Faculty of Medicine

University of Dhaka

Sleep disorders among children with cerebral palsy: characteristics and associated factors as reported by their mothers

Md. Shidul Islam Patowary

Bachelor of Science in Physiotherapy

DU Roll No: 1514

Registration No: 6271

Session: 2019-2020

Bangladesh Health Professions Institute (BHPI)

Department of Physiotherapy

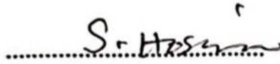
CRP, Savar, Dhaka-1343, Bangladesh

August, 2025

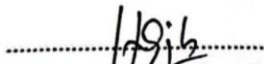
© 2025 Md. Shidul Islam Patowary

We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for acceptance of this dissertation entitled, **"Sleep disorders among children with cerebral palsy: characteristics and associated factors as reported by their mothers"** Submitted by **Md. Shidul Islam Patowary,** for the partial fulfillment of the requirement for the degree of Bachelor of Science in Physiotherapy (B.Sc. PT).

Muhammad Millat Hossain
Associate Professor
Project and Course Coordinator
Department of Rehabilitation Science
BHPI, CRP.



Prof. Dr. Mohammad Sohrab Hossain, PhD
Professor of Physiotherapy, BHPI
Executive Director, CRP.



Mohammad Habibur Rahman
Assistant Professor of Physiotherapy
School of Science and Technology
Bangladesh Open University, Gazipur-1750.

Prof. Md. Obaidul Haque
Vice Principal
BHPI, CRP.

Dr Shazal Kumar Das, PhD
Assistant Professor & Head
Department of Physiotherapy
BHPI, CRP.

Approved Date:

Declaration

I declare that the work presented here is my own. All sources used have been cited appropriately. Any mistakes or inaccuracies are my own. I also declare that for any publication, presentation or dissemination of information of the study, I would be bound to take written consent from the Department of Physiotherapy, Bangladesh Health Professions Institute (BHPI).

Name of the Student: **Date:**

Md. Shidul Islam Patowary

Bachelor of Science in Physiotherapy (B.Sc. PT)

DU Roll No:

Registration No: 6271

Session: 2019-2020

BHPI, CRP, Savar, Dhaka-1343, Bangladesh

CONTENTS

Topic	Page no.
Acknowledgement	i
Acronym	ii
List of Tables	iii
List of Figures	vi-v
Abstract	vi
CHAPTER-I: INTRODUCTION	**1-9**
1.1 Background	1-4
1.2 Rationale	5
1.3 Research Question	6
1.4 Objectives	7
1.5 Conceptual Framework	8
1.6 Operational Definition	9
CHAPTER-II: LITERATURE REVEW	**10-19**
CHAPTER-III: METHODOLOGY	**20-24**
3.1 Study design	20
3.2 Study site	20
3.3 Study population	20
3.4 Sampling technique	20
3.5 Sample size calculation	20-21
3.6 Inclusion criteria	21
3.7 Exclusion criteria	22
3.8 Outcome measurement tool	22-23
3.9 Data collection tools	23
3.10 Data collection procedure	23
3.11 Data Analysis	23
3.12 Informed consent	24
3.13 Ethical consideration	24
CHAPTER-IV: RESULT	**25-70**
CHAPTER-V: DISCUSSION	**71-74**
5.1 Limitation	74

CHAPTER-VI: CONCLUSION AND RECOMMENDATION	**75-76**
REFERENCES	**77-86**
APPENDIX	**vii-xxiv**
Informed consent (English)	vii
Informed consent (Bangla)	viii
Questionnaire (English)	ix-xiv
Questionnaire (Bangla)	xv-xxii
IRB permission letter	xxiii
Site permission letter	xxiv

Acknowledgement

First of all, I am grateful to almighty Allah for enabling me to complete this thesis and then thanks to my parents to assist me in all aspect of my life. I am extremely grateful to my honorable and praiseworthy supervisor **Muhammad Millat Hossain**, Associate Professor & Course Coordinator, Department of Rehabilitation Science, BHPI, CRP, Savar, Dhaka-1343, Bangladesh for his excellent guidance from the very beginning to winding up of this study. It was impossible to carry out this study without his proper direction and advice.

I would like to express my gratitude to respected **Professor Md. Obaidul Haque**, Vice Principal, Bangladesh Health Professions Institute (BHPI), CRP, Savar, Dhaka-1343, Bangladesh. I would like to express my gratitude to **Dr. Shazal Kumar Das, PhD,** Assistant Professor & Head, Department of Physiotherapy, BHPI, CRP, Savar, Dhaka-1343, Bangladesh for his valuable class and guidelines. And I want to show my gratitude to my respected teacher and guardian **Professor Dr. Mohammad Anwar Hossain (PhD)**, Professor, Department of Physiotherapy, BHPI, Senior Consultant & Head of the Physiotherapy Department, CRP, Savar, Dhaka-1343, Bangladesh. I am also thankful and want to express to gratitude to respected teacher **Fabiha Alam**, Assistant Professor of BHPI, Department of Physiotherapy, BHPI, CRP, Savar, Dhaka-1343, Bangladesh and all of my respected teachers. My special thanks to my friends Rifat, Zibran, Shovon, Hrith & my beloved juniors mentioning Faysal, Tania, who were beside me without any expectations. I am thankful to all the staff of BHPI Library for their cordial help to find important books and journals. I would like to thank the participants of the research for giving me their valuable time. All my gratitude is towards Allah.

Acronyms

BHPI: Bangladesh Health Professions Institute

BMRC: Bangladesh Medical Research Council

CP: Cerebral palsy

CRP: Centre for the Rehabilitation of the Paralysed

IRB: Institutional Review Board

NREM: Non-rapid eye movement

OSA: Obstructive sleep apnea

SDB: Sleep-disordered breathing

SES: Socioeconomic status

SPSS: Statistical Package for the Social Sciences

WHO: World Health Organization

List of Tables

Table No.	Title	Page No.
Table-1	Socio-demographic Information	25-26
Table-2	Subject characteristics	41-42
Table-3	Sleep disorders among children with cerebral palsy	65
Table-4	Association between sociodemographic information and sleep disorders among children with cerebral palsy	66-67
Table-5	Association between subject characteristics and sleep disorders among children with cerebral palsy	68-70

List of Figures

Figure No.	Title	Page No.
Figure-1(a)	Age of the Children (Histogram)	27
Figure-1(b)	Age of the Children	28
Figure-2	Gender of the Children	29
Figure-3	Mother’s education level	30
Figure-4	Mother’s occupation	31
Figure-5	Residential area	32
Figure-6	Religion	33
Figure-7(a)	Number of family members (Histogram)	34
Figure-7(b)	Number of family members	35
Figure-8	Family types	36
Figure-9(a)	Monthly income (Histogram)	37
Figure-9(b)	Monthly income	38
Figure-10(a)	Monthly treatment cost (Histogram)	39
Figure-10(b)	Monthly treatment cost	40
Figure-11	Types of cerebral palsy	43
Figure-12	Types of delivery	44
Figure-13	GMFCS level	45
Figure-14	Gestational age	46
Figure-15	Presence of epilepsy	47
Figure-16	Anti-epileptic drug use	48
Figure-17	Anti-spasticity drug use	49
Figure-18	Vision status	50
Figure-19	Hearing status	51
Figure-20	Comorbid conditions	52
Figure-21	Child sleeps alone	53
Figure-22	How child falls asleep	54
Figure-23	Wears orthotic at night during sleep	55
Figure-24	Mother snores	56
Figure-25	Diet pattern	57

Figure-26	Food allergy	58
Figure-27	Allergy affects sleep	59
Figure-28	Gastrointestinal problem	60
Figure-29	Sugar before sleeping	61
Figure-30	Sleep environment	62
Figure-31	Hyperactivity before sleep	63
Figure-32	Fear of dark or being alone	64
Figure-33	Sleep disorders in children	65

ABSTRACT

Background: Children with cerebral palsy (CP) are significantly more prone to sleep disturbances due to associated neurological, behavioral, and environmental challenges. These disorders not only impact their physical and cognitive development but also place a substantial burden on caregivers, particularly mothers, who are often the primary observers and caretakers. **Objectives:** This study aimed to explore the characteristics and associated factors of sleep disorders among children with cerebral palsy, as reported by their mothers. **Methodology:** A cross-sectional study was conducted at the Centre for the Rehabilitation of the Paralysed (CRP), Savar, Dhaka, involving 104 mothers of children diagnosed with CP. Data were collected using the Sleep Disturbance Scale for Children (SDSC) and a structured sociodemographic and questionnaire. Convenience sampling was employed, and data were analyzed using SPSS version 25. Descriptive and inferential statistics, including chi-square tests, were used to identify associations between variables. **Results:** Among the children, 81% were aged 2–5 years and 57% were boy. Spastic quadriplegia was the most common CP type (39%), and 54% of children were classified as GMFCS level III. Notably, 37% of children exhibited signs of sleep disturbances, with insomnia and sleep-wake transition disorders being most prevalent. Significant associations were found between sleep disorders and factors such as epilepsy, use of anti-epileptic drugs, environmental conditions, hyperactivity before sleep, and fear of darkness or being alone. **Discussion:** The findings underscore a high prevalence of sleep disorders among children with CP, which are closely associated with clinical and environmental factors. Mothers' perspectives provided crucial insights into the daily challenges and stressors faced in managing these conditions. Addressing these sleep issues through routine clinical assessment and tailored non-pharmacological interventions is essential for improving outcomes for both children and their caregivers.

Keywords: *Cerebral palsy, sleep disorders, Sleep Disturbance Scale for Children (SDSC), epilepsy, GMFCS.*

Word count: 10691

CHAPTER - I	INTRODUCTION

1.1 Background

Cerebral palsy (CP) comprises a collection of enduring mobility and postural impairments resulting from non-progressive disruptions in the developing fetal or newborn brain, resulting in activity restrictions and frequently associated with cognitive, sensory, behavioral, and communication difficulties (Sandran et al., 2024). Cerebral palsy is a prevalent cause of motor dysfunction in children, with a worldwide incidence of between 1 to 4 per 1,000 live births (Afifah et al., 2024). The incidence of cerebral palsy (CP) in Bangladesh is estimated at 3.4 per 1,000 children, equating to around 233,514 afflicted children nationwide (Khandaker et al., 2019). Cerebral palsy is categorized according to the kind and distribution of motor impairment, with the principal subtypes being spastic, dyskinetic, and ataxic (Potcovaru et al., 2022). The condition physically impacts children by inducing muscle tone issues, musculoskeletal deformities, and gait abnormalities (Erol and Arıkan, 2024). Mental effects may result in cognitive impairments and intellectual disabilities, while emotional consequences might manifest as behavioral problems and emotional issues (Potcovaru et al., 2022). The etiology of cerebral palsy is multifaceted, encompassing genetic and environmental variables, with increased risks associated with preterm delivery, maternal infections, and neonatal hypoxia (Sandran et al., 2024). Despite the significant prevalence of related impairments, numerous children in rural Bangladesh are deprived of rehabilitation and educational services, highlighting the necessity for comprehensive interventions to enhance their quality of life (Narayan et al., 2023). Timely diagnosis and intervention are essential for improving functional capabilities and autonomy in children with cerebral palsy (Potcovaru et al., 2022).

Sleep is essential for children's comprehensive development, acting as a cornerstone for physical, cognitive, and emotional well-being. Sufficient sleep facilitates cerebral development, emotional control, and learning, but inadequate sleep may result in considerable developmental obstacles, including behavioral problems and cognitive impairments (Corcoran, Cooke and Griffiths, 2023). Sleep is crucial for children with cerebral palsy (CP) owing to their increased susceptibility to sleep disruptions, which can worsen existing health conditions and impede general well-being (Sanguino et al.,

2024). Studies demonstrate that children with cerebral palsy frequently suffer from inadequate sleep quality, marked by recurrent awakenings and insomnia, adversely affecting their physical health and cognitive performance (Sheehan, 2023). Consequently, tackling sleep issues in this demographic is crucial for improving their quality of life and fulfilling their developmental requirements (Sanguino et al., 2024).

Sleep problems in children include several conditions that disturb regular sleep patterns, adversely affecting their physical, emotional, and cognitive development. These disorders are categorized as insomnia, sleep apnea, parasomnias, and circadian rhythm disorders, with classifications that reflect developmental factors (Trosman and Ivanenko, 2024). Prevalent sleep problems in children encompass insomnia and sleep-related respiratory issues, especially among individuals with pre-existing impairments or neurodevelopmental abnormalities (Thabet and Tabarki, 2023). The prevalence of sleep problems in children with cerebral palsy (CP) is significantly elevated, with studies revealing that over 67% suffer from these conditions, predominantly insomnia (Gamayani et al., 2022). Factors leading to sleep disruptions in this group encompass anatomical anomalies, muscular spasms, and other motor limitations, highlighting the necessity for heightened awareness and specific therapies (Sobremonte-King, 2021).

Sleep difficulties profoundly affect children with cerebral palsy (CP), resulting in several detrimental effects on their daily functioning, conduct, and general quality of life. Children with cerebral palsy frequently endure suboptimal sleep quality, marked by heightened awakenings and sleeplessness, which may intensify behavioral problems such as aggressiveness and self-harm (Sanguino et al., 2024). Sleep disorders are associated with physical health issues, such as compromised glucose regulation and obesity, and may impede therapeutic effects by diminishing involvement and responsiveness during therapies (Nisbet, Davey and Nixon, 2024). Furthermore, insufficient sleep might impede therapeutic results, as children may find it challenging to participate actively in rehabilitation owing to exhaustion (Almeida et al., 2024). The consequences include caregivers, who indicate a worse quality of life stemming from the stress and obligations of overseeing a kid with sleep disturbances (Almeida et al., 2024). Consequently, tackling sleep disturbances in children with cerebral palsy is essential for enhancing their health and the welfare of their families (Nisbet, Davey and Nixon, 2024).

Sleep difficulties in children with cerebral palsy (CP) are affected by several physical, environmental, and medicinal variables. Primary factors include pain, especially from spasticity, which correlates with heightened sleep disruptions; children with consistently elevated pain levels report much worse sleep quality (Shearer et al., 2024). Furthermore, periodic limb movements during sleep may intensify sleep-related problems, underscoring the necessity for thorough evaluations of sleep patterns in this demographic (Nisbet, Davey and Nixon, 2024). Environmental variables, including sleep patterns and environments, significantly influence sleep quality, with non-pharmacological therapies demonstrating efficacy in enhancement (Almeida et al., 2024). Moreover, mental health disorders and sensory impairments are common in children with cerebral palsy, exacerbating sleep difficulties (Sanguino et al., 2024). These characteristics collectively highlight the intricacy of sleep disturbances in children with cerebral palsy and the need for specific therapies.

Mothers are essential in recognizing and addressing sleep disorders in children with cerebral palsy (CP), frequently serving as the primary observers of their children's sleep patterns and behaviors. This population exhibits a variety of sleep disorders, such as insomnia, sleep-related breathing disorders, and challenges with sleep initiation and maintenance (Almeida et al., 2024). Mothers recognize that sleep problems substantially affect their children's health and the overall functioning of the family, resulting in sleep deprivation and heightened caregiver burden (Olorunmoteni et al., 2023). Mothers encounter challenges such as insufficient awareness and support from healthcare professionals concerning sleep issues, alongside the emotional and physical impact of managing these disorders on their well-being (Hulst et al., 2020). There is an urgent requirement for specific interventions that tackle the sleep disorders of children and the related difficulties encountered by their caregivers (Olorunmoteni et al., 2023).

Recent studies on sleep disorders in children with cerebral palsy (CP) indicate notable deficiencies, especially concerning the prevalence and effects of these disorders on quality of life. Research shows that 23%-46% of children with cerebral palsy experience sleep disturbances, such as obstructive sleep apnea and challenges with sleep initiation and maintenance. However, there is a notable deficiency in comprehensive studies addressing these specific issues in this demographic (Sobremonte-King, 2021). The perspectives of mothers, frequently the primary caregivers, remain underexplored, despite their essential role in managing their

children's health and well-being. Examining sleep disorders through the perspectives of mothers is crucial, as their insights can enhance care strategies and illuminate the emotional and practical challenges encountered, thereby contributing to more effective interventions and support systems for families impacted by CP (Simard-Tremblay et al., 2011).

Investigating the characteristics and contributing factors of sleep disorders in children with cerebral palsy (CP) holds important implications for clinical care and support systems. Studies show that children with cerebral palsy exhibit a significant prevalence of sleep difficulties, such as insomnia and sleep-wake transition disorders, which negatively impact their quality of life and that of their caregivers (Sanguino et al., 2024). Analyzing these sleep patterns can guide specific non-pharmacological interventions, including the optimization of sleep environments and routines, which have demonstrated efficacy in enhancing sleep quality (Almeida et al., 2024). Additionally, the management of sleep disorders can reduce stress and health consequences for caregivers, thereby improving family cohesion and overall well-being (Olorunmoteni et al., 2023). Integrating sleep assessments into routine clinical evaluations enables healthcare providers to create comprehensive care plans that address the needs of both the child and caregivers, thereby improving health outcomes for families affected by CP (Masi et al., 2022).

1.2 Rational

Sleep is essential for the physical, cognitive, and emotional development of children; however, those with cerebral palsy (CP) are more susceptible to sleep disturbances due to causes such as stiffness, pain, and epilepsy. These sleep disturbances might exacerbate their disease and adversely affect rehabilitation and quality of life. Notwithstanding the significance of sleep, sleep disturbances in children with cerebral palsy are frequently underdiagnosed, with less study addressing the mother viewpoint. This study aims to investigate the features and contributing factors of sleep disturbances in children with cerebral palsy, as reported by their mothers. Comprehending maternal perspectives helps elucidate practical difficulties, underscore relevant elements, and guide focused treatments. This research seeks to refine care techniques, optimize sleep outcomes, and improve the quality of life for children with cerebral palsy and their families.

1.3 Research question

What are the characteristics and associated factors of sleep disorders among children with cerebral palsy who attended CRP, as reported by their mothers?

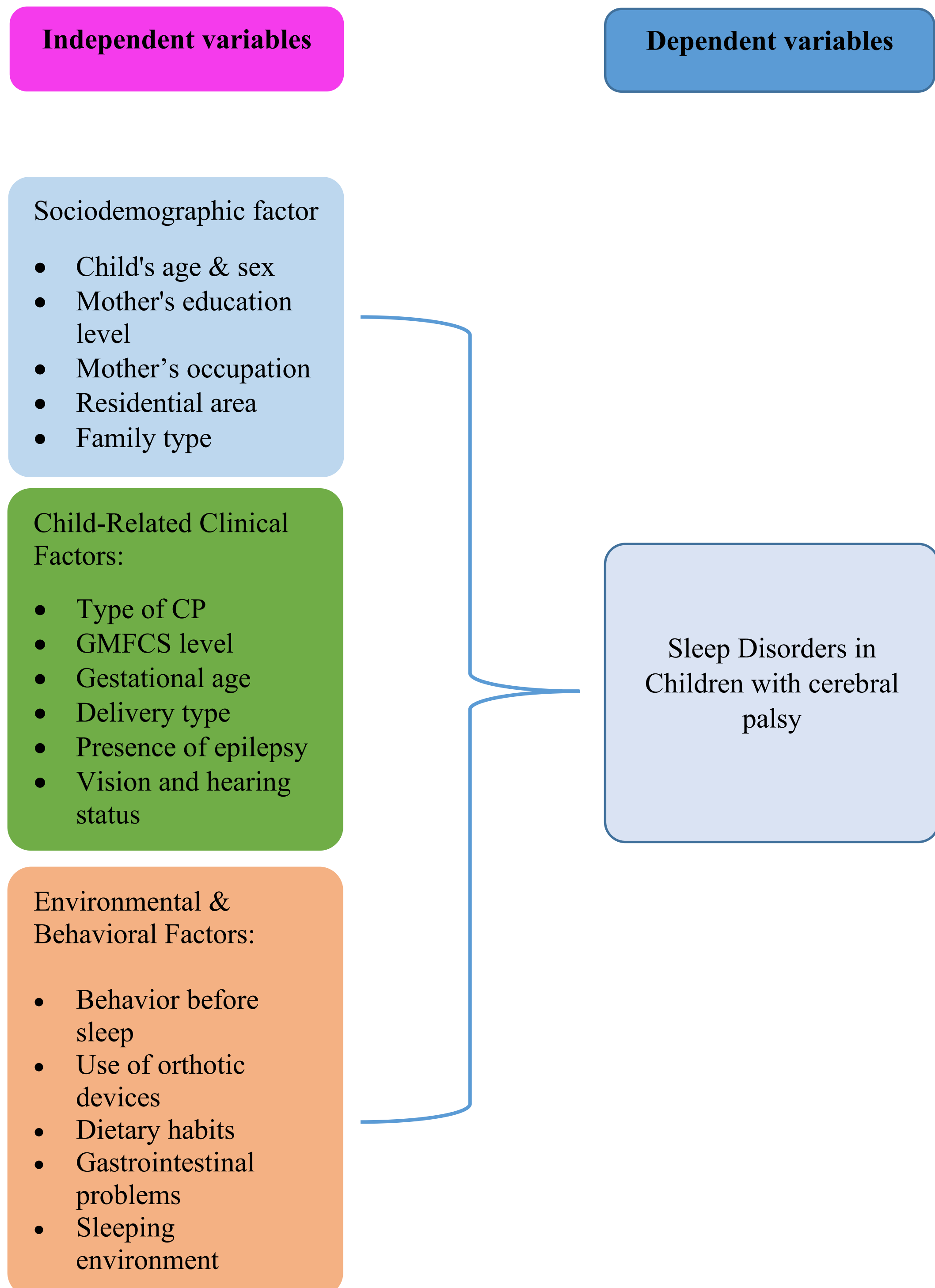
1.4 Study objective

1.4.1 General objective: To find out the characteristics and associated factors of sleep disorders among children with cerebral palsy, as reported by their mothers.

1.4.2 Specific objective:

i. To determine the sociodemographic information of the study population.
ii. To find out the characteristics and associated factors of sleep disorders among children with cerebral palsy.
iii. To check out sleep disorders among children with cerebral palsy.
iv. To figure out association between sociodemographic information and sleep disorders among children with cerebral palsy.
v. To evaluate association between subject characteristics and sleep disorders among children with cerebral palsy.

1.5 Conceptual framework



1.6 Operational definition

Cerebral palsy: Cerebral palsy (CP) is a multifaceted neurodevelopmental illness defined by a range of mobility and postural deficiencies resulting from non-progressive disruptions in the developing fetal or neonatal brain. The etiology of cerebral palsy is multifaceted, encompassing genetic and environmental influences, with probable causes occurring during the prenatal, perinatal, and postnatal periods.

Sleep disorders: Sleep disorders include many problems that interfere with the quality, length, or scheduling of sleep, frequently resulting in considerable daily dysfunction and health repercussions. More than 90 sleep disorders are acknowledged, including insomnia, obstructive sleep apnea (OSA), narcolepsy, and parasomnias including sleepwalking and night terrors.

CHAPTER - II LITERATURE REVIEW

Cerebral palsy (CP) is a non-progressive neurological condition resulting from injury to the developing fetus or newborn brain, causing a range of mobility and postural disabilities. This is the most prevalent motor handicap in children, impacting between 1 to 4 per 1,000 live births worldwide (Basoya, Kumar and Wanjari, 2023). Cerebral palsy is categorized according to the kind and distribution of motor impairment, encompassing spastic, dyskinetic, and ataxic subtypes, in addition to the severity and parts of the body affected (Potcovaru et al., 2022). The etiology of cerebral palsy is multifaceted, encompassing both hereditary and environmental influences. Genetic predispositions, preterm delivery, multiple gestations, intrauterine growth restriction, maternal illnesses, and perinatal hypoxia are substantial risk factors (Sandran et al., 2024). Furthermore, prenatal, perinatal, and neonatal variables, including maternal smoking, alcohol intake, and infections, augment the incidence of cerebral palsy (Potcovaru et al., 2022). The principal motor symptoms consist of muscle tone irregularities, musculoskeletal deformities, and gait disturbances, whereas non-motor symptoms involve cognitive, sensory, behavioral, and communication difficulties, in addition to epilepsy and musculoskeletal diseases (Potcovaru et al., 2022). Timely diagnosis and intervention are essential for enhancing the quality of life and functional capabilities of persons with cerebral palsy, highlighting the need of customized rehabilitation programs (Basoya et al., 2023).

Cerebral palsy (CP) affects brain function, movement, and muscle tone as a result of non-progressive brain injury during development, resulting in motor impairments including spasticity, muscle weakness, and postural control difficulties (Salomon, 2024). Children with cerebral palsy frequently encounter comorbidities such as epilepsy, intellectual disabilities, sensory processing disorders, and communication difficulties (Wilewska et al., 2024). Current treatment strategies emphasize a multidisciplinary approach that integrates physical and occupational therapies, pharmacological interventions such as baclofen for spasticity, and innovative rehabilitation techniques including neurodevelopmental therapy (Swarnakar and Yadav, 2024). Emerging therapies that target neuroinflammation and oxidative stress demonstrate potential; however, further validation is necessary (Salomon, 2024). Effective management of cerebral palsy requires customized interventions that target

both physical and psychosocial needs, thereby improving the overall quality of life for affected children and their families (Swarnakar and Yadav, 2024).

Common sleep disorders in children encompass obstructive sleep apnea (OSA), insomnia, and restless leg syndrome, with OSA impacting approximately 1.17% of children and insomnia affecting around 0.52% (Williamson et al., 2024). These disorders have a substantial effect on cognitive development, behavior, and academic performance. OSA is linked to neurocognitive impairments, behavioral challenges, and suboptimal academic performance resulting from disrupted sleep patterns and oxygen deprivation during sleep (Kim and Choi, 2024). Insomnia, common among all age groups, can impede brain development, resulting in emotional dysregulation and heightened behavioral issues (Himelfarb and Shatkin, 2024). Additionally, sleep disorders may worsen conditions such as obesity and inflammation, thereby complicating the health and well-being of children (Cakıl, 2024). Timely identification and intervention for these disorders are essential to reduce their negative impact on children's overall development (Cohen, Reiter and Gileles-Hillel, 2024).

Childhood sleep problems result from a complex interaction of biological and environmental variables, including genetics, age, prenatal impacts, and psychosocial aspects such as family dynamics and socioeconomic position (Liu et al., 2022). Prevalent problems encompass sleep apnea, insomnia, and parasomnias, which can profoundly impact a child's physical, emotional, and cognitive development (Thabet and Tabarki, 2023). Children's sleep architecture contrasts with that of adults, characterized by extended durations of REM sleep and more frequent sleep cycles, essential for growth and development (Shelton, 2023). Present diagnostic techniques encompass verified questionnaires and clinical evaluations, however treatments vary from behavioral therapies to pharmaceutical alternatives, like low-sodium oxybate for narcolepsy (Shelton, 2023). Prompt recognition and management are crucial to alleviate the enduring effects linked to unmanaged sleep problems (Thabet and Tabarki, 2023).

