

Screening for Sleep Disorders among Obese Adolescents Using the BEARS Screening Tool: A Prospective Observational Study**B. N. Siddu¹, Charitha R.²**¹Assistant Professor, Department of Paediatrics, Sri Chamundeshwari Medical College Hospital and Research Institute, Karnataka, India²Senior Resident, Department of Paediatrics, Sri Chamundeshwari Medical College Hospital and Research Institute, Karnataka, India

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Abstract**Background:** Obesity is a growing public health concern in India. It has various risk factors ranging from genetics to lifestyle. Obesity increases risk of cardio-metabolic diseases, apart from it sleep related disorders can't be ignored. Sleep disorders is one common risk factor as well as consequence of obesity with bidirectional relationship.**Objectives:** To screen obese adolescents for prevalence of sleep disorders using the BEARS screening tool.**Methods:** This is a prospective observational study where adolescents presenting to paediatric OPD at a tertiary care teaching hospital were screened for obesity. BMI >27th adult equivalent as per IAP growth charts was considered obese. Adolescents with obesity were screened for sleep disorders using the BEARS tool after obtaining informed consent and results were analysed.**Results:** Total 260 obese adolescents were screened for sleep disorders. There were higher proportion of mid adolescents (48.84%), predominantly males (60%), nearly equal proportion from urban and rural residence. 206 adolescents had sleep affected in at least one of the 5 domains of BEARS screening tool. 54 (20.77%) had no sleep related complaints. Prevalence was higher in late adolescents, male subjects, urban population, and upper lower socioeconomic class.**Conclusion:** Adolescents with obesity do suffer from sleep disorders, attributable mainly to lifestyle. The BEARS screening tool is a simple, quick tool that can be practically applied in routine paediatrics OPD for early identification.**Keywords:** Adolescents, Obesity, Sleep Disorders, BEARS Sleep Screening Tool.**DOI:** 10.25258/ijcpr.18.7.91

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Introduction

Obesity on the other spectrum of malnutrition is a raising concern in India. Meta-analysis of studies between 2003- 2023 in India showed a pooled prevalence of 8.4% for childhood obesity and 12.4% for childhood overweight. [1] In India having the world's highest adolescent population, risk factors identified are lack of physical activity, poor dietary habits, high socioeconomic status, greater screen time, poor sleep quality increasing adiposity. [2]

Obesity is associated with various adverse health outcomes like insulin resistance, metabolic syndrome, type 2 diabetes mellitus, hypertension, dyslipidaemia, depression, anxiety, musculoskeletal problems. Adolescent obesity also increases the risk of mortality due to cardiac diseases later in adulthood. [3] Obesity is known to have strong

association with sleep disorders like obstructive sleep apnoea, sleep hypoventilation syndrome leading to insomnia, mental health disturbances. [4] In this study we want to screen adolescents for sleep disorders using BEARS questionnaire which is a simple screening tool that can be easily applied in OPD.

There is no much literature from India associating sleep disorders with obesity. There is limited evidence of a valid sleep screening tool used. With high prevalence of adolescent obesity, it is need of the hour to screen for sleeping disorders using a valid tool.

Materials and Methods

Prospective observational study conducted in tertiary care hospital during June 2025 – May 2026.

Adolescents aged 10-18 years with obesity defined by BMI $>27^{\text{th}}$ Adult equivalent were included and those with chronic systemic illness, bronchial asthma on medication, intellectual disability, chronic neurological disorders, were excluded. Institutional ethical clearance was obtained. After obtaining consent and assent adolescents who were obese defined by BMI $>27^{\text{th}}$ adult equivalent were screened for sleep disorders using the BEARS screening tool.

BEARS tools is a quick user-friendly tool containing 5 domains. It can be applied from 2-12 years in primary care setting. It involves direct questions to interview the parents and adolescents.

Other parameters considered were sex, rural vs urban area of residence, socioeconomic status.

Statistical Analysis

Sample Size: Total of 260 adolescents were screened. Statistical analysis was done using SPSS version 26 software. Descriptive data was expressed as percentages and computed in tabular columns.

