

# Prevalence of Insomnia among Paediatric Cancer Patients: A Hospital-based Observational Study

SANJANA SHARMA<sup>1</sup>, POOJA BHARTI<sup>2</sup>, PALLAVI SHARMA<sup>3</sup>, SANJEEV KUMAR DIGRA<sup>4</sup>,  
SUNIL DUTT SHARMA<sup>5</sup>, GHANSHYAM SAINI<sup>6</sup>



## ABSTRACT

**Introduction:** Insomnia and other sleep disturbances are the common occurrences in paediatric patients suffering from cancer. These may be attributed to the disease itself or its treatment and accompanying psychosocial stress. Sleep disorders including insomnia are known to have a detrimental effect on the quality of life in these patients.

**Aim:** To estimate the prevalence of insomnia among cancer patients aged 1-15 years admitted in the paediatric oncology ward.

**Materials and Methods:** A prospective observational, hospital-based study was conducted in the Paediatric Oncology ward, Shri Maharaja Gulab Singh (SMGS) Hospital, Government Medical College (tertiary care institute), Jammu, India, from June 2022 to August 2022. A total of 50 patients, in the age group of 1-15 years, diagnosed with malignancies like leukaemia, lymphoma, aplastic anaemia, hepatoblastoma, etc., were enrolled after taking informed consent from their parents.

Insomnia Severity Index (ISI) was administered to parents of children below 10 years age and to patients themselves who were between 10-15 years to screen for symptoms of insomnia with the help of their parents/investigators as and when required. Continuous variables were expressed as mean±Standard Deviation (SD) and categorical variables were summarised as frequencies and percentages.

**Results:** The study subjects were distributed according to their age into three groups, as 1-5 years (n=26), 6-10 years (n=16), and 11-15 years (n=8). There were 24 (48%) males and 26 (52%) females. In this study, 32 (64%) study subjects did not have insomnia, 5 (10%) had subthreshold insomnia, 13 (26%) had moderate insomnia and none had severe insomnia.

**Conclusion:** The prevalence of insomnia found in the study was 26%. Insomnia is common in paediatric cancer patients necessitating its recognition and management for improved quality of life.

**Keywords:** Children, Malignancy, Oncology, Sleep

## INTRODUCTION

Sleep disturbances like insomnia, increased daytime sleepiness, increased time to sleep onset, decreased sleep duration, poor sleep quality, etc., are the common consequences of cancer and its treatment in paediatric patients [1]. Advances in the treatment of paediatric cancer have led to significant increases in long-term survival, highlighting the need to address not only survival but treatment associated morbidity and improved quality of life as well [1-3]. In paediatric patients, cancer and its treatment can result in impaired cognitive function, functional impairment, activity limitations and impaired mental health issues like pain and anxiety [1]. One of the most chronic and disturbing side-effects reported by paediatric cancer patients and survivors is problems with sleep, suggesting that this is a major quality of life concern. Surgery, chemotherapy and radiotherapy, in addition to the effect of the cancer, can all cause short-and long-term sleep disturbance [4-9]. Sleep represents a complex, multi-staged process required for survival, daily functioning, neurocognitive and physical development [10,11]. Poor sleep in the children is associated with deleterious effects on mood and neurocognition; a higher risk of clinical depression and anxiety; increased behavioural difficulties, including increased rates of hyperactivity; and less success in school. Sleep disorders are linked with pain, fatigue, and hospitalisation in paediatric cancer patients [12-15]. Thus, it is important to identify and address insomnia and other sleep disturbances in paediatric patients with cancer for their holistic management and improvement in quality of life. This study was conducted to estimate the prevalence of insomnia among cancer patients aged 1-15 years admitted in the Paediatric Oncology ward.

## MATERIALS AND METHODS

This prospective observational, hospital-based study was conducted in the Paediatric Oncology ward, Shri Maharaja Gulab Singh (SMGS) Hospital, Government Medical College, Jammu, India, from June 2022 to August 2022. Ethical clearance was obtained from the Institutional Ethics Committee (no IEC/GMCJ/2022/1069) before conducting the study.

Fifty patients, in the age group of 1-15 years, diagnosed with malignancy {leukaemia (n=30, 60%), lymphoma (n=7, 14%), aplastic anaemia (n=4, 8%), hepatoblastoma (n=3, 6%), germ cell tumour (n=2, 4%) and others (n=4, 8%)}, were enrolled after taking informed consent from their parents.

A total of 68 patients were admitted in Paediatric Oncology ward during the study period out of which 12 patients were excluded because of critical illness while parents of six patients refused to give consent to participate in the study. Remaining 50 patients were included in the study after obtaining informed consent from their parents.