Children with cerebral palsy (CP) demonstrate a markedly elevated incidence of sleep difficulties relative to neurotypical counterparts, with research revealing that around 44% of children with CP encounter clinically severe sleep issues (Whittingham et al., 2024). Prevalent sleep problems in this demographic including insomnia, challenges in initiating sleep, nocturnal awakenings, and sleep-disordered breathing (SDB), notably

obstructive sleep apnea (OSA), which has been shown in as many as 54% of cerebral palsy patients (Sanguino et al., 2024). Motor dysfunction, muscular stiffness, and involuntary movements exacerbate these disruptions by affecting sleep posture and heightening discomfort, resulting in frequent awakenings and decreased sleep efficiency (Pascoe et al., 2023). The existence of comorbid disorders such as epilepsy intensifies sleep disturbances, underscoring the necessity for specific therapies to enhance sleep quality in children with cerebral palsy (Whittingham et al., 2024).

Pain, discomfort, and gastroesophageal reflux disease (GERD) are significant contributors to sleep disturbances, with research indicating a bidirectional relationship between these conditions. Gastroesophageal reflux disease (GERD) impacts around 13% of adults, with up to 25% of those affected experiencing sleep disturbances, frequently attributed to nocturnal reflux episodes that compromise sleep quality and duration (Shibli et al., 2020). Medications for conditions such as cerebral palsy (CP), including muscle relaxants and antiepileptic drugs, can complicate sleep patterns. While some may induce sedation, others can alter sleep architecture, potentially worsening sleep issues (Tan et al., 2024). Epilepsy, prevalent in individuals with cerebral palsy, is linked to diminished sleep quality resulting from seizures and the side effects of medications, thereby exacerbating overall sleep health (Lindam et al., 2016). The interaction among GERD, pain, and medication effects highlights the complexity of sleep disturbances in affected populations (Oh, 2016).

Neurological disorders profoundly affect sleep regulation, especially in cases of dystonia and neuromuscular illnesses. Cerebellar dysfunction is a pivotal element of dystonia, resulting in heightened vigilance and less REM sleep, as demonstrated by research on mice models indicating altered neurotransmission that impacts sleep architecture (Salazar Leon and Sillitoe, 2023). The cerebellum's function in sleep regulation is highlighted by its participation in a comprehensive "dystonia network," where disturbances may result in sleep disorders irrespective of motor symptoms (Salazar Leon and Sillitoe, 2023). In neuromuscular illnesses, sleep disruptions occur due to variables such as muscle weakness, discomfort, and respiratory complications, potentially resulting in problems including obstructive sleep apnea and restless legs syndrome (Boentert, 2023). The findings underscore the intricate relationship between neurological impairments and sleep regulation, requiring focused therapy strategies to manage both motor and sleep-related symptoms (Boentert, 2023).

Pain and discomfort markedly influence sleep fragmentation, especially in patients with epilepsy, where the relationship between sleep and seizure activity is intricate. Epilepsy alters sleep architecture, resulting in heightened arousals and modified sleep phases, notably impeding REM sleep, essential for restorative functions (Khachatryan and Tunyan, 2017). Non-rapid eye movement (NREM) sleep may facilitate epileptic activity, but REM sleep often inhibits it, establishing a bidirectional connection in which sleep disorders can intensify the frequency and severity of seizures (Furia, Canevini and Zambrelli, 2022). Moreover, as many as two-thirds of individuals with epilepsy experience sleep disturbances, such as insomnia and excessive daytime drowsiness, frequently intensified by the sedative properties of antiepileptic drugs (Grayson and DeWolfe, 2018). Resolving these sleep-related concerns is crucial, since enhanced sleep quality correlates with improved seizure management and general health (Grayson and DeWolfe, 2018).

The sleep environment substantially influences sleep quality in children with cerebral palsy (CP), with elements like lighting, noise, and temperature being critical factors. Studies show that children with cerebral palsy are at increased risk for multiple sleep disorders, such as obstructive sleep apnoea and challenges with sleep initiation and maintenance, which may be worsened by environmental factors (Almeida et al., 2017). Inappropriate lighting can disrupt circadian rhythms, and excessive noise can impede the ability to initiate and maintain sleep (Dutt, Roduta-Roberts, and Brown, 2015). Furthermore, temperature regulation is essential, as discomfort due to heat or cold may result in more frequent awakenings and diminished sleep quality (Dutt, Roduta-Roberts and Brown, 2015). The interaction of environmental factors and sensory-motor challenges in children with CP highlights the necessity for customised non-pharmacological interventions to improve sleep quality (Simard-Tremblay et al., 2011).

Adaptive sleep aids, including specialised mattresses and positioning devices, are intended to improve sleep quality and comfort, especially for children with cerebral palsy (CP). Nevertheless, contemporary studies suggest that the efficacy of various sleep systems is still uncertain. Research indicates no substantial variations in sleep patterns or pain levels between sleep with and without these systems, implying a little effect on sleep quality (Blake et al., 2015). Moreover, although sleep positioning solutions are designed to avoid issues such as hip migration, data substantiating their effectiveness is insufficient (Humphreys et al., 2019). The research lacks precise

insights on the distinct effects of co-sleeping versus independent sleeping on children with cerebral palsy, highlighting the necessity for more investigation to comprehend the consequences for sleep and general well-being.

Anxiety and stress markedly affect sleep disruptions, especially in children with neurodevelopmental disorders like cerebral palsy (CP). Studies reveal that children with cerebral palsy encounter significant sleep disturbances, with insomnia being the predominant condition, impacting over 67% of this demographic (Gamayani et al., 2022). Behavioural sleep disorders, characterised by challenges in beginning and sustaining sleep, are prevalent and frequently intensified by worry and distress, which may impede treatment efficacy (Fehr, Chambers, and Ramasami, 2021). Children with cerebral palsy exhibit specific sleep problems, including sleep-wake transition disorders, difficulties in initiating sleep, and sleep-related respiratory issues (Olorunmoteni et al., 2023). Moreover, the existence of concurrent behavioural disorders, including aggressiveness and self-injury, correlates with heightened severity of sleep disturbances, indicating that resolving sleep problems may alleviate these behavioural difficulties (Ryan, Estes and MacEachern, 2024). The interaction among anxiety, stress, and sleep problems highlights the necessity for specific therapies in this at-risk group (Dreier et al., 2021).

Parental stress and caregiving responsibilities substantially impact sleep disturbances, especially in carers of youngsters and adults with dementia. Carers frequently endure heightened stress levels, which are associated with worse sleep quality, including problems such as sleep fragmentation and insomnia (Monteiro et al., 2023). Carers of children experience fewer regular bedtimes and more night awakenings compared to carers of spouses or parents (Stearns et al., 2024). Moreover, elevated perceptions of caring obligations correlate with reduced likelihood of reporting satisfactory sleep quality, highlighting the adverse effects of caregiving duties on sleep (Petrovsky and Luth, 2024). The mother perception of sleep disturbances is essential, as it affects both diagnosis and treatment; prompt recognition and intervention can alleviate negative impacts on maternal and foetal health (Gökdemir and Yilmaz, 2022). Consequently, mitigating carer stress and sleep disturbances is crucial for enhancing overall well-being and health outcomes (Mattos et al., 2024).

Investigations of sleep disturbances in children with cerebral palsy (CP) have utilised several study methodologies, encompassing qualitative, quantitative, and mixed methods approaches. Quantitative research frequently employs cross-sectional methods, exemplified as studies evaluating the incidence of sleep disorders with instruments such as the Sleep Disturbances Scale for Children (SDSC) and the Pittsburgh Sleep Quality Index (PSQI) (Olorunmoteni et al., 2023). Mixed methods techniques have been significant, integrating quantitative evaluations with qualitative data from carer focus groups to investigate the wider implications of sleep disturbances (Olorunmoteni et al., 2023). Assessment tools for sleep encompass subjective measurements, including sleep diaries and parental questionnaires, as well as device-based approaches like as actigraphy and bed sensors, which have been evaluated for their efficacy (Rijssen et al., 2022). The various techniques underscore the intricacy of sleep disturbances in this demographic and the necessity for thorough evaluation procedures (Almeida et al., 2024).

Parental reports are instrumental in examining sleep disorders in children, especially among those with developmental disabilities, as they offer insights into perceived sleep difficulties; however, they frequently exhibit high rates of missing data and inconsistencies when juxtaposed with objective assessments such as actigraphy (Lee et al., 2023). In children with cerebral palsy (CP), subjective assessments have been insufficient in encapsulating the intricacies of sleep disturbances, which are common in this population (Sanguino et al., 2024). Obtaining objective sleep data is challenged by the dependence on caregiver reports for actigraphy grading, which may lack consistency, and the complexities of deploying thorough monitoring techniques in clinical environments (Reynolds et al., 2023). Contemporary research procedures reveal deficiencies, including an absence of multi-method approaches that integrate subjective and objective evaluations, as well as inadequate investigation of genetic and environmental factors affecting sleep patterns (Reynolds et al., 2023). Mitigating these limitations is essential for improving the comprehension of sleep disorders in pediatric populations.

Subpar sleep quality markedly affects cognitive development and learning in children with cerebral palsy (CP), as demonstrated by the high incidence of sleep problems within this demographic. Research demonstrates that as many as 80% of children with neurodevelopmental problems, such as cerebral palsy, suffer from chronic insomnia,

negatively impacting their cognitive functions, memory, attention, and overall learning outcomes (Ogundele, Yemula and Ayyash, 2024). Sleep disturbances result in heightened daytime weariness and irritation, which further aggravate behavioral problems and hinder emotional control (Spruyt, 2024). Moreover, children with cerebral palsy frequently have elevated incidences of sleep disorders, including insomnia and sleep bruxism, which can adversely affect their quality of life and that of their caregivers (Sanguino et al., 2024). Resolving these sleep disturbances is essential for improving cognitive performance and emotional health in children with cerebral palsy (Almeida et al., 2024).

The correlation between inadequate sleep and the deterioration of motor symptoms in persons with cerebral palsy (CP) is substantial, since sleep problems can intensify both motor and non-motor symptoms. Children with cerebral palsy may have sleep disturbances, such as sleeplessness and frequent awakenings, resulting in increased exhaustion and emotional discomfort (Sanguino et al., 2024). Subpar sleep quality has been associated with increased severity of motor symptoms and a wider range of non-motor symptoms, including anxiety and sadness (Yi et al., 2022). Insufficient sleep detrimentally influences physical health and negatively effects social relationships and emotional well-being, since children with cerebral palsy may encounter difficulties in cognitive and emotional development, resulting in difficulty in social engagement (Sobremonte-King, 2021). Resolving sleep disturbances is essential for enhancing overall health and quality of life in this demographic (Sanguino et al., 2024).

Sleep disruptions in children substantially affect parental sleep and mental well-being, with recurrent nocturnal awakenings being especially harmful. Studies demonstrate that caregivers of children with sleep disorders endure increased stress, worry, and sadness, which may be intensified by the child's neurogenetic abnormalities or behavioral challenges (Huffman et al., 2023). Caregivers of children with mental health issues frequently experience heightened sleeplessness and stress, and research indicates that improving children's mental health can enhance caregiver well-being (Huffman et al., 2023). The alignment of sleep patterns between parents and children indicates that when children have sleep problems, parents are prone to experiencing analogous concerns, resulting in increased variability in their sleep quality (Varma et al., 2022). This interconnection underscores the necessity for treatments that promote sleep health for both children and caregivers to improve overall family well-being (Varma et al., 2022).

The responsibility of addressing sleep issues considerably increases parental stress and fatigue, especially as children's sleep disorders frequently intensify parental sleeplessness and stress levels. Studies demonstrate that parents of children with sleep problems encounter a threefold escalation in stress, exacerbated by insomnia and sleep apnea (Merrill and Slavik, 2023). Moreover, the mental and physical burdens of home administration, particularly for mothers, are associated with heightened sleep disruptions, resulting in a cycle of fatigue and burnout (Eldridge-Smith et al., 2023). This dynamic impacts individual well-being and disturbs family patterns, as stressed parents may find it challenging to interact constructively with their children, potentially leading to emotional estrangement and neglect (Blanchard, Hoebeke and Heeren, 2023). Addressing these interrelated difficulties through focused therapies can result in substantial enhancements in both parental sleep and overall family dynamics (Huffman et al., 2023).

Investigations on sleep disturbances in children with cerebral palsy (CP) indicate several inadequately studied dimensions, notably concerning the complex effects of these diseases on family dynamics and the necessity for a more comprehensive knowledge of parental viewpoints, especially from mothers. Although current research emphasizes the incidence of sleep disorders, including insomnia and sleep-related respiratory problems in children with cerebral palsy, it frequently neglects the intricate experiences of family members, especially siblings and dads (Sobremonte-King, 2021). The mental and physical burden on women, who often shoulder the majority of caregiving duties, is little examined (Olorunmoteni et al., 2023). Comprehending mothers' viewpoints is essential, as their perspectives help clarify the relationship between their kid's sleep difficulties and the family's general dynamics, therefore guiding specific therapies that cater to both child and caregiver requirements (Almeida et al., 2024). This research gap highlights the need for qualitative studies that incorporate varied family perspectives to refine care techniques and elevate the quality of life for children with CP and their families.

Cultural and socioeconomic disparities markedly affect sleep problems, especially among youngsters and minority groups. Studies demonstrate that socioeconomic inequalities lead to increased prevalence and severity of sleep disordered breathing (SDB) among economically poor and underrepresented minority children, along with related comorbidities such as obesity and learning deficits (Su-Velez and Boss, 2024).

Cultural variables, such as views on sleep and healthcare accessibility, compound these differences, leading some ethnic groups to face elevated incidence of illnesses including insomnia and sleep apnea (Gentry, 2020). Socioeconomic status (SES) is a significant factor, as research indicates that reduced parental income and education are associated with heightened sleep disruptions in both children and adults (Etindele Sosso et al., 2022). Consequently, tackling these differences necessitates a comprehensive strategy that takes into account cultural beliefs and socioeconomic aspects to enhance sleep health outcomes among varied communities (Rojanapairat et al., 2023).

It is essential to do further longitudinal research on sleep and chronic pain (CP) because of the intricate, bidirectional link between both disorders. Studies demonstrate that sleep problems are common in persons with Parkinson's disease and other chronic pain disorders, worsening non-motor symptoms and overall quality of life (Xu, Anderson and Pavese, 2022). Longitudinal studies can clarify the temporal variations in sleep quality and its influence on the advancement of chronic pain disorders, including chronic low back pain and fibromyalgia (Mun et al., 2024). Furthermore, comprehending the temporal dynamics of sleep disruptions in connection with cognitive impairment in situations such as Alzheimer's disease underscores the necessity for continuous monitoring (Lucey et al., 2021). Enhanced insights from these research may guide treatment methods, perhaps stabilizing cognitive function and improving adherence to medications such as CPAP for obstructive sleep apnea, frequently associated with chronic pain (Teague et al., 2022). Consequently, longitudinal research is vital for formulating effective therapies and enhancing patient outcomes.

Future research can improve the diagnosis, treatment, and intervention techniques for sleep disturbances in children with cerebral palsy (CP) by concentrating on many critical areas. The use of non-pharmacological therapies, including environmental adjustments and behavioural strategies, has demonstrated potential in enhancing sleep quality and alleviating carer strain (Almeida et al., 2024). Furthermore, novel treatments such as Jin's three-needles therapy in conjunction with low-frequency repetitive transcranial magnetic stimulation (rTMS) have been helpful in mitigating sleep disturbances and enhancing motor function in children with spastic cerebral palsy (Liu, Zhu, and Li, 2024). Moreover, progress in paediatric sleep diagnostics, especially via automated and remote monitoring technologies, can enable prompt and precise

detection of sleep-disordered breathing, essential for early intervention (Vennard et al., 2024). Finally, it is crucial to address the current information deficiencies about sleep problems in paediatric populations, particularly the necessity for objective approaches and enhanced access to therapies, to formulate complete care plans (Reynolds et al., 2023).

CHAPTER - III	METHODOLOGY

3.1 Study design

The researcher used a cross-sectional study to find out the information. This study used a cross-sectional design to investigate sleep disturbances in children with cerebral palsy, focusing on features and related variables as reported by their mothers. This study design was suitable for achieving the objectives. The data was gathered simultaneously or within a short time frame. A cross-sectional design provides a momentary overview of the study's variables at a certain period.

3.2 Study site

Data was gathered at the CRP Paediatric Unit in Savar, Dhaka. This research was done on the mothers of children with cerebral palsy at the Centre for the Rehabilitation of the Paralysed (CRP) in Savar, Dhaka. The parents exhibited no difficulties in giving information to the researcher.

3.3 Study population

The study populations were mothers of children with cerebral palsy who received treatment at the CRP Paediatric Unit from January to March 2025.

3.4 Sampling technique

The researcher chose convenience sampling technique to extract the sample from the population, since it is one of the simplest, most cost-effective, and quickest techniques of sample selection. This is a form of nonprobability sampling in which participants from the target population are selected based on certain practical factors, such as accessibility, geographical closeness, availability at a certain time, or desire to participate (Etikan, Musa and Alkassim, 2016).

3.5 Sample size calculation

The sampling process for the cross-sectional study was conducted using the following equation –

Here,

$$n = \frac{z^2 pq}{d^2}$$

$$= \frac{(1.96)^2 \times 0.5 \times (1 - 0.5)}{(0.05)^2}$$

$$= \frac{0.9604}{(0.05)^2}$$

$$= 384$$

Where,

n = Sample size

z= linked to 95% confidence interval (use 1.96)

p = expected prevalence,

= 0.5 (Macfarlane, 1997).

q = 1- p (expected non-prevalence)

d = margin of error at 5% (standard value of 0.05)

The calculation indicates that the sample size should be 384 people. But due to time limitation and unavailability of the patients during the data collection period caused in reduction of the sample size, therefore only 104 patients were selected.

3.6 Inclusion Criteria

- Mothers who had children with Cerebral Palsy and whose diagnosis had been confirmed by a pediatrician (Patery, Sunartini and Sutomo, 2021).
- Mothers of children with Cerebral Palsy who were aged between 2 and 12 years (Patery, Sunartini and Sutomo, 2021).
- Interviews were conducted only with mothers who were willing to participate in the study (Patery, Sunartini and Sutomo, 2021).
- Availability of mothers who could provide detailed information about their child's sleep patterns and related factors (Bautista et al., 2018).

3.7 Exclusion Criteria

- Mother who had children with chronic diseases (conditions that lasted 1 year or more such as cardiovascular disease, malignancy, chronic obstructive pulmonary disease, and diabetes mellitus) (Patery, Sunartini and Sutomo, 2021).
- Mother who had children with other neurological disorders or conditions (Kotagal and Broomall, 2012).
- Mother who had children undergoing specific treatments for sleep disorders at the time of the study (Kotagal and Broomall, 2012).
- Severe communication barriers in the child and mother, preventing reliable data collection (Kotagal and Broomall, 2012).

3.8 Outcome measurement tool

Among the tools used for assessing sleep disturbances in children and adolescents is a 26 item Likert scale questionnaire, the Sleep Disturbance Scale for Children (SDSC). Bruni et al. (1996) developed a method which provides a detailed evaluation of sleep disturbances and which, in turn, encompasses six separate categories of sleep related disturbances: sleep onset and sleep maintenance problems, sleep related breathing problems, sleep related arousal and nightmares, sleep/wake transition disturbances, excessive daytime somnolence and nocturnal excessive sweating. For application with children and adolescents aged 2 to 12 years, the SDSC has been confirmed. A parent or carer who is filled out using a paper and pencil format and takes about 10 to 15 minutes. Reliably and validly, psychometric assessments of the SDSC have been performed. Reliability of internal consistency varies from 0.71 to 0.79, test–retest reliability from 0.71 and diagnostic accuracy from 0.91. A cutoff score of 39 is proposed, corresponding to the top percentile of the control group and a sensitivity of 0.89 and specificity of 0.74. The evaluation framework counts on a five point scale where 1 means "never" and 5 means "always (daily)." Scores were elevated and aggregated for each of the six disorder categories and computation of a cumulative score. Several other research have used the SDSC to look at sleep disorders in different groups. It was shown in its validity and structure by the original Bruni et al. (1996) paper. Carotenuto et al. (2006) demonstrated using the scale that in obese children, waist circumference predicts sleep

disordered breathing. Hartshorne et al. (2009) likewise explored sleep disruptions in children with CHARGE syndrome and furthered explored the impact on behaviour and carer well being. The SDSC is still a much used instrument for the purpose of spot and assessment of sleep problems in children in both clinical and research environment.

3.9 Data collection tools

A structured questionnaire and a demographic information chart served as the data collecting instruments. During that period, other essential materials such as a pen, pencil, white paper, and clipboard were used. The English questions were converted into Bengali for participant interviews. Researchers must get permission from each volunteer participant using a written consent form in Bengali.

3.10 Data collection procedure

Written consent was taken from participants. Data was accumulated using a Questionnaire through face to face conversation. Researcher thoroughly trained data collectors before data collection and explained the entire data collection process to them. All of the data was collected by carefully chosen trained data collectors in the presence of the researcher to prevent mistakes. The researcher read each questionnaire a second time to see if anything was missing or unclear.

3.11 Data Analysis

Each response was carefully verified post-initial data collection to detect any mistakes or unclear information. The data collected was then input into SPSS version 25 for analysis. The majority of the graphs and charts were created on Microsoft Office Excel 2016. The data was analysed using descriptive and inferential statistics. The descriptive section for parametric data displayed central tendency and dispersion using mean and standard deviation. The categorical data was shown as frequency and percentage using various visualisation tools, including pie charts and bar charts etc. The Chi-square test was used for analysing the relationship between sociodemographic factors, subject features, and sleep disorders. This study considers the significance level to be 5% ($p < 0.05$).

3.12 Informed consent

In this study, permission forms were provided to interested participants following verbal descriptions of the research objectives. They were notified that their participation was completely optional and that they might withdraw at any moment. Furthermore, they were assured that confidentiality would be upheld. Although their identities will remain undisclosed, material may be disseminated in various written formats or presentations. The study's findings may not have an immediate impact on patients, although the physiotherapy population might eventually profit from it.

3.13 Ethical Consideration

The researcher adhered to the specified ethical guidelines: The researcher complied with the directives established by the WHO and the Bangladesh Medical Research Council (BMRC). The BHPI physiotherapy department submitted a study proposal for clearance, which the faculty authorised. The proposal obtained preliminary permission from the course coordinator and the research project supervisor prior to the commencement of the investigation. The Institutional Review Board (IRB) of Bangladesh Health Professions Institute (BHPI) has received the dissertation proposal and methodology for an oral defence presentation. The Institutional Review Board subsequently granted clearance and authorised the continuation of this investigation. The researcher began the investigation following the academic center's approval. The Paediatric Department of CRP, Savar has granted the researcher authorisation to gather data. Prior to soliciting their participation in the study, the participants would be apprised. A written agreement form was employed to get each participant's consent for the study, and for individuals aged 2 to 12 years, the researcher additionally got clearance from their parents. The researcher ensured that each participant was informed of their rights and freedoms, as well as the study's aim and objectives. The researcher ensured that the study did not impede the organisation (CRP). Stringently upheld confidentiality throughout all categories. The researcher ensured the confidentiality of every information. Upon acquiring the academic and clinical guidelines for executing the study, including the required actions and prohibitions, the researcher became qualified to do the investigation. All participant rights were safeguarded, and the researcher was required to address any enquiries from participants regarding the study.

CHAPTER – IV	RESULTS

A total of 104 subjects were studied in this research. Essential information was gathered from the respondents and following analysis, the data was presented in tables and graphical format below.

4.1 Socio-demographic Information

Table 1: Socio-demographic Information

Variable	Types of variables	Mean/ SD	Median/ Mode	Percentage (%)/ Frequency(n)
Age	Continuous	45.51 ±25.757	36.00 24	2-5 years= 81% (n=84) 5-8 years= 13% (n=14) 8-12 years= 6% (n=6)
Gender	Nominal			Boy= 57% (n=59) Girl= 43% (n=45)
Mother's education level	Ordinal			Primary= 20% (n=21) Secondary= 39% (n=41) S.S.C= 19% (n=20) H.S.C= 12% (n=12) Graduate= 10% (n=10) Illiterate= 0% (n=0)
Mother's occupation	Nominal			Housewife= 97% (n=101) Service holder= 1% (n=1) Others= 2% (n=2)
Residential area	Nominal			Urban= 22% (n=23) Semi-urban= 13% (n=13) Rural= 65% (n=68)

Religion	Nominal			Islam= 92% (n=96) Hindu= 8% (n=8)
Number of family members	Continuous	4.20 ±1.177	4.00 3	3-5 person= 87.5% (n=91) 5-7 person= 11.5% (n=12) 7-9 person= 1% (n=1)
Family types	Nominal			Joint family= 19% (n=20) Nuclear family= 81% (n=84)
Monthly income (Tk)	Continuous	24413.46 ±19916.627	24000.00 30000	5000-20000 taka= 49% (n=51) 20000-35000 taka= 45% (n=47) 35000-50000 taka= 3% (n=3) Above 50000 taka= 3% (n=3)
Monthly treatment cost (Tk)	Continuous	7355.77 ±5804.113	5000.00 5000	2000-9000 taka= 71% (n=74) 9000-16000 taka= 21% (n=22) 16000-23000 taka= 4% (n=4) Above 23000 taka= 4% (n=4)

4.1.1 Age

Among the 104 Children in the research, the minimum age was 24 months, and the maximum age was 135 months. The mean was 45.51, the median was 36.00, the mode was 24, and the standard deviation was ±25.757.

