

Adolescent today



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IAP Adolescent Health Academy



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From the Editor's desk

My Dearest colleagues of IAP Adolescent Health Academy,

Greetings from Gwalior,

Adolescent Health Academy is continuously striving hard to update your knowledge about Adolescent care and also to make you aware about the recent issues, which need your immediate attention. With the same intention AHA have been publishing the news bulletin "Adolescent Today". This special issue on "Adolescent Sleep" is with you now and I am sure you will find it useful and worth reading.

Evidence of short sleep durations, daytime sleepiness and excessive caffeine use indicate adolescents are sleeping fewer hours than needed. Middle- and high-school students not getting enough sleep is a chronic problem worldwide. Further, restricted sleep has been linked to alarming health and behavioral outcomes, such as increased risk for car crashes, delinquent behaviors, depression and psychological stress.

A combination of biological processes, modern lifestyles and social obligations decrease the opportunity for adolescents to obtain adequate sleep. Nighttime screen use and social networking, which have significantly increased in the 21st century are external factors that contribute to insufficient sleep among adolescents. Several studies have demonstrated that use of multiple electronic devices at nighttime potentially disrupts sleep.

Regarding school start times, few schools in metros have delayed school start times in response to research about the prevalence of insufficient sleep among adolescents. They have resulted in more total sleep on weekday's nights, less daytime sleepiness, less tardiness, fewer attention/concentration difficulties, and better academic performance compared with children who attended earlier-starting schools.

Caffeine use among children and adolescents has been understudied. Higher caffeine intake as early as 12 years of age was associated with shorter sleep duration, increased sleep onset latency, increased wake time after sleep onset, and increased daytime sleepiness. Further, increased caffeine use often coexists with other behaviors that negatively affect sleep, such as late-night technology use.

The causes and consequences of sleep loss are closely intertwined in complex ways, the researchers point out. Sleep problems both increase risk for depression and are a predictor of relapse. Recent data show addressing insomnia greatly improves treatment of depression.

"Adolescent sleep loss poses a serious risk to the physical and emotional health, academic success, and safety of our nation's youth... Pediatricians have the opportunity to make significant inroads into addressing the health risk that sleep loss presents through screening and health education efforts," the researchers in west has concluded.

I am sure you will find this issue and topic very exciting as the previous ones. Please do give us your honest feedback.

The Activity report of individuals and branches is a very interesting feature – I thank all the contributors of their respective reports.

The Present team of office bearers of AHA has done remarkably well during this tenure under the most able and dynamic leadership of Dr JS Tuteja. The work culture set by Dr Preeti Galgali, her enthusiasm and dedication has been phenomenal, Dr JC Garg deserves a special note of thanks for managing the accounts most meticulously.

Please keep the flame ignited. Jai Hind! Jai IAP!

Have a happy, enjoyable and informative reading!!

Sincerely,

Dr. C.P. Bansal

Editor in Chief, Adolescent Today
President, SAPA



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Dear Esteem seniors, colleagues, Honorable Members.

Greetings from Adolescent Health Academy-IAP

This academic year of adolescent health academy is almost through and we have had an excellent, memorable, fruitful conference in Mangalore this year 2015 with new flavor of four days of activities for academy, togetherness, enjoyment with lots of academics.

It is quite heartening to note the wide appreciation on last issues of Adolescent today have been received from our esteemed members of AHA from various parts of the country.

The soft copy was made available in AHA website for reading and downloading to all members. We are thankful all the contributors of last issue and the latest and final issue of this academic year which is on “Adolescent Sleep”.

I am sure all the members will like to read and would be benefited by the articles which are of importance.

Wishing you all a Happy and healthy, progressive - our beloved academy in 2016 and meeting you in Pedicon 2016 in adolescent activities.

Yours in academy service,

Dr. J.S. Tuteja
Chairperson, AHA



Dear Academicians,

“You can’t dream big, if you don’t sleep enough” is a popular saying. For adolescents who are making a transition from the dreamy world of childhood into reality of adulthood; ‘quality’ and ‘quantity’ sleep is a must. This is very challenging for adolescents as physiological changes in circadian rhythm and the pressures of the current world namely academic turmoil and expectations and distraction of digital media; keep them miles away from sleeping leading to poor health, risky behaviour and underachievement. The set of six articles in this e-bulletin written by renowned adolescent health specialists review the latest on adolescent sleep.

Happy Reading!

Dr. Preeti M. Galagali
Secretary, AHA
Associate Editor, Adolescent Today



Dear colleagues of Adolescent Health Academy,

It gives me immense pleasure on publication of November issue of ADOLESCENT TODAY.

Adolescent Health Academy had glorious years where it has organized beautiful conferences at Ludhiana & Mangalore, well organized, richly deliberated by eminent faculties, & attended by large numbers of delegates.

The topics of this issue are very important & authors are the best in their field.

I am confident that this issue will be very useful to members, particularly in their practice.

I wish all the members of Academy Happy & prosperous coming year 2016.

Dr. J.C. Garg
Treasurer, AHA



Normal Adolescent Sleep



Adolescent sleep health is becoming increasingly recognized internationally as a significant concern, with many countries reporting high incidences of sleep disturbance in our youth

Sleep is a basic drive of all living beings. Sufficient amount of sleep helps us to think more clearly, in accomplishing our daily tasks efficiently and more consistently and contribute significantly toward our important cognitive, emotional and performance related functions. Ongoing research corroborates.

With many cases reported of high incidences of sleep disturbances in our young generation, adolescent sleep health has become a subject of serious research and study.

Sleep is a complex process with many stages including drowsiness, moderate sleep, deep restorative sleep, and dream sleep. Dream sleep, when we work through problems from our waking life, is better known as rapid eye movement or REM sleep.

Physiological Patterns

Adolescents require at least as much sleep as they did as pre-adolescents (in general, 8.5 to 9.25 hours each night). (Carskadon et al., 1980). Daytime sleepiness increases for some, to pathological levels even when an adolescent's schedule provides for optimal amounts of sleep. (Carskadon, Vieri, Acebo, 1993)

Adolescents' sleep patterns undergo a phase delay, that is, a tendency toward later times, for both sleeping and waking. Studies show that the typical high school student's natural time to fall

asleep is 11:00 pm or later. (Wolfson and Carskadon, 1998)

Behavioral and Psycho social patterns

Many adolescents do not get enough sleep, especially during the week. Average total sleep time during the school week decreases from 7 hours, 42 minutes in 13 year olds to 7 hours, 4 minutes in 19 year olds. (Wolfson and Carskadon, 1998) Only 15 percent of adolescents reported sleeping 8.5 or more hours on school nights, and 26 percent of students reported typically sleeping 6.5 hours or less each school night.

Adolescents have irregular sleep patterns; in particular, their weekend sleep schedules are much different than their weekday schedules, to some extent as a direct consequence of weekday sleep loss. These differences include both the quantity and the timing of sleep.

In a study of more than 3,000 adolescents it was reported that the average increase of weekend over weekday sleep across ages 13-19 was one hour and 50 minutes. (Wolfson and Carskadon, 1998) In 18-year-olds, the average discrepancy was more than two hours. In addition, 91 percent of the surveyed high school students reported going to sleep after 11:00 pm on weekends, and 40 percent went to bed after 11:00 pm on school nights.

Irregular sleep schedules-including significant discrepancies between weekdays and weekends- can contribute to a shift in sleep phase (ie, tendency toward morningness or eveningness), trouble falling asleep or

awakening, and fragmented (poor quality) sleep.

While sleep duration decreases in the first 10 years of life, sleep need does not decline in the course of adolescence (around 9.25 hours on average). The most important change in adolescent sleep behavior is the delay of the sleep phase; thus, adolescents tend to stay up late at night and sleep late in the morning compared to pre-adolescents. This phase delay may result in presumed insufficient sleep during the school week and “catch-up sleep” during weekends. Explanations for the phase delay are easy to find in the changing adolescent psychosocial milieu, the teenage wishes for autonomy and independence, shifts in family configurations, peer culture and social expectations, academic demands, school culture, employment opportunities, and extracurricular activities. Maturation changes of biological sleep processes, however, are also related to sleep timing and amount during adolescence.

Behavioral states are constellations of functional patterns and physiological characteristics of sleep and wakefulness that are relatively stable and occur in a predictable manner. In the young infant, five behavioral states are defined on the basis of direct behavioral observations, sometimes accompanied by non invasive physical measures like heart rate and motor activity: quiet sleep, active sleep, quiet alertness, active alertness, and vocalization (crying).

Sleep states

Two distinct sleep states are defined on the basis of polysomnography that monitors electroencephalographic (EEG) patterns, eye movements (EOG) and muscle tone (EMG):



REM sleep (rapid eye movement sleep, REMS) and non-REM sleep (NREMS). (Carskadon, 1995)

Basic Concepts of Sleep Regulation during Early Human Development

Sleep is a dynamic and regulated set of behavioral and physiological states and stages. Current theoretical models describe two intrinsic regulatory processes that determine the timing of sleep and waking. A sleep-wake dependent homeostatic process accounts for an increase of sleep pressure as waking is extended and for a recovery process occurring during sleep. This homeostatic process interacts with a sleep-wake independent, clock-like circadian process. The circadian mechanism has a distinct neuro anatomical locus, and molecular components have also been identified. The homeostatic sleep-wake process is less well defined on a neuronal basis, although the intensity of slow wave activity in the delta range during NREMS (EEG delta power) has been proposed as an electro-physiological manifestation of this process. This two-process model of sleep regulation accounts remarkably well for NREMS.