**Inclusion criteria:** Patients in the age group of 1-15 years diagnosed with cancer, either on chemotherapy or admitted in the hospital for any other complications (n=50) were included in the study.

**Exclusion criteria:** Critically, ill patients admitted in Intensive Care Unit (ICU), children of parents who refused to give consent to participate in the study (n=18) were excluded from the study.

## Study Procedure

A structured questionnaire as per the Hindi version of Insomnia Severity Index (ISI) was administered and the severity of insomnia symptoms in the study participants was assessed. The Hindi

version of ISI has been found to be a valid and reliable tool for the assessment of severity of insomnia [16]. The questionnaire was administered to the parents of children below 10 years and to patients themselves who were between 10-15 years with the help of their parents/investigators as and when required. The questionnaire included seven items, which were rated on a 5-point Likert scale assessing insomnia symptoms in the last seven days. The scores ranged from 0 to 28 and clinical cut-off points were determined as:

- Score 0-7: No clinically significant insomnia;
- Score 8-14: Subthreshold insomnia;
- Score 15-21: Clinical insomnia-moderate severity; and
- Score 22-28: Clinical insomnia-severe.

All participants with a score of eight or more were classified as having insomnia symptoms. The psychometric properties of the ISI are well-established and have also been investigated in young adult cancer survivors and adolescents [17]. The socio-demographic data pertaining to the patient's age, sex, residence and final diagnosis were also recorded.

## STATISTICAL ANALYSIS

The recorded data was compiled and entered in a Microsoft Excel spreadsheet and then exported to data editor of Statistical Package for the Social Sciences (SPSS) software version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as mean±Standard Deviation (SD) and categorical variables were summarised as frequencies and percentages.

## RESULTS

In the study population, the subjects were distributed according to their age into three groups, 1-5 years (n=26), 6-10 years (n=16), and 11-15 years (n=8). There were 24 (48%) males and 26 (52%) females in the study population. Majority of the patients had leukaemia 30 (60%), followed by lymphoma seven (14%), aplastic anaemia four (8%), hepatoblastoma three (6%), germ cell tumour two (4%), others four (8%).

In this study, 32 (64%) study subjects did not have any symptoms of insomnia, while five (10%) had symptoms of sub-threshold insomnia. Thirteen (26%) subjects were observed to have moderate insomnia. Severe insomnia was not observed in any subject. Thus, the prevalence of insomnia found in this study was 26%.

In this study, in the age group of 1-5 years, only 2 (7.7%) subjects had insomnia, in 6-10 years, five (31.3%) subjects had insomnia and six (75%) subjects in the age group of 11-15 years were found to have insomnia. The prevalence of insomnia among female paediatric cancer patients was observed to be 30.8% (n=8) while it was 20.8% (n=5) in males. The prevalence of insomnia in different subgroups and gender wise distribution of insomnia in the study population is shown in [Table/Fig-1].

Sample characteristics	Total no. of patients (n=50)	No insomnia (n=32)	Subthreshold insomnia (n=5)	Moderate insomnia (n=13)	Severe insomnia (n=0)
<b>Age (in years)</b>					
1-5	26	24 (92.3%)	0 (0%)	2 (7.7%)	0
6-10	16	7 (43.7%)	4 (25%)	5 (31.3%)	0
11-15	8	1 (12.5%)	1 (12.5%)	6 (75%)	0
<b>Gender</b>					
Males	24	18 (75%)	1 (4.2%)	5 (20.8%)	0
Females	26	14 (53.8%)	4 (15.4%)	8 (30.8%)	0

[Table/Fig-1]: Sample characteristics and their prevalence of insomnia. Values are presented as n and n (%)

## DISCUSSION

Sleep disturbances especially insomnia is a common problem encountered among paediatric cancer patients. In both paediatric

cancer patients and survivors, sleep disturbances are usually severe and need treatment as they affect the quality of life in such population [18]. The onset and persistence of such sleep problems in children with cancer have been explained with many proposed models like Sleep Disturbances in Paediatric Cancer Model (SDPCM) [19]. The SDPCM proposes that psychosocial, environmental, and biological factors get affected by factors related to cancer like diagnosis and treatment (e.g., medication, radiation therapy, chemotherapy, surgery) which, in turn, lead to disrupted sleep.

Kaushik P et al., assessed sleep patterns in 63 children between age group 3-15 years undergoing therapy for cancer using Bedtime problems, Excessive daytime sleepiness, Awakenings during sleep, Regularity and duration of Sleep (BEARS) screening tool and the Children's Sleep Habits Questionnaire (CSHQ). It was found that the overall prevalence of sleep disturbances in paediatric cancer patients, based on BEARS tool and CSHQ scores was 60.3% and 69.8%, respectively as compared to 34% in normal healthy children [20].