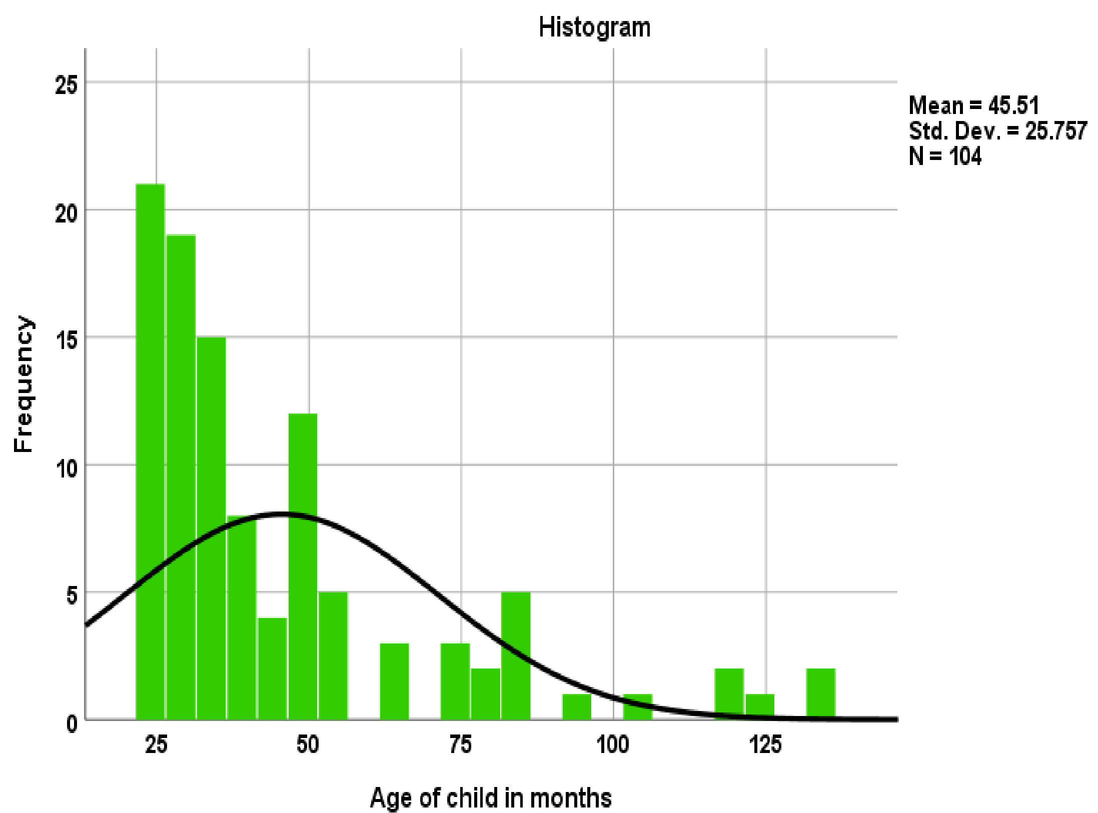


Figure 1(a): Age of the Children (Histogram)

In this research, majority of the children 81% (n=84) were between 2 to 5 years of age, followed by 13% (n=14) were between 5 to 8 years of age and 6% (n=6) were between 8-12 months of age.

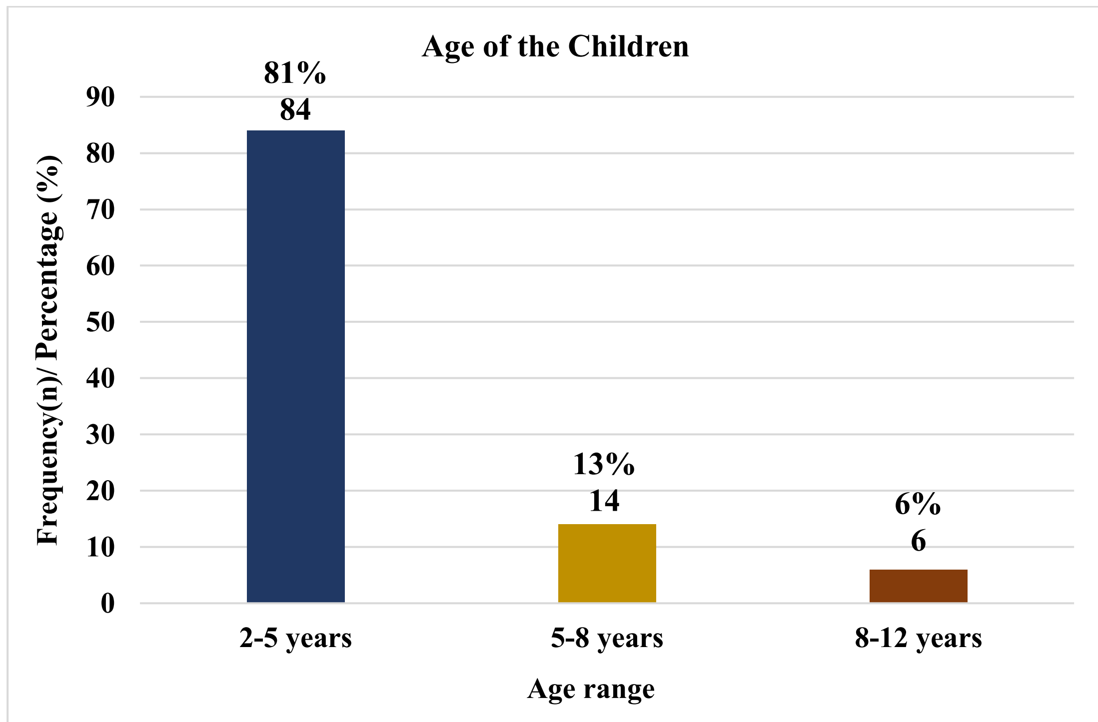


Figure 1(b): Age of the Children

4.1.2 Gender

Among the 104 Children's 57% (n=59) were boys and 43% (n=45) were girls.

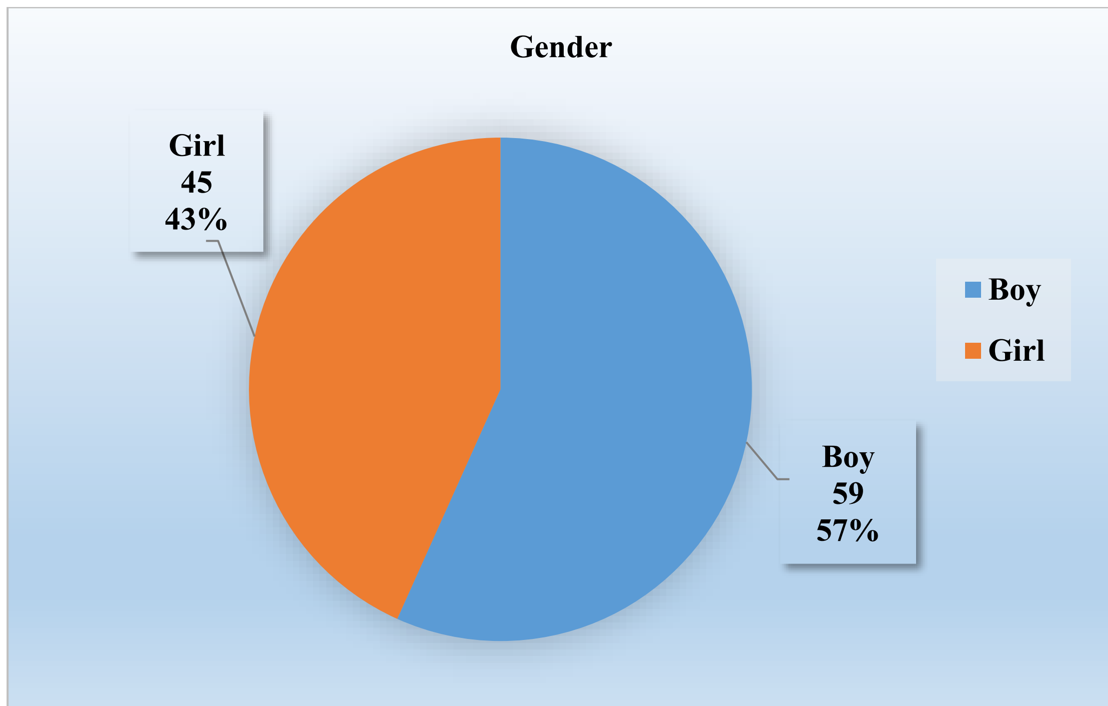


Figure 2: Gender of the Children

4.1.3 Mother's education level

Among the 104 participants 20% (n=21) were primary, 39% (n=41) were secondary, 19% (n=20) were SSC, 12% (n=12) were HSC, and 10% (n=10) were graduate.

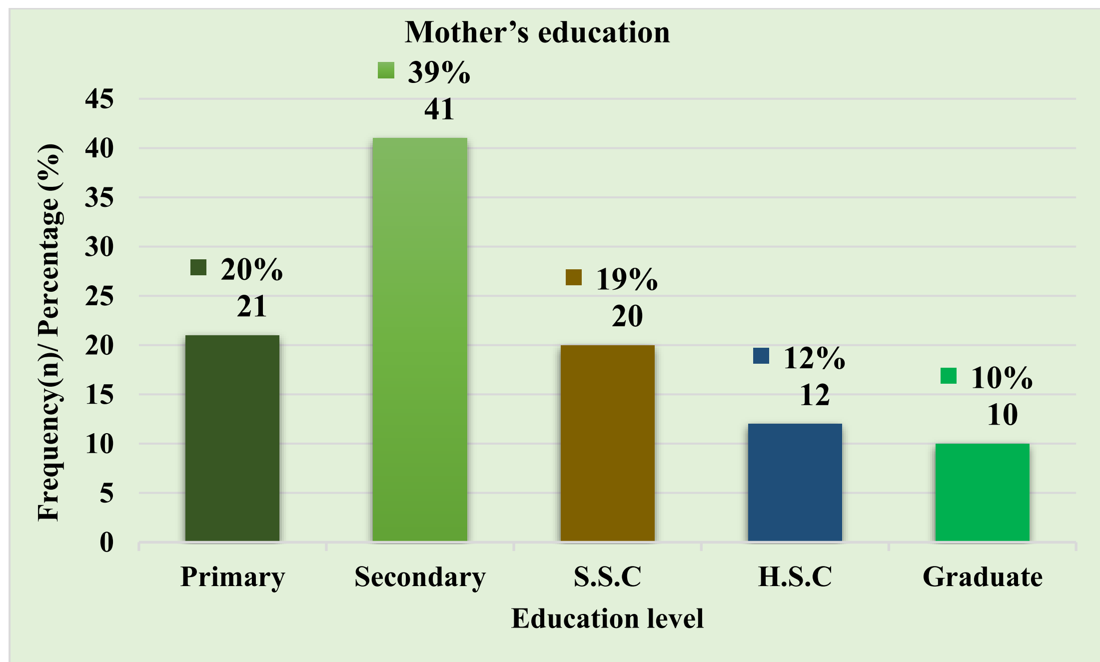


Figure 3: Mother's education level

4.1.4 Mother's occupation

Among 104 participants, 97% (n=101) were housewife, 1% (n=1) were service holders, and 2% (n=2) were others, such as teacher.

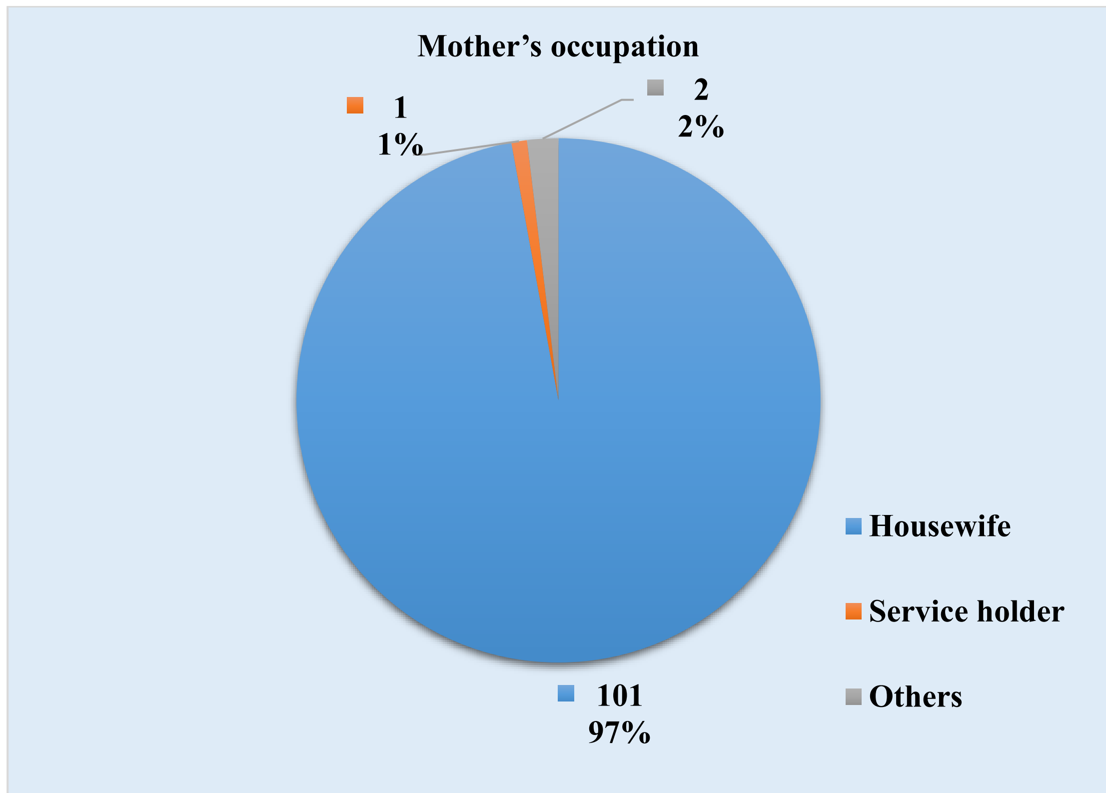


Figure 4: Mother's occupation

4.1.5 Residential area

Among the 104 participants, 22% (n=23) were urban, 13% (n=13) were semi-urban, and 65% (n=68) were rural.

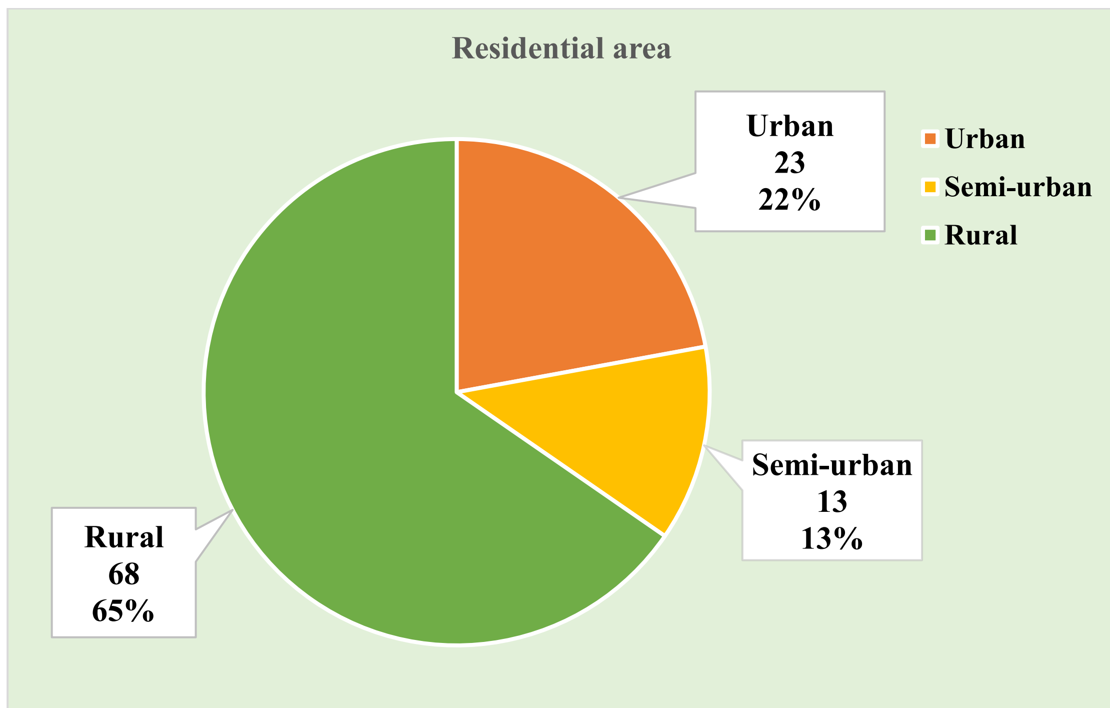


Figure 5: Residential area

4.1.6 Religion

Among the 104 participants, 92% (n=96) were Muslim and 8% (n=8) were Hindu.

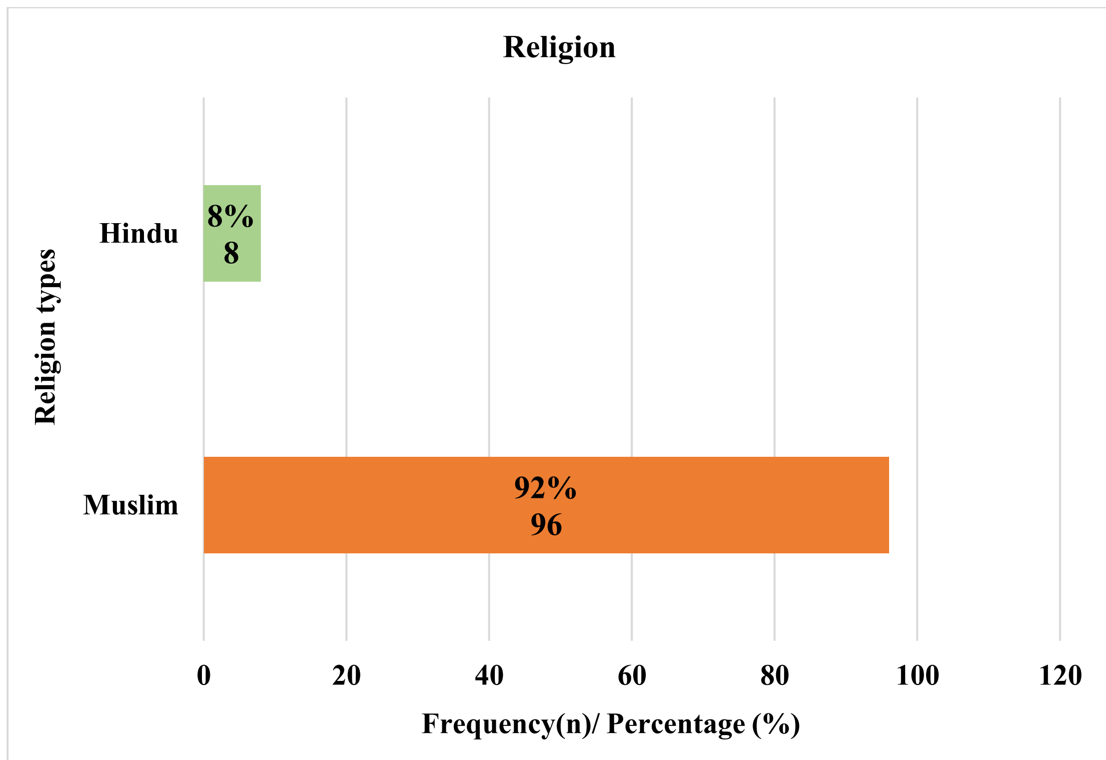


Figure 6: Religion

4.1.7 Number of family members

Among the 104 participants, in the research, the minimum family members were 3 and the maximum family members were 8. The mean was 4.20, the median was 4.00, the mode was 3, and the standard deviation was ±1.177

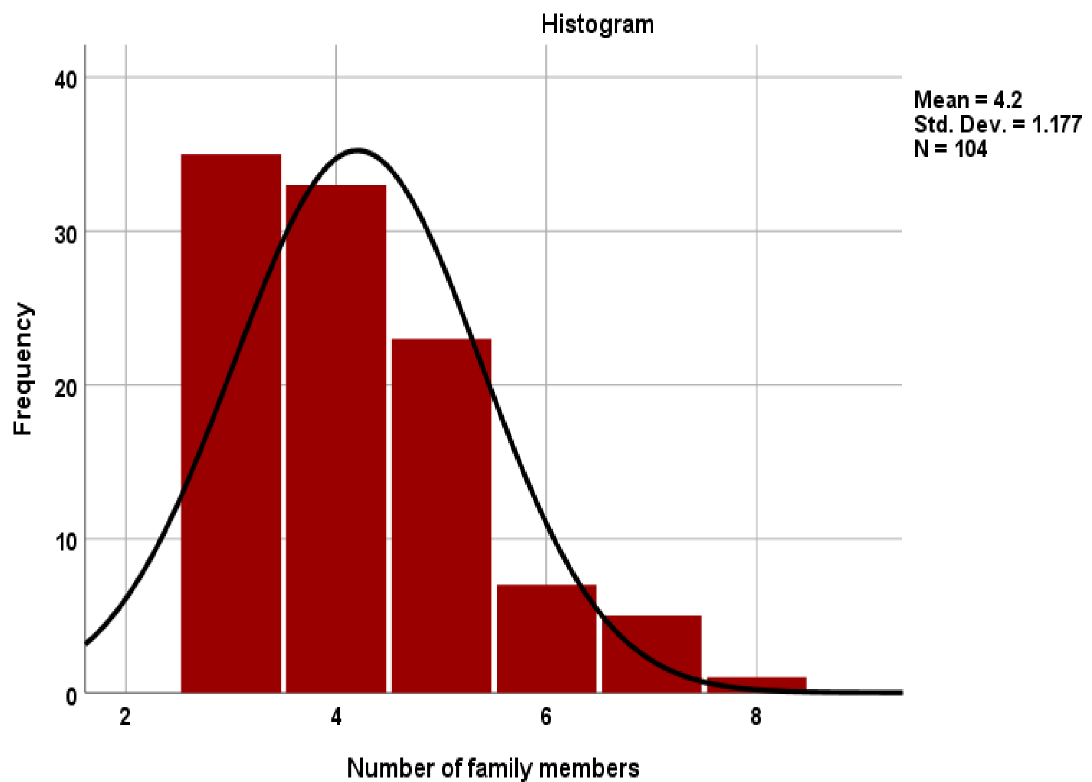


Figure 7(a): Number of family members (Histogram)

In this research, majority number of family members (n=91) 87.5% were between 3-5 person, followed by (n=12) 11.5% were between 5-7 person, and (n=1) 1% were between 7-9 person.

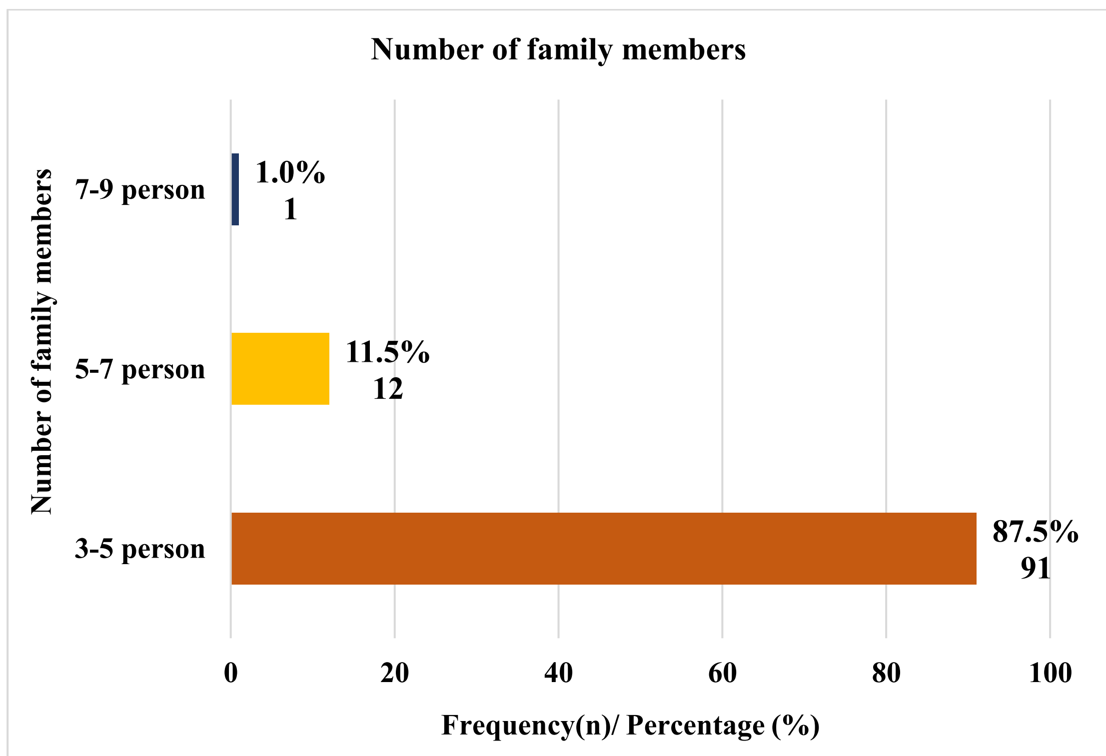


Figure 7(b): Number of family members

4.1.8 Family types

Among 104 participants, 19% (n=20) lived in joint family and 81% (n=84) lived in nuclear family.

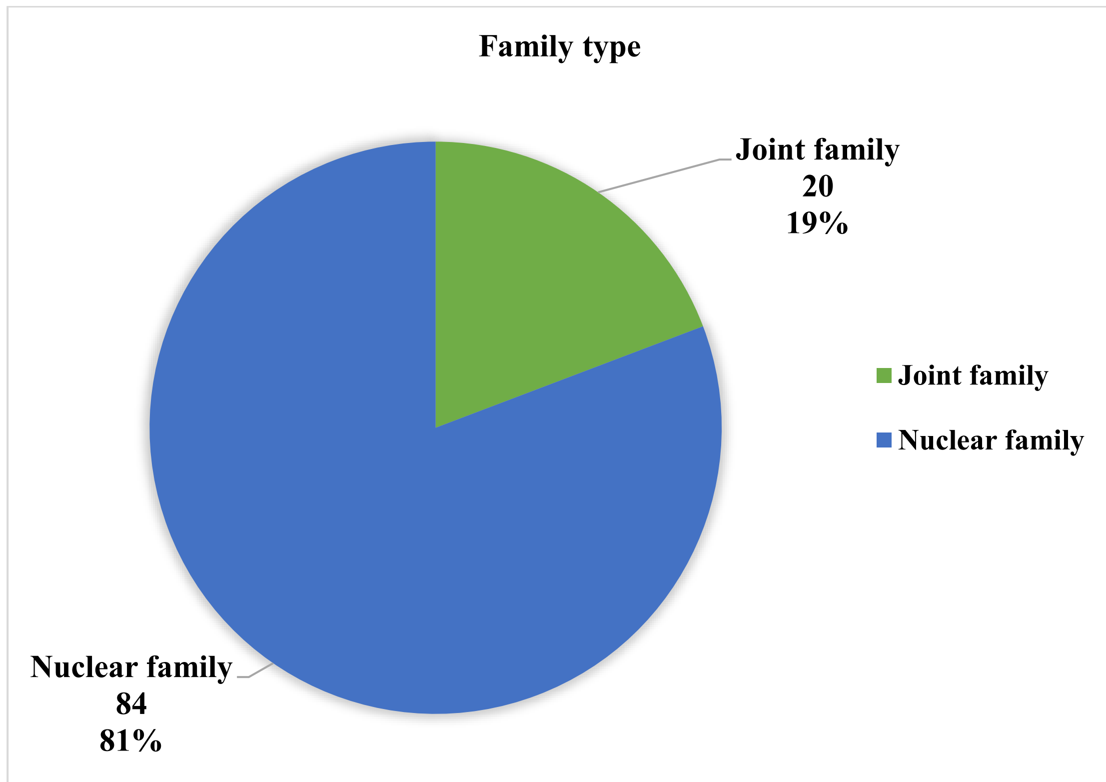


Figure 8: Family types

4.1.9 Monthly income

Among the 104 participants in the research, the minimum monthly income was 5000, and the maximum monthly income was 200000. The mean was 24413.46, the median was 24000.00, the mode was 30000, and the standard deviation was ±19916.627.

