

Sleep and Health: Mapping Insomnia

Prof. Mirza Sibtain Beg ✉

Dept. of English, Shia P.G. College, Lucknow, U.P.

Under the scourging toll of fast life, furious and fuming stress, and seductive sedentary lifestyle, guinness to fluorescent screens till late night, the beauty of our sleep is eroded by insomnia miserably. Sleep is one of the most important determinants of our good health-mental and physical both. Sleep deprivation or inadequate sleep has cast aspersions on our overall health system, and shaken the metabolism, hormone secretion and its functional rhythm, and giving rise to innumerable physical disorders as hypertension, metabolic syndrome, insulin resistance, diabetes mellitus, cardiovascular ailments, obesity, mood swings and irritability, immune and autoimmune disorders, kidney issues, dementia, depression, and even Alzheimer's disease inter alia. Sleep is one of the most requisite and involuntary processes that charge us up to function effectively. It is a process of rest and repair and restores the senses of our body and brain. In holy scriptures, the importance of sleep is inscribed. In Ayurvedic Samhitas- Charak Samhita, and Ahtanga Hridaya, the value and worth of sleep is inscribed, and is considered one of the tree tenets of life, along with diet and good conduct. Good sleep in circadian rhythm is very beneficial for life, and potent marker of healthy life. The paper is a humble attempt to spread awareness about significance of quality sleep that disparages our mental, and physical health, and our overall wellbeing, and role of medication and meditation, In the paper, we'll discuss sleep and its mechanism, insomnia and its causes, effects, and treatment.

Keywords: Sleep, health, insomnia, mental health, metabolic syndrome, and meditation.

Good sleep is the determiner of healthy body, and measure of good mental and physical health. Poor sleep or insomnia is precursor of psychiatric problems and often part of diagnostic criteria for health hazards. In the hustle bustle of hectic life today, people are deficient of quality sleep of eight hours. Stress is also one of the contributors to the development of insomnia. In the beginning, it is overlooked as a trivial thing but in the long run, it culminates into a harbinger of numerous health issues and ailments. However, extensive research is carried out by scientists and clinicians, and they infer unanimously that poor sleep is due to poor mental health, busy work schedules, improper diet, and tumultuous lifestyles that ransack our health and physiology of the body. Dr. Kajal NK in her article "Sleeping Disorders: A Concept of Sleep in Ayurveda" opines that:

Acharya Sushruta had said that by obtaining proper sleep a person can get delightment, growth, virility, knowledge and proper survival of life. Whereas improper sleep can lead us to sorrow, emaciation, weakness, impotence, ignorance as well can even lead to termination of life (<https://theancientayurveda.com>)

Sleep substantiates the pathways in our brains, and enables us to know and create memories, playing vital role in performance of various brain functions, and facilitating neurons for communication. During sleep, toxins of the brain fade away. Sleep mechanism establishes a balance between two operations: the circadian rhythm (biological clock, and homeostatic urge or the sleep pressure). These acts are performed by complex neural networks in the brain, basically binding the suprachiasmatic nucleus (SCN) in the hypothalamus of the brain and ventrolateral preoptic arc (VLPO), which is a

sleep button. Adenosine, an organic compound, that regulates sleep, and builds block for RNA and energy molecule ATP, stimulating VLPO, brings sleep. Thus, two fundamental mechanisms: Circadian or biological rhythm, and homeostatic urge or sleep pressure cause us sleep. Hypothalamus controls all these mechanisms. It also regulates the production of hormone melatonin (from pineal glands). Melatonin is high in the night to promote the onset of sleep, and in the morning melatonin production diminishes in the presence of sunlight. The Hypothalamus sends signals to cerebral cortex to release neurotransmitters that maintains wakefulness and sleep. During the different phases of sleep, our brain sends electrical signals. Seeing the electrical activity of brain, and other physiological functions, we can know the phases of sleep. Each sleep cycle is divided into two parts: Non-REM (Rapid Eye Movements) sleep and REM sleep. Non REM sleep takes place at night and lasts for long hours (from wakefulness to sleep and then deep sleep phase. REM sleep runs to and forth with Non-ERM sleep. During sleep, new connectivity is acted between neurons, and neural networks are refurbished.

