



Insomnia: Types ,pathophysiology ,treatment An overview

Aitizam Farooq shah⁽¹⁾,

(Pharm.D,Adesh institute of pharmacy and biomedical sciences,Bathinda)

Jahangir Hussain khan⁽²⁾

(Pharm.D,Adesh institute of pharmacy and biomedical sciences,Bathinda,

R.K Patil⁽³⁾

(Associate professor, Adesh institute of pharmacy and biomedical sciences)

Ramit Gupta⁽⁴⁾

(Associate professor ,department of psychiatry-psychology, Adesh hospital Bathinda)

ABSTRACT:

Sleep is vital component of health .insomnia is day by day become a major health concern and effect all age group. It has negative effect on quality of life individual increase physical,social economic burden. involves complex process of cognitive psychological arousal, altered circadian rhythm and homeostatic mechanism Insomnia persistently leads to many mental and psychological disorders such as anxiety, depression, mood disorder. Deprived sleep increases the chances of dependence on alcohol, substance abuse, or drug dependence DSM IV TR standard criteria used for diagnose of primary insomnia. Various self reported instruments are used such as PSQI (Pittsburgh sleep Quality Index) ,ISI (Insomnia severity index) treatment involve both pharmacological, nonpharmacological approaches Nonpharmacological approaches : it involved cognitive behavioral approaches,Stimulus controle Therapy, Sleep restriction, Sleep hygiene techniques. The different investigations identified with commonness were done in European and Western nations. prevalence rate found was 19.7%in United States, 21.4 % in Canada,37% in UK,46.8% in Portugal,22.8% in South Korea ,15.3% in Turkey. It remains undiscovered until it prompts genuine complexity so it is necessary to early recognition to diminish the antagonistic result.

KEY WORDS: Sleep, DSM IV, pathophysiology ,psychological disorders, treatment

Received 26 June, 2021; Revised: 06 July, 2021; Accepted 08 July, 2021 © The author(s) 2021.

Published with open access at www.questjournals.org

I. INTRODUCTION

Sleep. It is defined by two ways behaviourally and scientifically. On the basis of behavioural defination it is defined as decreased activities related to motor functioning therefore response to stimulation, stereotyped posture decrease, which is reversible in nature.

According to scientifically definition sleep is defined by electrophysiological signals. Normal sleep is categorised into two main stages

- Rapid eye movement stages (REM)
 - Non Rapid eye movement sleep (NREM)
 - Non REM sleep consist of 4 stages stage 1 (S1), stage 2 (S2),Stage 3 (S3),Stage 4 (S4)[1]
- stages are measured on the basis of electroencephalographic (EEG),muscle tone(EMG),eye movement (EOG)

Stage 1 of Non REM cycle : it is the stage of lightest sleep, the frequency of EEG is slower,skeletal muscle tone present, breathing at normal rate.

Stage 2 It is called deepest sleep. Ability of awakening decrease

Stage 3 and 4 sleep called deep Sleep these stages are also called delta sleep or slow wave sleep[2]Normal sleep for adult. Young adults need sleep of 7.0-8.5 hours. This duration is considered a proper restorative. The amount of sleep required constant for everyone but there are many variations among peoples.[3]

Sleep disorder (five major types of sleep disorder)

- Insomnia.
- Narcolepsy
- **Sleep Apnea.**
- **REM Sleep Behavioral Disorder.**
- Restless Legs Syndrome[4]

Insomnia

Insomnia is characterized as a "complaint of inadequate sleep. Sleep is non-restorative and unrefreshing. It is due to the difficulty in initiating and sustaining sleep. Insomnia is act as a clinical manifestation for some disease and also occur as a syndrome. It act as heterogeneous complaint which reduced quality.

Insomnia brings some adverse results to the individual and also to society. It becomes a major public concern day by day which influences the quality of life of numerous individuals around the planet.[5]

On the basis of duration insomnia is two types acute and chronic Acute insomnia and chronic insomnia

Acute insomnia. When duration of inadequate sleep for less than 30 days . It is due to stress, personal stress, medical stress, Academic stress, financial stress,

Chronic insomnia : when insomnia lasts for 30 days or longer. it is due to medical disorders, medications, substance abuse, psychiatric disorder, sleep wake schedule disorder.[6]

. Other classification of insomnia

- Primary insomnia
- Secondary Insomnia

Primary insomnia .it is of 3 types Idiopathic insomnia, Psychophysiological insomnia, Paradoxical insomnia

