

Sleep and Sleep Disorders in Children-The Road Ahead

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The surge in the number of publications in recent years addressing the sleep related issues in children, has added immensely to our understanding of sleep in this segment of the population. However, the challenges still remain. Foremost amongst them is the need of a reference data addressing normal variations of optimum sleep at different developmental stages in childhood.

We know that 'childhood' is a spectrum rather than a singular entity and as such it is not enough to separate it from 'adolescents' and 'adults'. The terms 'infancy' (1-12 months) and 'neonate' (0-30 days) is used to further subdivide the group based on rapid developmental changes that occurs in these age-groups. But 'infancy' itself is wrought with the physical, cognitive and emotional developmental changes at a pace so rapid that it is never repeated in the entire life of an individual. Imagine tripling your own weight in 12 months and adding 75% of neural networks to your current brain repertoire in three years and these are merely the measurable changes.

It will take an immense effort to establish normative data and cut-offs on sleep requirements in childhood due to the enormous variations in normal sleep habits within the rapidly changing childhood developmental stages. Several researchers have shed some light in this neglected area, though mainly concentrating on adolescents [1-5]. A population based longitudinal birth cohort study from the United Kingdom showed considerably wide variation in sleep duration in the first 10 years of life, beginning from 10 to 17 hours in early infancy and narrowing to 8.5 to 11 hours at 11 years. Half of the children at preschool age woke at least once during the night, but frequent waking (> 3 times) peaked in infancy (10% of all infants) and steadily declined in the preschool-aged years and gender difference was also found [6]. The study underscores the difficulties in providing reference data on sleep duration throughout childhood and this was a demographically distinct and ethnically homogeneous population to begin with. Considerable individual variability has to be considered in forwarding any recommendations on normal sleep requirements in children.

Add to these challenges, the racial and ethnic differences in the prevalence of sleep disordered breathing and snoring [7], burden of rising obesity in children [8] and associated sleep apnea [9], the increasing use of technology at unprecedented levels [10,11], easy and unregulated access to caffeinated beverages and commercial energy drinks [12] and finally the stress of academic performance.

A matter of profound significance that separates the childhood sleep disorders from the adult world is the impact of sleep on a child's growth [13], behavior [14], school readiness [15], attention [16], concentration and academic performance [17]. Sleep affects learning through several pathways including memory consolidation and retention [18,19] as well as the visual and auditory processing [19], the mechanisms of which need further elucidation.

An area of study that could benefit from concentrated efforts is the ready availability of child-friendly investigative techniques to diagnose sleep disorders in children. Polysomnography is a gold standard but it needs to be standardized for pediatrics along with other sleep measurement methodologies [20].

The investigations for the sleep disorders in children rely heavily on parent reporting questionnaires and there is a paucity of those that could be used across the wide spectrum of childhood developmental stages. A psychometrically validated questionnaire is available for use in school age children between 5 and 10 years of age that provides a robust set of sleep

problem sub-scales which can be used for assessment of sleep concerns in a community sample as well as provide for optimal analysis of associations with other measures of childhood daytime functioning such as neuro cognition and behavior [21]. This questionnaire had combined several key elements from other validated questionnaires being used in children to diagnose sleep disorders [22,23] and added new ones. Unfortunately it still leaves out highly variable segments in childhood which are 0-5 years and adolescent years. We need more studies in finding the reference data in normal childhood sleep variations and psychometrically validated questionnaires to study sleep disorders in children in those segments as well. The matter is urgent especially considering that sleep related problems are present in up to 40% of children [24] and sleep disordered breathing has a prevalence of 1-4 % in school going children [25]. Many of these sleep disorders upon correction significantly improve children's learning, academic performance, growth and behavior [15,26]. The development of evidence-based clinical guidelines, specially to deal with disorders that lack a consensus, such as, obstructive sleep apneas [27] is a priority. Making public policy changes and creating public awareness in pediatric sleep medicine within the broader framework of sleep medicine is dependent on the thrust and direction of sleep research. The time has come to step confidently on the road ahead.