Sleep is considered one of the important aspects of human health, and it assays catalytic role in cognitive action, emotional and physical health, and enhances quality of life. However, sleep deprivation or insomnia have stricken the people especially who does mental work: students, academics, officials, and many sections of our society. A survey revealed that Insomnia affected 33% of Indian adults, and obstructive sleep apnea

(OSA) has cast evil eye on 4 to 21% people of India. Scientists are burning their midnight oil to explain all the functions of sleep, but they all infer that sleep is necessary for our wellness, and even survival. It is observed that those who are awake for more than sixteen hours, find their cognitive health and agility function declining miserably. Sound sleep restores health and wakefulness, and necessitates circadian aligning sleep. Dr.Dinges, Chief of the Division of Sleep and Chronobiology in the Department of Psychiatry at the University of Pennsylvania is of the view that whose sleep is inadequate, often are least aware of its toll on their physical health, cognitive function, efficiency, memory and accuracy etc. Stickgold R. and Walker MP opine in their paper:

Inadequate sleep also can take toll on psychological well-being, significantly affecting our emotional and psychosocial interpretation of events and exacerbating our stress levels. Studies have indicated that changes in mood may be due in part to the effects of sleep deprivation on the processing of emotional memory-in other words, our tendency to select and remember negative memories after inadequate sleep (Stickgold, 2013, 141)

Sleep and health are complementary to each other, Sleep is an essential and inadvertent process, and without which our body can't function smoothly and smartly. Poor sleep contributes to stress and unhappiness. Sometimes physical discomfort and fatigue or tiredness cause unhappiness, but fragmented sleep often fetches unhappiness and discomfort. Better sleep induces a feeling of wellness. Those who spend little time in the lap of nature, are found happier and less struggling

with sleep problem. Less sleep also contributes to mood swings and land people in the whirlpool of anxieties. Triantafillou et al. found: "People who sleep well were found to be more satisfied with life as opposed to those who struggle with sleep, who were more likely view happiness with a zero-sum mindset (Triantafillou, 221)". Inadequate sleep or insomnia brings many ailments like obesity, anxiety, depression, and the mental health and sanity is marred. Insomnia causes depression and obesity that leads to so many deadly diseases. Now we'll discuss many chronic conditions that emerge out from poor sleep.

Sleep and Mental Illness

Poor sleep is detrimental to health as it causes mental hazards. Baglioni, C considers: "Insomnia, a sleep disorder in which individuals have difficult time falling and/or staying asleep, is known to be associated with increased risk of depression (Baglioni, C, 2011, 135). High cortisol is a big biomarker of mental stress. Cortisol touches peak at midnight during our sleep as it prepares us to wake in the morning. High cortisol levels give increase to inflammatory cytokines. As cytokines increase and GR (Glucocorticoid) turns less responsive to increased cortisol, so stress rises. Psychological stress gives birth to sleep loss and thus establishing link between major depressive disorders (MDD) and poor sleep. We can address the high levels of cortisol by adopting healthy lifestyle, exercise and making dietary changes (including in diet more ALA, EPA and DHA and fiber), including micronutrients that make brain calmer and healthier. By improving brain

regulation of HPA axis, we can improve insulin sensitivity and metabolic health.