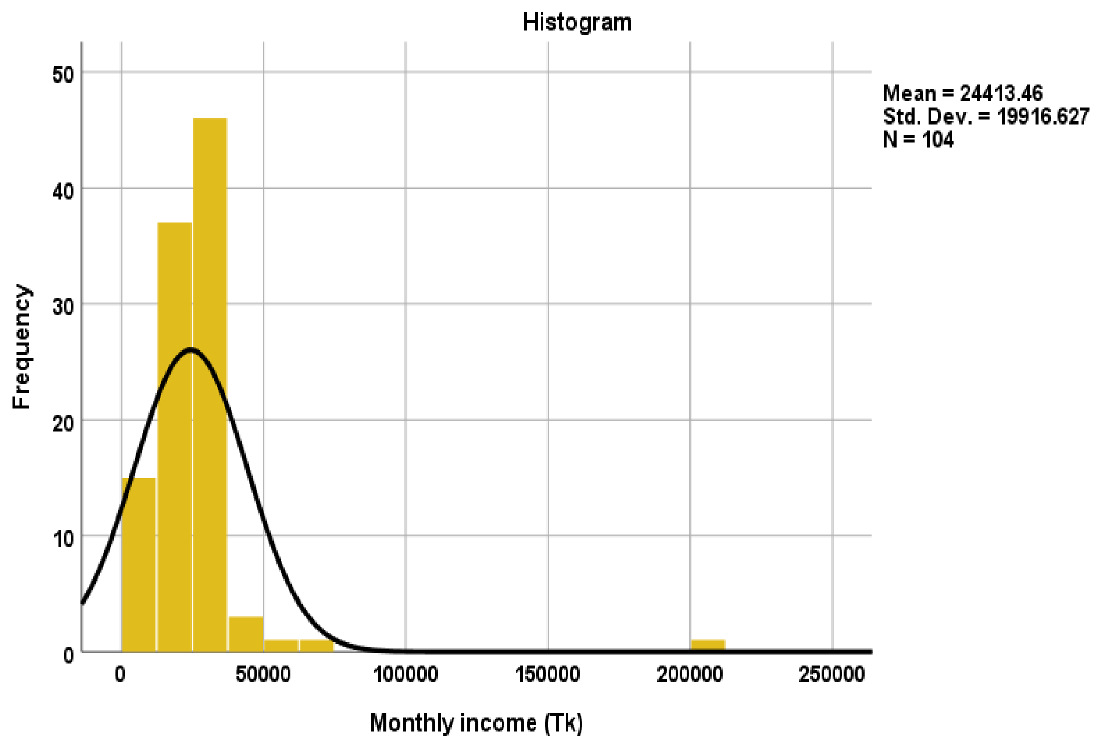


Figure 9(a): Monthly income (Histogram)

In this research, majority of the respondents (n=51) 49% were between 5000-20000 taka per months family income, followed by (n=47) 45% were between 20000-35000 taka per months, (n=3) 3% were between 35000-50000 taka per months, and (n=3) 3% were above 50000 taka per months family income.

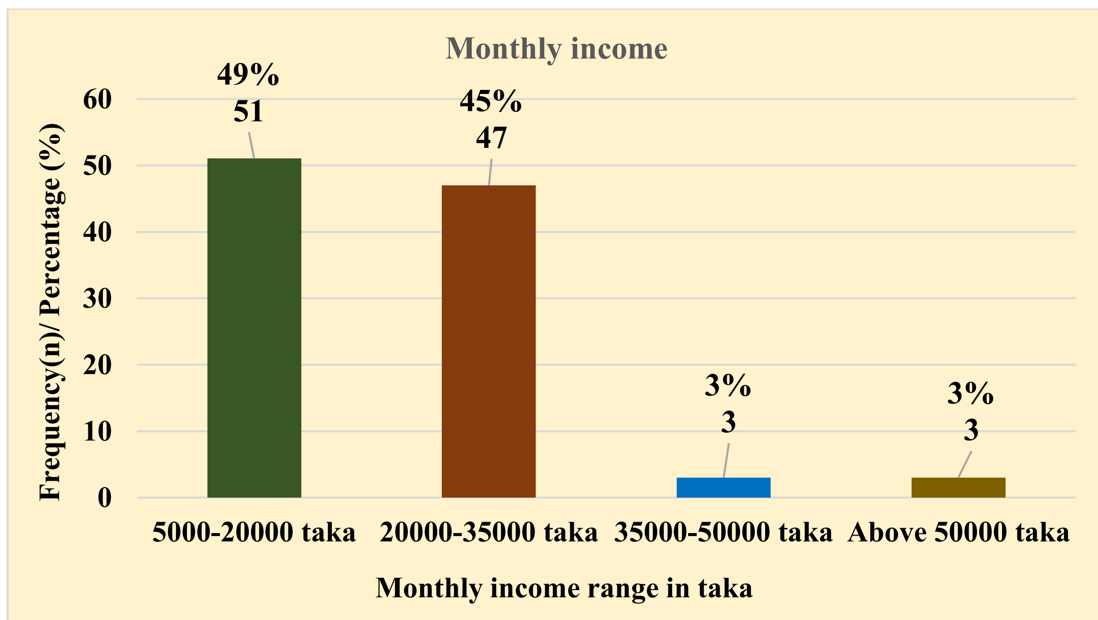


Figure 9(b): Monthly income

4.1.10 Monthly treatment cost

Among the 104 participants in the research, the minimum monthly treatment cost was 2000, and the maximum monthly treatment cost was 30000. The mean was 7355.77, the median was 5000.00, the mode was 5000, and the standard deviation was ±5804.113.

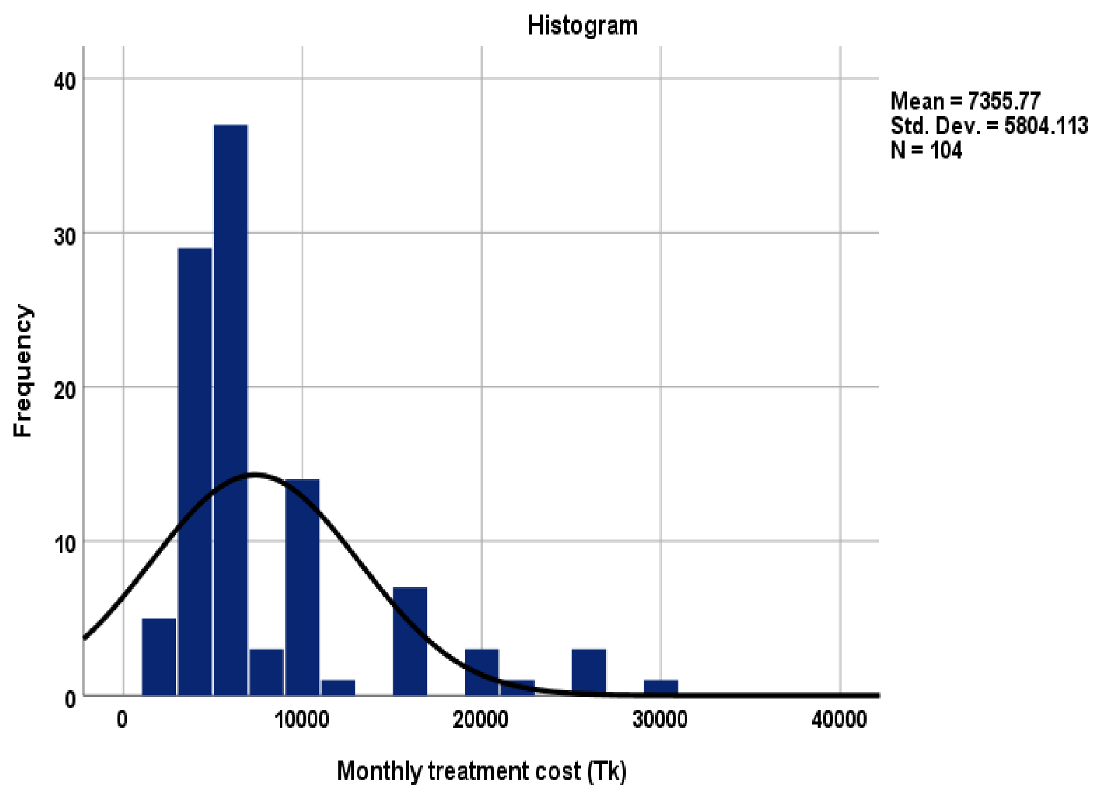


Figure 10(a): Monthly treatment cost (Histogram)

In this research, majority of the respondents (n=74) 71% were between 2000-9000 taka per months treatment cost, followed by (n=22) 21% were between 9000-16000 taka per months, (n=4) 4% were between 16000-23000 taka per months, and (n=4) 4% were above 23000 taka per months treatment cost.

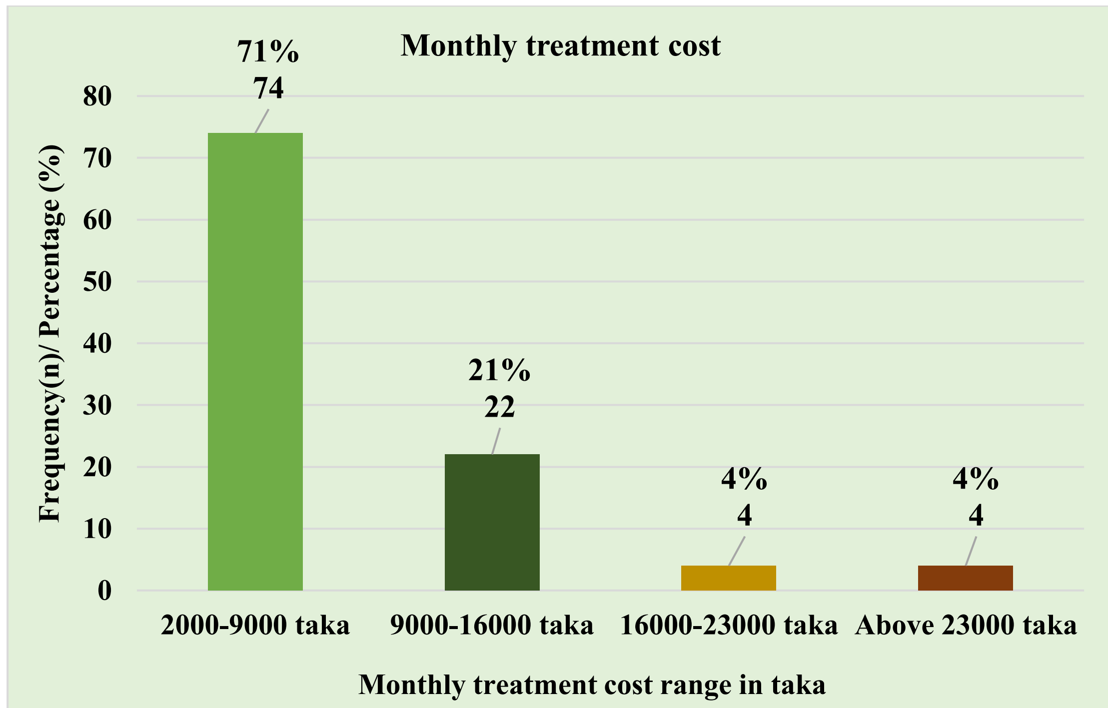


Figure 10(b): Monthly treatment cost

4.2 Subject characteristics

Table 2: Subject characteristics

Variable	Types of variables	Percentage (%) / Frequency(n)
Type of CP	Nominal	Spastic diplegia= 18% (n=19) Spastic hemiplegia= 17% (n=18) Spastic quadriplegia= 39% (n=41) Ataxic= 9% (n=9) Dyskinetic= 11% (n=11) Mixed= 6% (n=6)
Type of delivery	Nominal	Normal vaginal delivery= 57% (n=59) C-section delivery= 43% (n=45)
GMFCS level	Ordinal	GMFCS I= 3% (n=3) GMFCS II= 14% (n=15) GMFCS III= 54% (n=56) GMFCS IV= 23% (n=24) GMFCS V= 6% (n=6)
Gestational age	Nominal	Preterm= 19% (n=20) Term= 6% (n=6) Post-term= 75% (n=78)
Presence of epilepsy	Nominal	Yes= 49% (n=51) No=51% (n=53)
Anti-epileptic drug use	Nominal	Yes= 50% (n=52) No= 50% (n=52)
Anti-spasticity drug use	Nominal	Yes= 62.5% (n=65) No= 37.5% (n=39)
Vision status	Ordinal	Normal= 80% (n=83) Impaired= 20% (n=21)
Hearing status	Ordinal	Normal= 92% (n=96) Impaired= 8% (n=8)
Comorbid conditions	Nominal	Jaundice= 29% (n=30) Dehydration= 1% (n=1)

		Pneumonia= 26% (n=27) Hydrocephalus= 3% (n=3) Seizures= 41% (n=43)
Child sleeps alone	Nominal	Yes= 0% (n=0) No= 100% (n=104)
How child falls asleep	Nominal	Feeding= 17% (n=18) Physical touch (rocking, patting, holding)= 36% (n=37) Playing (grasping toys)= 2% (n=2) None= 44% (n=46) Others= 1% (n=1)
Wears orthotic at night during sleep	Nominal	Yes= 5% (n=5) No= 95% (n=99)
Mother snores	Nominal	Yes= 22% (n=23) No= 78% (n=81)
Diet pattern	Nominal	Consistent= 33% (n=34) Varies= 67% (n=70)
Food allergy	Nominal	Yes= 20% (n=21) No= 80% (n=83)
Allergy affects sleep	Nominal	Yes= 1.9% (n=2) No= 98.1% (n=102)
Gastrointestinal problem present	Nominal	Yes= 10.6% (n=11) No= 89.4% (n=93)
Sugar before sleeping	Nominal	Yes= 20% (n=21) No= 80% (n=83)
Sleep environment	Nominal	Noise= 27.9% (n=29) Poor lighting= 34.6% (n=36) Uncomfortable temperature= 3.8% (n=4) None= 33.7% (n=35)
Hyperactivity before sleep	Nominal	Yes= 45% (n=47) No= 55% (n=57)
Fear of dark or being alone	Nominal	Yes= 67% (n=70) No= 33% (n=34)

4.2.1 Types of cerebral palsy

Among the 104 participants of the mothers responded that their children 18% (n=19) were spastic diplegia, 17% (n=18) were spastic hemiplegia, 39% (n=41) were spastic quadriplegia, 9% (n=9) were ataxic, 11% (n=11) were dyskinetic and 6% (n=6) were mixed.

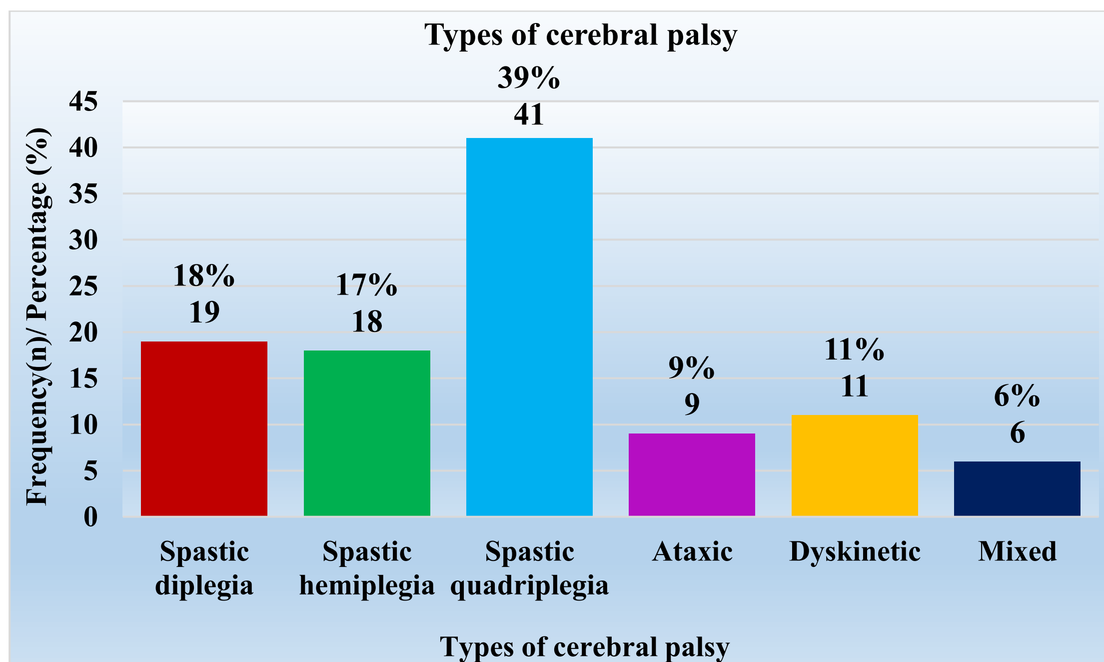


Figure 11: Types of cerebral palsy

4.2.2 Types of delivery

Among the 104 participants of the mothers responded that 57% (n=59) had a normal vaginal delivery and 43% (n=45) had a cesarian section.

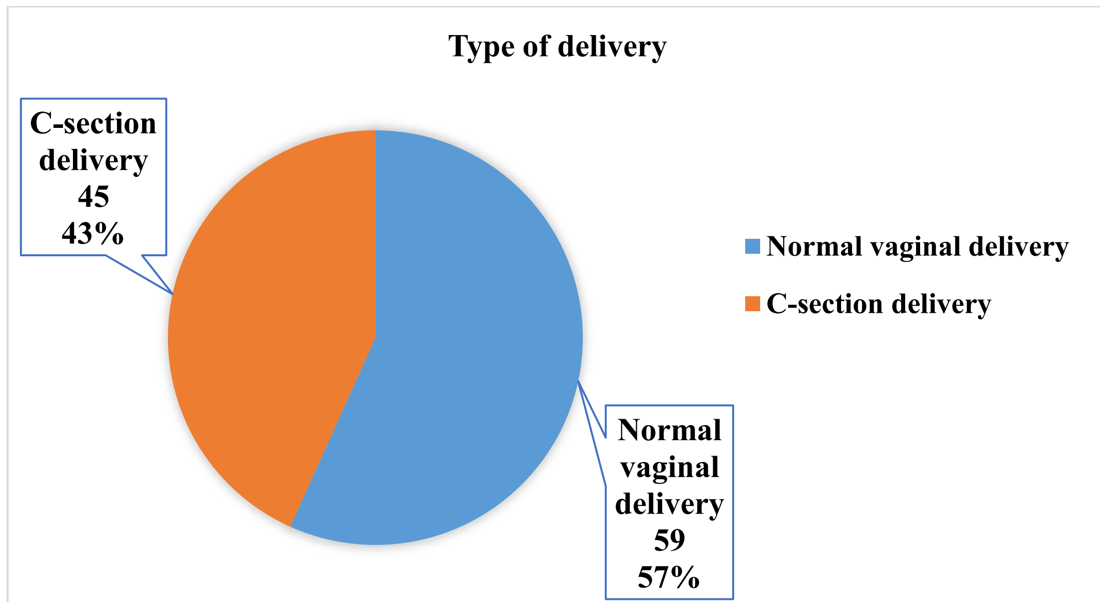


Figure 12: Types of delivery

4.2.3 GMFCS level

Among 104 children, GMFCS I was 3% (n=3), GMFCS II was 14% (n=15), GMFCS III was 54% (n=56), GMFCS IV was 23% (n=24), and GMFCS V was 6% (n=6).

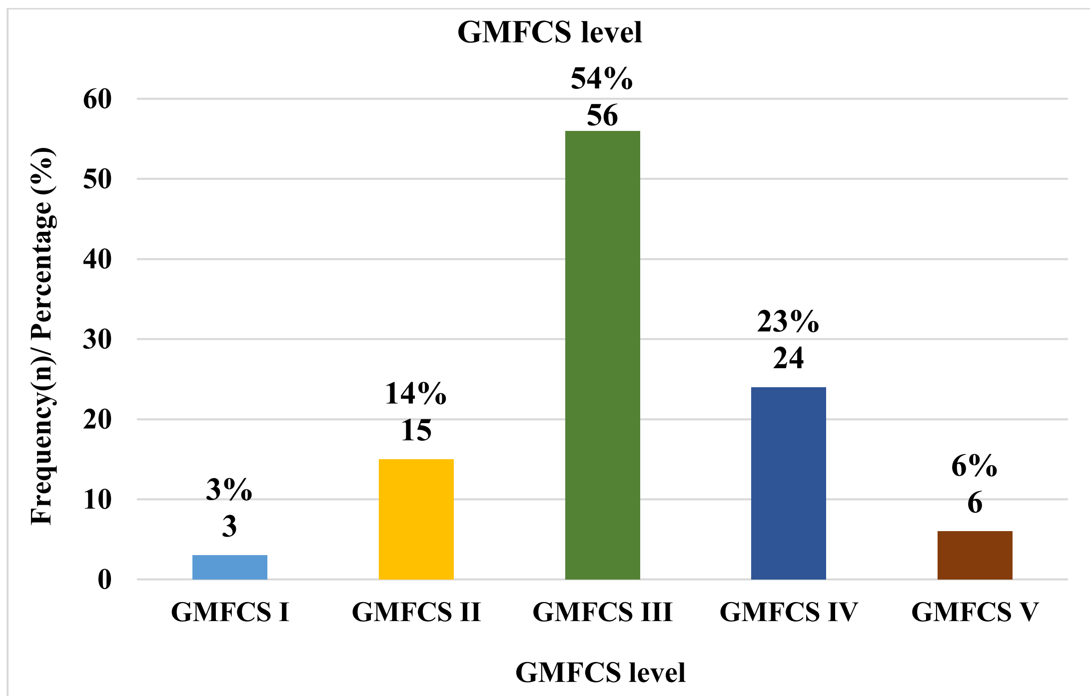


Figure 13: GMFCS level

4.2.4 Gestational age

Among 104 participants, 19% (n=20) were preterm, 75% (n=78) were term, and 6% (n=6) were post-term.

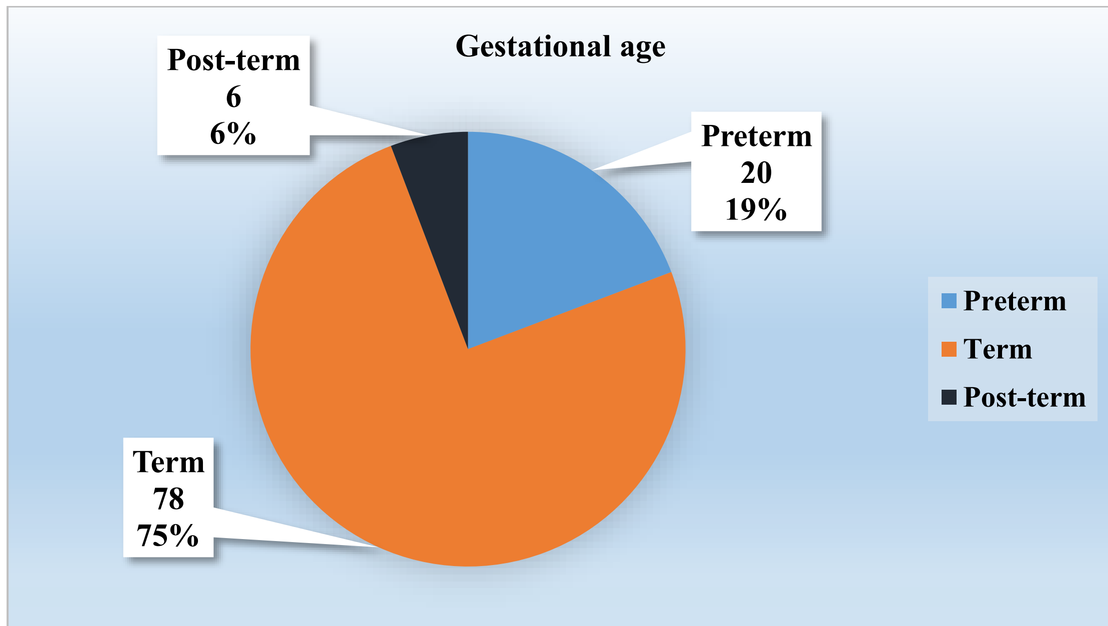


Figure 14: Gestational age

4.2.5 Presence of epilepsy

Among 104 children, 49% (n=51) had epilepsy whereas 51% (n=53) didn't.

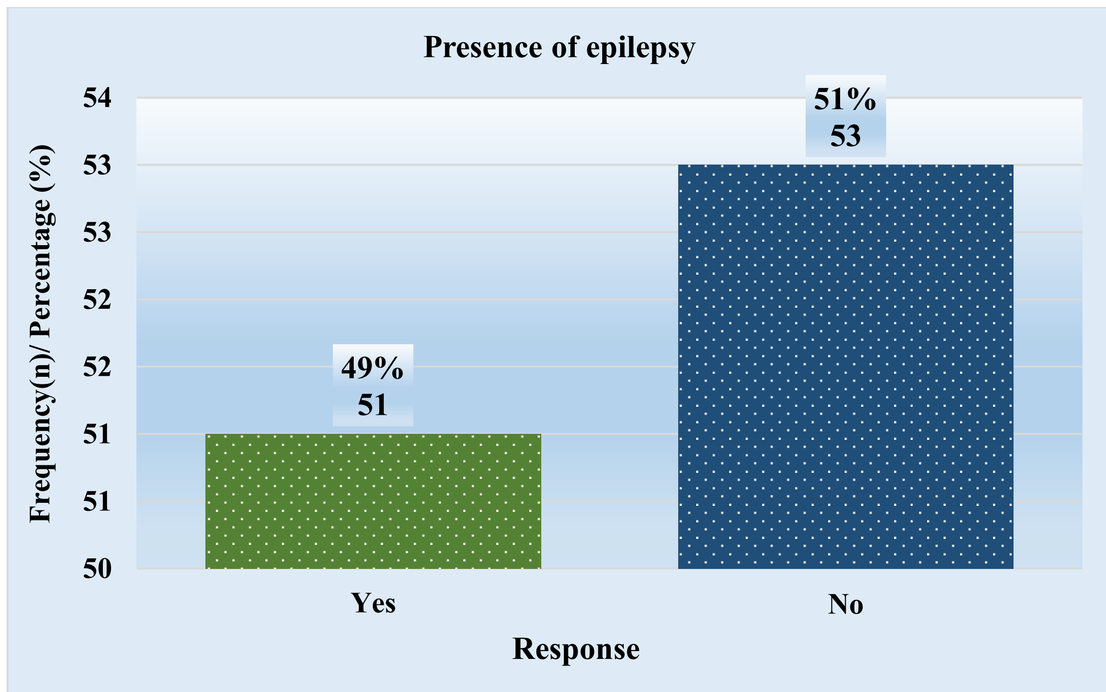


Figure 15: Presence of epilepsy

4.2.6 Anti-epileptic drug use

Among 104 children, 50% (n=52) took anti-epileptic drugs and 50% (n=52) didn't.