Idiopathic insomnia — insomnia springing up in period of infancy and early childhood Which is continuously unremitted

Psychophysiological insomnia _Insomnia because of a maladaptive conditioned reaction wherein the patient learns to companion the mattress surroundings with heightened arousal instead of sleep; onset regularly associated with an occasion inflicting acute insomnia, with the sleep disturbance persisting in spite of decision of the precipitating factor

Paradoxical insomnia _Insomnia characterised with the aid of using a marked mismatch between the patient's description of sleep period and goal polysomnography findings[7]

Secondary insomnia : insomnia is due to other reasons : Adjustment insomnia, inadequate sleep hygiene insomnia, insomnia due to psychiatric disorder, due to medical condition, due to substance abuse.

Adjustment insomnia : it is due to some dynamic psycho social stressor

Insomnia related to life style habits : it is due to lifestyle habits

Insomnia related to psychiatric disorder : such as anxiety, depression

Insomnia related to medical conditions: due to chronic pain, dyspnoea, nocturnal cough

Insomnia due to Consumption of alcohol, drug abuse, substance abuse[8]

Pathophysiology of insomnia

It *involves* complex process of cognitive psychological arousal, altered circadian rhythm and homeostatic mechanism. Many brain centers involved in wakefulness and sleep. wakefulness was due to ascending activity in brain stem and also involved posterior hypothalamus nuclei. It is also called ARAS (ascending reticular activated system) Anterior hypothalamus act as sleep promoting centres. and also involved Posterior arousal centers and lateral hypothalamus . VLPR (ventrolateral preoptic region) centers promote sleep The model of sleep wake cycle is called flip flop.[9] Orexin A and Orexin B involved in wakefulness. Neurotransmitter involved in sleep is GABA (gamma amino butyric acid), dopamine and norepinephrine help in wakefulness activities. Serotonin is involved in both activities.[10]

Etiology and factors

Many factors which leads to normal person to insomnia are called predisposing factors that are mostly non Modifiable in nature[11] it includes biological factors, psychological factors, Behavioral factor and environmental factor it include genetics ,individual personality traits which are responsible for physiologic and cognitive hyper arousal.[12]. some factors that are responsible for triggering the insomnia is called precipitating factors (stressful life event it involve any health, family work, school issue. Perpetuating factors which turns

acute insomnia to chronic insomnia. It involved behaviour, thoughts, coping strategies for example day time napping, spending most of the times on bed, [12]

Consequences

If it continues for a long time it leads to some physical and mental problems. Individual's mood, behavior, and concentration also alter. An individual with insomnia has decreased intellectual ability and cognitive functioning which causes impaired social and professional life. Insomnia persistently leads to many mental and psychological disorders such as anxiety, depression, mood disorder. Deprived sleep increases the chances of dependence on alcohol, substance abuse, or drug dependence. The chances of suicide are also increasing in the individual with insomnia. It does not affect only mental health but also affects individual immunity or immune functioning. It also acts as a risk factor for cardiac disease and mortality.[13]

Diagnose or assessment of insomnia

It involves physical examinations : evaluation of COPD, Asthma, restless leg syndromes which disturb sleep. Some blood test involving for the symptoms of thyroid disease, iron deficiency anemia. Sleep and psychiatric history. It includes sleep habits, precipitating factors, history of other psychiatric disease, Substance abuse.[14]

Polysomnography. It is standard technique for measuring sleep. It includes EEG, ECG, EMG, ECG for measures sleep apnea and narcolepsy.

Actigraphy. Sleep time and wake time can be analyzed using the movement data by device put on wrist[15].

DSM IV TR(table 1) standard criteria used for diagnose of primary insomnia. Various self reported instruments are used such as PSQI (Pittsburgh sleep Quality Index), ISI (Insomnia severity index) [16]

Table 1
Diagnosis of primary insomnia

DSM IV TR criteria of primary insomnia

These include any of the following:

- The predominant complaint is difficulty initiating or maintaining sleep, or non-restorative sleep, for at least 1 month.
- The sleep disturbance (or associated daytime fatigue) causes clinically significant distress or impairment in social, occupational, or other important areas of functioning
- The sleep disturbance does not occur exclusively during the course of narcolepsy, breathing-related sleep disorder, a circadian rhythm sleep disorder or a parasomnia.
- The disturbance does not occur exclusively during the course of another mental disorder (e.g., major depressive disorder, generalized anxiety disorder, a delirium).
- The disturbance is not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition.