Sleep and Metabolic Syndrome

Metabolic syndrome is the mother of the increased risks of obesity, fatty liver, diabetes, vascular diseases, and other serious ailments. Inadequate and excessive sleep leads to increase the risk of poor metabolic health. It increases because of two processes: much rapid eye movement (REM) or not having sufficient slow wave sleep (SWS). Inadequate sleep also increases the possibility of hypertension, LDL, BMI and insulin resistance. Medic et. al opined: "Long term risks of the sleep disruption include cardiovascular disease metabolic syndrome, type II diabetes mellitus, dyslipidemia, etc. (Medic...et al. 95)". With dietary changes like low carbs, healthy fats, proteins, probiotics and supplements like resveratrol that is found in cherries, red grapes, and peanuts, we can redress metabolic syndrome.

Sleep and Diabetes Mellitus or Type II Diabetes

It is more cruel disease that has engulfed one third world population, and our country has become its epicenter. Sleep deprivation progresses into metabolic syndrome and insulin resistance, and it anchors us to the sinister shores of diabetes. Sleep loss causes fatty liver and obesity and creates insulin resistance. Chirwa et al. mentions: "A significant relation between sleep deprivation and increased hemoglobin A1C (HbA1C) does exist (Chirwa...et al.137)". With lifestyle changes, diet changes, exercise,

managing stress, and above all having tight control on sugar levels, we can live a healthy life free of complications.

Sleep and Hypertension or CVD

Several studies have corroborated the fact that poor or inadequate sleep gives birth to hypertension ie increase in the Systolic and Diastolic Blood Pressures from the normal range (120/80). Sleep deprivation casts effects on sympathetic nervous system (SNS) causing increased blood pressure. Sleep deprivation is also associated with an increased production of endothelin, which is a vasoconstrictor (Palma ...et al, 76). If insomnia persists for a long time, then subtle change in endothelin leads to hypertension. Nitric Oxide (NO₂) works as vasodilator and can be used by including beet roots in food. Inadequate sleep may cause CVD through inflammatory proteins. Sleep loss heightens interleukin which increases C reactive protein (CRP), and high CRP levels induce risk of coronary heart disease. Thus, inadequate sleep will cause high inflammation leading to atherosclerosis.

Sleep and Neurological Disorders

Good sleep is essential for keeping neural health fine. Sleep deprivation can cause neurological ailments like dementia, Alzheimer's and Parkinson's disease. Sleep disturbances lead to release and reposition of neurotoxic proteins in brain. In patients suffering from neurological disorders, managing good sleep is very crucial and it must be the alternative treatment along with first line treatment. Poor sleep can aid to inflammation and oxidative stress in the cells

of the brain. Cognitive behavior therapy (CBT) is very beneficial to treat insomnia, simultaneously melatonin and bright light therapy can redress sleep problems in neurological patients.

Sleep and Renal Diseases

The relationship between sleep and renal health is intricate and bidirectional. Bo et al., found that those with a poor sleep or prolonged sleep profile experienced an increased risk of developing chronic kidney disease (Bo, Y.,...et al., 395). Sleep disorders in CKD patients can increase the mortality rate. Sleep less than five hours (for specially diabetics) can increase the proteinuria in the kidney which is the precursor of kidney ailment. High Blood pressure is also detrimental to kidney deterioration. Strategies like limiting caffeine and alcohol consumption, low protein and potassium, we can create sleep ambience, establishing resting and relaxing bedtime routine, along with appropriate treatment suggested by nephrologist. Thus, sleep inadequacy can cause CKD indirectly by increasing obesity, hypertension and metabolic syndrome.

Sleep and Gastrointestinal Diseases

Sleep disturbances have a direct relation with gastrointestinal diseases. Poor sleep exacerbates gastrointestinal symptoms through its effect on inflammation. Many gastrointestinal disturbances disrupt the circadian rhythm, leading to disturbed inadequate sleep. Inflammatory cytokines cause inflammatory bowel Disease (IBD) and irritable bowel syndrome (IBS). Sleep

disturbances also cause peptic ulcer and gastro esophageal reflux disease (GERD). Sleep loss increases stress hormone, such as cortisol that mars the digestive tract and gastro conditions like IBS. Sleep loss also can disturb our gut micro biome (gut dysbiosis) leading bloating, diarrhea and constipation. Apart from sleep, gut health also needs to be taken into consideration. One must avoid eating much before retiring to bed. Medical advice can also be taken by health care provider.

