief by masturbation or sexual activity (also see Chap. 32). Some authors suggest that RGS should be diagnosed when a patient meets criteria for PGAD and also has RLS symptoms or an overactive bladder [29]. Though, there is no consensus concerning the pharmacological and nonpharmacological treatments of RGS and BMS. There is some evidence that both disorders could respond to dopaminergic agents (pramipexol and ropinirole) or pregabalin [27, 28, 30].

For Sexual Medicine Practitioners:

Both the sexual medicine and clinical sleep specialists should be aware of unusual atypical sleep-related movement disorders such as restless genital syndrome and burning mouth syndrome as they may respond to the usual treatment for RLS. A simple screening question can be asked to identify patients with RLS with high sensitivity and good reliability: "When you try to relax in the evening or sleep at night, do you ever have unpleasant, restless feelings in your legs that can be relieved by walking or movement?"

For the symptoms of RGS, the patient should be asked "Do you experience the unpleasant sensation or urges in genitals with the absence of the sexual desire that usually worsens by the end of the day?"

20.2.4.3 Parasomnias

In the clinical setting, the term parasomnia relates to undesirable events that accompany sleep. Parasomnias encompass a broad spectrum including dreaming, misperceptions, dysphoric emotions, abnormal sleep-related movements and behaviors (confusion/delirium upon waking, sleepwalking, sleep terrors), and dysregulated autonomic nervous system functioning. Parasomnias become clinical disorders as they may result in sleep fragmentation, adverse health effects, troublesome psychosocial effects, and even injuries [31]. Parasomnias can appear during entry to sleep, within sleep, or during waking. The disorders of arousal include recurrent episodes of incomplete awakening, absent or inappropriate responsiveness, limited or no associated cognition or dream report, and partial or complete amnesia for the episode (ICSD-3).

The most frequent parasomnia related to involuntary sexual functioning is abnormal sexual activity during sleep called sexsomnia, sleep sex, or somnambulistic sexual behavior. Sexsomnia has still not been reported in the literature as often as other parasomnias. Its prevalence is unknown and can be based only on the overall prevalence of parasomnias, which for adults is estimated to range between 2% and 6% [32]. Sexsomnia has also been reported accompanying the other sleep-related disorders, though it is the most common with NREM parasomnias and OSA. Inappropriate sexualized behaviors that arise from the platform of sleep encompass a broad range of behaviors from profane vocalizations, inappropriate touch/fondling, masturbation, oral sex, to sexual intercourse. These behaviors are without conscious awareness and are frequently without dream mentation [32].

Treatment of sexsomnia is parallel to the treatment of other parasomnias and consists of maximizing safety of the sleeping environment; implementing the rules of sleep hygiene, especially by avoiding sleep deprivation and maintaining a regular sleep-wake schedule with a constant waking time; identifying and excluding known precipitating factors; and limiting (preferably eliminating) the use of alcohol and recreational drugs. Pharmacological treatment with SSRIs can be offered if the above changes do not lead to significant improvement. The most effective forms of pharmacological treatment are benzodiazepine hypnotics; however this class of medication has to be used with caution due to its negative effect on cognitive functioning during the day, increased risk of falls and accidents, and a risk of addiction.

For Sexual Medicine Practitioners:
Patients with sexsomnia should undergo video-polysomnography to identify the possible coexistence of other sleep disorders and its causal relationship to sexsomnia episodes. The screening questions for patients with all forms of parasomnias (and their bed partners) should be helpful in revealing the involuntary sexual behaviors. The involuntary sexsomnia behaviors could be potentially harmful (for the partner or the other family members) or even constitute acts prosecuted by the law.

Case Report 3

The patient aged 36 years, successful businessman, married for 9 years. Father of two children—a girl 8 years old and a boy 5 years old—presented to sexologist's office due to involuntary sexual behaviors during sleep.

Since early childhood he experienced the symptoms of sleepwalking and confused awakening. As the patient was physically healthy, he has been never medically diagnosed before. Also never consulted a psychiatrist or neurologist for any neuropsychiatric symptoms.