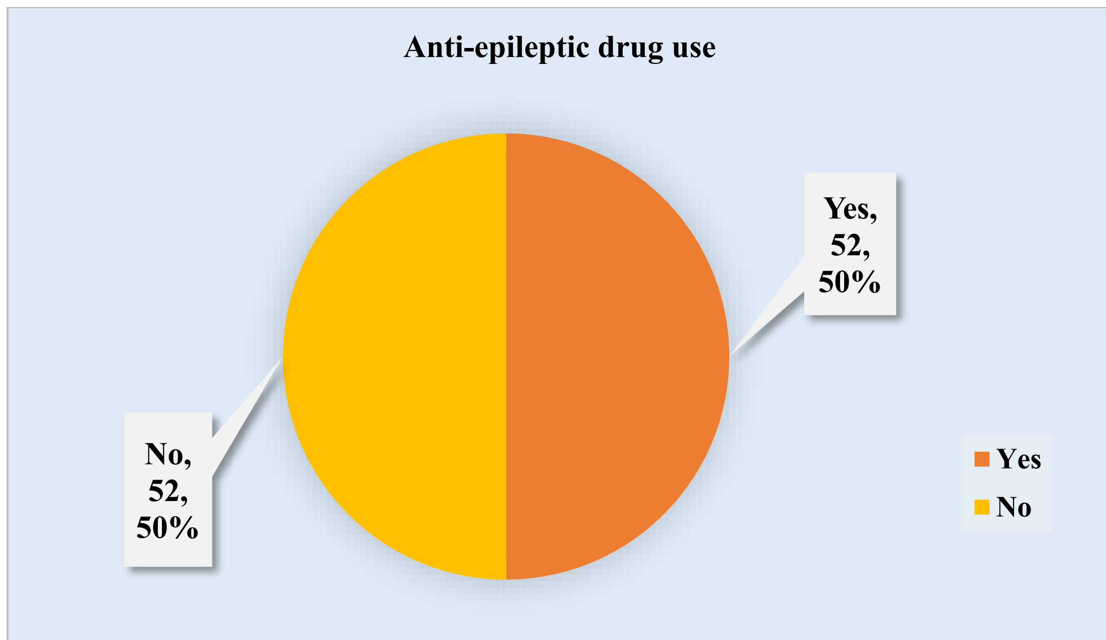


Figure 16: Anti-epileptic drug use

4.2.7 Anti-spasticity drug use

Among 104 children, 62.5% (n=65) took anti-spasticity drugs and 37.5% (n=39) didn't.

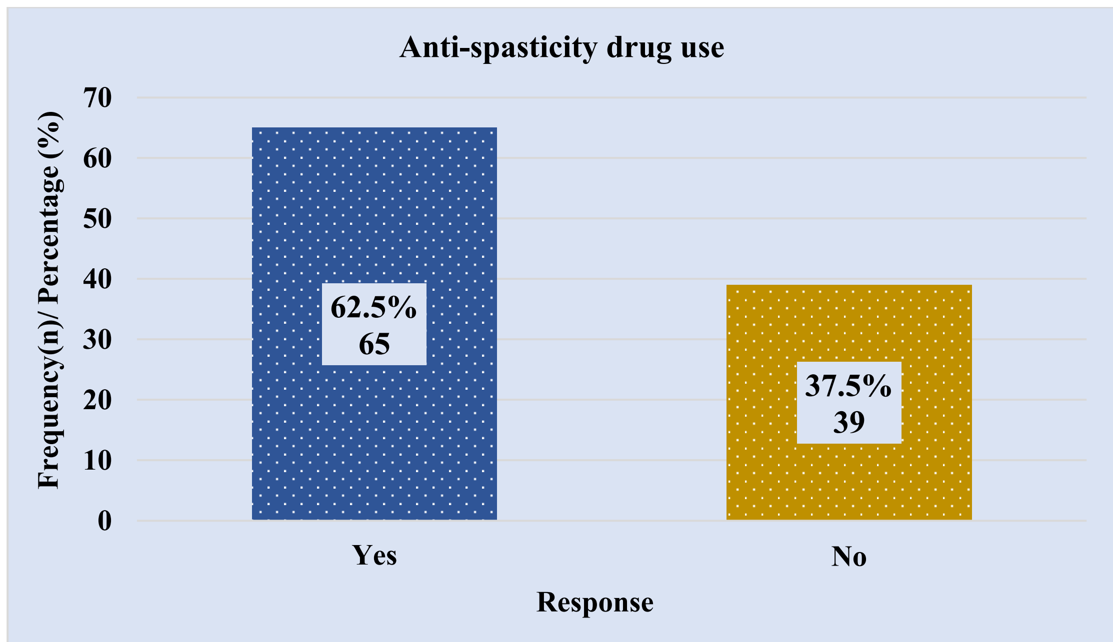


Figure 17: Anti-spasticity drug use

4.2.8 Vision status

Among 104 children, the vision status was normal in 80% (n=83) and 20% (n=21) were impaired.

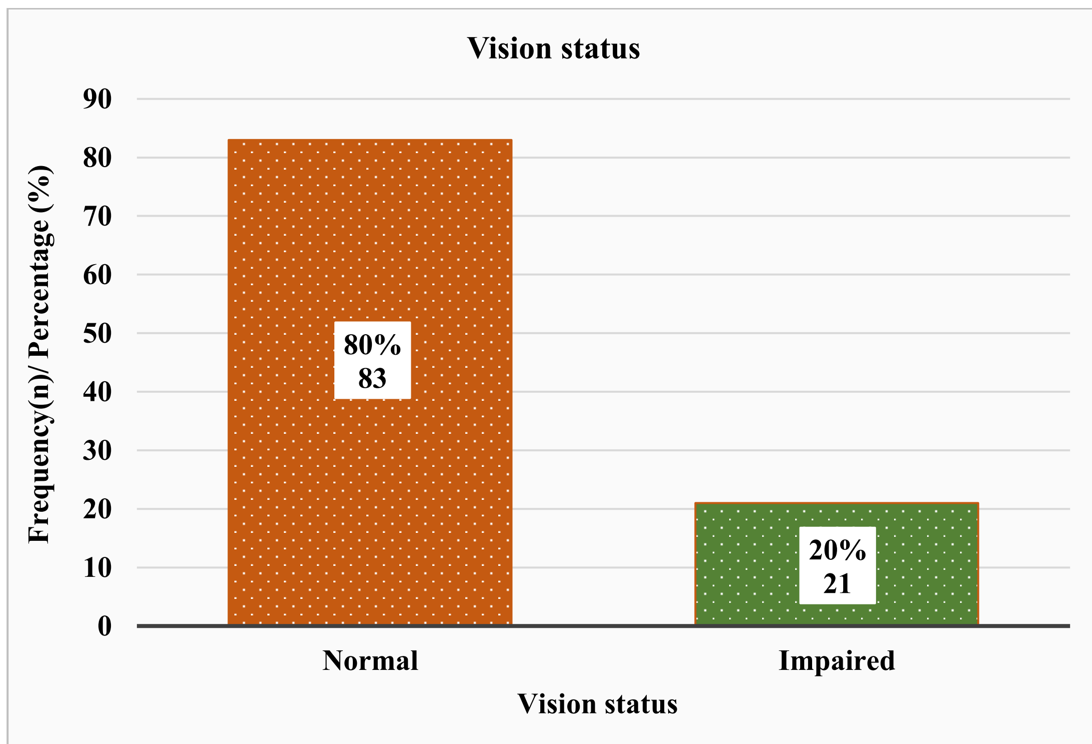


Figure 18: Vision status

4.2.9 Hearing status

Among 104 children, the hearing status was normal in 92% (n=96), and 8% (n=8) were impaired.

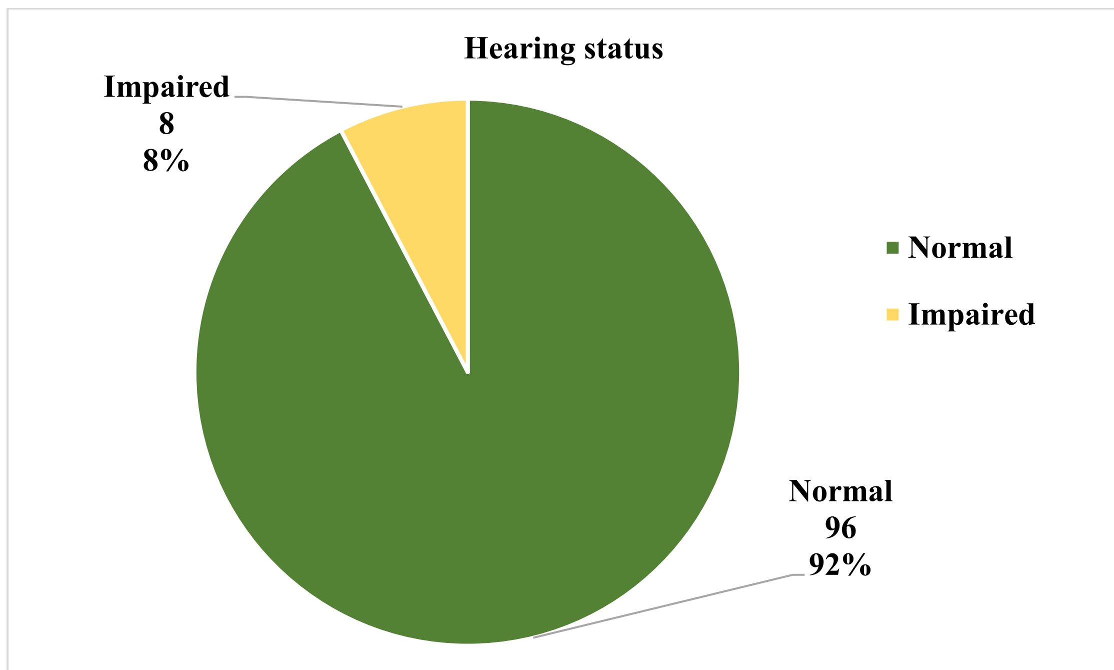


Figure 19: Hearing status

4.2.10 Comorbid conditions

Among 104 children, 29% (n=30) had jaundice, 1% (n=1) had dehydration, 26% (n=27) had pneumonia, 3% (n=3) had hydrocephalus, and 41% (n=43) had seizures.

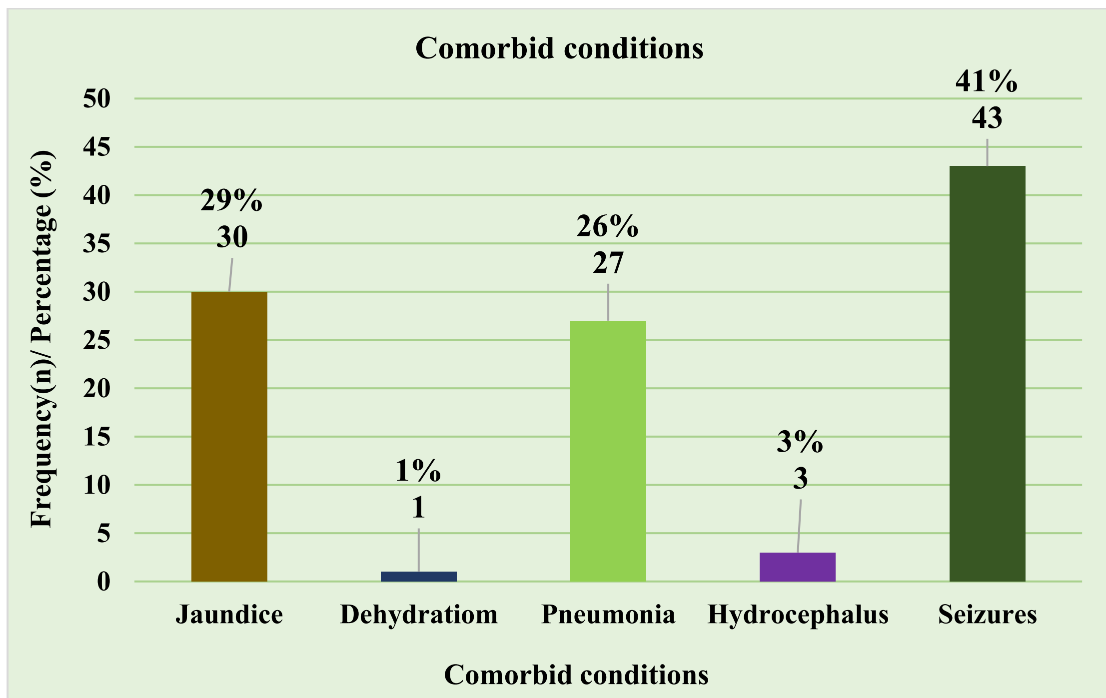


Figure 20: Comorbid conditions

4.2.11 Child sleeps alone

In this study about 100% (n=104) of the mothers responded that their children sleep with them and 0% (n=0) sleep alone.

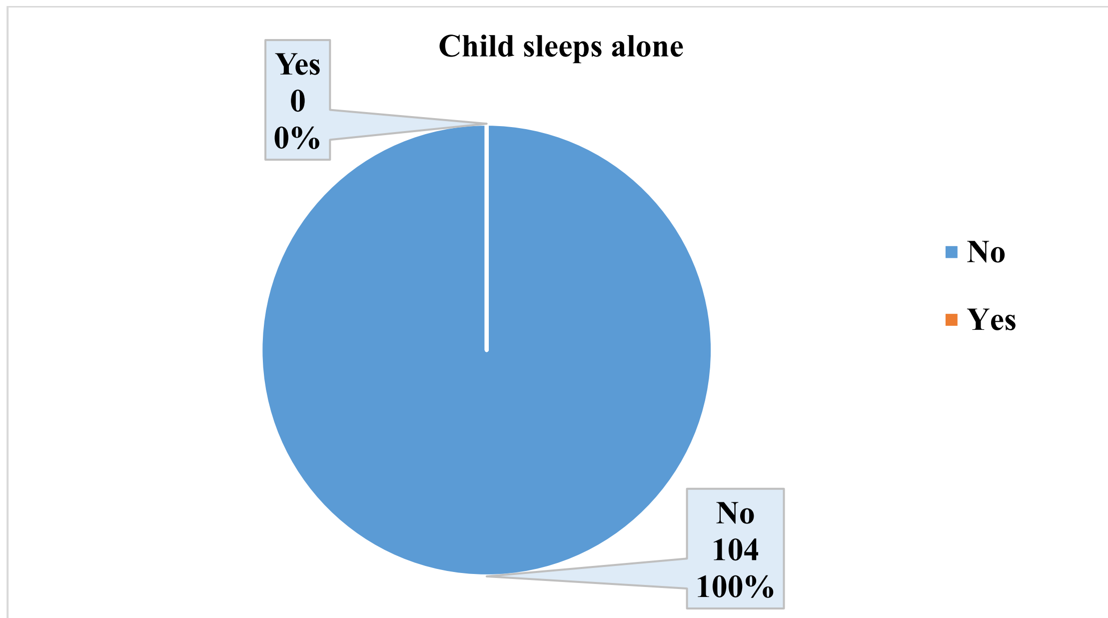


Figure 21: Child sleeps alone

4.2.12 How child falls asleep

In this study mothers responded that about 17% (n=18) of children fall asleep while feeding, 36% (n=37) through physical touch (rocking, patting, holding), 2% (n=2) by grasping their toys, 44% (n=46) were none, and 1% (n=1) was others such as listening to stories.

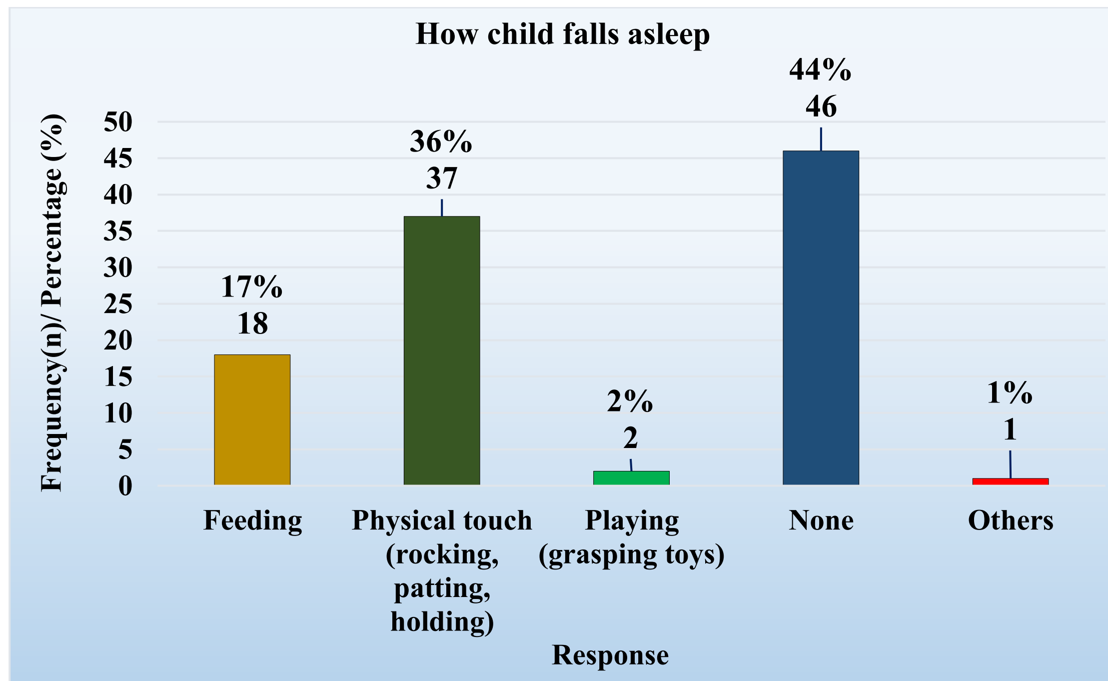


Figure 22: How child falls asleep

4.2.13 Wears orthotic at night during sleep

In this study about 5% (n=5) of the mothers responded that their children wore orthotic at night during sleep and 95% (n=99) did not.

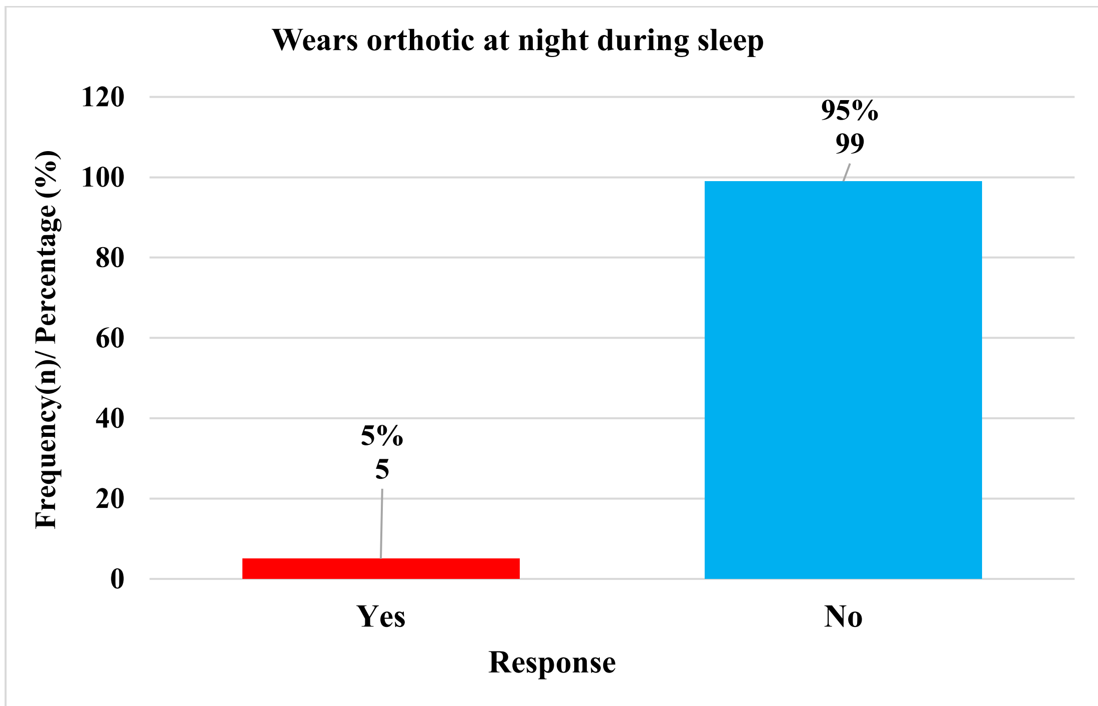


Figure 23: Wears orthotic at night during sleep

4.2.14 Mother snores

Among 104 participants, most (78%; n=81) responded that they snored during sleep while the remaining responded (22%; n=23) that they did not.

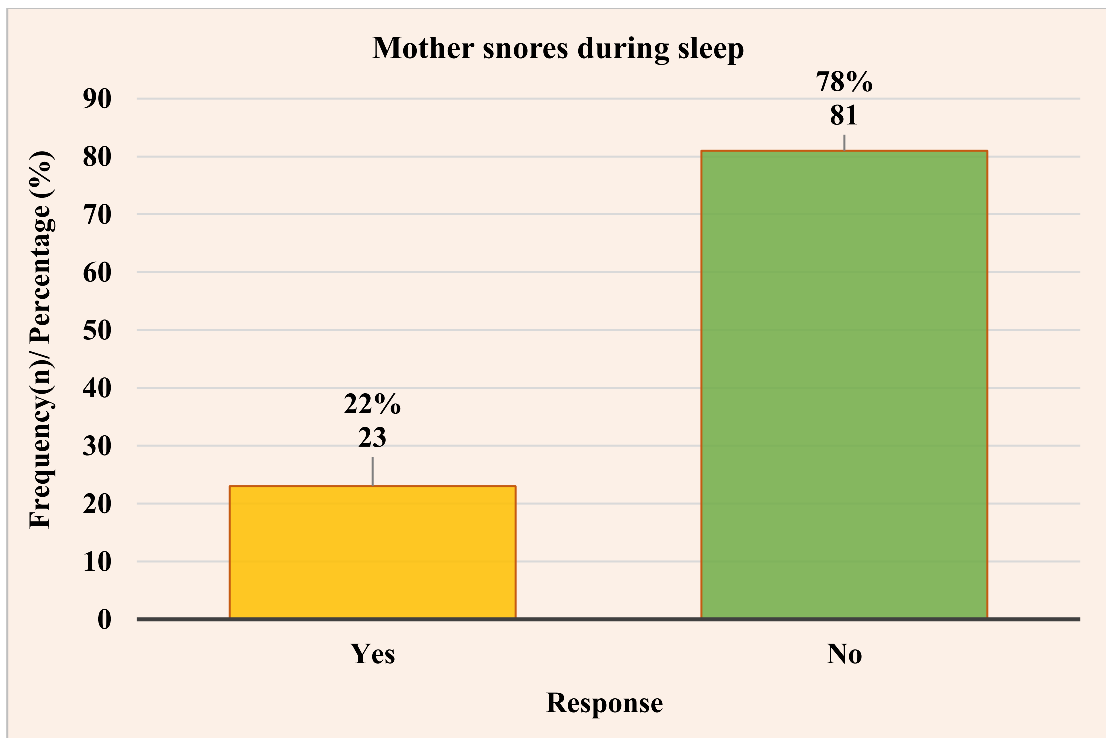


Figure 24: Mother snores

4.2.15 Diet pattern

Among 104 participants, 33% (n=34) of the mothers responded that their children consumed similar diet most of the days, whereas 67% (n=70) consumed different types of foods.

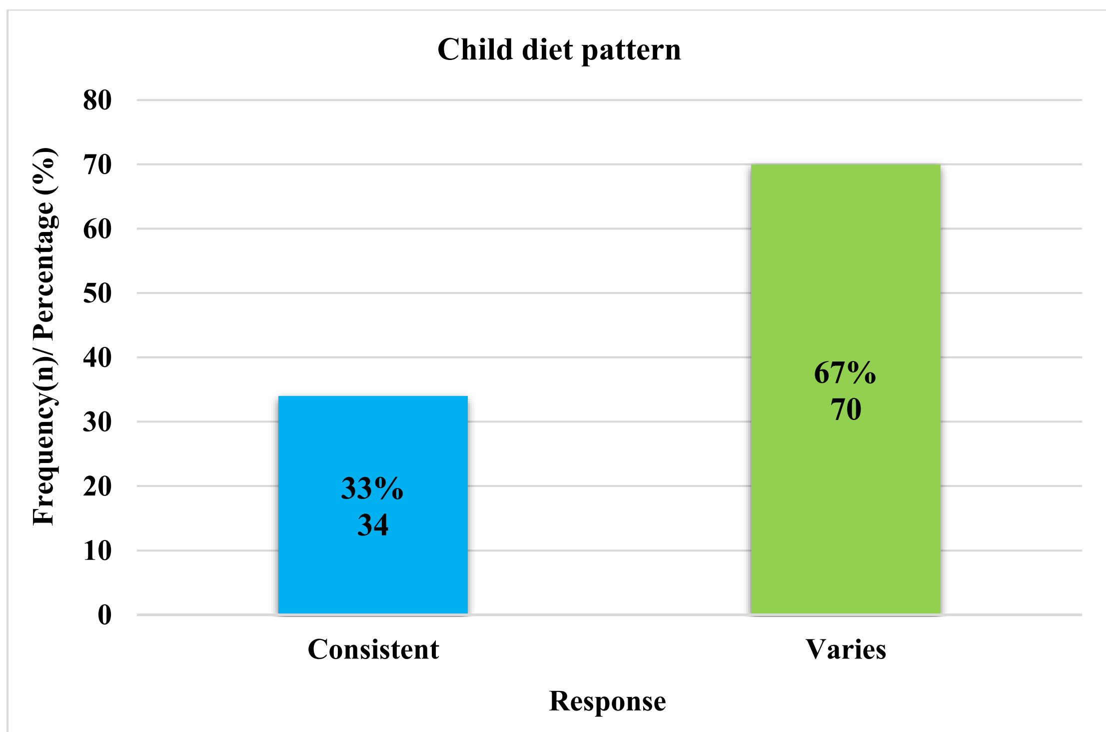


Figure 25: Diet pattern

4.2.16 Food allergy

In this study, mothers responded that about 20% (n=21) of children had a food allergy and 80% (n=83) had not.