A review by Merz EL and Madsen LT studied common sleep problems in children with cancer and suggested certain risk factors specific to childhood cancer which may contribute to disrupted sleep [10]. According to literature, most important risk factors hypothesised for sleep problems in paediatric cancer patients were disease parameters and its treatment, specific environmental conditions both during and after treatment, family factors like changes in family behaviour and norms, psychological factors and decreased physical activity [10].

Such sleep disturbances are more commonly seen in patients of the adolescent age group who usually are in knowledge of the illness and its accompanying complications and prognosis. In this study, eight out of 50 participants belonged to the age group of 11-15 years, out of which six patients (75%) were found to have symptoms of insomnia. The prevalence of insomnia in 6-10 years age group was 31.3%, while it was 7.7% in 1-5 years age group. In this study, insomnia was observed in 26% (13 out of 50) of study participants who were between 1-15 years of age. In a cross-sectional study by Peersmann SHM et al., insomnia was reported by 31.7% of patients, where the study participants belonged to the age group between 12-26 years [17]. Also, the sample size studied by Peersmann SHM et al., was 565 as compared to 50 patients enrolled in this study.

In this study, 36.6% (11 out of 30) patients with leukaemia were reported to have insomnia. In a retrospective case series review by Rosen G and Brand SR sleep problems were characterised in 70 children with cancer. Authors found that 39% of children with leukaemia had insomnia and it was the most common sleep problem identified [21].

In a literature review by Sheikh IN et al., sleep changes such as daytime sleepiness, insomnia, increased sleep onset time, and poor sleep quality, were reported to be common in paediatric cancer patients and survivors. About 40% and in some cases, greater than 80%, of children with leukaemia were reported to have some form of sleep disturbance, most prevalent of which was insomnia [1].

In this study, the prevalence of insomnia in female paediatric cancer patients was observed to be 30.8% while, it was 20.8% in male paediatric cancer patients. Peersmann SHM et al., also determined females being as a risk factor for insomnia with an explanation that they are more vulnerable to other mental health complaints, such as anxiety or depression, which often co-occur with insomnia symptoms and daytime fatigue [17].

For the management of sleep issues in the paediatric cancer population, interventions like massage and physical activity have been evaluated by some small pilot studies. However, no large randomised controlled trials have evaluated these potential interventions in paediatric cancer patients with sleep disturbances [1].

## Limitation(s)

The sample size in this study was small. The scale used for screening study subjects for symptoms of insomnia was the same for all the age groups. However, sleep requirements have been observed to be different for different age groups necessitating a much more comprehensive evaluation of sleep needs and their problems.

## CONCLUSION(S)

Insomnia and other sleep disturbances are a common occurrence in paediatric cancer patients, gravely affecting the overall quality of their lives. Owing to improved survivorship of such patients and increased concerns for better quality of life, identification and addressal of these sleep disturbances hold crucial importance in current times. More research in this field is needed to determine the burden of sleep problems in paediatric population diagnosed with malignancies. Healthcare providers need to be sensitised to common sleep problems including insomnia so that their diagnosis and management forms a part of the comprehensive care and treatment of paediatric cancer patients.