From ages 9 to 16 years, on the other hand, EEG voltages are markedly attenuated. REMS is characterized by high levels of desynchronized cortical EEG activity (mixed frequencies, relatively low voltage), absence of muscle tone, irregular heart rate and respiratory patterns, and episodic bursts of phasic eye movements, the hallmark of REMS. The term active sleep in young infants reflects frequent muscle twitches and body jerks that break through the muscle inhibition of infant REMS. In the first months of life, infants 'sleep is divided evenly (50:50) between NREMS and REMS.

The proportion of REMS decreases throughout early childhood to the adolescent and adult level of about 20 to 25% of nocturnal sleep. When young infants fall asleep, the initial sleep episode is typically REMS, that is, sleep onset REM periods. After 3 months, sleep onset REM periods become replaced by the adult pattern, i.e., sleep onset NREM periods. Slow-wave sleep (SWS; NREMS stages 3 and 4) is greatest in early childhood, drops off abruptly in the course of puberty (50% decline in SWS between age 12 and 14 years), and further declines across the life span.

This developmental pattern of SWS reflects the changing EEG amplitude that may be related to the age specific “programmed” alterations in synaptic connectivity among neurons and changes in neuronal, neurotransmitter, or neuroreceptor properties. Sleep cycles: NREMS and REMS alternate through the night in cycles (ultradian sleep rhythms) with a period of about 50 minutes in infancy. The period of this ultradian rhythm gradually lengthens through childhood achieving mature period length of about 90-110 minutes around school age. SWS predominate in the sleep cycles early at night while, in the last part of the night, the proportion of REMS is increased.

Influences on Physiological Sleep Patterns

Sleep researchers have established that basic sleep needs within individuals generally remain the same throughout their lifetime. Furthermore, insufficient sleep accumulates into a sleep debt that can ultimately be relieved only through additional sleep.

Circadian timing systems are also very resistant to change. Behavioral methods, such as controlled light exposure and chronotherapy, can sometimes help shift circadian timing to more socially appropriate sleep and wake times. Because the circadian rhythms in teenagers are typically highly sensitive to erratic schedules, to effectively adjust them requires making gradual, persistent and consistent changes.

It is important to recognize that excessive sleepiness during the day and other sleep problems can be an indication of an underlying biological sleep disorder. In most cases, symptoms of sleep disorders can be eliminated or minimized through the use of appropriate behavior modifications, medication or other therapies.

Perhaps the most significant behavioral change that adolescents can make – and that their parents can encourage them to make – is to establish and maintain a consistent sleep/wake schedule. This is a good practice for people at all ages, but may be especially important for adolescents.

Understanding and practicing other behaviors that are considered good sleep habits are also important. These include getting enough sleep, avoiding caffeine and other stimulants late in the day and alcohol at night, gaining exposure to bright light at appropriate times to reinforce the brain's circadian timing system, relaxing before going to sleep and creating an environment conducive to quality sleep.



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Importance of Sleep in Adolescence



लड़कपन खेल मे खोया,
जवानी नींद भर सोया,
बुढ़ापा देखकर रोया,
वही किस्सा पुराना है....

is a popular Hindi song we all grew listening to, but how important sleep is for adolescents and young adults, we never realized then. Sleep is an essential biological need of humans as well as animals. It is as important as food, water or air. Its vital importance is well documented by the fact that sleep deprivation can cause death more quickly than food deprivation. It is believed that sleep is beneficial for energy conservation and neuronal recuperation, synaptic homeostasis and brain plasticity.[1]

Sleep is a global state of immobility with greatly decreased responsiveness to environmental stimuli. It is a naturally occurring phenomenon and can be distinguished from coma, trance or anesthesia by its fast reversibility. It is like a process of recharge for the person as well as systems of the body.[2]

Sleep is very important in adolescents for physical, cognitive and psychological growth and wellbeing. Sleep deprivation can result in impairment of cognitive and psychological functioning and worsening of physical health. These issues have drawn attention of doctors, researchers and scientists towards sleep.[3]

Sleep Maturation in Adolescence

Adolescence is a gradual period of transition from childhood to adulthood and it affects sleep. During adolescence the sleep pattern changes. The somatic, neuronal, behavioural, and psychological

distinctive facets of adolescence are associated with maturational changes in sleep-wake cycle, and sleep timing, duration and architecture. During second decade the onset of sleep gets delayed with every passing year. During late adolescence, there is a change in timing of secretion of sleep-related hormone melatonin. That is believed to cause alterations in the circadian rhythms that guide a person's sleep-wake cycle. Roenneberg et. al.[4] measured the midpoint of sleep in European school children and documented a significant linear delay of 2 to 3 hours hours in the second decade, about 12 to 18 minutes later with each year of age. The reversal of this progressively delayed sleep pattern may be a considered as biological marker that heralds the end of adolescence and emergence of adulthood.

EEG changes mark the transition from childhood to adolescence. At puberty, on EEG, there is a reduction of both Slow Wave Sleep (SWS) and Rapid Eye Movement (REM) sleep is noticed with a relative increment of stage 2 non-REM sleep.[5,6]

How Much Sleep does an Adolescent Need?

Sleep research suggests that a healthy adolescent needs between 8 and 10 hours of sleep every night. Sleep deprivation (less than 8 hours of average daily sleep) has now been recognized as an important health risk in adolescents.

Courtesy National Sleep Foundation,
Washington DC, US

Role Of Sleep for Adolescent's Physical, Psychosocial, Adaptive and Mental Wellbeing and Scholastic Achievements

Sleep has a vital role in normal brain and body homeostasis. It is a vital activity and its

pathological alterations are known to induce maladaptive functioning and many physical and psychiatric diseases as well as decline in scholastic performances of adolescents. Its importance can be best understood by understanding the body functioning in its deprivation, as it is known to regulate many metabolic, thermoregulatory, cardiovascular, immune and respiratory functions.[7] Sleep plays a vital role in important cognitive and psychological processes, including learning and memory consolidation, abstract thinking, creativity and insightfulness, emotional memory and emotional processing including stress-related coping strategies. These cognitive and emotional changes are the hall mark of adolescence.[8-11]

In general, it is documented that non-REM sleep contributes to energy conservation and synaptic homeostasis whereas REM sleep is proposed to serve neuronal recuperation and emotional regulation.

Sleep, learning, and memory are complex phenomena that are not entirely understood. However, researchers suggest that the quantity and quality of sleep have a profound impact on learning and memory. Recent studies suggest that sleep helps learning and memory in two distinct ways. First, a sleep-deprived person cannot focus attention optimally and therefore cannot learn efficiently. Second, sleep itself has a role in the consolidation of memory, which is essential for learning new information. Recent evidences demonstrate that SWS and the portion of non-REM sleep immediately before SWS actively consolidate memories in which EEG delta waves and sleep spindles are also believed to play a critical role. Various studies including neuro-imaging evidences strongly indicate that the memory consolidation during SWS is effected through transfer of previously acquired memories stored in the hippocampus from the hippocampus to the cortex by the process of hippocampal- cortical dialog. It is shown that early night sleep that is rich in SWS transforms previously acquired implicit knowledge into explicit knowledge required for problem solving.[12-16] So sleeping early adds to an adolescent's memory consolidation and that in turn enhances the cognitive abilities.

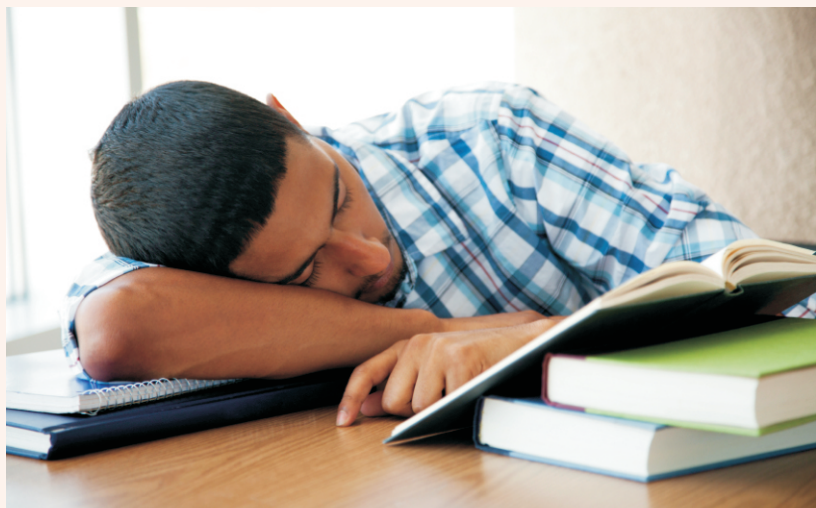
REM sleep also serves complex cognitive and

psychological functions.[17] REM sleep has been shown to facilitate access to weak associations, thus promoting human heuristic creativity, the ability to fill the gaps between events and complete the missing links by imagination based on experiences and thinking. Late night REM sleep has been demonstrated to preserve previously learned implicit knowledge.[16] Studies have found that REM sleep consolidates mostly procedural memory and is related to integration of recently consolidated memory in a more general and individual specific context.[18]

Certain adolescent conditions including somatic and psychiatric disorders could substantially affect sleep duration and architecture, and thus may lead to maladaptive functioning, including obesity, poor academic achievement, and suboptimal emotional and psychological processing. These conditions may make the adolescent vulnerable for making suboptimal decisions and actions, increased incidence of unintentional injuries, violence, emotional liability, stress in social relationships with peers, substance abuse, and media addiction.[19-24] The relationship between these conditions and altered sleep architecture seem to be bidirectional for example altered sleep architecture leads to more social stress, poor academic performance, media addiction and even substance abuse which in turn further disturb sleep and alter sleep architecture.