Results

A total of 260 adolescents among the outpatient and inpatient cases during the study period were found to be obese.

Table 1: Baseline characteristics

Parameter	Total Number n (Percentage)	BEARS screen positive (%)
Age –		
early adolescents (10-13 years)	86(33.07)	65(75.58)
Mid adolescents (14-16 years)	127(48.84)	102(80.32)
Late adolescents (17-19 years)	47(18.07)	41(87.23)
Sex - Male	156(60.0)	138(88.46)
Female	104(40.0)	70(67.30)
Place of residence- Urban	138(53.07)	116(84.05)
Rural	122(46.92)	92(75.40)
Socioeconomic status-		
Class 1- Upper	28(10.76)	24(85.71)
Class 2- Upper middle	76(29.23)	61(80.26)
Class 3- Lower middle	92(35.38)	77(83.69)
Class 4- Upper lower	33(12.69)	29(87.87)
Class 5- Lower	31(11.92)	17(54.83)
Physical activity-		
<2 hours	142(54.61)	115(80.98)
>2 hours	118(45.38)	93(78.81)

In this study we noticed mid adolescents (48.84%) constituted the largest age group followed by early (33.07%) and late adolescents (18.07%). Male subjects predominated with 60% (156) against 40% (104) of female population.

Nearly equal distribution of subjects were noted from urban and rural residence. 54.61% of the

subjects reported low physical activity. Prevalence of sleep disorder was highest in late adolescents (87.23%). Male population (88.46%), urban residents (84.05%) had higher prevalence of sleep disorders. Among socioeconomic class prevalence was least in lower class.

BEARS Screening Tool:

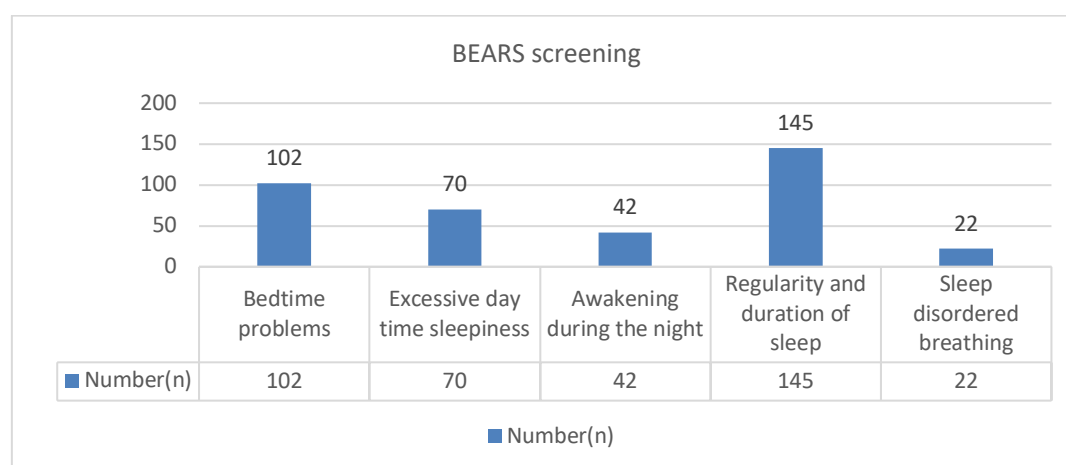


Fig 1. Distribution of sleep disorders among 5 domains of the BEARS sleep screening tool among obese adolescents.

Regularity and duration of sleep was the predominant disorder affecting 55.77% (145) of adolescents mostly attributed to increased screen time before going to bed and irregular meal time. Second highest affected domain was initiating sleep noticed in 39.23% (102) of adolescents.

Excessive day time sleepiness like feeling drowsy while travelling, dozing in classroom was noted in 26.92% (70) of subjects. Sleep disordered breathing was the least affected domain with habitual snoring being the major complaint. 54(20.77%) adolescents had none of the sleeping problems while others had one or more domain affected. To conclude nearly 4 out of 5 obese adolescents screened positive for one or more sleep related problems highlighting the burden in study population.