## REFERENCES

- [1] Sheikh IN, Roth M, Stavinoha PL. Prevalence of sleep disturbances in pediatric cancer patients and their diagnosis and management. *Children (Basel)*. 2021;8(12):1100.
- [2] Phillips SM, Padgett LS, Leisenring WM, Stratton KK, Bishop K, Krull KR, et al. Survivors of childhood cancer in the United States: Prevalence and burden of morbidity. *Cancer Epidemiol Biomarkers Prev*. 2015;24(4):653-63.
- [3] Rueegg CS, Michel G, Wengenroth L, Weid NX, Bergstraesser E, Kuehni CE, et al. Physical performance limitations in adolescent and adult survivors of childhood cancer and their siblings. *PLoS One*. 2012;7(10):e47944.
- [4] Clanton NR, Klosky JL, Li C, Jain N, Srivastava DK, Mulrooney D, et al. Fatigue, vitality, sleep, and neurocognitive functioning in adult survivors of childhood cancer: A report from the Childhood Cancer Survivor Study. *Cancer* 2011;117(11):2559-68.
- [5] Walter LM, Nixon GM, Davey MJ, Downie PA, Horne RSC. Sleep and fatigue in pediatric oncology: A review of the literature. *Sleep Med Rev*. 2015;24:71-82.
- [6] Kaleyias J, Manley P, Kothare SV. Sleep disorders in children with cancer. *Semin Pediatr Neurol*. 2012;19:25-34.
- [7] Zhou ES, Recklitis CJ. Insomnia in adult survivors of childhood cancer: A report from project REACH. *Support Care Cancer*. 2014;22:3061-69.
- [8] Mulrooney DA, Ness KK, Neglia JP, Whitton JA, Green DM, Zeltzer LK, et al. Fatigue and sleep disturbance in adult survivors of childhood cancer: A report from the childhood cancer survivor study (CCSS). *Sleep*. 2008;31(2):271-81.
- [9] Steur LMH, Kolk RHE, Mooij F, Vries RD, Grootenhuis MA, Kaspers GJL, et al. The prevalence and risk factors of sleep problems in pediatric oncology: Its effect on quality of life during and after cancer treatment. *Expert Rev Qual Life Cancer Care*. 2016;1(2):153-71.
- [10] Merz EL, Madsen LT. Sleep disruption in pediatric cancer survivors conceptual framework and opportunities for clinical assessment and behavioural treatment. *Am J Lifestyle Med*. 2018;12(4):311-23.
- [11] Mindell JA, Owens JA. A clinical guide to pediatric sleep: Diagnosis and management of sleep problems. 3<sup>rd</sup> ed. Wolters Kluwer Health/Lippincott Williams & Wilkins; Philadelphia, PA, USA: 2010.
- [12] Alvaro PK, Roberts R, Harris JK. A systematic review assessing bidirectionality between sleep disturbances, anxiety and depression. *Sleep*. 2013;36(7):1059-68.
- [13] Owens J. Insufficient sleep-in adolescents and young adults: An update on causes and consequences. *Pediatrics*. 2014;134:e921-32.
- [14] Dahl RE. Sleep and the developing brain. *Sleep*. 2007;30(9):1079-80.
- [15] Meltzer LJ, Mindell JA. Systematic review and meta-analysis of behavioural interventions for pediatric insomnia. *J Pediatr Psychol*. 2014;39(8):932-48.
- [16] Lahan V, Gupta R. Translation and validation of the Insomnia Severity Index in Hindi language. *Indian J Psychol Med*. 2011;33(2):172-76.
- [17] Peersmann SHM, Grootenhuis MA, Straten AV, Tissing WJE, Abbink F, Andrica C, et al. Insomnia symptoms and daytime fatigue co-occurrence in adolescent and young adult childhood cancer patients in follow-up after treatment: Prevalence and associated risk factors. *Cancers (Basel)*. 2022;14(14):3316.
- [18] Stavinoha PL, Olsthoorn IM, Swartz MC, Nowakowski S, Wells SJ, Hicklen RS, et al. Non-pharmacological sleep interventions for pediatric cancer patients and survivors: a systematic review protocol. *Syst Rev*. 2021;10(1):166.
- [19] Daniel LC, Schwartz LA, Mindell JA, Tucker CA, Barakat LP. Initial validation of the sleep disturbances in pediatric cancer model. *J Pediatr Psychol*. 2016;41(6):588-99.
- [20] Kaushik P, Sharma S, Shah N, Kutty PK, Ghildiyal R. Sleep disturbances and childhood cancer-a tertiary care experience. *Pediatric Hematology Oncology*. 2022;7(3):e103-07.
- [21] Rosen G, Brand SR. Sleep in children with cancer: Case review of 70 children evaluated in a comprehensive pediatric sleep center. *Supportive Care in Cancer*. 2011;19:985-94.

### PARTICULARS OF CONTRIBUTORS:

1. Lecturer, Department of Paediatrics, Government Medical College, Jammu, Jammu and Kashmir, India.
2. Lecturer, Department of Paediatrics, Government Medical College, Jammu, Jammu and Kashmir, India.
3. Junior Resident, Department of Psychiatry, ASCOMS, Jammu, Jammu and Kashmir, India.
4. Professor, Department of Paediatrics, Government Medical College, Jammu, Jammu and Kashmir, India.
5. Professor, Department of Paediatrics, Government Medical College, Jammu, Jammu and Kashmir, India.
6. Professor and Head, Department of Paediatrics, Government Medical College, Jammu, Jammu and Kashmir, India.

### NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Pooja Bharti,  
SMGS Hospital, Shalamar-180001, Jammu and Kashmir, India.  
E-mail: drbhartipooja@gmail.com

### PLAGIARISM CHECKING METHODS: [\[Jain H et al.\]](#)

- Plagiarism X-checker: Jan 23, 2023
- Manual Googling: Feb 24, 2023
- iThenticate Software: Mar 22, 2023 (14%)

### ETYMOLOGY: Author Origin

### AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Jan 23, 2023**  
Date of Peer Review: **Feb 28, 2023**  
Date of Acceptance: **Apr 05, 2023**  
Date of Publishing: **May 01, 2023**