References

1. Yang CK, Kim JK, Patel SR, Lee JH (2005) Age-related changes in sleep/wake patterns among Korean teenagers. *Pediatrics* 115: 250-256.
2. Colrain IM, Baker FC (2011) Changes in sleep as a function of adolescent development. *Neuropsychol Rev* 21: 5-21.
3. Tarokh L, Raffray T, Van Reen E, Carskadon MA (2010) Physiology of normal sleep in adolescents. *Adolesc Med State Art Rev* 21: 401-417.
4. Wolfson AR, Carskadon MA (2003) Understanding adolescents' sleep patterns and school performance: a critical appraisal. *Sleep Med Rev* 7: 491-506.
5. Wolfson AR, Carskadon MA (1998) Sleep schedules and daytime functioning in adolescents. *Child Dev* 69: 875-887.
6. Blair PS, Humphreys JS, Gringras P, Taheri S, Scott N, et al. (2012) Childhood sleep duration and associated demographic characteristics in an english cohort. *Sleep* 35: 353-360.
7. Goldstein NA, Abramowitz T, Weedon J, Koliskor B, Turner S, et al. (2011) Racial/ethnic differences in the prevalence of snoring and sleep disordered breathing in young children. *J Clin Sleep Med* 7: 163-171.
8. Verhulst SL, Van Gaal L, De Backer W, Desager K (2008) The prevalence, anatomical correlates and treatment of sleep-disordered breathing in obese children and adolescents. *Sleep Med Rev* 12: 339-346.
9. Spruyt K, Gozal D (2012) A mediation model linking body weight, cognition, and sleep-disordered breathing. *Am J Respir Crit Care Med* 185: 199-205.
10. Van den Bulck J (2004) Television viewing, computer game playing, and Internet

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- use and self-reported time to bed and time out of bed in secondary-school children. *Sleep* 27: 101-104.
11. Munezawa T, Kaneita Y, Osaki Y, Kanda H, Minowa M, et al. (2011) The association between use of mobile phones after lights out and sleep disturbances among Japanese adolescents: a nationwide cross-sectional survey. *Sleep* 34: 1013-1020.
 12. Calamaro CJ, Mason TBA, Ratcliffe SJ (2009) Adolescents living the 24/7 lifestyle: effects of caffeine and technology on sleep duration and daytime functioning. *Pediatrics* 123: 1005-1010.
 13. Bonuck K, Parikh S, Bassila M (2006) Growth failure and sleep disordered breathing: a review of the literature. *Int J Pediatr Otorhinolaryngol* 70: 769-778.
 14. Carvalho Bos S, Gomes A, Clemente V, Marques M, Pereira AT, et al. (2009) Sleep and behavioral/emotional problems in children: a population-based study. *Sleep Med* 10: 66-74.
 15. Quach J, Hiscock H, Ukoumunne OC, Wake M (2011) A brief sleep intervention improves outcomes in the school entry year: a randomized controlled trial. *Pediatrics* 128: 692-701.
 16. Shur-Fen Gau S (2006) Prevalence of sleep problems and their association with inattention/hyperactivity among children aged 6-15 in Taiwan. *J Sleep Res* 15: 403-414.
 17. Gruber R, Wiebe ST, Wells SA, Cassoff J, Monson E (2010) Sleep and academic success: mechanisms, empirical evidence, and interventional strategies. *Adolesc Med State Art Rev* 21: 522-541.
 18. Matarazzo L, Frankó E, Maquet P, Vogels R (2008) Offline processing of memories induced by perceptual visual learning during subsequent wakefulness and sleep: A behavioral study. *J Vis* 8: 7.1-9.
 19. Key APF, Molfese DL, O'Brien L, Gozal D (2009) Sleep-disordered breathing affects auditory processing in 5-7-year-old children: evidence from brain recordings. *Dev Neuropsychol* 34: 615-628.
 20. Owens JA, Mindell JA (2006) Pediatric sleep medicine: priorities for research, patient care, policy and education. *J Clin Sleep Med* 2: 77-88.
 21. Biggs SN, Kennedy JD, Martin AJ, van den Heuvel CJ, Lushington K Psychometric properties of an omnibus sleep problems questionnaire for school-aged children. *Sleep Medicine*.
 22. Chervin, Hedger K, Dillon JE, Pituch KJ (2000) Pediatric sleep questionnaire (PSQ): validity and reliability of scales for sleep-disordered breathing, snoring, sleepiness, and behavioral problems. *Sleep Med* 1: 21-32.
 23. Owens JA, Spirito A, McGuinn M (2000) The Children's Sleep Habits Questionnaire (CSHQ): psychometric properties of a survey instrument for school-aged children. *Sleep* 23: 1043-1051.
 24. Mindell JA, Meltzer LJ (2008) Behavioural sleep disorders in children and adolescents. *Ann Acad Med Singapore* 37: 722-728.
 25. Sinha D, Guilleminault C (2010) Sleep disordered breathing in children. *Indian J. Med. Res* 131: 311-320.
 26. Huang YS, Guilleminault C, Li HY, Yang CM, Wu YY, et al. (2007) Attention-deficit/hyperactivity disorder with obstructive sleep apnea: a treatment outcome study. *Sleep Med* 8:18-30.
 27. Kaditis A, Kheirandish-Gozal L, Gozal D (2012) Algorithm for the diagnosis and treatment of pediatric OSA: A proposal of two pediatric sleep centers. *Sleep Med* 13: 217-227.