Discussion: Obesity is a newly arising threat to the Indian culture. Of the various risk factors and consequences of obesity, sleep disorders is a major

problem with bidirectional relation of being a risk as well as a result of obesity.

Various studies have shown this result with different scales. It was seen that sleep disorders were higher in obese and overweight children compared to normal weight using sleep disturbance scale for children (SDSC). [5] SDSC being relatively lengthy scale with many parameters might be difficult to apply in OPD due to time constraints. Much easier and quick tool like the BEARS sleep screening tool will be helpful for a quick screen.

BEARS tool contains 5 domains. It contains direct questions to be asked to parent and child, over wide age range from 2-18 years. BEARS stands as acronym for the components involved and makes it easier to remember. Though it doesn't exactly point at duration and nature of disorder, it hints and directs towards the kind of problem.

Table 2: BEARS Sleep Screening Tool

Category	Preschool (2-5 years)	School-aged (6-12 years)	Adolescent (13-18 years)
Bedtime problems	Does your child have any problems going to bed? Falling asleep?	Does your child have any problems at bedtime? (P) Do you have any problems going to bed? (C)	Do you have any problems falling asleep at bedtime? (C)
Excessive daytime sleepiness	Does your child seem over tired or sleepy a lot during the day? Does she still take Naps?	Does your child have difficulty waking in the morning, seem sleepy during the day or take naps? (P) Do you feel tired a lot? (C)	Do you feel sleepy a lot during the day? in school? while driving? (C)
Awakenings during the night	Does your child wake up a lot at night?	Does your child seem to wake up a lot at night? Any sleepwalking or nightmares? (P) Do you wake up a lot at night? Have trouble getting back to sleep? (C)	Do you wake up a lot at night? Have trouble getting back to sleep? (C)
Regularity and duration of sleep	Does your child have a regular bedtime and wake time? What are they?	What time does your child go to bed and get up on school days? weekends? Do you think s/he is getting enough sleep? (P)	What time do you usually go to bed on school nights? Weekends? How much sleep do you usually get? (C)
Sleep-disordered Breathing	Does your child snore a lot or have difficulty breathing at night?	Does your child have loud or nightly snoring or any breathing difficulties at night? (P)	Does your teenager snore loudly or nightly? (P)
Legend: B bedtime problems; E excessive daytime sleepiness; A awakenings during the night; R regularity and duration of sleep; S sleep-disordered breathing; P Parent; C Child.			

It is known that adolescents with poor sleep quality are at risk of obesity. Possible mechanism is that poor sleep affects behaviour, eating patterns and activity levels which leads to increased calorie intake and reduce physical activity increasing the risk for obesity. [6] Our study shows that reduced physical activity has sleep disorder prevalence of 80.98% which proves this association.

In a nationwide study in Israel among 1601 obese adolescents, prevalence was greater in males

(1.8/1000) compared to females (0.45/1000). [7] Our study results are consistent with this showing higher prevalence in male adolescents.

Obesity is known to cause sleep related problems which can be broadly divided into respiratory and non-respiratory. Obstructive sleep apnoea is the respiratory disorder, narcolepsy, restless leg syndrome, sleep related bruxism, insomnia, delayed sleep phase syndrome to name a few are non-respiratory sequelae. [8] With this range of

problems it is an absolute necessity to screen for the same. Current guidelines on management of adolescent obesity generally focuses on dietary modification and encourages physical activity with little or no emphasis on sleep quality. Incorporating sleep disorder screening by the clinician using a simple valid tool allows early identification and timely counselling on sleep hygiene, behavioural intervention and early referral when necessary.

Conclusion:

This study shows a positive association of obesity with sleep disorders. Nearly 4 out of 5 adolescents with obesity have at least one domain of the BEARS screening tool affected, with irregular sleep pattern and duration being affected predominantly. Further BEARS tool is a simple screening tool that can be implemented in the paediatrics OPD for quick assessment.

This facilitates early diagnosis, timely intervention and comprehensive management of obesity.

Ethical Approval: Obtained from institutional ethical committee.

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