Impact of Sleep Deprivation

Sleep deprivation leads to the adolescent to be moody, anxious, stressed, uneasy, nervous and irritable. In addition, he or she tends to get frustrated or upset more easily, engage in risk-taking behaviours, such as drinking and driving fast.



Inadequate sleep results in problems with attention, memory, critical thinking, reaction time, decision making and creativity, all of which are important in school performance and scholastic achievements. Adolescents who get less sleep are poorly organised, poor time managers, remain inattentive and have lack of concentration thus more likely to get poor grades in school, fall asleep in school, and have school absenteeism. They are prone to struggle with maths, sciences, languages and abstract concepts. Behaviour wise he or she may become aggressive, anti-social, withdrawn, hyperactive, unable to control or regulate behaviour due to inadequate sleep and difficulty in social situations. These adolescents are less into sports, clumsier, more accidents prone and more at risk of being obese and overweight, have poorer immune system, more likely to get acne and skin diseases and fall sick more often.[25]

Conclusion

In the light of the evidences gathered by sleep researchers over the years, it can be concluded that sleep plays an important role in maintaining physical mental and social wellbeing during adolescence, the critical period for development of a child to a healthy adult. Adequate (more than 8 hours of sleep) and sound night time sleep is of paramount importance for a healthy adolescent. Attention, memory, concentration, abstract thinking, heuristic creativity and problem solving all depend on sleep and thus social and academic success of an adolescent is a function of sound sleep. So sleep should be a priority for an adolescent.

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Sleep Patterns during Adolescence



Adolescents are in their active phase of growth and rejuvenation of body and mind by sleep is essential for reaching their potential. But do our adolescents sleep adequately; are they sleep deprived? This article makes an attempt to unravel the sleep needs of adolescents and how the sleep needs and patterns are influenced by biological, social, academic and cultural factors. Further an attempt is being made to find solutions to make adolescents enjoy sleep better.

Stages of Normal Sleep

Typical sleep cycle consists of four stages (1 to 4) of Non Rapid Eye Movement sleep followed by Rapid Eye Movement Sleep (REM). Each sleep cycle usually lasts for 90 to 110 minutes. Stage 1 is light sleep associated with alpha waves where a person is drifting to sleep, stage 2 is a slightly deeper sleep with sleep spindles but arousable and stages 3 and 4 are deep sleep with delta waves. It is difficult to arouse a person from deep sleep. REM sleep is the phase where there is loss of muscle tone associated with eye movements and dreams. On a given night each adolescent can have up to six or seven cycles. Earlier sleep cycles have more deep sleep than REM sleep. Subsequent sleep cycles have more REM sleep compared to deep sleep.

Benefits of Sleep

Sleep rejuvenates a person physically and emotionally. Uncluttering of brain happens during sleep. Information from short term memory gets transferred to long term memory during sleep. This helps in learning. Immunologically a well rested person is more resistant to infections. Sleep gives a rested feeling with associated calmness that is essential to face the challenges of the next day.

During adolescence, Growth Hormone, Luteinizing Hormone and Follicle Stimulating Hormone are secreted in pulses during the deep stages of sleep. Almost one third to 40% of an adolescent's life should be spent in sleep to help in normal adolescent growth and development.

What determines the Sleep Needs of a Person?

Circadian/ Biological/ Body Clock /Internal Clock determine the timing at which a person is sleepy. This is determined by the person's internal needs. This usually runs a 24 hour cycle. Some are morning sleepers called as Owls and some are evening sleepers referred to as Larks. Learning capacity also corresponds to sleep needs in most adolescents.

Homeostatic sleep drive determines the necessity to fall asleep after a period of prolonged wakefulness. When an adolescent who usually falls asleep by 11 pm is not able to go to bed by 11p.m., he or she will be able to keep awake for some more time. But at some point of time the body would announce its need for sleep by drifting off to sleep. Here the adolescent would enter the REM sleep much earlier than in a normal cycle of sleep. This is the homeostatic drive as it takes care of the homeostasis of the body.

Factors that influence the Adolescents' Sleep

Biological Factors

Puberty as such contributes to shift in the sleep to Delayed phase. Thus late adolescents sleep later than their early adolescent stages. This corresponds to Sexual Maturity as evidenced by studies.

Secretion of Melatonin determines the onset of sleep and it has been found that late adolescents



have a slower onset of secretion of melatonin and a later fall in the same preventing late adolescents from waking up early in the day.

Social Factors

Academic Demands: High School adolescent in India is the busiest person across age groups. School demands, tuition needs and coaching classes' schedules along with sports activities challenge the adolescents to forego sleep.

Social Pressure: Social Networking, sleepovers with parties, weekend partying activities and peer interactions during adolescence usually take place after the household settles. This takes away many hours of sleep in the early part of the night.

Gadgets: Electronic media, play stations, computers or smart phones with adolescents are a sure way to give less importance to sleep with resultant sleep debt

Substances: Usage of prescription drugs or substances with mind altering capacity like caffeine, alcohol increases during adolescence which determines the changes in the sleep pattern that ensue.

Catch up Sleep: Weekend sleep duration usually compensates for the sleep debts created during the week with most adolescents wanting to sleep till 2 PM on Sundays with a late onset sleep on Sunday night with difficulty in waking up on Monday mornings. When adolescents are asked about this they say that by Wednesday of every week they get used to the demands on wakeful hours but feel the need to sleep longer by weekends .

Cultural Factors

In households where there is permissive parenting style weekend catch up sleep is permitted. In households where authoritarian parenting

practices are followed, the fixed sleep schedule insisted by adults do not meet the sleep needs of the adolescents.

In households where adolescents are expected to share the bedroom with grandparents who have an Advanced Sleep Phase with early to sleep and early to rise pattern, clashes take place everyday about the sleep routine practiced by the adolescent.

Effects of Sleep deprivation

Well slept adolescent is a Healthy Adolescent. Rejuvenation, recuperation, readiness to learn, relaxed approach to life and calmness in demeanour are the major outcome of sleep.

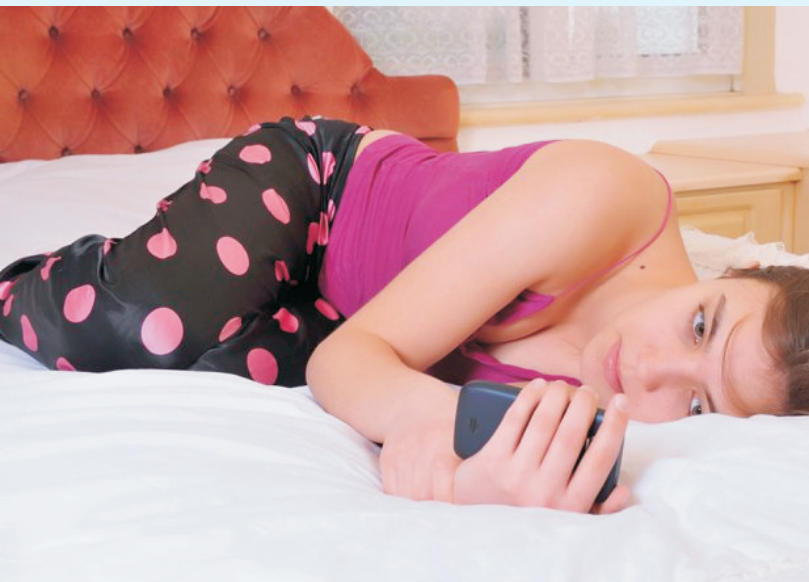
Sleep deprived adolescent becomes susceptible to infections, forgetfulness, irritability, fatigability, restlessness, memory loss, and inattention.

Increase in day time sleepiness as evidenced by Multiple Sleep Latency Tests done in labs makes us understand that a sleep deprived adolescent has a lesser time lag between reaching the bed and actual falling asleep. The reduction in the time taken to fall asleep is more pronounced in the afternoon. Also monotony makes the sleep deprived adolescent drift into sleep easily. Thus classroom lectures, driving and monotonous work can make sleep deprived adolescents to fall asleep within a short span. Thus a sleep deprived adolescent is prone for accidents and crashes.

Sleep deprivation increases obesity which may be due to alterations in the eating schedule or may result from the changes in the leptin and ghrelin hormone systems. Obesity makes adolescents prone for Obstructive Sleep Apnoea due to increased fat in the soft palate.



Depression is also a common consequence to sleep inadequacy in adolescents who are prone for depression.