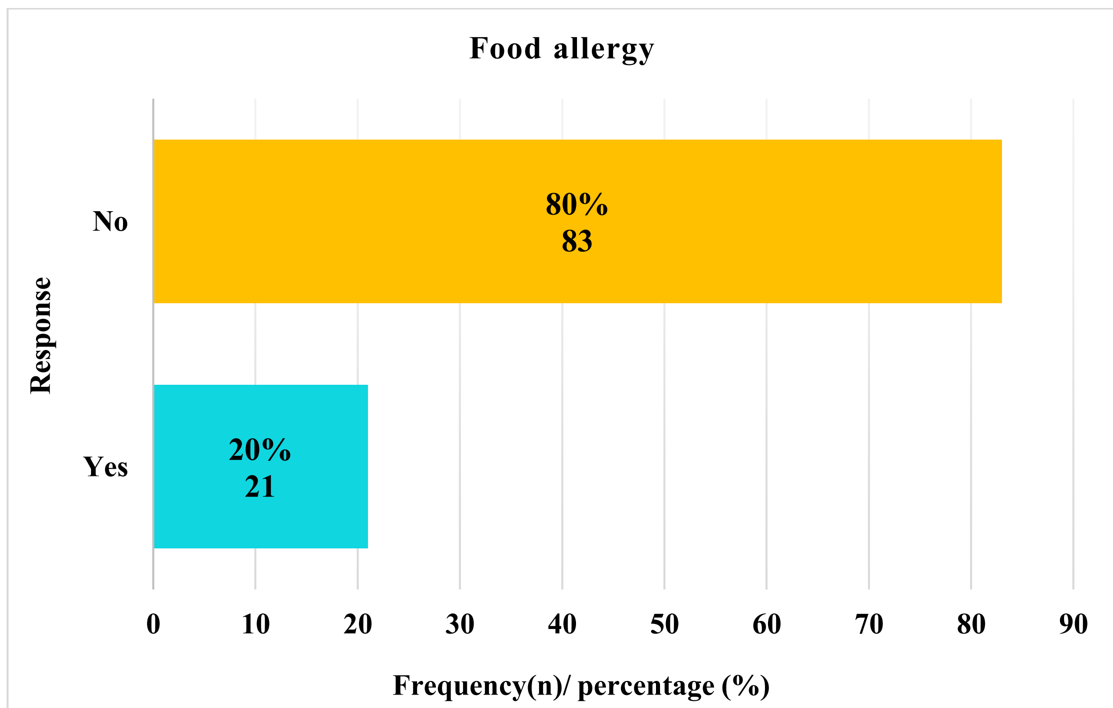


Figure 26: Food allergy

4.2.17 Allergy affects sleep

In this study, mothers responded that, about 1.9% (n=2) of children's sleep were affected by allergies and 98.1% (n=102) did not affect.

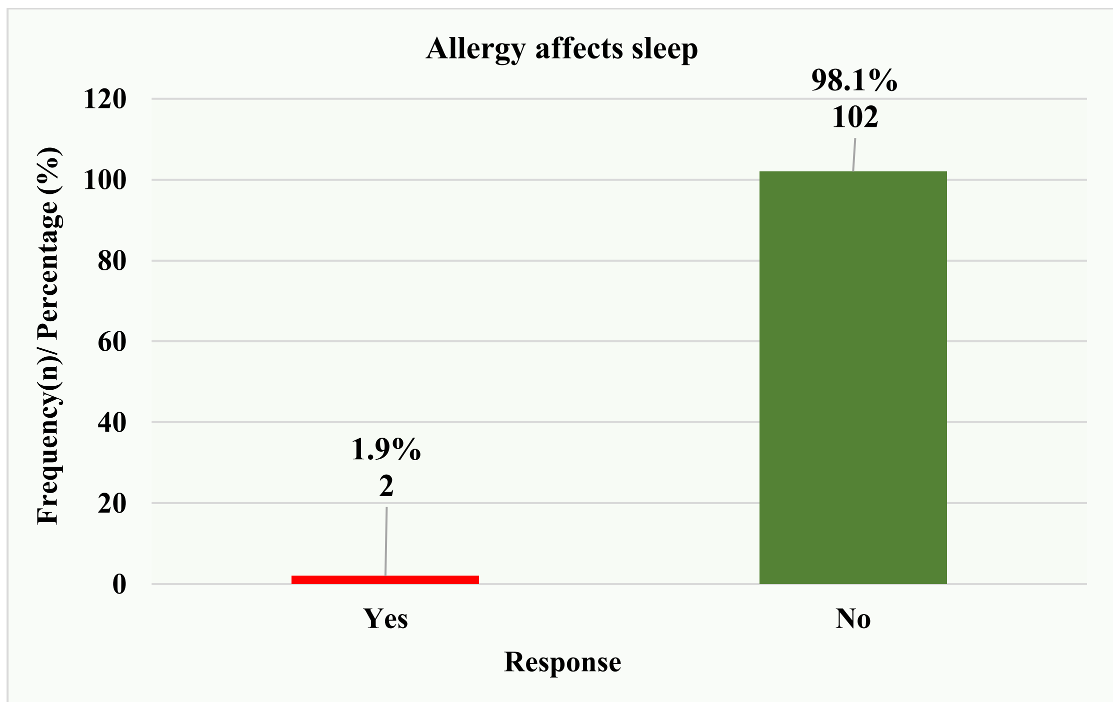


Figure 27: Allergy affects sleep

4.2.18 Gastrointestinal problem

In this study, mothers responded that, about 10.6% (n=11) of children had gastrointestinal problems and 89.4% (n=93) had not.

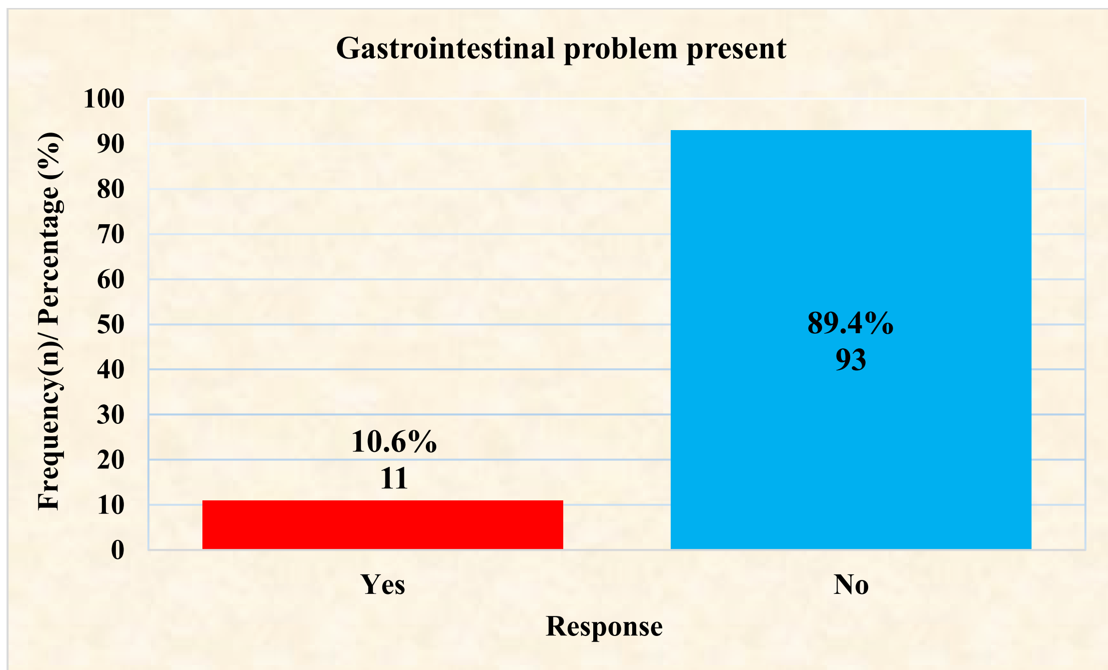


Figure 28: Gastrointestinal problem

4.2.19 Sugar before sleeping

Among 104 children, 20% (n=21) took sugar before sleep and 80% (n=83) did not.

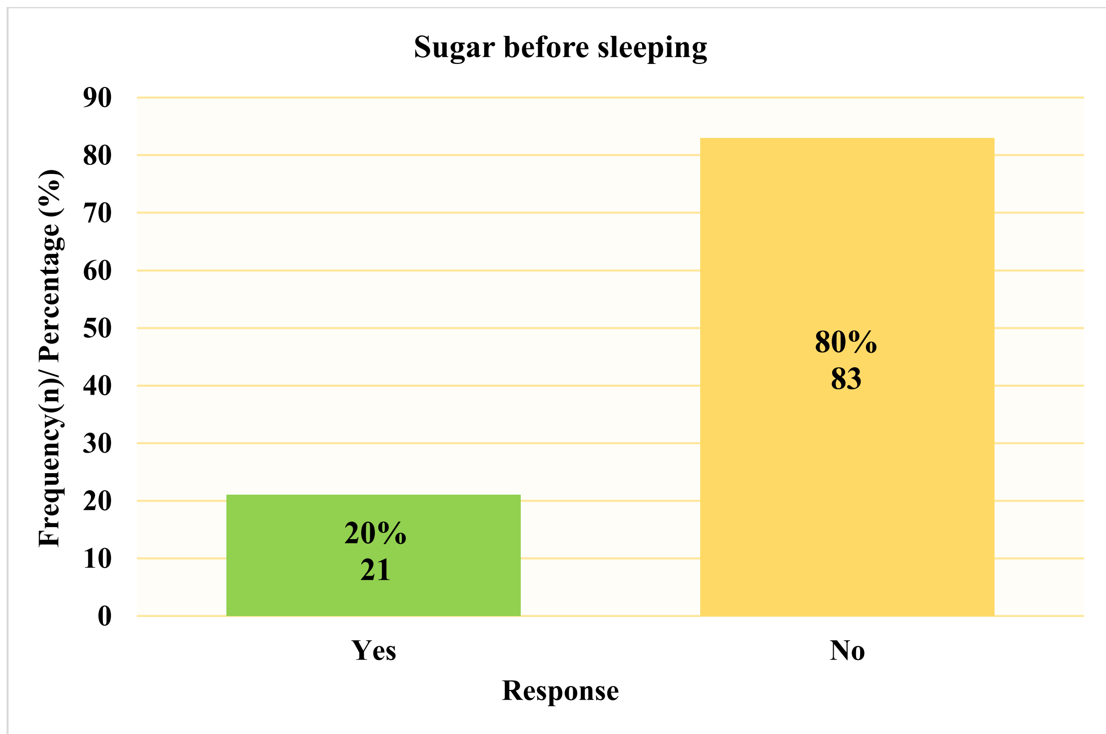


Figure 29: Sugar before sleeping

4.2.20 Sleep environment

In this study, mothers responded that, about 27.9% (n=29) of children sleeping environment were noisy, about 34.6% (n=36) were poor lighting, 3.8% (n=4) were uncomfortable temperature, and 33.7% (n=35) were none.

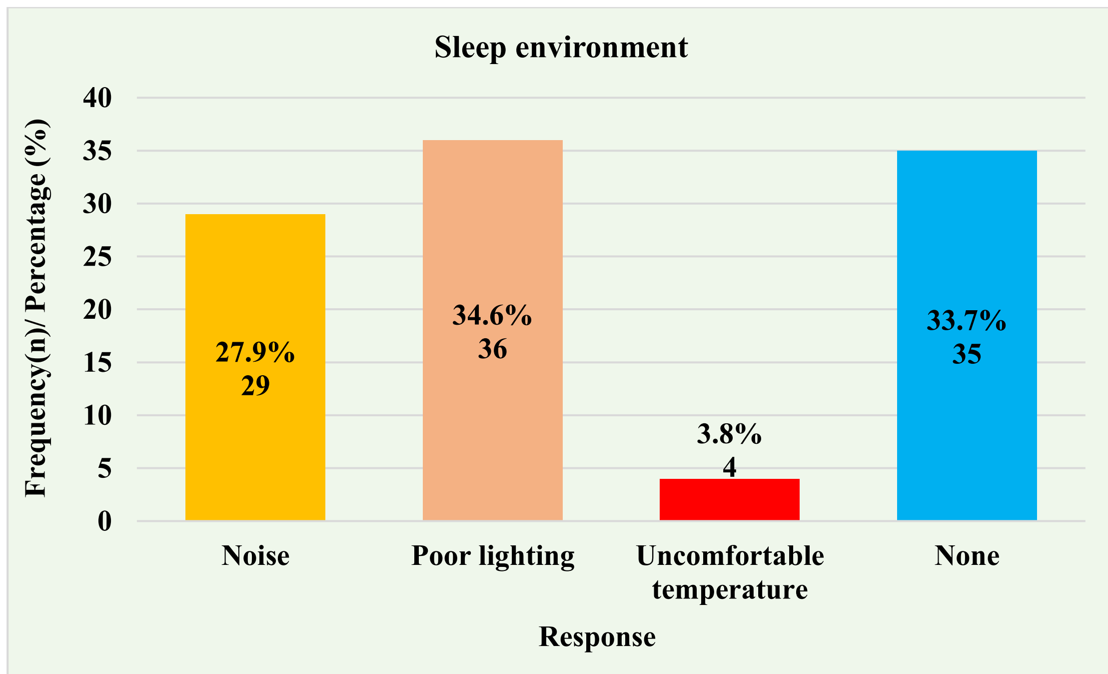


Figure 30: Sleep environment

4.2.21 Hyperactivity before sleep

In this study, mothers responded that, about 45% (n=47) of children exhibited hyperactivity before sleep and 55% (n=57) did not.

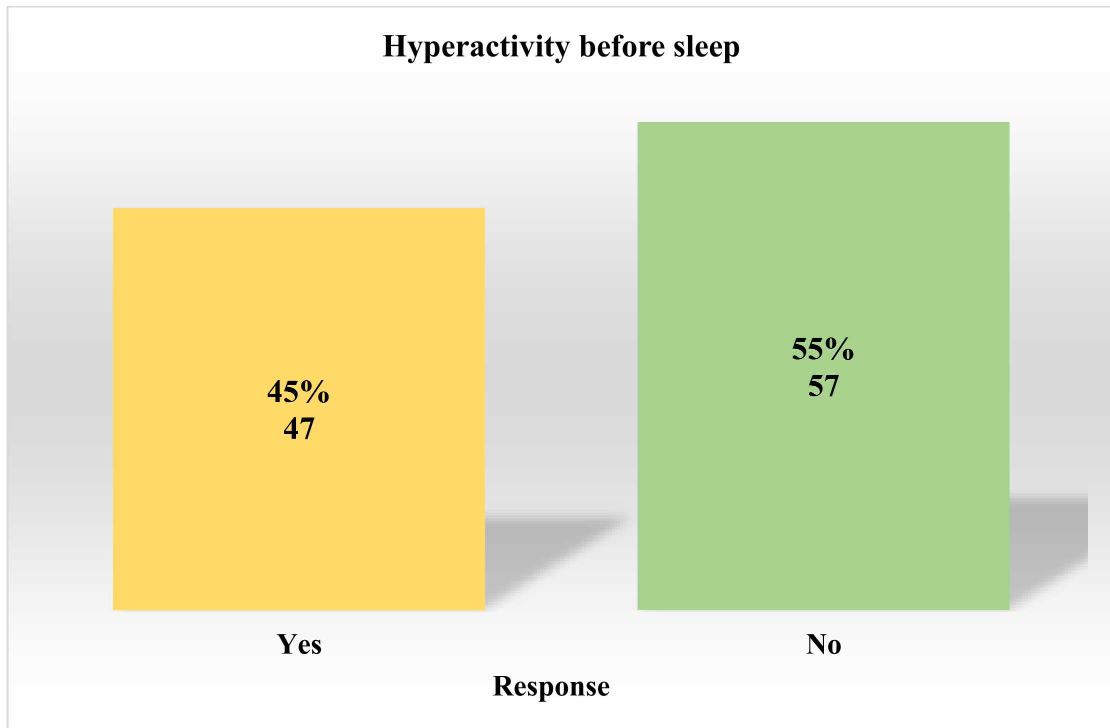


Figure 31: Hyperactivity before sleep

4.2.22 Fear of dark or being alone

Among 104 mothers, 67% (n=70) of their children had fear of dark or being alone, and 33% (n=34) weren't.

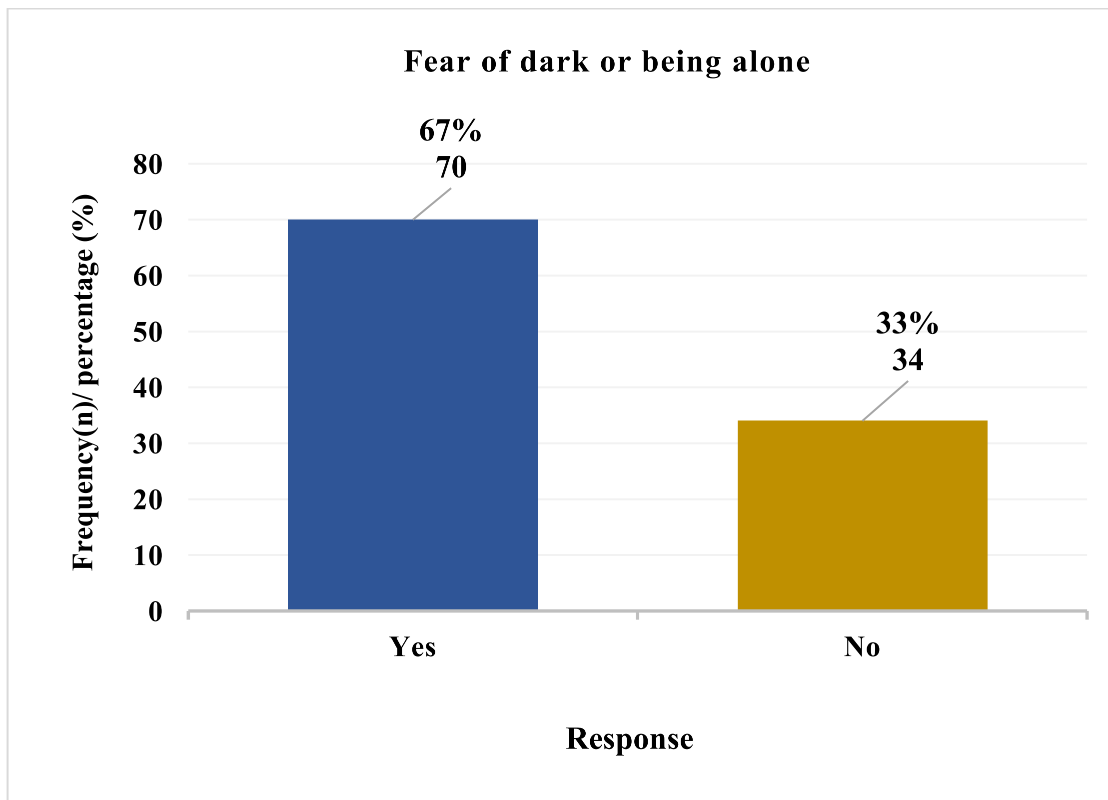


Figure 32: Fear of dark or being alone

4.3 Sleep disorders among children with cerebral palsy

Table 3: Sleep disorders among children with cerebral palsy

Variable	Frequency (n)	Percentage (%)
Sleep Disorders		
Yes	39	37.5%
No	65	62.5%

4.3.1 Sleep disorders

Based on reports from 104 mothers, 37.5% (n=39) of their children were found to have sleep disorders, while the remaining 62.5% (n=65) did not.

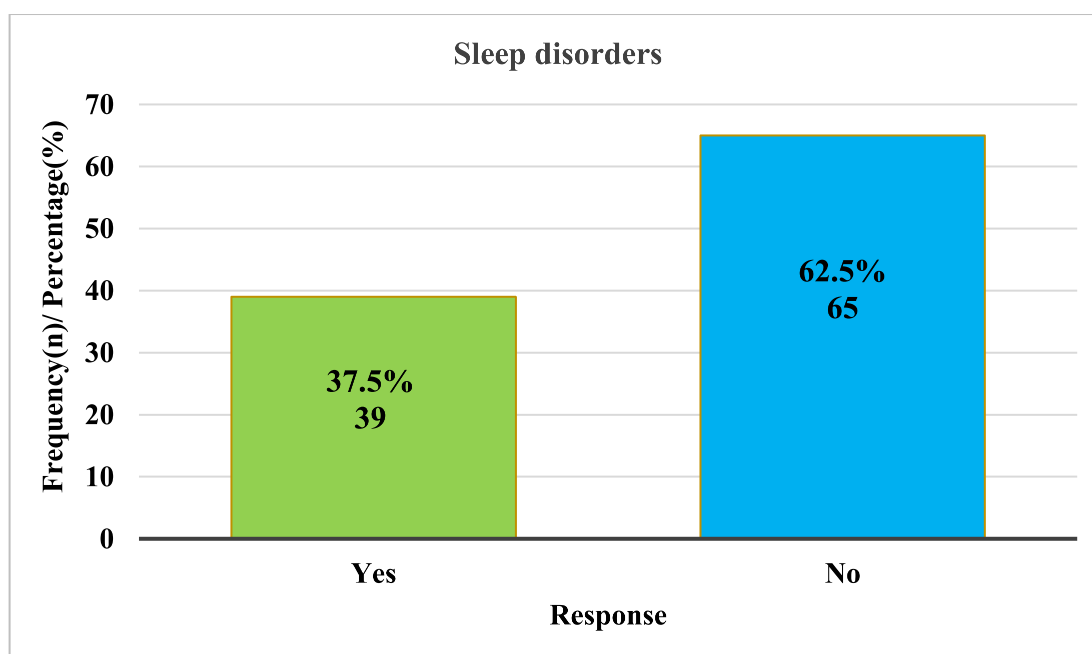


Figure 33: Sleep Disorders in Children

4.4 Association between sociodemographic information and sleep disorders among children with cerebral palsy

Table 4: Association between sociodemographic information and sleep disorders among children with cerebral palsy

Variable 1	Variable 2	Chi-Square value	Significance/ P value	Comment
Age	Sleep Disorders	0.432	0.806	No significant association found
Gender		0.755	0.385	No significant association found
Mother's education level		5.725	0.221	No significant association found
Mother's occupation		0.734	0.693	No significant association found
Residential area		1.439	0.487	No significant association found
Religion		2.311	0.128	No significant association found
No. of family members		0.725	0.696	No significant association found
Family types		0.594	0.441	No significant association found

Monthly income (Tk)	2.753	0.431	No significant association found
Monthly treatment cost (Tk)	12.043	0.001	Significant association found

Table 4 showed the association between sociodemographic information and sleep disturbances in children with cerebral palsy, evaluated using the Sleep Disturbance Scale for Children (SDSC).

The analysis showed no statistically significant correlations between sleep disorders and childrens age (Chi-square test = 0.432, p = 0.806), gender (Chi-square test = 0.755, p = 0.385), mother's education level (Chi-square test = 5.725, p = 0.221), or mother's occupation (Chi-square test = 0.734, p = 0.693). No significant relationships were found with residential area (Chi-square test = 1.439, p = 0.487), religion (Chi-square test = 2.311, p = 0.128), number of family members (Chi-square test = 0.725, p = 0.696), family type (Chi-square test = 0.594, p = 0.441), and monthly family income (Chi-square test = 2.753, p = 0.431) (p > 0.05 for all).

A statistically significant association was found between monthly treatment cost and sleep disturbances (Chi-square test = 12.043, p = 0.001). This research indicates that increased financial strain to link with the childs medical treatment may correlate with an increased risk of sleep problems.

The findings showed that, among the sociodemographic factors analysed, only monthly treatment cost had a significant correlation with sleep problems, while other variables showed no significant association.

4.5 Association between subject characteristics and sleep disorders among children with cerebral palsy

Table 5: Association between subject characteristics and sleep disorders among children with cerebral palsy

Variable 1	Variable 2	Chi-Square value	Significance/ P value	Comment
Type of CP	Sleep Disorders	4.739	0.448	No significant association found
Type of delivery		0.128	0.721	No significant association found
GMFCS level		9.656	0.047	Significant association found
Gestational age		0.539	0.764	No significant association found
Presence of epilepsy		1.603	0.205	No significant association found
Anti-epileptic drug use		2.010	0.156	No significant association found
Anti-spasticity drug use		1.994	0.158	No significant association found
Vision status		0.004	0.950	No significant association found

Hearing status	2.311	0.128	No significant association found
Comorbid conditions	10.495	0.033	Significant association found
How child falls asleep	13.355	0.010	Significant association found
Wears orthotic at night during sleep	0.686	0.407	No significant association found
Mother snores	0.093	0.760	No significant association found
Diet pattern	11.198	0.001	Significant association found
Effect of food allergy on sleep	3.989	0.046	Significant association found
Gastrointestinal problem present	0.007	0.934	No significant association found
Sugar before sleeping	4.332	0.037	Significant association found
Sleep environment	13.611	0.003	Significant association found
Hyperactivity before sleep	0.934	0.334	No significant association found

Fear of dark or being alone	0.012	0.914	No significant association found

Table 5 showed the association between subject characteristics and sleep disturbances in children with cerebral palsy, assessed using the Sleep Disturbance Scale for Children (SDSC).

The analysis showed no statistically significant correlations between sleep disorders and various factors, including type of cerebral palsy (Chi-square = 4.739, p = 0.448), type of delivery (Chi-square = 0.128, p = 0.721), gestational age (Chi-square = 0.539, p = 0.764), presence of epilepsy (Chi-square = 1.603, p = 0.205), use of anti-epileptic drugs (Chi-square = 2.010, p = 0.156), use of anti-spasticity drugs (Chi-square = 1.994, p = 0.158), vision status (Chi-square = 0.004, p = 0.950), hearing status (Chi-square = 2.311, p = 0.128), Wears orthotic at night during sleep (Chi-square = 0.686, p = 0.407), mother snoring (Chi-square = 0.093, p = 0.760), gastrointestinal problem present (Chi-square = 0.007, p = 0.934), hyperactivity before to sleep (Chi-square = 0.934, p = 0.334), and fear of darkness or being alone (Chi-square = 0.012, p = 0.914) ($p > 0.05$ for all).