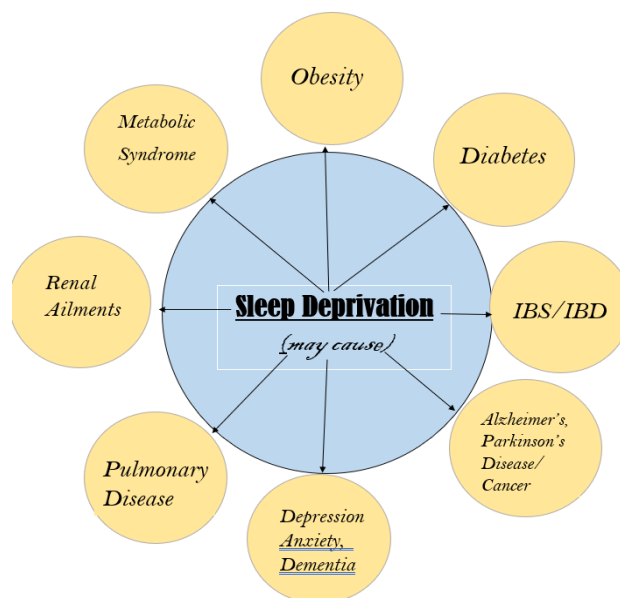
Sleep and Pulmonary Diseases

Diseases like obstructive sleep apnea and chronic obstructive pulmonary disease (COPD) are both pulmonary diseases that are born of inadequate sleep. Sleep, especially REM sleep, naturally changes respiratory function, which can make breathing problematic. In conditions like COPD, the blood's oxygen levels can drop during sleep, leading to health hazards. Inadequate sleep can negatively affect cognitive function. Strategies like Continuous Positive Airway Pressure (CRAP) can be effective for management of obstructive sleep apnea.

Sleep and Cancer Risk

Sleep disorders can cause breast, prostate and colorectal cancer, as poor sleep disrupts hormone production, can cause low immunity and exacerbate inflammation. Inadequate sleep lowers production of melatonin hormone which prevents DNA damage. The circadian rhythm regulates cell cycle progression and protects DNA, are disturbed because of poor sleep. Health care

provider must be consulted for sleep loss and other problems.



Treatment (A)

Ayurveda-Ayurveda is indigenous holistic approach which offers herbs that can heal insomnia and other sleep disorders. In Ayurveda, there is wide range of herbs that have adaptogenic, calming and tranquilizing properties, which are very useful in treatment of insomnia or sleep loss. The doses can be adjusted according to prescription of a qualified ayurvedic medico.

Ashwagandha (Withania Somnifera): Ashwagandha is famous adaptogen that can improve various aspects of sleep, curtail stress, and increase sleep efficiency. It has also some anti-inflammatory, antioxidant, and immune booster effects that can be a good option for mental wellness. It may regulate neurotransmitters, such as serotonin and GABA, adding cheer and relaxation. Dose: 1-3g at bedtime with milk or water.

Brahmi (Bacopa Monnieri): It reduces stress and anxiety. It lessens cortisol level and elevates mood. It improves nervous system function, and reduces the symptoms of distress, dementia or Alzheimer's disease. Dosage: 1-3g at bedtime.

Jatamansi Flowers (Spikenard): It is thought out to be brain and memory booster, and it prevents cell damage due to its strong antioxidant property. Dose: 1g at bedtime.

Shankhapushpi (Convolvulus Pluricaulis): It is famous in Ayurveda as it improves memory, and cognitive function. It also reduces stress, anxiety, and insomnia. The herb is very strong antioxidant and brain protective. Dose: 1g powder along with milk or warm water.