Suggestions to improve sleep in adolescents

- Knowledge of sleep schedule in adolescents by parents and health care professionals would help in rectifying the habit and thus preventing the emergence of sleep debt
- Parenting practices to maintain a sleep schedule for the family can promote normal duration of sleep among adolescents
- Recommendations to reduce exposure to gadgets before sleep time would enable in less stimulation before bedtime
- Promotion of physical activity during evenings would enhance the quality of sleep; avoidance of excessive physical activity near bed time would ensure less sleep latency
- Avoidance of substances that alter sleep architecture is a wiser option

Points to Ponder

- It is a well known fact that adolescents sleep less than their actual requirement of 9 hours and 20 minutes sleep on a daily basis.
- Sleep debt created during the weekdays is compensated in the weekends by some adolescents
- Excessive demand placed by academics on adolescents is paving way for less sleep with

reduced learning

- Sleep deprived adolescents are nation's liability
- Productivity falls with reduced sleep
- Queries should be posed by health care professionals to know the sleep pattern in adolescents to help in healthy development.

Case Vignette:

17 y old Aditya a student of Class XII, came in the month of January with concern about his falling grades in the previous three months. He had been working towards IIT JEE Mains and Advanced in addition to his Class XII CBSE Exams. He had been registered with a coaching program for the last four years with additional inputs from teachers who had been giving him personalized approach to handle the academic challenge.

His Physical, Biochemical and Academic parameters were within normal limits.

Clue emerged only on probing his sleep hygiene. He had been sleeping only for 5 hours on a given day for the last four years, because he has been advised by his mentors at the coaching centre that less sleep, with more work is a sure way to Success.

Aditya was advised to sleep to his heart's content for the next 15 days. He caught up with his sleep debt with almost 12 hours of sleep every day the whole of next week.

He came out with flying colours in all his exams and is currently studying in IIT, Mumbai.

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Sleep Disorders



Poor sleep hygiene, insomnia, delayed sleep phase disorder, obstructive sleep apnea, restless legs syndrome, periodic limb movement disorder and narcolepsy are the important sleep disorders of adolescence. A European telephone survey of 1125 adolescents aged 15-18 years found that 20% suffered from excessive daytime sleepiness, and studies suggest that the lifetime prevalence of insomnia in adolescents may be as high as 11%.

The sleep history

Before taking a sleep history one should enquire into the child's daily routine, to get an idea of the amount of time spent at school, and on sleep, homework, studies, TV, computer, sports, activities and with friends and family. The routine followed on weekends and during the holidays should be noted separately. The sleep history should include bed time, sleep environment (e.g. TV in the bedroom), behavior at bedtime (e.g. bedtime stalling, difficulty falling asleep), and sleep-onset latency. Ask parents about behaviour during sleep e.g. snoring, apneic episodes, sweating, and restlessness, moving or kicking about. Review waking behaviour: does he need an alarm or is he woken up; does he wake up promptly when the alarm goes off, is there daytime sleepiness, does he take naps during the day, caffeine intake, mood, school performance.

A sleep diary provides a wealth of objective information about sleep. An actigraph is useful; this is an electronic wristwatch (e.g. Fitbit) that also measures exercise and activity levels and sleep-wake patterns for extended periods of time. Polysomnography (PSG) is the gold standard for assessing sleep stages and sleep disruptors, such as Obstructive Sleep Apnea (OSA) and Periodic

Limb Movement Disorder.

Sleep Deprivation

The most common cause of daytime sleepiness in adolescence is insufficient sleep. They sacrifice sleep in order to find time for homework, to participate in evening sports and cultural activities, to meet with friends, to work for pocket money, and to watch TV or visit Facebook. But sleep deprivation takes its toll, so that they are late for class, fall asleep in the classroom, become irritable, and fall ill more often. Though they rely on caffeinated or energy drinks to boost them, sleep deprivation ultimately reduces their attention, long-term memory, and academic performance.

Parents are often unaware that their children are sleep deprived. Any child should be considered as sleep deficient if he needs to be routinely awakened for school, if he frequently falls asleep in school, or if he sleeps 2 hours or more in the weekends and holidays than on school days. Parents may actually encourage poor sleep practices by themselves having irregular sleep schedules, oversleeping on weekends, and falling asleep in front of the TV.

Primary Insomnia

The adolescent has difficulty falling asleep, and he worries so much about the resultant sleep deficit and the daytime drowsiness that will follow that he becomes agitated, and this further interferes with his ability to fall asleep. This problem is best managed by teaching him sleep hygiene e.g. regular sleep times, avoiding daytime naps, advising him not to do any stimulating activities in bed (such as listening to music, watching TV, phoning friends), getting out of bed after 20

minutes if he has not fallen asleep yet, and teaching relaxation techniques.

Adolescents who suffer from depression or anxiety frequently develop insomnia. Those with anxiety generally having difficulty falling asleep, while those with depression are more likely to wake up in the middle of the night and have difficulty going back to sleep. In either case it is necessary to treat simultaneously both the mood/anxiety and the insomnia.

Delayed Sleep Phase Disorder (DSPD)

In this disorder there is a dramatic and persistent postponement of the individual's daily schedule. He consistently sleeps late, and as a result he wakes up late, and is frequently late for school or for work. He is forced to use an alarm clock to wake up, resulting in daytime drowsiness, tiredness and inattention.

Delayed Sleep Phase Disorder usually manifests abruptly in adolescence; about 10% of adolescents face this problem. It is most common in 'owls', who have always preferred to study late and to party late. They have difficulty falling asleep, but once asleep they sleep well, and have difficulty waking up the next morning.

This disorder was named in the belief that the hormonal changes of puberty somehow delay the circadian rhythm. However there is increasing evidence that this is primarily a behavioural disorder. Children often resist bedtime, but fall asleep promptly if firmly put to bed. In similar circumstances the adolescent persistently asserts his independence, and delays sleep in favour of social pleasures or homework, until it becomes habitual.

Management consists in advising him to go to bed 15 minutes earlier every 3-4 days, until the target bedtime is reached. If this proves ineffective, an alternative is to postpone sleep time by 2 hours every 24 hours until the target time is attained. Physiologic doses of melatonin (0.3-0.5 mg) are effective in advancing the sleep time if given 6 hours before the usual sleep time.

Restless Legs Syndrome

The characteristic feature of this neurological disorder is a powerful urge to move the legs, usually associated with strange sensations in the

lower limbs. Walking, stretching, or even rubbing the limbs will result in immediate but temporary relief of these symptoms, which tend to be worse at rest, especially at bedtime. These symptoms interfere with the ability to fall asleep. This syndrome may occur even in children but is often noted first at adolescence, with an incidence of 2%, and the prevalence increases with age. It is worsened by alcohol or caffeine intake, sleep deprivation, antidepressants, iron deficiency anaemia, and pregnancy. It is more common in those who have systemic illnesses, especially renal disorders. Management is by avoiding aggravating factors and by treating iron deficiency anaemia. If this proves inadequate pramipexole, which increases dopamine levels in the CNS, is highly effective.

Periodic Limb Movement Disorder

The adolescent may be totally unaware of this disorder. During sleep there are repeated jerking movements affecting mainly the lower limbs, each movement lasting only a few seconds, usually occurring every 20-40 seconds, but this can go on for minutes or even hours. Most commonly there is minimal movement: the big toe extends and the ankle dorsiflexes repeatedly. However he may kick around a lot, moves all over the bed, and even fall off it. The next morning he complains of muscle pains, or drowsiness due to disrupted sleep.

Polysomnography reveals these movements in over 10% of adolescents who complain of insomnia or daytime drowsiness. These movements occur in stage 1 and 2 of sleep. They do occur infrequently in healthy individuals, and it is considered a disorder only when they are severe enough to disturb sleep.



Periodic limb movements in sleep are more common in adolescents with iron deficiency anaemia, those who have consumed alcohol or caffeine, those who are on antidepressants or antihistamines, those who are pregnant, and those who have systemic illnesses including renal disorders. Thus it is more common in adolescents with restless legs syndrome. It is very common in adolescents with ADHD, and the management of PMLD often dramatically relieves the ADHD symptoms. Management is as for restless legs syndrome.

Narcolepsy

This chronic disorder manifests with profound daytime sleepiness. He has difficulty waking up after a nap, and needs more sleep at night too. He may also have repeated 'sleep attacks' i.e. he falls asleep unexpectedly and uncontrollably in the midst of a pleasant activity such as a friendly chat or an enjoyable meal. He experiences 'cataplexy' which is an abrupt loss of muscle tone in response to a pleasant emotional reaction e.g. laughter may result in buckling of the knees or he may fall down helplessly, and it may take a few minutes for muscle tone to return to normal. Other typical features (that may also occur in individuals without narcolepsy) are sleep paralysis (wherein the person cannot move or sleep for a few seconds or minutes after waking up) and hypnagogic/hypnopompic hallucinations (vivid hallucinations that occur just as a person is falling off to sleep or waking up).

Narcolepsy occurs due to an unexplained damage to the lateral hypothalamus. It has obvious negative consequences on behaviour and social relations. Poor attention and concentration interferes with studies. It is usually diagnosed late, being often misinterpreted initially as laziness, a seizure disorder or a psychiatric illness.

The diagnosis can be confirmed easily by polysomnography, which reveals two classic features: an unusually short sleep onset latency and onset of REM sleep soon after sleep onset. Normally REM sleep occurs only after a period of prolonged deep sleep. Management consists of having fixed and adequate sleep time at night, and scheduled naps during the day. CNS stimulants are beneficial, and new drugs like modafinil and

sodium oxybate are promising.