Statistically findings were identified between sleep disorders and GMFCS level (Chi-square = 9.656, p = 0.047), comorbid conditions (Chi-square = 10.495, p = 0.033), how child falls asleep (Chi-square = 13.355, p = 0.010), diet pattern (Chi-square = 11.198, p = 0.001), problems sleeping due to allergies (Chi-square = 3.989, p = 0.046), sugar consumption before sleeping (Chi-square = 4.332, p = 0.037), and sleep environment (Chi-square = 13.611, p = 0.003).

The data showed significant relationships with GMFCS level, comorbidities, how child falls asleep, diet pattern, problems sleeping due to allergies, sugar consumption before sleeping, and sleep environmental ($p < 0.05$). On the other hand, no significant relationships were observed with type of cerebral palsy, type of delivery, gestational age, epilepsy status, use of anti-epileptic drugs, use of anti-spasticity drugs, vision status, hearing status, mother snoring, gastrointestinal problems, hyperactivity before sleep, and fear of darkness or being alone ($p > 0.05$).

CHAPTER – V DISCUSSION

The purpose of this study was to determine the characteristics and related factors for sleep disorders in children with cerebral palsy (CP) from their mothers reported. The various sociodemographic factors, subject characteristics under study, exerted several significant associations with the sleep disorders. Below is a detailed analysis, comparison and contras to the existing literature.

The findings evidenced the no significant relationships between sociodemographic variables including age, sex, mother's level of education, occupation, residential area, and income per month, and occurrences of sleep disorders among children with CP. These findings are replicated by other research, for example, one by Atmawidjaja et al. (2014), which failed to reveal any significant correlation between these variables with sleep disturbances. It is a notable fact that most of the children of the above mentioned study were drawn from rural backgrounds (65%) and the mothers with lower education levels. This may be the case that such variables as a socioeconomic status; opportunity to seek healthcare (and so on) may influence indirectly the sleep patterns but the mechanisms can be more complex and related to other variables.

In contrast, the monthly treatment cost showed a meaningful relationship with sleep disorders (Chi-square test= 12.043, p= 0.001), which means that more intensive treatment would require them to have poor quality of sleep. This finding is supported by those of Patery, Sunartini and Sutomo (2021) who indicated that children with CP who receive a high volume of medical treatment are more prone to suffer from disorders of sleep, emotionally and physically, as a result of the constant care received.

Analysis of subject characteristics showed that there were significant associations between GMFCS level and comorbid conditions on the one hand and sleep disorders on the other hand. In particular, children with higher GMFCS levels (IV and V) reported more sleep disturbances (Chi-square test = 9.656, p = 0.047). This is in agreement with findings from Munyumu et al. (2018), who proposed that motor function impairments are an essential cause of sleep disruption. More severely impaired children tend not to be able to accommodate or maintain a comfortable position for sleep, thus experiencing sleep fragmentation.

Comorbidities such as seizures and pneumonia were notably co-related to sleep disturbances (Chi-square test = 10.495, p = 0. 033). This is in concordance with previous research from Dreier et al. (2021) that indicated that neurological (seizures) and respiratory (pneumonia) comorbidities contribute to sleep problems among children with CP. The results obtained indicate that the existence of comorbidities should be taken into account in assessing and treating the sleep disorders in children with CP, as it may cause greater discomfort and pain at night.

The research also found out a number of health related facets that played a very significant role in causing child sleep disorders with CP. It was indicated that dietary pattern had a strong relationship with sleep disturbances (Chi-square test = 11.198, p = 0.001). Children who consumed foods based on inconsistent dietary regimens were more likely to have sleep problem, perhaps because of disturbed circadian rhythms as a result of varying meal times. It was also indicated by other studies that irregular eating patterns are associated with bad sleeping quality (Dreier et al., 2021). Therefore, increasing dietary consistency would be an important intervention to improve sleep quality in this population.

Food allergy affecting sleep was also another factor that was significantly correlated with sleep disorders (Chi-square test 3.989, p 0.046). This finding means that children with allergies might have a harder time falling asleep and staying asleep. Research from Patery, Sunartini and Sutomo (2021) supports this to confirm that allergies are a common aggravator of sleep disturbance in children with CP. Therefore, proper control of allergic states can help to enhance sleep for children who have the CP.

Even the variable of sugar intake just before the sleep also exhibited a meaningful correlation with sleep disorders (Chi-square test = 4.332, p = 0.037). Such result is in line with studies by Landolt (2015) on adverse effects of sugar on sleep quality. In children with CP, these substances may worsen sleep onset latency and nighttime awakenings because they suffer from a diminished ability to regulate the effects. The results of the study indicate that by cutting back on such substances and particularly consumption of them just before bedtime, would be a major strategy for achieving better sleep in the population.

The prevalence of sleep disorders was also influenced by the sleep environment in a significant way. Noisy, poor lighting, uncomfortable temperatures were highly

correlated with interrupted sleep (Chi-square test = 13.611, p = 0.003). Previous studies Dreier et al. (2021) have demonstrated that an unfavorable sleep environment especially poor lighting and environmentally noisy adversely affects sleep. Therefore, a quiet, cosy, and dark sleeping environment should be viewed as one of the major interventions to help sleep in CP children.

Interestingly, before sleep hyperactivity and fear of the dark did not manifest significant correlations with sleep disorders. These discoveries are opposed to some studies that have thought that anxiety, and pre-sleep hyperactivity may negatively influence the quality of sleep (Patery, Sunartini and Sutomo, 2021). Nevertheless, it might be the case that other unmeasured psychological and emotional human capital contribute to sleep disorders in this population. At the same time, there might be some error maid by data collectors during the data collection procedure.

According to a study conducted by Dreier et al. (2021), type of CP, type of delivery, gestational age; did not show any statistically significant relationship to the occurrence of sleep disorders which directly correlates with the findings of this study. But another study by Patery, Sunartini and Sutomo (2021) demonstrated that type of CP (Spastic quadriplegic type) linked to sleep disorder in children with CP.

On the other hand, in this study we found no significant associations between anti-epileptic drug use, anti-spasticity drug use and sleep disorders. A study conducted by Patery, Sunartini and Sutomo (2021) showed that same results.

Epilepsy, vision and hearing status, were not significantly associated with sleep disturbances (Chi-square test = 1.603, 0,004, 2.311 and p value= 0.205, 0.950, 0.128) which comes to an agreement with previous studies, such as Atmawidjaja et al. (2014). But another study conducted by Patery, Sunartini and Sutomo (2021) showed that epilepsy significantly associated with sleep disorders in children with CP.

In this study, between 104 children, about 49% (n=51) of them had epilepsy whereas 51% (n=53) didn't which correlates with the study done by El-Tallawy et al. (2014) where they have also found the presence of epilepsy which is 48.9% among the total sample (n=98).

According to a study conducted by Me, Kalina and Va (2021), wearing of orthotic device at night during sleep did not show any statistically significant relationship to the

occurrence of sleep disorders and showed significant associated with how child falls asleep. It directly correlates with the findings of this study.

At the same time, we found other factors, including mother's snoring, and child gastrointestinal problems, did not exhibit any statistically significant relationships to sleep disorders in CP children. A study conducted by Adiga et al. (2014) showed that same results.

In this study, 37.5% reported by mothers of children on cerebral palsy to have sleep disorders. Although this prevalence is impressive, it is lower than have been reported from several international studies. For example, Atmawidjaja et al. (2014) indicated that sleep disorders affect up to 60–80% of the CP population, is especially prevalent in those children with more severe motor impairments and comorbidity. Similarly, similar to the findings by Patery, Sunartini, and Sutomo (2021) about 47% prevalence of sleep problem in children with CP in Indonesia population, indicates that sleep disturbances are indeed a major yet with variability reported issue across the world.

Finally, the present study emphasizes the complexity of the issue of sleep disorders in children with cp, the major role of motor impairment, comorbidities, diet patterns, allergy related sleep disturbances, sugar intake, and sleep environment in sleep quality. These findings will serve as a base for multi-dimensional sleep improvement strategies in this population, and underscores the necessity of comprehensive management.

5.1 Limitations

Although this study has provided deep insights, there are limitations in this study. The size of the sample, data collection duration and some error maid by data collectors during the data collection procedure may influence the general ability to generalize the results and the cross-sectional design does not allow to define causality. Long-term cross-sectional studies and those with a larger sample size, in the future, may enable a stronger understating of the factors that lead to the onset of sleep disorders in children with CP.

CHAPTER – VI CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The aim of this study was to explore characteristics and the associated factors of sleep disorders in children with cerebral palsy (CP) based on the mothers' responses to the data. Based on the findings, sleep disorders were prevalent in among 37.5% of children that were diagnosed with CP. From this large number of sociodemographic and subject-related characteristics considered, several strong associations were found. In particular, sleep disorders were strongly correlated with the level of motor impairments (GMFCS level), types of comorbidities existing, inconsistent dietary patterns, poor sleep environments, intake of sugar products before sleeping, and allergy related issues. Further, increased monthly costs of treatment were highly associated with sleep disorders which is suggestive of possible financial implication associated with caregiving stress and health outcome.

While some of these associations have previously been discussed in the literature, this particular study provides unique contributions. Importantly, no major associations were found with age, gender, mother's education or occupation and residence, or type of cerebral paralysis, which is a replicated of some previous research. These results emphasize the complex and multifactorial nature of sleep disorders in CP and highlight the pressing need for narrowly focused multi-disciplinary management approaches that address the needs and context of the child.

6.2 Recommendations

Future research should also undertake longitudinal designs to establish better causal relations between the factors associated and sleep disorders in the children with CP. Investigations should also be made regarding the effectiveness of particular measures such as regulation of dietary, environmental change, behavioral therapy in managing sleep-quality. Also, further research could be supported by adding to it child-reported outcomes, caregiver's mental health evaluation, and objective measures of sleep (actigraphy or polysomnography) to bring more clarity. Diversifying the sample by geography and socioeconomic conditions across countries would also strengthen generalizability as well as the design of inclusive evidenced based interventions.

Due to strong associations that are been identified, a multi-pronged pragmatic strategy for clinical and caregiving interventions should be considered. Pediatric neurologists, physiotherapist, and occupational therapists should include routine sleep screening as part of the work-up in CP management protocols. Educational programs directed for caregivers is very important, including such activities as the necessity to observe the same bedtime routine, eliminating sweet foods just before going to bed, determining the optimal sleep environment (or removal if it causes issues with sleeping: for example, noise, light and temperature). But with comorbidities, such as seizures and allergies, cooperation with specialists is essential to solving sleep disturbances. Finally, financial support services, or supported treatment plan can reduce economic pressure for families and enhance caregiving ability in general.

REFERENCES

Adiga, D., Gupta, A., Khanna, M., Taly, A.B. and Thennarasu, K., 2014. Sleep disorders in children with cerebral palsy and its correlation with sleep disturbance in primary caregivers and other associated factors. *Annals of Indian Academy of Neurology*, *17*(4), pp.473-476.

Afifah, F., Hulfifa, L.N., Syafitri, B.A.S., Manafe, C.J.W., Amany, Z., Aziri, Z.V., Wahyudi, S.M., Prawira, A.A.B.T.I., Abdurrosyid, M., Billah, M.A. and Kusuma, D.R., 2024. Cerebral Palsy: A Literatur Review. *Jurnal Biologi Tropis*, *24*(4), pp.220-227.

Almeida, M.F.D., Mello, S., Zonta, M.B. and Crippa, A.C., 2024. Cerebral palsy and sleep: nonpharmacological treatment and impact on the life of caregivers–an integrative review. *Arquivos de Neuro-psiquiatria*, *82*(3), p.s00441781464.

Atmawidjaja, R.W., Wong, S.W., Yang, W.W. and Ong, L.C., 2014. Sleep disturbances in Malaysian children with cerebral palsy. *Developmental medicine & child neurology*, *56*(7), pp.681-685.

Basoya, S., Kumar, S. and Wanjari, A., 2023. Cerebral palsy: a narrative review on childhood disorder. *Cureus*, *15*(11).

Bautista, M., Whittingham, K., Edwards, P. and Boyd, R.N., 2018. Psychometric properties of parent and child reported sleep assessment tools in children with cerebral palsy: a systematic review. *Developmental Medicine & Child Neurology*, *60*(2), pp.162-172.

Blake, S.F., Logan, S., Humphreys, G., Matthews, J., Rogers, M., Thompson-Coon, J., Wyatt, K. and Morris, C., 2015. Sleep positioning systems for children with cerebral palsy. *Cochrane Database of Systematic Reviews*, (11).

Blanchard, M.A., Hoebeke, Y. and Heeren, A., 2023. Parental burnout features and the family context: A temporal network approach in mothers. *Journal of family psychology*, *37*(3), p.398.

Boentert, M., 2023. Schlafstörungen bei neuromuskulären Erkrankungen. *Somnologie*, *27*(1), pp.64-73.

Bruni, O., Ottaviano, S., Guidetti, V., Romoli, M., Innocenzi, M., Cortesi, F. and Giannotti, F., 1996. The Sleep Disturbance Scale for Children (SDSC) Construct ion and validation of an instrument to evaluate sleep disturbances in childhood and adolescence. *Journal of sleep research*, *5*(4), pp.251-261.

Cakıl, Z., 2024. Comprehensive Mini Review Of Pediatric Sleep Disorders: Types, Impact On Health, And Current Management Strategies. *Journal of Contemporary Medicine*, *14*(6), pp.355-359.

Carotenuto, M., Bruni, O., Santoro, N., Del Giudice, E.M., Perrone, L. and Pascotto, A., 2006. Waist circumference predicts the occurrence of sleep-disordered breathing in obese children and adolescents: a questionnaire-based study. *Sleep Medicine*, *7*(4), pp.357-361.

Cohen, Y., Reiter, J. and Gileles-Hillel, A., 2024. Sleep-related disorders in children: A narrative review. *Pediatric Discovery*, *2*(2), p.e76.

Corcoran, H., Cooke, F. and Griffiths, A.L., 2023. 333 Sleep Development in Infancy and Childhood. In *Oxford Handbook of Developmental Cognitive Neuroscience* (pp. 333-380). Oxford University Press.

Dreier, L.A., Kapanci, T., Lonnemann, K., Koch-Hogrebe, M., Wiethoff-Ubrig, L., Rauchenzauner, M., Blankenburg, M., Zernikow, B., Wager, J. and Rostasy, K., 2021. Assessment of sleep-related problems in children with cerebral palsy using the SNAKE Sleep Questionnaire. *Children*, *8*(9), p.772.

Dutt, R., Roduta-Roberts, M. and Brown, C.A., 2015. Sleep and children with cerebral palsy: a review of current evidence and environmental non-pharmacological interventions. *Children*, *2*(1), pp.78-88.

Eldridge-Smith, E.D., Holm, K., Edinger, J. and Depew, A., 2023. 0741 gender differences in the Association of Household Burden with sleep disturbance. *Sleep*, *46*(Suppl. S1)), p.A326.

El-Tallawy, H.N., Farghaly, W.M., Shehata, G.A., Badry, R. and Rageh, T.A., 2014. Epileptic and cognitive changes in children with cerebral palsy: an Egyptian study. *Neuropsychiatric disease and treatment*, pp.971-975.

Erol, E. and Arıkan, H. (2024) ‘Cerebral Palsy’, pp. 1–21

Etikan, I., Musa, S.A. and Alkassim, R.S., 2016. Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, *5*(1), pp.1-4.

Etindele Sosso, F.A., Kreidlmayer, M., Pearson, D. and Bendaoud, I., 2022. Towards a socioeconomic model of sleep health among the Canadian population: A systematic review of the relationship between age, income, employment, education, social class, socioeconomic status and sleep disparities. *European Journal of Investigation in Health, Psychology and Education*, *12*(8), pp.1143-1167.

Fehr, K.K., Chambers, D.E. and Ramasami, J., 2021. The impact of anxiety on behavioral sleep difficulties and treatment in young children: A Review of the Literature. *Journal of clinical psychology in medical settings*, *28*(1), pp.102-112.

Furia, F., Canevini, M.P. and Zambrelli, E., 2022. Sleep and Epilepsy. In *Sleep and Neuropsychiatric Disorders* (pp. 683-706). Singapore: Springer Nature Singapore.

Gamayani, U., Aryani, M., Lailiyya, N. and Pusparini, I., 2022. Sleep disorder prevalence and influencing factors in children with cerebral palsy. *Glob Med Health Commun [Internet]*, *30*.

Gentry, R., 2020. Cultural considerations and sleep. *Handbook of cultural factors in behavioral health: a guide for the helping professional*, pp.323-329.

Gökdemir, F. and Yılmaz, T., 2022. Maternal Uyku Sorunlarının Obstetrik Sonuçlara Etkisi ve Bakım. *Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi*, *15*(3), pp.418-429.

Grayson, L.P. and DeWolfe, J.L., 2018. Sleep disorders in epilepsy: current trends and future perspectives. *Current Sleep Medicine Reports*, *4*, pp.125-133.

Hartshorne, T.S., Heussler, H.S., Dailor, A.N., Williams, G.L., Papadopoulos, D. and Brandt, K.K., 2009. Sleep disturbances in CHARGE syndrome: Types and relationships with behavior and caregiver well-being. *Developmental Medicine & Child Neurology*, *51*(2), pp.143-150.

Himelfarb, M. and Shatkin, J.P., 2021. Pediatric insomnia. *Child and Adolescent Psychiatric Clinics*, *30*(1), pp.117-129.

Huffman, L.G., Lawrence-Sidebottom, D., Huberty, J., Guerra, R., Roots, M., Roots, K. and Parikh, A., 2023. Sleep problems and parental stress among caregivers of children and adolescents enrolled in a digital mental health intervention. *Frontiers in Child and Adolescent Psychiatry*, *2*, p.1265095.

Hulst, R.Y., Voorman, J.M., Pillen, S., Ketelaar, M., Visser-Meily, J.M. and Verschuren, O., 2022. Parental perspectives on care for sleep in children with cerebral palsy: a wake-up call. *Disability and Rehabilitation*, *44*(3), pp.458-467.

Humphreys, G., King, T., Jex, J., Rogers, M., Blake, S., Thompson-Coon, J. and Morris, C., 2019. Sleep positioning systems for children and adults with a neurodisability: A systematic review. *British Journal of Occupational Therapy*, *82*(1), pp.5-14.

Khachatryan, S.G. and Tunyan, Y.S., 2017. An effect of epilepsy on sleep structure. *Zhurnal Nevrologii i Psikhiatrii Imeni SS Korsakova*, *117*(9. Vyp. 2), pp.88-94.

Khandaker, G., Muhit, M., Karim, T., Smithers-Sheedy, H., Novak, I., Jones, C. and Badawi, N., 2019. Epidemiology of cerebral palsy in Bangladesh: a population-based surveillance study. *Developmental Medicine & Child Neurology*, *61*(5), pp.601-609.

Kim, J. and Choi, J.H. (2024) 'Pediatric Obstructive Sleep Apnea: Clinical Manifestations and Consequences', *Korean journal of otorhinolaryngology-head and neck surgery*, 67(10), pp. 515–524.

Kotagal, S. and Broomall, E., 2012. Sleep in children with autism spectrum disorder. *Pediatric neurology*, *47*(4), pp.242-251.

Landolt, H.P., 2015. Caffeine, the circadian clock, and sleep. *Science*, *349*(6254), pp.1289-1289.

Lee, J., Schwichtenberg, A.J., Bliwise, D., Ali, S.Z., Hayat, M.J., Clark, P.C. and Spratling, R., 2024. Simultaneous recording of objective sleep in mothers and

school-aged children with developmental disabilities: a pilot study of actigraphy and videosomnography. *Journal of Developmental and Physical Disabilities*, *36*(1), pp.63-85.

Lindam, A., Ness-Jensen, E., Jansson, C., Nordenstedt, H., Åkerstedt, T., Hveem, K. and Lagergren, J., 2016. Gastroesophageal reflux and sleep disturbances: a bidirectional association in a population-based cohort study, the HUNT study. *Sleep*, *39*(7), pp.1421-1427.

Liu, J., Ji, X., Rovit, E., Pitt, S. and Lipman, T., 2024. Childhood sleep: assessments, risk factors, and potential mechanisms. *World journal of pediatrics*, *20*(2), pp.105-121.

Liu, S., Zhu, M. and Li, Y., 2024. Effects of Jin's three-needles therapy combined with low-frequency repetitive transcranial magnetic stimulation on sleep disorders and EEG in children with spastic cerebral palsy.

Lucey, B.P., Wisch, J., Boerwinkle, A.H., Landsness, E.C., Toedebusch, C.D., McLeland, J.S., Butt, O.H., Hassenstab, J., Morris, J.C., Ances, B.M. and Holtzman, D.M., 2021. Sleep and longitudinal cognitive performance in preclinical and early symptomatic Alzheimer's disease. *Brain*, *144*(9), pp.2852-2862.

Macfarlane, S.B., 1997. Conducting a descriptive survey: 2. Choosing a sampling strategy. *Tropical doctor*, *27*(1), pp.14-21.

Masi, A., Moni, M.A., Azim, S.I., Choi, B., Heussler, H., Lin, P.I., Diaz, A.M. and Eapen, V., 2022. Clinical and behavioral attributes leading to sleep disorders in children on the autism spectrum. *Autism Research*, *15*(7), pp.1274-1287.

Mattos, M.K., Bernacchi, V., Shaffer, K.M., Gallagher, V., Seo, S., Jepson, L. and Manning, C., 2024. Sleep and caregiver burden among caregivers of persons living with dementia: a scoping review. *Innovation in Aging*, *8*(2), p.igae005.

Me, G., Kalina, M. and Va, P., 2023. Sleep Disorders in Pediatrics Associated to Underlying Diseases. Cross Sectional Study.

Merrill, R.M. and Slavik, K.R., 2023. Relating parental stress with sleep disorders in parents and children. *PLoS One*, *18*(1), p.e0279476.

Monteiro, B.C.D.C., Santos, T.T.B.A.D., Nogueira, M.M.L. and Dourado, M.C.N., 2023. The relationship between burden and caregiver's sleep disturbances in dementia: a systematic review. *Dementia & neuropsychologia*, *17*, p.e20230030.

Mun, C.J., Youngstedt, S.D., Petrov, M.E., Pituch, K.A., Elliott, J.A., George, S.Z., LoVecchio, F., Mardian, A.S., Elam, K.K., Winsick, N. and Eckert, R., 2024. Sleep and circadian rhythm disturbances as risk and progression factors for multiple chronic overlapping pain conditions: a protocol for a longitudinal study. *Pain Reports*, *9*(6), p.e1194.

Munyumu, K., Idro, R., Abbo, C., Kaddumukasa, M., Katabira, E., Mupere, E. and Kakooza-Mwesige, A., 2018. Prevalence and factors associated with sleep disorders among children with cerebral palsy in Uganda; a cross-sectional study. *BMC pediatrics*, *18*, pp.1-7.

Narayan, A., Muhit, M., Whitehall, J., Hossain, I., Badawi, N., Khandaker, G. and Jahan, I., 2023. Associated impairments among children with cerebral palsy in rural Bangladesh—Findings from the Bangladesh cerebral palsy register. *Journal of Clinical Medicine*, *12*(4), p.1597.

Nisbet, L.C., Davey, M.J. and Nixon, G.M., 2024. Periodic limb movements during sleep in children with neuromuscular disease or cerebral palsy–An important potential contributor to sleep-related morbidity. *Sleep medicine*, *121*, pp.58-62.

Nisbet, L.C., Davey, M.J. and Nixon, G.M., 2024. Periodic limb movements during sleep in children with neuromuscular disease or cerebral palsy–An important potential contributor to sleep-related morbidity. *Sleep medicine*, *121*, pp.58-62.

Ogundele, M.O., Yemula, C. and Ayyash, H.F., 2023. Clinical Assessment of Children and Young People with Sleep Problems and Co-Morbid Neurodevelopmental Disorders. In *Sleep Medicine-Asleep or Awake?*. IntechOpen.

Ogundele, M.O., Yemula, C. and Ayyash, H.F., 2023. Clinical Assessment of Children and Young People with Sleep Problems and Co-Morbid Neurodevelopmental Disorders. In *Sleep Medicine-Asleep or Awake?*. IntechOpen.

Oh, J.H., 2016. Gastroesophageal reflux disease: recent advances and its association with sleep. *Annals of the New York Academy of Sciences*, *1380*(1), pp.195-203.

Olorunmoteni, O.E., Akande, J.I., Babalola, T.E., Kareem, A., Oyetoke, T.T. and Seun-Fadipe, C., 2024. "It Affects Everything about Me": Sleep Problems among Children with Cerebral Palsy and Their Caregivers in Ile-Ife—A Mixed-Methods Study. *Journal of Pediatric Neurology*, *22*(03), pp.215-226.

Pascoe, J.E., Zygmunt, A., Ehsan, Z. and Gurbani, N., 2023, December. Sleep in pediatric neuromuscular disorders. In *Seminars in pediatric neurology* (Vol. 48, p. 101092). WB Saunders.

Patery, S.W.M., Sunartini, S. and Sutomo, R., 2021. Sleep disorders and associated factors in children with cerebral palsy. *Paediatrica Indonesiana*, *61*(4), pp.179-85.

Petrovsky, D. and Luth, E., 2024. EXAMINING PREDICTORS OF POOR SLEEP AMONG CAREGIVERS OF PERSONS LIVING WITH DEMENTIA. *Innovation in Aging*, *8*(Suppl 1), p.497.

Potcovaru, C.G., Salmen, T., Chitu, M.C., Dima, V., Mihai, M.B., Bohiltea, R.E. and Cinteza, D., 2022. Cerebral palsy: review of epidemiology, etiology, clinical features, classification and prevention. *Roman J Pediatr*, *71*(S2), pp.18-22.

Reynolds, A.M., Spaeth, A.M., Hale, L., Williamson, A.A., LeBourgeois, M.K., Wong, S.D., Hartstein, L.E., Levenson, J.C., Kwon, M., Hart, C.N. and Greer, A., 2023. Pediatric sleep: current knowledge, gaps, and opportunities for the future. *Sleep*, *46*(7), p.zsad060.

Rijssen, I.M., Hulst, R.Y., Gorter, J.W., Gerritsen, A., Visser-Meily, J.M.A., Dudink, J., Voorman, J.M., Pillen, S. and Verschuren, O., 2023. Device-based and subjective measurements of sleep in children with cerebral palsy: a comparison of sleep diary, actigraphy, and bed sensor data. *Journal of Clinical Sleep Medicine*, *19*(1), pp.35-43.

Rojanapairat, O., Beggs, A., Zeidler, M. and Prasad, B., 2023. Race and socioeconomic status: interlinked drivers of sleep health disparities. *Health Equity*, *7*(1), pp.307-311.