Hemp Seeds (Cannabis Sativa L): It may be used as to heal stress and insomnia. It is good for better sleep as it contains compounds like melatonin, tryptophan and GLA, which strengthen sleep cycle regulation, and in diminishing stress. Dose: 2-3 g powder or as prescribed by ayush physician.

Nutmeg (Myristica Fragrans): It induces sleep by stimulating serotonin and contains myristicin, which is useful for nerve-soothing effects. Dose: 1-2 mg/Kg body weight or suggested by doctor.

Tagara (Valerian Wallichii): It is also known as Indian Valerian, used for its calming and sedative properties. It induces restful sleep by interacting with the GABA receptors (gamma amino butyric acid) in the brain, calming the nervous system, reducing the anxiety, and improving the circadian rhythm. Dosage: -1-3 g or as directed by healthcare provider.

Cashews: Cashews are very useful for good sleep as it contains tryptophan, an amino acid that promotes the production of hormone melatonin, and mineral magnesium that can induce sleep by calming the nervous system. Dose: 1 to 10 kernels of cashew before sleep, those who are diabetic can take it in moderation as it has more calories.

Hops (Humulus Lupulus): Its extract is useful to improve sleep as it has compounds like xanthohumol, and alpha acids, which substantiate GABA system in the brain. It supports non-REM sleep and delta waves by interaction with GABA receptors. Dosage: 150-300 mg or as suggested by physician. All these natural herbs or supplements can be used under the supervision of a qualified medical practitioner.

(B) Allopath

Antianxiety drugs or tranquilizers are the drugs that act as mild CNS depressants, produce a sedative effect without meddling with mental or physical functions. These drugs differ from anxiolytic-sedative drugs from antipsychotic drugs like phenothiazines. They improve the sleep disorders. According to K.D. Tripathi's Clinical Pharmacology, the following drugs given the table treat sleep disorders:

S.No.	Name of the Drug	Indications	Recommended Doses
1. Benzodiazepines	Diazepam Chlordiazepoxide Oxazepam Lorazepam, Alprazolam	Primarily used for sleep onset, and maintaining insomnia	2-10 mg 10-20 mg 15-30 mg 1-5 mg 0.25-1mg or as suggested by physician.
2. Azapirones	Buspirone	Treat mild to moderate anxiety	5-10 mg
3. Sedative antihistaminic	Hydroxyzine	Antihistaminic with sedative, antiemetic, antimuscarinic and spasmolytic properties	5-100 mg
4. Beta Blockers	Propranolol	Diminish symptoms like palpitation, tremor, high B.P.	40-480 mg

(M.D. Tripathi, 2010, 449)

(C) Homeopath

Sleep is a problem that everyone today is grappling with, and they are opting for natural alternatives to absolve them of this ailment. Among such alternatives, homeopath is a promise to restore loss of sleep that has no side effects. The following homeopath medicines can be tried under the guidance of homeopath medico:

Passiflora Incarnata: It is widely used to treat sleeplessness, anxiety, stress and acute insomnia. It calms the nervous system, and cures the acute and chronic sleep disorders. 10-20 drops of its mother tincture in lukewarm water 1 hour before sleep time or as suggested by healthcare provider.

Hypericum Perforatum: It corrects the moods, and stress that interrupts sleep. To hypersensitive or emotional people, it improves nervous sensitivity and induces sleep. Dose- 10-20 drops of the tincture with warm water before time along or in combination as suggested by physician.

Ginseng: Ginseng is known for its adaptogenic properties, and to diminish stress

and nervous tension. It improves cognition function, and recall of stored memories. It brings better sleep. Dose- 10 drops of mother tincture with warm water before bedtime.

Coffea Cruda: This homeopath remedy relieves anxiety and sleeplessness. It supports better sleep and cure stress and insomnia. When it is taken with water, coffee or caffeinated beverages are not advised drink. Dose- 4 drops of Coffee Cruda 200 CH with water before bedtime.