Sleep Walking (Somnambulism)

Somnambulism is more common in the pre-adolescent, but may occasionally persist into adolescence. During deep sleep, in the early hours after going to bed, he sits up in bed, and may dress, walk about, and even leave the house. This is most likely to occur when he is excessively tired or sleep deprived, and may be aggravated by stress. If awakened suddenly, he may become confused and even violent. He should be quietly guided back to his bed, whereupon he will promptly fall asleep again. He will have no memory of the event the next morning.

An occasional episode of sleepwalking is not uncommon, and is benign. Sleepwalking should be considered as a disorder only if it is recurrent or if the adolescent does something risky like walking out of the house at night. If there is an obvious precipitating factor (sleep deprivation, acute stress) this should be looked into. Benzodiazepines may be indicated rarely.



Obstructive Sleep Apnoea Syndrome



Obstructive Sleep Apnea (OSA) is the extreme form of Sleep Disordered Breathing (SDB) which also includes Primary/habitual snoring and Upper Airway Resistance Syndrome (UARS). By definition, OSA is a disorder of breathing during sleep, characterized by prolonged upper airway obstruction, or intermittent partial/complete obstruction causing obstructive hypopnea or apnea, or both prolonged and intermittent obstruction that disrupts normal ventilation during sleep or disrupts sleep patterns or both. (1)

In children, apnea is defined as a cessation of airflow over two or more respiratory cycles. Hypopnea is a reduction in airflow of at least 30%, with or without arousal from sleep and/ or oxygen desaturation of 3-4 %.[1]

SDB occur in all age groups from the neonate to adolescents and adults. SDB in neonates is not covered in this article. UARS causes obstructed breathing during sleep without either apnea/hypopnea or the metabolic changes seen with OSA and causes sleep fragmentation and excessive daytime sleepiness. The plethora of neurocognitive deficits, cardiovascular morbidities and metabolic changes, which occurs as a result of OSA, constitutes OSA Syndrome. Table 1.[2]

3-12% of healthy pediatric population has habitual snoring. About 2-3% has OSA. Habitual snorers do not have hypopnea/apnea, respiratory-effort related sleep arousal, or abnormal gas exchange and this is thought to be due to adequate neuromuscular compensation. OSA occurs in all age groups, but peaks at 2-8 years due to prominent growth of lymphoid tissue around the upper airway at this age. Later

onset of symptoms in prepubertal children and adolescents is usually associated with obesity. OSA may also occur in children with craniofacial anomalies affecting upper airway structures and in neurological disorders affecting upper airway neuromotor tone.

RISK FACTORS FOR OSA

Anatomic

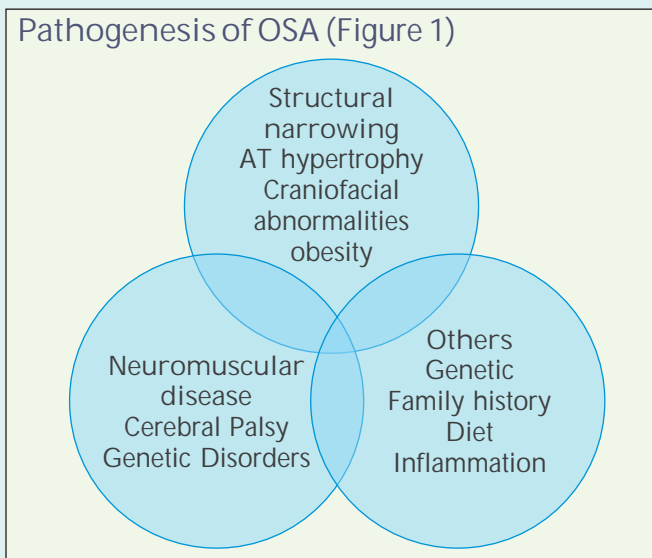
1. Adenotonsillar hypertrophy
2. Allergic rhinitis, sinusitis
3. Asthma
4. U Airway obstruction eg: polyp, tumor, deviated septum
5. Macroglossia
6. Chronic upper/lower airway infections
7. Obesity
8. Hypothyroidism
9. Cleft palate after surgical repair

Functional

1. Family h/o OSA
2. Premature birth
3. Neuromuscular disorders eg, cerebral palsy, muscle dystrophies, myelomeningocele
4. Achondroplasia
5. Mucopolysaccharidosis

Genetic syndromes with craniofacial anomalies

1. Down's Syndrome
2. Pierre Robin Syndrome
3. Crouzon Syndrome
4. Apert Syndrome
5. Goldenhar Syndrome



The pathogenesis of the disorder is interplay of

(a) anatomic factors causing narrowing of upper airway, (b) hypotonia of the upper airway muscles especially of the pharyngeal dilator, leading to easy airway collapsibility and obstruction during sleep and (c) increased local (adenotonsillar) and systemic inflammation.

Figure1.[3] The resulting airway narrowing, due to the Venturi effect, causes faster airflow with lesser pressure exerted by the air column on the lateral walls, predisposing to collapse of the airway.[4] Episodic and prolonged hypoxia and hypercapnia causes sympathetic activation resulting in hypertension, cardiovascular morbidity and insulin resistance.[5,6,7,8] OSA interacts with environmental factors - nutrition, passive/active smoking, physical inactivity, frequent respiratory infections and reduced intellectual activity- and genetic factors in the form of presence of an allelic variant of the gene encoding apolipoprotein E, which increases individual susceptibility to inflammation and oxidative stress. Children with OSA have elevated levels of cysteinyl leukotrienes and CRP.[6] This interaction increases the risk of end organ morbidity associated with the disease, causing OSA Syndrome. However, the CV and metabolic risks of OSAS can be reversed significantly by treating the airway obstruction independent of the other risk factors.[9]

Snoring is the hallmark of OSA. However, only 10-30% of snoring children have OSA, typically with intermittent pauses, snorts or gasps. On the

basis of differences in pathophysiology and symptomatology of OSA in non-obese children (due to adenotonsillar hypertrophy), and obese children (due to fat deposits in the upper airway structures), two distinct varieties of OSA are identified. Capdevila et al have proposed these two varieties be called Type I and Type II respectively and possibly a Type III including OSA associated with various craniofacial and neuromuscular disorders.[10] This classification is useful in comparing the pathophysiology, clinical, biochemical, prognostic and diagnostic features of the two varieties, as also the risk of complications.

Common features in clinical presentation of OSA Types I and II:

- Habitual snoring (at least 3 nights/wk.)
- Agitated sleep with frequent awakenings
- Diaphoresis
- Parasomnias (Night terrors, nightmares and sleep walking)
- Bedwetting
- Breathing pauses reported by parents
- Nasal speech pattern and stuffy nose
- Mouth breathing and limited nasal airflow

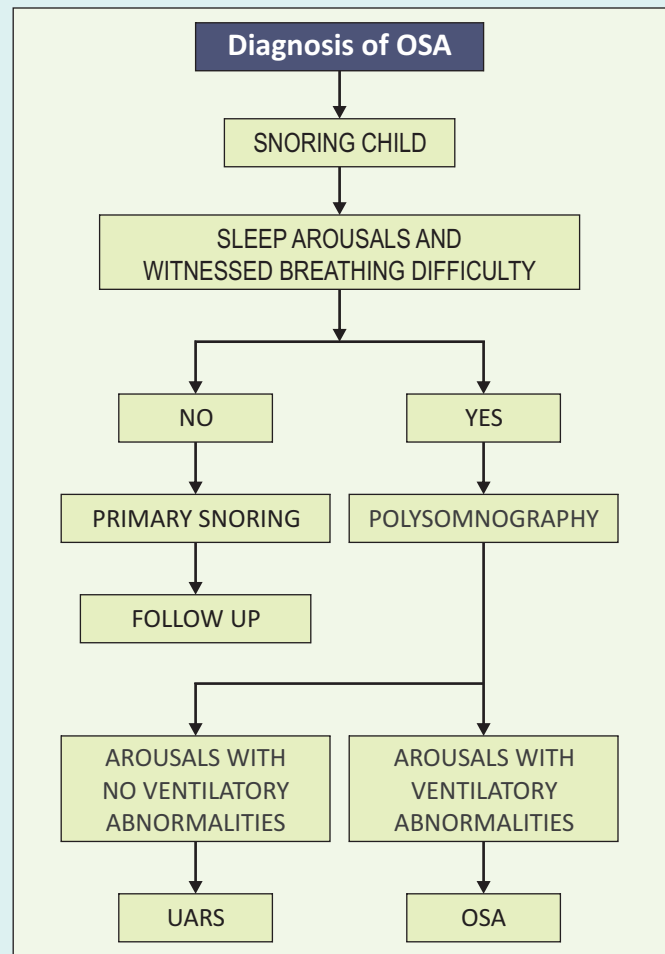
Specific features of Type I and II which distinguish the two:

Symptoms	OSA Type I	OSA Type II
Daytime sleepiness	+	++++
Hyperactive behavior	++++	+/-
Attention problems	++++	+++
Truncal obesity	- or +	+++
Enlarged tonsils/adenoids	++++	++
^^ neck circumference	- or +	+++
Recurrent otitis media	+++	+
Depression/low self esteem	+	+++
Shyness & social withdrawal	+	+++
Systemic Hypertension	+	++++
Insulin Resistance	-	++++
Serum lipid abnormalities	+	++++
Elevated C - reactive protein	++	++++
Elevated liver enzymes	--	++

Apart from snoring seen in all children with OSA, symptoms seen in toddlers are witnessed apnea, restless sleep, daytime hyperactivity and irritability. School age children, in addition to snoring may have frog-like position while sleeping, morning sleepiness, early morning headaches, symptoms consistent with ADHD, learning difficulties due to impaired concentration and short term memory, enuresis, dental malocclusion and mouth breathing. Older children show internalizing symptoms such as depression & anxiety, poor quality of physical, emotional and social life and day time somnolence.