Treatment

It involves pharmacological and non pharmacological techniques

Pharmacologic treatment : it involves 4 classes or 4 approaches. First class involved sedative hypnotics (barbiturates, benzodiazepines and benzodiazepine agonist) .drugs are Estazolam, triazolam, temazepam and benzodiazepine agonist are Eszopiclone, zolpidem, zaleplon. . Second approach is use of melatonin agonist . Drug involved remelteon. Third approach is use low dose of doxepin. Fourth kind of approaches is use of antipsychotic(Quetiapine) and antidepressant (Trazadone).[17]

Nonpharmacological approaches: it involves cognitive behavioral approaches, Stimulus control Therapy, Sleep restriction, Sleep hygiene techniques

Cognitive behavioural approaches It is multicomponent technique involved stimulus control Therapy, sleep restriction therapy, sleep hygiene technique.

Stimulus control therapy : depends on the reason that a sleeping disorder is an adapted reaction to fleeting (sleep time) and ecological (bed/room) signals that are generally connected with sleep. Going to bed only when feeling sleep nothing for other activities like watching TV. If difficulty to falling sleep then getting out of bed to another room and getting back to bed only when feel lethargic. Maintain the normal waking time and avoid day time snoozing.[18]

Sleep restriction Therapy : limit the amount of time spent in bed and match the total time for sleep in bed. For instance, if an individual reports dozing a normal of 6 hours of the night out of 9 hours spent in bed, the underlying endorsed "rest window" (i.e., from beginning sleep time to last emerging time) would be 6 hours. Therefore, the passable time in bed is expanded by 15–20 minutes for a given week when rest productivity (characterized as proportion of complete rest/time spent in bed × 100%) surpasses 90%, diminished by a similar measure of time when rest effectiveness is lower than 80%. Occasional changes are made (generally consistently) until an ideal rest term is accomplished.[18] and [19]

Relaxation therapy : insomnia patient shows high level of physiologic and cognitive Arousal at day and night time. Relaxation strategy are utilized to deactivate the highly excitement framework.Somatic arousal are reduced by muscle relaxing technique, cognitive arousal are decreased by focusing technique or thought stopping techniques. Some relaxation techniques are used like hypnosis, meditations and abdominal breathing exercise. Relaxing techniques required practice for many weeks.

Sleep hygiene: it involves the good health practice proper diet and exercise and focus on some environmental factors such as temperature, noise,light, mattress that effect sleep. It help in better sleep health.[19]

Prevalence and health concern

Insomnia is a significant public worry in the community that impacts the quality of life of an individual but it remains undiscovered until it prompts genuine complexity so it is necessary to early recognition to diminish the antagonistic result.[20] The different investigations identified with commonness were done in European and Western nations. prevalence rate found was 19.7%in United States, 21.4 % in Canada,37% in UK,46.8% in Portugal,22.8% in South Korea ,15.3% in Turkey .⁽¹⁰⁾The prevalence varies according to one population to another population. [21] and [22]

II. DISCUSSION

Insomnia is highly prevalent disease with prevalence rate of 15%-30% .It impairs physical and cognitive functions. It also effect the emotional and social domains. As compared to the good sleepers, people with insomnia has more chances of accidents. Also decreased job performance. However it is necessary to distinguish between tiredness, insomnia, not feeling well after sleep for providing more clear data about accurate insomnia and also find sleep accuracy. Further studies required for better understanding about insomnia. Besides that for the treatment of insomnia many trials conducted for pharmacological treatments more interventions studies are required for non pharmacological approaches for both primary and secondaryinsomnia. More data still required on the physical and mental consequences of insomnia not only in old age but in youth population also..