Kali Phos: This a strong remedy for relieving stress, phobia and produce sleep. Dose- 6X 4 tabs under tongue before bedtime. It is generally taken in combination.

Chamomile: Chamomile is plant, and its leaves are used as tea. It is mild sedative and lowers stress and induces sleep. Dosage- 10 drops with warm water before sleep or as suggested by physician.

Over and above, there is bevy of evidence that mount to prove insufficient sleep detrimental to our overall health. Inadequate sleep or sleep loss, less than seven hours can lead to dementia, Alzheimer's or Parkinson's diseases inter alia. It is seen that sleep is essential for neurological functions in four ways- to act as a catalyst or trigger, cleaner, protector and defragmentation tool. Sleep may trigger epigenetic processes, that biological mechanism that leads to dementia. It also woks a cleaner of neurons in the brain lies vacuum system to produce beta amyloids which are heap of proteins particularly in brain regions, and neurons shrink by cleaning potentially toxic proteins. Sleep also serves as a protector from vascular dementia that is driven by cardio-metabolic risks like high blood pressure,

elevated sugar levels, they spawn micro legions in terms of white matter hyper intensities that can trigger high B.P. and can cause cognitive decline. The last, it works as defragmentation tool to consolidates all cognitive functions, and more important, diminish and dispel brain fog. Sleep is the primary biomarker of good health and life. It modulates metabolism, weight, hormones regulation, age reversing, moods, mental sharpness, memory, immune system and overall wellbeing and performance. The following tips will be of great worth to improve health problems:

Tip 1: We should fix our schedule of sleep right and tight. By limiting caffeine intake especially at night, exposure to blue light and keeping off-screen much before the bedtime. We must keep bedroom's environment conducive for sleep.

Tip 2: We must have social engagements and interactions and hop on brain calming activities like music or reading books of taste or interest. White noises box can be used.

Tip 3: We must eat a balanced die containing low carbs that reduces adrenaline, and cortisol level low. We must include for better gut health L Luteri yogurt or other probiotics with good amount of fiber in meal. In the evening, we can use mocktail of seeds as snack, need to avoid spicy and oily foods.

Tip 4: We must keep our legs little warm and keep the temperature of the sleeping room lower than body temperature. We can take warm shower in the evening to get signal for sleep and relaxation.

Tip 5: We must try supplements as per the guidance and suggestion of healthcare expert. They are:

Magnesium Glycinate: It is an essential mineral to regulate various physiological processes and sleep process. Magnesium plays a vital role in the production of neurotransmitters that help to fall asleep and in the release of melatonin and GABA. Magnesium modulates the activity of hypothalamic-pituitary-adrenal axis, which regulates the stress response and influences sleep (Schwalfenberg, G.K....et al 326). Dose-200 to 400 mg as suggested by physician.

Melatonin: Melatonin is hormone produced by pineal gland that regulates the sleep-wake cycle (msp, 45). Its production is modulated by suprachiasmatic center of hypothalamus, which receives the signal from neurons of retina about the level of light. Melatonin levels peak in the night, then lower in the morning, thus regulating circadian rhythm. The recommended dose is 1 to 10mg before sleep time.

L Theanine: It is an amino acid generally derived from green tea (camellia sinesis), with potential relaxation and sleep-promoting effects. It increases the production and release of GABA, a key inhibitor of neurotransmitters that support rest and sleep. Dose-50-100 mg as per the dictate of physician. We can also use methylated B12 and try to lower homo cysteine level.

Tip 6: In studies, it is found that yoga reduces stress and induces good sleep. Deep breath exercises-inhalation and exhalation help a lot in the reduction of stress and bringing better health. Cycling, swimming,

and exercising can also help us improve sleep. The following yoga poses before bedtime earn better results. Meditation also helps reduce cortisol level.