Table1. Consequences of OSA in children

Behavioral:
Hyperactivity
Aggression
Psychosocial difficulties
Nocturnal enuresis
Psychiatric:
Depression
Anxiety
Cognitive:
Inattentiveness
Impaired memory
Poor Scholastic performance
Cardiopulmonary:
Systemic hypertension
Impaired LV/ RV Function
Cor pulmonale (rare)
Growth & Metabolism:
Failure to thrive
Delayed physical growth
Delayed puberty
Metabolic Syndrome



Polysomnograph (PSG), requiring overnight stay in the sleep lab, is the gold standard for diagnosis of OSA. Sleep EEG for sleep arousals, electro oculogram, submental muscle EMG, ECG for heart rate, airflow at nose/mouth with a nasal pressure cannula, end tidal CO₂ capnograph or transcutaneous CO₂, pulse oximetry, inductance plethysmography which measures chest and abdominal movements, finger tonometer which checks autonomic nervous system activity and audio-video recordings of the sleeping child are the variables monitored overnight in the sleep lab.

Total number of overnight apnoeas/hypopnoeas averaged per hour of sleep is called Apnoea Hypopnoea Index (AHI). AHI of >1/hour is abnormal in children and adolescents upto 12-15 years. AHI score of 1.5, 1.5-5 and >5 are considered mild, moderate and severe OSA respectively. Corresponding adult scores are : <5 no OSA, 5-15 mild, 15-30 moderate, and >30 severe OSA and this adult scoring is valid for older adolescents too.[11]

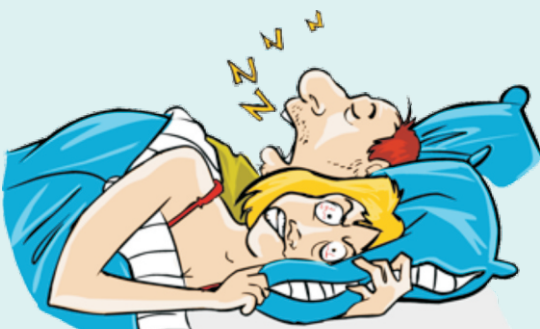
Other less accurate methods of diagnosis include [4]:

1. Overnight pulse oximetry- useful if cyclical hypoxemia is recorded, negative result needs PSG.
2. Overnight Audio Recording-significant snoring if documented, necessitates a PSG, no further workup is necessary if negative.
3. Home video recording for short period of 30 minutes during sleep is a screening tool only and needs to be substantiated with a PSG. Overnight audiovisual recording with pulse oximetry is more sensitive in diagnosis and can be carried out at home.
4. Nap Polysomnograph done during the day.

Lab tests include lateral neck x-ray for adenoid hyperplasia, hemogram for polycythemia, blood gas analysis for respiratory acidosis and metabolic alkalosis. Blood glucose & serum insulin, serum lipids, liver enzymes, ECG and Echocardiogram help in estimating end organ damage if any.

OSA can be cured in 80-85% of children by adenotonsillectomy irrespective of adenotonsillar hypertrophy and is recommended as the first line management in all children including obese ones.[12] Children undergoing surgery for OSA need to be retained overnight and monitored carefully as peri-operative complications such as difficult intubation/ extubation, bleeding, inflammatory swelling ,and pulmonary edema are known to occur. Reevaluation is done 6-8 weeks after surgery. Surgical failure is more likely in the more severe OSAS and in grossly overweight patients.

Multidisciplinary approach involving a sleep physician, ENT surgeon, pulmonologist, child nutritionist, psychologist, cardiologist and a social worker is required to counsel, treat and follow up obese children with OSAS and their families.



Nasal CPAP therapy- which delivers constant air pressure via a nasal mask during sleep- prevents collapse of the airway and improves functional residual capacity and is recommended for those with surgical contraindications, refuse surgery or have persistent OSA after adenotonsillectomy. This is a long term therapy option and needs frequent clinician assessment of compliance and efficacy.

Other recent modalities of keeping the airway patent during sleep are Variable Positive Airway Pressure or BiPAP and Automatic Positive Airway Pressure (APAP).



Adjunctive modalities include:

Medical:

1. Intranasal instillation of high potency corticosteroids. [13]
2. Avoidance of tobacco smoke, indoor pollutants and allergens, treatment of rhinitis
3. Weight control in overweight children.
4. Oral Appliances or splints while sleeping hold the lower jaw lower and forward which improves breathing.
5. Sleeping in a 30 - degree reclining position and on the side as opposed to the back.

Surgical:

1. Uvulopharyngopalatoplasty

2. Palatal implants
3. Tongue base reduction
4. Craniofacial reconstructive surgery
5. Tracheostomy in severe cases.
6. Orthodontic procedures-orthopedic mandibular advancement, rapid maxillary expansion.

In conclusion, though snoring is common in children and adolescents, not all snoring children have OSA. Chronic OSA has serious repercussions on growth, cognitive functions, CV system and metabolism. Snoring must be asked for in all children during well health visits and those with a positive history investigated. Polysomnography is the gold standard in diagnosis. Adenotonsillectomy is curative and must be offered to all patients to avoid the serious consequences of OSA. Multidisciplinary approach and CPAP during sleep is recommended in obese children who do not respond to surgery. Research is in progress in identifying biomarkers of SDB such as cytokines and urinary proteins[14], and in developing more efficient and cost effective home based tests for diagnosis of OSA.

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Review of Recent Research on Sleep and Adolescents



Insufficient sleep in adolescents was recognized as a serious health risk in 2010 in a jointly sponsored American Medical Association/ American Academy of sleep Medicine resolution[1]. Furthermore, objectives for sleep health, a new topic in Healthy People 2020, specifically include reducing adolescent sleep loss[2]. "SH-3: Increase the proportion of students in grades 9 through 12 who get sufficient sleep" (defined as 8hrs of sleep on an average school night).

Physiological patterns

- Adolescents require at least as much sleep as they did as pre adolescents (8.5 to 9.25 hrs each night)
- Adolescents' sleep patterns undergo a phase delay i.e., a tendency toward later times, for both sleeping and waking

Behavioural and psychological patterns

Many adolescents do not get enough sleep, especially during the weekdays. The National Sleep Foundation (NSF) 2006 American poll revealed that adolescents report sleeping 7.6 hrs on school nights, even though they feel that they need an average of 8.2 hrs of sleep for optimal daytime functioning [3]. Various US based and International studies revealed decreased sleep duration with increasing age among adolescents[3,4,5]. The National Sleep Foundation (NSF) 2014 poll in America found that approximately 45% of all children obtained 9hrs or more of sleep per night. When looking at sleep duration by age, shorter sleep was more common at older ages. Over half (58%) of 15-17 yr olds slept 7hrs or less per night and only 10% slept 9hrs or more[6].

Adolescents have irregular sleep patterns. They often attempt to address the accumulated weekday debt during the weekend [3, 4, 5]

Table 1: Average sleep duration in adolescents noted in various studies

Area of study	Reported average sleep duration on weekdays(hrs)	Reported average sleep duration on weekends(hrs)
Northern Taiwan[4]	7.35±1.23	9.38 ± 1.62
Germany[5]	8.04 ± 0.89	9.51 ± 1.65
India [7]	7.8	Not mentioned
US 2006 poll[3]	7.6	8.9

Factors contributing to insufficient sleep in adolescents

The combination of biologically driven processes with modern lifestyles and social obligations minimise the opportunities for adolescents to obtain adequate sleep.

1. Electronic Media Use

Adolescents today rely heavily on technology to stay connected with the world and when children have them on past bedtime, the duration and quality of their sleep appears to suffer. The concerns about media's effect on sleep in children have been an ongoing issue for more than 30 years[8]. Several studies have demonstrated that electronic exposure in the evening potentially disrupts sleep. The use of multiple electronic devices at the same time has been associated with less sleep at night and greater degree of sleepiness during the daytime[3, 8].

Media has been postulated to disrupt sleep by following mechanisms [1, 9]

- Use of media directly displaces sleep
- Light produced by electronic devices may disrupt circadian rhythm by suppressing melatonin. This may exacerbate their natural night owl tendency.