REFERENCES

- [1]. Gulia, K. K., & Kumar, V. M. (2018). Sleep disorders in the elderly: a growing challenge. *Psychogeriatrics*, 18(3), 155-165.
- [2]. Cho, J. W., & Duffy, J. F. (2018). Sleep, Sleep Disorders, and Sexual Dysfunction. *The world journal of men's health*, 37(3), 261-275.
- [3]. Hirshkowitz, M., Whiton, K., Albert, S. M., Alessi, C., Bruni, O., DonCarlos, L., ... & Hillard, P. J. A. (2015). National Sleep Foundation's sleep time duration recommendations: methodology and results summary. *Sleep health*, 1(1), 40-43.
- [4]. Cellini, N. (2017). Memory consolidation in sleep disorders. *Sleep medicine reviews*, 35, 101-112.
- [5]. Ramakrishnan, K., & Scheid, D. C. (2007). Treatment options for insomnia. *American family physician*, 76(4), 517-526.
- [6]. Silber, M. H. (2005). Chronic insomnia. *New England Journal of Medicine*, 353(8), 803-810.
- [7]. Choueiry, N., Salamoun, T., Jabbour, H., El Osta, N., Hajj, A., & Rabbaa Khabbaz, L. (2016). Insomnia and relationship with anxiety in university students: a cross-sectional designed study. *Plos one*, 11(2), e0149643.
- [8]. Dopheide, J. A. (2020). Insomnia overview: epidemiology, pathophysiology, diagnosis and monitoring, and nonpharmacologic therapy. *The American journal of managed care*, 26(4 Suppl), S76-S84.
- [9]. Saper, C. B., Fuller, P. M., Pedersen, N. P., Lu, J., & Scammell, T. E. (2010). Sleep state switching. *Neuron*, 68(6), 1023-1042. <https://doi.org/10.1016/j.neuron.2010.11.032>
- [10]. Bethea, T. N., Zhou, E. S., Schernhammer, E. S., Castro-Webb, N., Cozier, Y. C., & Rosenberg, L. (2020). Perceived racial discrimination and risk of insomnia among middle-aged and elderly Black women. *Sleep*, 43(1), zsz208. <https://doi.org/10.1093/sleep/zsz208>
- [11]. Bastien, C. H., Vallières, A., & Morin, C. M. (2004). Precipitating factors of insomnia. *Behavioral sleep medicine*, 2(1), 50-62. https://doi.org/10.1207/s15402010bsm0201_5
- [12]. Chung, K. F., Kan, K. K., & Yeung, W. F. (2011). Assessing insomnia in adolescents: comparison of Insomnia Severity Index, Athens Insomnia Scale and Sleep Quality Index. *Sleep medicine*, 12(5), 463-470. <https://doi.org/10.1016/j.sleep.2010.09.019>
- [13]. Benca, R. M. (2001). Consequences of insomnia and its therapies. *Journal of Clinical Psychiatry*, 62, 33-38.
- [14]. Saddichha S. (2010). Diagnosis and treatment of chronic insomnia. *Annals of Indian Academy of Neurology*, 13(2), 94-102. <https://doi.org/10.4103/0972-2327.64628>
- [15]. Arnedt, J. T., Conroy, D. A., Posner, D. A., & Aloia, M. S. (2006). Evaluation of the insomnia patient. *Sleep Medicine Clinics*, 1(3), 319-332.
- [16]. Pigeon W. R. (2010). Diagnosis, prevalence, pathways, consequences & treatment of insomnia. *The Indian journal of medical research*, 131, 321-332.
- [17]. Saddichha S. (2010). Diagnosis and treatment of chronic insomnia. *Annals of Indian Academy of Neurology*, 13(2), 94-102. <https://doi.org/10.4103/0972-2327.64628>
- [18]. Drake, C. L., Kalmbach, D. A., Arnedt, J. T., Cheng, P., Tonnu, C. V., Cuamatzi-Castelan, A., & Fellman-Couture, C. (2019). Treating chronic insomnia in postmenopausal women: a randomized clinical trial comparing cognitive-behavioral therapy for insomnia, sleep restriction therapy, and sleep hygiene education. *Sleep*, 42(2), zsy217.
- [19]. Chung, K. F., Lee, C. T., Yeung, W. F., Chan, M. S., Chung, E. W. Y., & Lin, W. L. (2018). Sleep hygiene education as a treatment of insomnia: a systematic review and meta-analysis. *Family practice*, 35(4), 365-375.
- [20]. Ishak, W. W., Bagot, K., Thomas, S., Magakian, N., Bedwani, D., Larson, D., Brownstein, A., & Zaky, C. (2012). Quality of life in patients suffering from insomnia. *Innovations in clinical neuroscience*, 9(10), 13-26.

- [21]. Ali, T., Belete, H., Awoke, T., Zewde, F., Derajew, H., Yimer, S., & Menberu, M. (2019). Insomnia among Town Residents in Ethiopia: A Community-Based Cross-Sectional Survey. *Sleep disorders, 2019*, 6306942.
- [22]. Singareddy, R., Vgontzas, A. N., Fernandez-Mendoza, J., Liao, D., Calhoun, S., general population prospective study. *Sleep medicine, 13*(4), 346–353.