Wild-Knee Child's Pose (Balasana):

By kneeling on the floor and bringing together the toes, keeping forehead on the floor, and we take slow and steady breaths.

Legs up on the Wall (Viparaitta Karani): By spreading mat on the floor close to the wall, we lie on the mat and place the legs straight on the wall and then relax arms on respective sides.

Yoga Nidra: It calms the body and mind, relaxes and brings sleep. It reduces the stress and brings quality sleep. It activates the parasympathetic nervous system and hones the effects of sympathetic nervous system. The sympathetic nervous system begins a stress response, and parasympathetic nervous system restores the body. Thus, by suppressing sympathetic system, and sensitizing parasympathetic nervous system, yoga nidra relaxes the body and induces better sleep. It is found that "regularly practicing yoga nidra mood, well-being and confidence (www.sleepfoundation.org). It activates, alerts, lowers blood pressure, regulates sugar levels, and decreases inflammation.

Action; Lying in the shavasana pose, spread the body on mat, affirm a resolution, breathing in and out of the body, recalling sensations, regaining the resolution again, and then place the body on the mat.

Tip 6: We need to improve our gut health, as melatonin and serotonin produced in pineal gland but in gut too. That is why it is also called second brain. Probiotics and

prebiotics can be tried. Antibiotics are chosen according to the suggestions of the healthcare provider.

Tip 7: We need to work on our hormone's regulation. Cortisol, serotonin, dopamine, progesterone, Estrogen, ACTH and insulin etc.

Tip 8: Sprinkle lavender oil in the bedroom 1 hour before sleep time.

Tip 9: Spawn sleep friendly environment in the room by eliminating blue light and creating darkness.

Tip 10: Waking for ten minutes or so on the grass and grounds help much for better sleep, electron move freely from ground to human body and reduce the free radicals. To have the feeling of gratitude, amity, and less competitiveness can also help metacognition. In the last, we may concur with the notion of William C. Dement, the world's famous proponent of sleep and sleep deprivation: "We are not healthy unless our sleep is healthy. And we cannot make our sleep healthy unless we become thoroughly aware of both its peril and promise (consumer.org.my). Quality sleep is cornerstone of better health, affecting brain, cognitive and function like memory, and alertness, immunity, cardio-metabolic health, physiological functions like homeostasis and keeping the biological environment quite conducive, falls or stumbling and less risk of chronic deadly diseases. Incessant insufficient sleep can trigger primordial serious health disorders such as mental health issues, obesity, metabolic syndrome, insulin resistance, diabetes and impaired immunity. The perfunctory riddle is that sleep is very essential for good and hassle-free life, and it is

imperative on our part to foster a consistent, controlled, comfortable and conducive environment for sleep. We must improve our sleep by adopting and adapting solutions and strategies, focusing on holistic practices, lifestyle and dietary changes, and therapeutic approaches that fetch lasting transformation. Sleep is an investment whereby the more we invest to our life, the more healthily and productive we will be in our career. Sleep is an elixir of life, essential for body and brain and its smooth function—a health process of repair and recover. We must start the day with exposure to sunlight and get our circadian clock set. From morning to night, we must follow a strategy to keep ourselves fit and feisty, need to festoon with social threads, interactions, discouraging negativity overpower us. With 360° perspective, we can follow the 3-2-1 formula, meaning to stop eating three hours before bedtime, drinking fluids 2 hours before sleep, and keeping off the screens and minimizing the exposure to EMF 1 hour before sleep. We sign off with the wish of Sir Philip Sidney that he ensconced in the sonnet 39 of “Astrophel and Stella” invoking sleep amidst thoughts of Penelope Devereux:

Come Sleep! O sleep, the certain knot of Peace,
The baiting-place of wit, the balm of woe,
The poor man’s wealth, the prisoner’s release,
Th’ indifferent judge between the high and low
(poetryfoundation.org).

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