NSF 2006 poll in US showed that 97% of adolescents had at least one electronic device in their bedroom [3]. NSF 2014 poll showed that presence of electronics in the bedroom is related to child's age. Older children had more electronic devices. The median number of electronic devices kept were: 1 device (ages 6-11yrs old); 2 devices (ages 12-14 years old); 3 devices (ages 15-17years old)[6]

Table 2: Electronic Devices Kept in Bedroom

Research Study	Music device	TV	Video game console	Computer	Cell phone
NSF 2006 poll[3]	90%	57%	43%	28%	42%
Philadelphia [8]	79%	66%	-	30%	90%
NSF 2014 poll[6]	40%	45%	25%	21%	30%

One study from Philadelphia suburb showed that among adolescents aged 12 to 18 years, 82% watched television and 55% used their computers after 9pm. Other night time activities included watching DVDs, cell phone use and playing video/computer games [8]

2. School start times

The early start times seen in many school systems directly conflict with teenagers' internal biologic rhythm and adversely contribute to the trend towards significant sleep deprivation in adolescents. Studies have reported increase in sleep duration and decreased daytime sleepiness associated with delayed school start times.[10,11,12]. In addition other positive outcomes noted were more satisfaction with sleep, improved motivation, decline in self reported depressed mood and health centre visits for fatigue related complaints[12].

3. Caffeine:

Caffeinated soda and energy drinks are a part of youth culture and can be considered the most commonly consumed psychoactive substance worldwide. Current research has raised important questions regarding the complex interrelationship between caffeine use and sleep patterns in adolescents [13, 14, 15]. Caffeine is an adenosine (key component of homeostatic sleep regulation) antagonist that blocks and counteracts adenosine activity and leads to the release of dopamine, activation of CNS and increased wakefulness [16]. High caffeine intake is associated with shorter sleep duration, increased sleep onset latency and increased daytime sleepiness [13,14,17]. Moreover, it also reduces the percentage of time spent in slow wave/deep sleep in a dose related manner and alters temporal organization of REM/NREM sleep [1,15,18]. Increased caffeine use frequently coexists with other behaviours that negatively affect sleep such as late night technology use[8].

The 2006 NSF poll in US found that those adolescents who reported drinking 2 or more caffeinated beverages per day were more likely to get insufficient sleep on school nights compared with those who drank 1 cup or less[3].



Consequences of Insufficient sleep

The causes and consequences of chronic sleep loss in adolescents are often intertwined in complex ways, further exacerbating the situation. Multiple adverse outcomes have been associated with sleep deprivation in adolescents.

Table 3: Consequences of Inadequate Sleep in Adolescents

<p>Poor School Performance [11,19]</p> <ul style="list-style-type: none"> • May Impair cognitive functions such as memory and attention • Mood disturbances like impulsivity and depression further worsen academic performance • Impairment in executive function(working memory,organisation,time management) • Deficits in abstract thinking, verbal activity • Poor school attendance
<p>Negative Moods</p> <ul style="list-style-type: none"> • Anger, sadness, fear, difficulty in controlling emotions and behavioural disturbances • Increased vulnerability to stress
<p>Mood disturbances and depression</p> <ul style="list-style-type: none"> • Sleep debt in college students has been shown to be associated with a higher risk of reporting depressive symptoms[20] • Reduced quantity of sleep increases risk for major depression ,which in turn increases risk for decreased sleep[21]
<p>Suicidal Ideation</p> <ul style="list-style-type: none"> • Higher incidence of suicidal ideation noted in adolescents who are sleep deprived[R22,23,24]
<p>Increases likelihood of stimulant use</p>
<p>Increased rate of motor vehicle crashes (drowsy driving)</p>
<p>Obesity</p> <ul style="list-style-type: none"> • Several mechanisms implicated which include alteration in metabolic profiles(insulin, ghrelin, leptin, cortisol), increased sympathetic nervous system activity, increased hunger and decreased satiety[25,26,27] • Evidence of a "dose response" inverse relationship between sleep and weight with odds ratio of overweight increasing with decreasing sleep duration[28] • Relation between short sleep duration and obesity is further complicated by presence of Obstructive Sleep Apnea.

What can be done?

The insufficient and erratic sleep pattern among adolescents and the accompanying negative effects on health and well being highlight the importance of potentially modifiable factors.

1. Influencing physiological sleep patterns

Education of adolescents and families regarding the significance of sleep, optimal sleep duration needed and healthy sleep habits should be an important part of anticipatory guidance and well child care.

2. Health care professionals

Health care professionals should be aware of adolescent sleep needs. They should educate parents, teenagers and educators about the biologic and environmental factors that contribute to sleep deprivation in adolescents. Risks of chronic sleep deprivation should be highlighted. Educational efforts should emphasize the importance of behaviour change and the personal responsibility that families and students themselves have in modifying their sleep habits.

3. Parental involvement

NSF 2014 US poll showed that children of parents who had rules enforcing their child's bedtime slept an average of 1.1 hr longer than children of parents who did not have these rules. Paediatrician should endorse parental involvement in setting bedtime and in supervising sleep practices like social networking and electronic media use in bedroom. Adolescent should be regularly queried regarding sleep duration and patterns.

4. Creating sleep friendly schools

Educate teachers and school personnel regarding adolescent sleep needs and patterns and also symptoms of sleep loss. Healthcare providers should provide evidence based rationale to school boards about the benefits of instituting a delay in school start times as a highly effective countermeasure to adolescent sleep deprivation.

5. Limitation of the availability of caffeine to teenagers should be considered.

Conclusion

Although there is evidence that many adolescents may have sleep needs that exceed the recommended 8 to 9 hrs each night, they have been shown to receive less sleep. Aspects of adolescent lifestyle, such as early school starts, academic pressure, stress, anxiety and social pursuits can interact and lead to irregular sleep patterns. Shortened sleep duration has been found to be associated with poor school performance, mood disorders and obesity. Paediatricians and adolescent physicians can play an important role in educating teenagers, parents and teachers to reduce sleep deprivation and the associated negative consequences on health and wellbeing of adolescents.

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NATIONAL CONFERENCE OF ADOLESCENT HEALTH ACADEMY KARNATAKA ADOLESCON 2015



Organized by
Dept. of Pediatrics, AJ Institute of Medical Sciences, Mangalore, Karnataka
Adolescent Health Academy, IAP DK Branch

A BRIEF REPORT

PRE-CONFERENCE WORKSHOP

Workshop on	Adolescent Endocrinology
Date	14th August 2015
Venue	Conference Hall, Father Muller Medical College, Mangalore
Timing	10.00 am to 5.00 pm
Participants	80 delegates participated actively in the highly interactive sessions conducted by the learned faculty namely Dr. Anurag Bajpai, Dr. Vaman Khadilkar, Dr. Yuthika Bajpai and Dr. Anjana Hulse

SCHOOL HEALTH PROGRAMME & YUVA MELA

School health programme focusing on Life Skill Education, Family Life Education and Parenting was organized at Lourdes Central School, Mangalore and Vivekananda School, Puttur on 13.08.2015.

1000 students and 200 parents participated at Puttur. Dr JS Tuteja, Dr Sulekha Vardaraj, Dr Anuradha HS, Dr Nilima Rao, Dr Ashoo Arora and Dr Rekha Hariram were the faculty. The program was highly appreciated by all attendees.

380 students of Lourdes Central School participated enthusiastically in the programme. Workshop objective and faculty were introduced by Dr Amitha Rao Aroor. Dr Preeti Galagali, Dr Amita Rao, Dr Geeta Patil, Dr Shubha Badami, Dr Sushma Kirtani, Dr Somashekar and Dr Newton Luiz were the impressive faculty.

Life skill sessions were followed by Youth Exhibition. The local faculty trained 20 students of class IX and class X as peer educators for various stations on the following topics:

1. Study skills
2. Impact of media
3. Self defense
4. Personal hygiene
5. Mental health
6. Substance abuse
7. Nutrition

Posters on these topics were displayed and supervised by various faculties.

Parental sessions on adolescent parenting were conducted. Post lunch, students were divided into 2 groups- boys and girls in two different halls. Boys were addressed by Dr. Newton Luiz and Dr. Somashekar. Girls were addressed by Dr. Preeti Galagali and Dr. Geeta Patil. Questions from students were answered during this session. This session was very much appreciated by students.

MAIN CONFERENCE

15th National conference of Adolescent Health Academy, ADOLESCON 2015 was held in the auditorium at AJ Institute of Medical Sciences on 15th and 16th August 2015 with the theme of "ADOLESCENTS IN OFFICE PRACTICE".

The conference started on a highly patriotic note on 15 August with flag hoisting and Independence day speech by Dr. J.S. Tuteja. The program was attended by 50 conference delegates. Inauguration function took place on 15th August 2015. The Chief guest for the occasion was Dr. M.K.C. Nair, Vice Chancellor, Kerala University of Health Sciences, Thrissur. The guest of Honor was Shri A.J. Shetty, President, Laxmi Memorial Educational Trust, Mangalore. Dr. J.S. Tuteja gave the presidential address and Dr. Preeti Galagali, Secretary AHA, presented the Secretary's report. Dr. Pavan Hegde, Organising Chairman, welcomed the audience. Dr. Tuteja, Chairperson AHA, was felicitated by Dr. M.K.C. Nair, Shri A.J. Shetty and Dr. Pavan Hegde. This was followed by the release of souvenir by Shri A.J. Shetty. Two best branch awards were presented to Surat and Chennai. Vote of thanks was proposed by Dr. Aswathy Rajan, Organising Secretary.

Around 300 delegates participated in the conference from all over India. All the sessions were well attended and appreciated by all the participants. On the second day, 16.08.2015, Dr. Swathi Bhave, Dr. M.K.C. Nair, Adolescent Health Academy Oration was delivered by Dr. C.P. Bansal. The oration was applauded and appreciated by one and all.