During his marriage he presented some episodes of different sexual behaviors during sleep among them caressing, kissing, or initiating sexual activity with his wife. Confronted with these behaviors, the wife was neglecting his sexual initiation (most often by waking him) or engaging in sex with the husband. The patient did not present any aware paraphilic behaviors in the state of arousal, and he did not meet the criteria for paraphilic disorders.

The reason for the consultation concerned the situation when the couple's daughter came to the bedroom of the patient and his wife and fell asleep lying between the spouses. The patient, being asleep, started to touch the genitals of his daughter. The wife did not wake him up but recognized what had happened. The next several days led to a severe conflict between the spouses, wherein the wife accused the patient of paraphilic behaviors. During the consultation the patient was slightly depressed and reported poor sleep quality since the incident.

The patient was diagnosed with sexsomnia classified as the non-REM parasomnia. He was offered trazodone (max 75 mg in the evening) to help him with the symptoms of the transient insomnia caused by the conflict with his wife. Couple's therapy was offered for both spouses focused on the understanding the symptoms of sexsomnia, exploring the wider reasons for the present conflict and introducing the rules for all the family members to prevent future uncontrolled sexual behaviors of the patient. As the sleep history of the patient revealed that he was chronically sleep deprived due to his large work load, he was also asked to increase the length of his nocturnal bedtime to 8 h. After several weeks this change resulted in substantial decrease of sexsomnia episode frequency. The episodes were also mild in intensity and could be easily interrupted by his wife by awakening the patient.

20.2.5 Sleep and Sexual Disorders Related to Lifestyle Changes

It is important to note that both sleep and sexual disorders may result from or be influenced by the modern lifestyle in developed countries. Stress, low physical activity, irregular bedtimes, too short sleep time at workdays, and need to compensate it during the weekends lead to disturbances of homeostatic and circadian sleep regulation. It also disrupts hormonal and autonomic regulation further aggravating sleep and sexual disturbances. Therefore, next to treating sleep disorders, it's

important to educate patients about good sleeping habits. Many patients report that they follow good sleep hygiene rules, but the clinical interview clearly indicates that they only eliminate factors that disturb sleep like eating too late and use of alcohol and nicotine before bedtim and caffeine in the afternoon and in the evening. It is far more difficult for the patients to change their lifestyle to strengthen their homeostatic sleep need and their circadian sleep rhythm.

Most important sleep hygiene rules that have positive effect on sleep quality and circadian rhythm regulation are:

1. Reduce or increase time spent in bed. For most people with insomnia, the recommended time spend in bed is 6, 5, to 7 h until insomnia disappears. For most people with hypersomnia, the recommended time spend in bed is above 8 h until hypersomnia disappears.
2. Get tired physically in the late afternoon or early evening. Exercising for at least 30 min 5 times/week is necessary to increase the sleep pressure.
3. Avoid or use daytime naps. Every period of rest in lying position during the day, even a short one without falling asleep, reduces the need for night sleep. On the contrary patients with hypersomnia should be encouraged to take a nap during lunch time.
4. Avoid taking sleeping pills regularly. Hypnotics induce sleep; however, they do not strengthen natural sleep.
5. Keep regular lifestyle (meal, work, and rest times) and get up at the same time every morning. It strengthens the sleep rhythm and circadian rhythm of hormone secretion.
6. Avoid bright or blue light in the evening and during the night. Bright light and every light source with a lot of blue color, even as weak as screen of smartphone or tablet, negatively influence the biological clock.

20.3 Key Messages

- Sleep disorders may impair mood, daytime performance, sexual functioning, and relationship satisfaction, so the clinical assessment of individuals seeking help due to mental or sexual health issues should include evaluation of the quality of sleep and sleep patterns.
- Promoting sleep hygiene is an important aspect of promoting an overall healthy lifestyle that preserves sexual dysfunction and mental disorders.
- Screening for sleep disorders that may have negative influence on both above mentioned conditions include specific questions referring to:
  - Difficulties in falling or staying asleep
  - Loud snoring and abrupt awakenings related with breathing cessations
  - Daytime fatigue, drowsiness, difficulties in concentration, related mood disturbances, or cataplexia
  - Chronotype that is irregular or non-compliant with one's sexual partner
  - Atypical sleep-related movements or behaviors including sexual behaviors and their influence on the sexual response cycle and sexual relationship

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