Amongst the 27 research papers, 5 were selected for awards and 5 for free paper category. Poster presentation included 12 posters.

AWARDS

1. More Than 35yrs: **Name:** Dr. Chandrika Rao
 Topic: Correlation Of Lung Function And Abdominal Obesity In Adolescents With Emphasis On Asthamatic Children.
2. Less Than 35 Years: **Name:** Dr. Divyashree
 Topic: Retrospective Hospital Based Study On Cholelithiasis.
3. Best Oral Presentation Under Free Paper Category:
 Name: Dr. Asha Hegde
 Title: "listen To Us"-adolescent Perceptions Regarding Mental And Reproductive Healthcare Services On Coastal Karnataka.
4. Posters: 1. **Name:** Drsuraj Upadhya
 Topic: Thyroid Function In Chronically Transfused Children In The Second Decade Of Life With Beta Thalassemia.
 2. **Name:** Dr. Kallol Roy
 Topic: Who To Discuss With About Our Reproductive Health? a Qualitative Study To Address The Unmet Needs Of Adolescent Boys.



NATIONAL CONFERENCE OF ADOLESCENT HEALTH ACADEMY

PUNJAB ADOLESCON 2014

Organized by

Dept. of Pediatrics, Dayanand Medical College and Hospital, Ludhiana, Punjab
Adolescent Health Academy & IAP, Punjab



A BRIEF REPORT

PRE-CONFERENCE WORKSHOP

A. **Workshop on** ADOLESCENT HEALTH ISSUES (For Post Graduates and Pediatricians)

Date Friday, 14th November 2014

Venue Seminar Room, Department of Pediatrics, Dayanand Medical College and Hospital, Ludhiana, Punjab.

Timing 02.30 – 05.00 P.M.

Participants 40 (postgraduate students, pediatricians and nursing tutors)

Workshop Details

02:30 - 02:40 p.m.	Introduction	Dr. A.S. Chawla
02:40 - 03:30 p.m.	Approach to an Adolescent	Dr. Preeti Galagali
03:30 - 04:00 p.m.	Adolescent Mental Health Issues	Dr. J.S. Tuteja
04:00 - 04:30 p.m.	Role of Parents in Prevention of Adolescent High Risk Behaviors	Dr. Atul Kanikar
04:30 - 05:00 p.m.	Feedback and Questions by Participants	

B. **Workshop on** ADOLESCENT EDUCATIONAL PROGRAM FOR TEENAGERS

An adolescent education program for teenagers was organized at Guru Nanak Public School, Ludhiana.

Part I: 12th November 2014

The Ludhiana faculty trained 35 students of class XI & XII of Guru Nanak Public School as on the following topics.

- Dr. Harmesh.S. Bains - Parenting
- Dr. A.S. Chawla - Impact of media
- Dr. R.S. Sibia - Study skill
- Dr. G.S. Dhooria - Mental Health issue
- Dr. S.S. Luthra - Nutrition
- Dr. Gurmeet Kaur - Personal Hygiene
- Dr. Deepika Khosla - Problems of girls

Part II: 14th November 2014

650 students from ten leading high schools of city gathered at Guru Nanak Public School. Workshop aim was introduced by Dr. Atul Kanikar, Dr. Preeti Galagali delivered talk on

approach to an Adolescent. Dr.J.S.Tuteja – talked about Adolescent mental health issue.

It was followed by Role play by students, where they showed sacrifice of Martyrs Shaheed Bhagat Singh and his colleagues and how our present young generation is ruining their life with drugs. This was greatly appreciated by students and faculty.

80 posters on different topics like role of media, life skill education etc. were displayed in a hall students who had been trained on 12th explained about these to other students, while Adolescent experts supervised this activity.

Later after a short refreshment break, students were divided into two groups – Boys & Girls went into separate halls.

Boys were addressed by Dr. Atul Kanikar and girls by Dr. Preeti Galagali. Students had lots of questions which were collected on slips of paper and were answered by the experts including Dr. Sangita Yadav. This interactive session was greatly appreciated by students. Students and teachers had expressed desire to have more such sessions in future.

MAIN CONFERENCE

National conference of Adolescent Health academy, ADOLESCON 2014 was held in Ludhiana at Dumra Auditorium, Dayanand Medical College & Hospital on 14-16th Nov. 2014. The inaugural function was held at Hotel Aveda. The chief guest for the occasion was Dr SS Gill, Vice Chancellor of Baba Farid University of Health Sciences, Punjab and the guest of honour was Dr Karanjeet Singh, Director Health and Family Welfare, Punjab. Dr j.s.Tuteja gave the presidential address and Dr Preeti Galagali presented the secretary's report. Dr A.S Chawla welcomed the audience and Dr Harmesh S.Bains proposed the vote of thanks. The inaugural function was followed by a beautiful cultural program.

Around 350 delegates participated in the conference from all over India. All the sessions were well attended and appreciated by the participants. Two pre conference workshops for teenagers and post graduate students & Pediatricians were held on 14th Nov. 2014.

A record number of research papers i.e. 33 were received for presentation during the conference this included 4 award papers >35 years category and 7 award papers < 35 years category, 3 oral papers and 19 posters.

Organizing committee is thankful to the office bearers of AHA for giving this opportunity to organize this esteemed scientific meeting.

AWARDS

1. More than 35 years:
 - Name: Dr.Latika Bhalla
 - Topic: Pattern of adolescents aggressive behavior, beliefs and attitudes towards violence in school children. a threat to peers.
 - Name: Dr. S.Manchanda
 - Topic: Comparison of aggression in school children of two schools from New Delhi.
2. Less than 35 years
 - Name: Ms. Prabhjot Saini
 - Topic: Awareness regarding menstrual cycle and contraceptives among adolescent girls.

Name: Manjit Sidhu

Topic: Gender differences in adolescent temperaments and its relationship to psychosocial functioning.

Name: Dr. Gourav

Topic: Study of body image among the adolescent age group and its correlation with body mass index.

3. Posters

Name: Dr. Aswini

Topic: Practice of menstrual hygiene among adolescent girls.

Name: Ms. Rupinder Deol and Ms. Richa Talwar.

Topic: Influence of parenting styles on the self esteem among adolescent girls.

Name: Dr. Dinesh

Topic: Assessment of health related quality of life in adolescents.



NATIONAL CONFERENCE OF ADOLESCENT HEALTH ACADEMY

KERALA ADOLESCON 2015

Organized by
Adolescent Health Academy (AHA), IAP, Kerala



A BRIEF REPORT

The conference started at 9 am on 10 October 2015. There was good attendance with 69 delegates and around 30 accompanying delegates. The first talk was by Dr. P. Ashok Kumar, Secretary, AHA and the topic was 'Adolescent Nutrition-Food for thought' and the next talk was by Dr. Krishna Kumar. P, Additional Professor of Pediatrics, on the topic 'Adolescent Brain – A work in Progress'. This was followed by the talk 'Antioxidants-Something new, something not very new' by Dr. Riyaz, Professor and H.O.D of Pediatrics, GMC, Kozhikode. The next talk was delivered by Dr. M.N. Venkiteswaran, President AHA and the topic was 'Influence of Media on Adolescence', followed by the talk on 'Dermatological Concerns in Adolescence' by Dr. Najeeba Riyaz, Professor and H.O.D of Dermatology, GMC, Kozhikode.



The Inaugural Function was presided by the President of AHA, Dr. M.N. Venkiteswaran. Welcome Address was by Dr. P.M. Saleem, Organizing Secretary & President IAP Vadakara. After the Message by the Organizing Chairman, Dr. M. Muraleedharan and the Presidential Address by Dr. M.N. Venkiteswaran, the inauguration was done by the Respected Vadakara M.L.A, Shri C.K. Nanu by lighting the lamp. He gave a short and thought provoking speech urging the doctors to educate the public and be socially committed. The Chief Guest Dr. M.K.C. Nair, Vice Chancellor of KUHS was adorned a 'Ponnada' by the MLA as a token of appreciation by IAP Vadakara. Dr. M.K.C. Nair gave an inspiring discourse on managing the Teens as the Keynote Address. State Secretary of IAP Kerala, Dr. Shimmy Paulose delivered the Message from the state. Felicitations were done by Dr. P. Ashok Kumar (Secretary AHA) M.K. Santhosh (Past National Executive Member, IAP Kerala) and Dr. Sr. Betty (President, IAP Wayanad). Vote of Thanks was proposed by Dr. Jidesh Kumar (Secretary, IAP Vadakara)

After the Inauguration, the prestigious Dr. M.K.C. Nair Award oration was delivered by Dr. Beena Johnson, Consultant in Child & Adolescence Guidance. The talk was on 'Incredible Power of Emotional Intelligence'. It was an excellent talk and was well appreciated. This was followed by Lunch.

The post lunch session started with a talk on 'Adolescent Vaccination' by Dr. Geetha Govindaraj, Additional Professor of Pediatrics, GMC, Kozhikode and the last talk was by Dr. Sachith. D, Consultant in Learning Disabilities and he spoke on 'Learning Disorders in Children'.

The conference then concluded at 4 pm with a short Valedictory function.

The Conference as a whole was a grand success with a near capacity crowd at the IMA Hall and the topics also were very interesting and the speakers also did a good job keeping the audience very attentive throughout.