Ryan, M., Estes, M. and MacEachern, S., 2024. 20 Co-occurring behaviours of concern and sleep problems in children with neurodevelopmental disorders. *Paediatrics & Child Health*, *29*(Supplement_1), pp.e8-e8.

Salazar Leon, L.E. and Sillitoe, R.V., 2023. Disrupted sleep in dystonia depends on cerebellar function but not motor symptoms in mice. *Dystonia*, *2*, p.11487.

Salomon, I., 2024. Neurobiological Insights Into Cerebral Palsy: A Review of the Mechanisms and Therapeutic Strategies. *Brain and Behavior*, *14*(10), p.e70065.

Sandran, N.G., Badawi, N., Gecz, J. and van Eyk, C.L., 2024, November. Cerebral Palsy as a Childhood-onset Neurologic Disorder caused by both genetic and environmental factors. In *Seminars in Fetal and Neonatal Medicine* (p. 101551). WB Saunders.

Sanguino, H., Brunton, L., Condliffe, E.G., Kopala-Sibley, D.C., Noel, M.E., Mish, S.J. and McMorris, C.A., 2025. Sleep Characteristics of Children and Youth with Cerebral Palsy. *Journal of Child Neurology*, p.08830738241285074.

Shearer, H.M., Côté, P., Hogg-Johnson, S. and Fehlings, D.L., 2024. A good night's sleep: pain trajectories and sleep disturbance in children with cerebral palsy. *Journal of Clinical Sleep Medicine*, *20*(5), pp.719-726.

Sheehan, A., 2023. The importance of sleep for normal growth and development. *Advances in family practice nursing*, *5*(1), pp.193-205.

Shelton, A.R., 2023. Sleep disorders in childhood. *CONTINUUM: Lifelong Learning in Neurology*, *29*(4), pp.1205-1233.

Shibli, F., Skeans, J., Yamasaki, T. and Fass, R., 2020. Nocturnal gastroesophageal reflux disease (GERD) and sleep: an important relationship that is commonly overlooked. *Journal of clinical gastroenterology*, *54*(8), pp.663-674.

Simard-Tremblay, E., Constantin, E., Gruber, R., Brouillette, R.T. and Shevell, M., 2011. Sleep in children with cerebral palsy: a review. *Journal of child neurology*, *26*(10), pp.1303-1310.

Sobremonte-King, M., 2021. Sleep in Cerebral Palsy. *Sleep Neurology: A Comprehensive Guide to Basic and Clinical Aspects*, pp.215-229.

Spruyt, K., 2021. Neurocognitive effects of sleep disruption in children and adolescents. *Child and adolescent psychiatric clinics of North America*, *30*(1), pp.27-45.

Stearns, M., McGovney, K., Curtis, A., Costa, A., Miller, M.B., Nair, U. and McCrae, C., 2024. SLEEP AND STRESS IN MIDDLE-AGED AND OLDER CAREGIVERS OF CHILDREN, PARENTS, AND SPOUSES: EXAMINING SEX DIFFERENCES. *Innovation in Aging*, *8*(Supplement_1), pp.979-979.

Su-Velez, B.M. and Boss, E.F., 2024. Socioeconomic disparities in pediatric sleep disordered breathing. In *Snoring and Obstructive Sleep Apnea in Children* (pp. 29-42). Academic Press.

Swarnakar, R. and Yadav, S.L., 2024. A Combined Comprehensive Palliative and Rehabilitative Care Plan for a Child With Cerebral Palsy. *Cureus*, *16*(12).

Tan, X., Wang, S., Wu, F. and Zhu, J., 2024. Bidirectional correlation between gastroesophageal reflux disease and sleep problems: a systematic review and meta-analysis. *PeerJ*, *12*, p.e17202.

Teague, T.T., Debian, A., Kokonda, M., Malhotra, S., Arentson-Lantz, E., Shaib, F. and Nowakowski, S., 2022. Longitudinal analysis evaluating self-reported CPAP use for OSA during the COVID-19 pandemic. *Brain Sciences*, *12*(2), p.131.

Thabet, F. and Tabarki, B., 2023. Common sleep disorders in children: assessment and treatment. *Neurosciences Journal*, *28*(2), pp.85-90.

Trosman, I. and Ivanenko, A., 2024. Classification and epidemiology of sleep disorders in children and adolescents. *Psychiatric Clinics*, *47*(1), pp.47-64.

Varma, P., Jackson, M.L., Junge, M. and Conduit, R., 2023. Actigraphy-measured sleep concordance, night-wakings, intraindividual sleep variability in parents and their children—Associations with childhood sleep disturbances. *Journal of Sleep Research*, *32*(3), p.e13773.

Vennard, H., Buchan, E., Davies, P., Gibson, N., Lowe, D. and Langley, R., 2024. Paediatric sleep diagnostics in the 21st century: the era of “sleep-omics”?. *European Respiratory Review*, *33*(172).

Whittingham, K., Benfer, K., Sakzewski, L., Wotherspoon, J., Burgess, A., Comans, T., Keramat, S.A., Ware, R.S. and Boyd, R.N., 2024. Sleep problems in a population-based cohort of primary school age children with Cerebral Palsy. *Research in Developmental Disabilities*, *147*, p.104690.

Wilewska, A., Pomirski, B., Pomirska, A., Biernikiewicz, J., Biernikiewicz, M., Alabrudziński, K., Borowiec, A., Borowiec, K., Kwaśniewska, P. and Graczyk, P., 2024. Multifaceted Treatment and Therapies in the Care of Children with Cerebral Palsy–A Literature Review. *Journal of Education, Health and Sport*, *76*, pp.56413-56413.

Williamson, A.A., Uwah, E.A., Min, J., Zhang, X., Griffis, H., Cielo, C.M., Tapia, I.E., Fiks, A.G. and Mindell, J.A., 2024. Diagnosis of sleep disorders in child healthcare settings. *Sleep Medicine*, *119*, pp.80-87.

Xu, Z., Anderson, K.N. and Pavese, N., 2022. Longitudinal studies of sleep disturbances in Parkinson's disease. *Current neurology and neuroscience reports*, *22*(10), pp.635-655.

Yi, Q., Yu-Peng, C., Jiang-Ting, L., Jing-Yi, L., Qi-Xiong, Q., Dan-Lei, W., Jing-Wei, Z., Zhi-Juan, M., Yong-Jie, X., Zhe, M. and Zheng, X., 2022. Worse sleep quality aggravates the motor and non-motor symptoms in Parkinson's disease. *Frontiers in Aging Neuroscience*, *14*, p.887094.

APPENDIX

English Consent Form

(Please read out to the participants)

Assalamu alaikum.

I am **Md Shidul Islam Patowary**, Final Year student of B.Sc. in Physiotherapy of Bangladesh Health Professions Institute (BHPI), an academic Institution of CRP under the Faculty of Medicine, University of Dhaka. For my study purpose I am conducting a study on the children with cerebral palsy and my study title is, "**Sleep disorders among children with cerebral palsy: characteristics and associated factors as reported by their mothers**."

I would like to know about some personal information, socioeconomic information and sleep status regarding this study. This will take approximately 25-30 minutes. This is an academic study and will not be used for any other purpose. Your participation in the research will have no impact on your present or future treatment. Researcher will maintain confidentiality of all procedures. Your data will never be used without your permission. Your participation in this study is voluntary and you may withdraw yourself at any time during this study.

If you have any query about the study on your rights as a participant, you may contact with me or my supervisor **Muhammad Millat Hossain**, Assistant Professor, Department of Rehabilitation Science, Bangladesh Health Professions Institute, CPR, Savar, Dhaka-1343, Bangladesh.

So, may I have your consent to proceed with the interview or work?

Yes	No

Signature of the Participant and Date ……………………………

Signature of the Interviewer and Date……………………………

অনুমতিপত্র

(অংশগ্রহণকারীকে পড়ে শোনাতে হবে)

আসসালামু আলাইকুম।

আমি **মোঃ সাইদুল ইসলাম পাটোয়ারী**, ঢাকা বিশ্ববিদ্যালয়ের মেডিসিন অনুষদের অধীনস্থ বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউট (বিএইচপিআই) যা সিআরপি-এর একটি একাডেমিক প্রতিষ্ঠান, এর বিএসসি ফিজিওথেরাপি বিভাগের শেষ বর্ষের ছাত্র। আমার অধ্যয়নের উদ্দেশ্যে আমি সেরিব্রাল পালসি আক্রান্ত শিশুদের উপর একটি অধ্যয়ন পরিচালনা করছি এবং আমার অধ্যয়নের শিরোনাম হল, **"সেরিব্রাল পালসি আক্রান্ত শিশুদের মধ্যে ঘুমের ব্যাধি: তাদের মায়ের দ্বারা রিপোর্ট করা বৈশিষ্ট্য এবং সম্পর্কিত কারণগুলি"।**

আমি এই গবেষণা সম্পর্কিত কিছু ব্যক্তিগত তথ্য, আর্থ-সামাজিক তথ্য এবং ঘুমের অবস্থা সম্পর্কে জানতে চাইব। এক্ষেত্রে প্রায় ২৫-৩০ মিনিট সময় লাগবে। এটি একটি একাডেমিক অধ্যয়ন এবং অন্য কোন উদ্দেশ্যে ব্যবহার করা হবে না। এই গবেষণায় আপনার অংশগ্রহণ আপনার বর্তমান বা ভবিষ্যতের চিকিৎসার উপর কোন প্রভাব ফেলবে না। গবেষক গবেষণা চলাকালীন প্রতিটি ধাপে গোপনীয়তা বজায় রাখবেন। আপনার অনুমতি ছাড়া আপনার তথ্য ব্যবহার করা হবে না। এই গবেষণায় আপনি স্বেচ্ছায় অংশগ্রহণ করতে পারেন এবং আপনি এই গবেষণা চলাকালীন যেকোনো সময় নিজেকে প্রত্যাহার করতে পারেন।

আপনি একজন অংশগ্রহণকারী হিসেবে গবেষণাটি সম্পর্কে যদি কোন প্রশ্ন থাকে, তাহলে আপনি আমার সাথে অথবা আমার সুপারভাইজার **মুহাম্মদ মিল্লাত হোসেন**, সহকারী অধ্যাপক, রিহ্যাবিলিটেশন সাইন্স বিভাগ, বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউট (বিএইচপিআই), সিআরপি, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ এর সাথে যোগাযোগ করতে পারেন ।

তাহলে, আমি আপনার অনুমতি নিয়ে এই সাক্ষাৎকার শুরু করতে পারি?

হ্যাঁ	না

অংশগ্রহণকারীর স্বাক্ষর এবং তারিখ ....

সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর ও তারিখ................................

Research Questionnaire (English)

Title: Sleep disorders among children with cerebral palsy: characteristics and associated factors as reported by their mothers.

Personal Information

Patient's ID	
Patient's name	
Age	
Gender	
Mother's name	
Address	
Contact number	

Socio-Demographic Information

[Use tick (√) to mark the correct answer]

QN	Question	Response
1	What is your educational qualification?	1= Illiterate 2= Primary 3= Secondary 4= S.S.C 5= H.S.C 6= Graduate 7= Post Graduate
2	What is your occupation?	1= Housewife 2= Student 3= Shopkeeper 4= Business 5= Service holder 6= Unemployed 7= Others ( )

3	How is your residential area?	1= Urban 2= Semi-urban 3= Rural
4	What is your religion?	1= Islam 2= Hinduism 3= Christianity 4= Buddhism
5	What is the number of your family members?	
6	What is your family type?	1= Joint family 2= Nuclear family
7	What is your family's monthly income?	Tk
8	What is the average cost of continuing your child's current treatment?	Tk

Subject characteristics and associated factors

[Use tick (√) to mark the correct answer]

QN	Question	Response
1	Type of Cerebral palsy (Diagnosed by Doctor/ Expert/Physiotherapist) [Take from the assessment form]	1= Spastic diplegia 2= Spastic hemiplegia 3= Spastic quadriplegia 4= Ataxic 5= Dyskinetic 6= Mixed
2	Types of delivery [Take from the assessment form]	1= Normal vaginal delivery 2= C-section delivery
3	Type of GMFCS [Take from the assessment form]	1= GMFCS I 2= GMFCS II 3= GMFCS III 4= GMFCS IV 5= GMFCS V
4	Gestational age [Take from the assessment form]	1= Preterm 2= Term 3= Post-term
5	Presence of epilepsy	1= Yes 2= No

	[Take from the assessment form]	
6	The child takes anti-epileptic drug [Take from the prescription]	1= Yes 2= No
7	The child takes anti-spasticity drug [Take from the prescription]	1= Yes 2= No
8	Vision status [Take from the assessment form]	1= Normal 2= Impaired 3= Loss
9	Hearing status [Take from the assessment form]	1= Normal 2= Impaired 3= Loss
10	Comorbidities [Take from the assessment form]	1= Jaundice 2= Dehydration 3= Pneumonia 4= Hydrocephalus 5= Seizures 6= Others ( )
11	Does your child sleep alone?	1= Yes 2= No
12	How does your child fall asleep?	1= Feeding 2= Physical touch (rocking, patting, holding) 3= Playing (grasping toys) 4= None 5= Others ( )
13	Does your child sleep at night wearing an orthotic device?	1= Yes 2= No
14	Do you snore during the sleeping?	1= Yes 2= No
15	Does your child's diet always stay the same, or does it change significantly?	1= Consistent 2= Varies
16	Does your child have any known food allergies or intolerances?	1= Yes 2= No
17	If yes, does it affect his sleep?	1= Yes 2= No
18	Does your child have any gastrointestinal problems?	1= Yes 2= No
19	Does your child consume foods rich in caffeine or sugar before sleeping?	1= Yes 2= No
20	Does your child's sleeping environment have any problems?	1= Noise 2= Poor lighting

		3= Uncomfortable temperature 4= None
21	Does your child exhibit hyperactivity or difficulty calming down before sleeping?	1= Yes 2= No
22	Does your child have a fear of the dark or being alone?	1= Yes 2= No

Sleep Disturbance Scale for Children (SDSC)

This questionnaire will allow the researcher to gain a better understanding of your child's sleep-wake ratio and of any potential problems in their sleep behavior. Try to answer all questions. Consider each question in terms of only the last 6 months in your child's sleep behavior.

Please answer each question by circling or tick out the numerical score you assign.

QN	Question	Response				
1	How many hours does your child manage to sleep most nights?	1 (9-11) hours	2 (8-9) hours	3 (7-8) hours	4 (5-7) hours	5 Less than 5 hours
2	How long after going to bed does your child usually fall asleep?	1 Less than 15 min	2 15-30 min	3 30-45 min	4 45-60 min	5 More than 60 min

Here,

5 = (always daily)

4 = Often (3 to 5 times per week)

3 = Sometimes (1 or 2 times per week)

2 = Occasionally (once or twice a month or less)

1 = Never

Response

3	The child goes to bed in a bad mood	1	2	3	4	5
4	The child has difficulty falling asleep at night	1	2	3	4	5
5	The child feels anxiety or is afraid of falling asleep	1	2	3	4	5
6	The child is startled or parts of their body jerk when falling asleep	1	2	3	4	5
7	The child engages in repetitive movements, such as head-rolling to fall asleep	1	2	3	4	5
8	The child lives out dream sequences when falling asleep	1	2	3	4	5
9	The child sweats profusely while falling asleep	1	2	3	4	5
10	The child wakes up more than twice at night	1	2	3	4	5
11	After waking up at night, the child has difficulty falling asleep again	1	2	3	4	5
12	The child experiences frequent leg contractions or jerking while sleeping, or often changes position at night, or kicks the bed sheets	1	2	3	4	5
13	The child experiences difficulty in breathing during the night	1	2	3	4	5
14	The child gasps for breath or is unable to breathe during sleep	1	2	3	4	5
15	The child snores	1	2	3	4	5

16	The child sweats profusely at night	1	2	3	4	5
17	You have observed your child to sleepwalk	1	2	3	4	5
18	You have observed your child to sleep-talk	1	2	3	4	5
19	The child grinds their teeth during sleep	1	2	3	4	5
20	The child wakes from dreams screaming or confused	1	2	3	4	5
21	The child has nightmares they do not remember the next day	1	2	3	4	5
22	The child is difficult to wake up in the mornings	1	2	3	4	5
23	The child wakes up feeling tired in the morning	1	2	3	4	5
24	The child feels unable to move when waking up in the morning	1	2	3	4	5
25	The child experiences daytime sleepiness	1	2	3	4	5
26	The child suddenly falls asleep at inappropriate moments	1	2	3	4	5

Total score ……………..

গবেষণার প্রশ্নাবলী (বাংলা)

শিরোনাম: সেরিব্রাল প্যালসিতে আক্রান্ত শিশুদের মধ্যে ঘুমের ব্যাধি: তাদের মায়েদের দ্বারা রিপোর্ট করা বৈশিষ্ট্য এবং সম্পর্কিত কারণগুলি।

ব্যক্তিগত তথ্য

রোগীর আইডি	
রোগীর নাম	
বয়স	
লিঙ্গ	
মায়ের নাম	
ঠিকানা	
মোবাইল নাম্বার	

আর্থ-সামাজিক তথ্যবলী

[সঠিক উত্তরের পাশে টিকচিহ্ন (√) প্রদান করুন]

প্রশ্ন নম্বর	প্রশ্ন	উত্তর
১	আপনার শিক্ষাগত যোগ্যতা কি?	১= নিরক্ষর ২= প্রাথমিক ৩= মাধ্যমিক ৪= এস.এস.সি ৫= এইচ.এস.সি 6= স্নাতক ৭= স্নাতকোত্তর
২	আপনার পেশা কি?	১= গৃহিণী ২= ছাত্র ৩= দোকানদার ৪= ব্যবসা ৫= চাকুরীজীবী ৬= বেকার

		৭= অন্যান্য ( )
৩	আপনার আবাসিক এলাকা কেমন?	১= শহর ২= মফস্বল ৩= গ্রাম
৪	আপনার ধর্ম কি?	১= ইসলাম ২= হিন্দুধর্ম ৩= খ্রিষ্টান ধর্ম ৪= বৌদ্ধধর্ম
৫	আপনার পরিবারের সদস্য সংখ্যা কত?	
৬	আপনার পরিবারের ধরন কি?	১= যৌথ পরিবার ২= একক পরিবার
৭	আপনার পরিবারের মাসিক আয় কত?	টাকা
৮	আপনার সন্তানের বর্তমান চিকিৎসা চালিয়ে যাওয়ার গড় খরচ কত?	টাকা

বৈশিষ্ট্য এবং সংশ্লিষ্ট কারণগুলি

[সঠিক উত্তরের পাশে টিকচিহ্ন (√) প্রদান করুন]

প্রশ্ন নম্বর	প্রশ্ন	উত্তর
১	সেরিব্রাল প্যালসির ধরণ (ডাক্তার / বিশেষজ্ঞ / ফিজিওথেরাপিস্ট দ্বারা নির্ণয়) [অ্যাসেসমেন্ট ফর্ম থেকে নেয়া]	১ = স্পাস্টিক ডিপ্লেজিয়া ২ = স্পাস্টিক হেমিপ্লেজিয়া ৩ = স্পাস্টিক কোয়াড্রিপ্লেজিয়া ৪ = অ্যাটাক্সিক ৫ = ডিস্কিনেটিক ৬ = মিক্সড
২	ডেলিভারির প্রকারভেদ [অ্যাসেসমেন্ট ফর্ম থেকে নেয়া]	১ = নরমাল ভেজাইনাল ডেলিভারি ২ = সিজারিয়ান সেকশন ডেলিভারি
৩	জিএমএফসিএসের ধরণ [অ্যাসেসমেন্ট ফর্ম থেকে নেয়া]	১ = জিএমএফসিএস এক ২ = জিএমএফসিএস দুই ৩ = জিএমএফসিএস তিন ৪ = জিএমএফসিএস চার ৫ = জিএমএফসিএস পাঁচ

৪	গর্ভকালীন বয়স [অ্যাসেসমেন্ট ফর্ম থেকে নেয়া]	১= প্রিটার্ম ২= টার্ম ৩= পোস্ট-টার্ম
৫	মৃগী রোগের উপস্থিতি [অ্যাসেসমেন্ট ফর্ম থেকে নেয়া]	১= হ্যাঁ ২= না
৬	শিশু অ্যান্টি-মৃগীরোগের ওষুধ খায় [প্রেসক্রিপশন থেকে নেয়া]	১= হ্যাঁ ২= না
৭	শিশু অ্যান্টি-স্পাস্টিসিটি ড্রাগ গ্রহণ করে [প্রেসক্রিপশন থেকে নেয়া]	১= হ্যাঁ ২= না
৮	দৃষ্টি অবস্থা [অ্যাসেসমেন্ট ফর্ম থেকে নেয়া]	১= নরমাল ২= ইম্পেয়ার্ড ৩= লস
৯	শ্রবণ অবস্থা [অ্যাসেসমেন্ট ফর্ম থেকে নেয়া]	১= নরমাল ২= ইম্পেয়ার্ড ৩= লস
১০	কোমর্বিডিটি [অ্যাসেসমেন্ট ফর্ম থেকে নেয়া]	১= জন্ডিস ২ = ডিহাইড্রেশন ৩= নিউমোনিয়া ৪= হাইড্রোসেফালাস ৫= খিঁচুনি ৬= অন্যান্য ( )
১১	আপনার বাচ্চা কি একা ঘুমায়?	১= হ্যাঁ ২= না
১২	আপনার সন্তান কিভাবে ঘুমিয়ে পড়ে?	১= খেতে খেতে ২= শারীরিক স্পর্শ (দোলানো, প্যাটিং, হোল্ডিং) ৩= খেলা (খেলনা আঁকড়ে ধরা) ৪= কোনটিই নয় ৫= অন্যান্য ( )
১৩	আপনার বাচ্চা কি রাতে কোনো অর্থোটিক ডিভাইস পরে ঘুমায়?	১= হ্যাঁ ২= না
১৪	আপনি কি ঘুমের মধ্যে নাক ডাকেন?	১= হ্যাঁ ২= না
১৫	আপনার সন্তানের ডায়েট কি সবসময় একই থাকে, না এটি উল্লেখযোগ্যভাবে পরিবর্তিত হয়?	১ = একই থাকে ২= পরিবর্তিত হয়
১৬	আপনার সন্তানের কি কোনও পরিচিত খাবারের অ্যালার্জি বা অসহিষ্ণুতা রয়েছে?	১= হ্যাঁ ২= না
১৭	যদি হ্যাঁ হয়, এটা কি তার ঘুমকে প্রভাবিত করে?	১= হ্যাঁ ২= না
১৮	আপনার বাচ্চার কি পেটে সমস্যা আছে?	১= হ্যাঁ ২= না

১৯	আপনার শিশু কি ঘুমানোর আগে ক্যাফিন বা চিনি সমৃদ্ধ খাবার গ্রহণ করে?	১= হ্যাঁ ২= না
২০	আপনার শিশুর ঘুমের পরিবেশে কি কোন সমস্যা আছে?	১= কোলাহল ২= কম/ বেশি আলো ৩= অস্বস্তিকর তাপমাত্রা ৪= কোনটিই নয়
২১	আপনার শিশু কি ঘুমানোর আগে হাইপার্য়াক্টিভিটি বা শান্ত হতে অসুবিধা প্রদর্শন করে?	১= হ্যাঁ ২= না
২২	আপনার শিশু কি অন্ধকার বা একা থাকতে ভয় পায়?	১= হ্যাঁ ২= না

শিশুদের জন্য ঘুমের ব্যাঘাত স্কেল (এসডিএসসি)

এই প্রশ্নাবলী গবেষককে আপনার সন্তানের ঘুম থেকে ওঠার অনুপাত এবং তাদের ঘুমের আচরণের সম্ভাব্য সমস্যা সম্পর্কে আরও ভালভাবে বোঝার অনুমতি দেবে। সব প্রশ্নের উত্তর দেওয়ার চেষ্টা করুন। আপনার সন্তানের ঘুমের আচরণে শুধুমাত্র শেষ ৬ মাসের পরিপ্রেক্ষিতে প্রতিটি প্রশ্ন বিবেচনা করুন।

আপনার নির্ধারিত সংখ্যাসূচক স্কোরটি বৃত্তাকার করে বা টিক দিয়ে দয়া করে প্রতিটি প্রশ্নের উত্তর দিন।

প্রশ্ন নম্বর	**প্রশ্ন**	**উত্তর**				
১	আপনার সন্তান বেশিরভাগ রাতে কত ঘন্টা ঘুমাতে পারে?	১ (৯-১১) ঘন্টা	২ (৮-৯) ঘন্টা	৩ (৭-৮) ঘন্টা	৪ (৫-৭) ঘন্টা	৫ ৫ ঘন্টার ও কম
২	বিছানায় যাওয়ার কতক্ষণ পরে আপনার শিশু সাধারণত ঘুমিয়ে পড়ে?	১ ১৫ মিনি	২ ১৫-৩০ মিনিট	৩ ৩০-৪৫ মিনিট	৪ ৪৫-৬০ মিনিট	৫ ৬০ মিনি

		টেরও কম				টেরও বেশি

এখানে,

৫= (সর্বদা প্রতিদিন)

৪= প্রায়ই (প্রতি সপ্তাহে ৩ থেকে ৫ বার)

৩= কখনও কখনও (প্রতি সপ্তাহে ১ বা ২ বার)

২= মাঝে মাঝে (মাসে একবার বা দুবার বা তার কম)

১= কখনই না

উত্তর

৩	বাচ্চা খারাপ মেজাজে বিছানায় যায়	১	২	৩	৪	৫
৪	শিশুর রাতে ঘুমাতে অসুবিধা হয়	১	২	৩	৪	৫
৫	শিশু উদ্বেগ অনুভব করে বা ঘুমিয়ে পড়ার ভয় পায়	১	২	৩	৪	৫
৬	ঘুমিয়ে পড়ার সময় শিশু চমকে ওঠে বা তাদের শরীরের কিছু অংশ ঝাঁকুনি দেয়	১	২	৩	৪	৫
৭	শিশুটি পুনরাবৃত্তিমূলক নড়াচড়ায় লিপ্ত হয়, যেমন ঘুমিয়ে পড়ার জন্য মাথা ঘোরানো	১	২	৩	৪	৫

৮	ঘুমিয়ে পড়ার সময় শিশুটি স্বপ্নের ক্রমানুসারে বেঁচে থাকে	১	২	৩	৪	৫
৯	ঘুমিয়ে পড়ার সময় শিশুর প্রচুর ঘাম হয়	১	২	৩	৪	৫
১০	শিশু রাতে দুইবারের বেশি জেগে ওঠে	১	২	৩	৪	৫
১১	রাতে ঘুম থেকে ওঠার পর শিশুর আবার ঘুমাতে অসুবিধা হয়	১	২	৩	৪	৫
১২	শিশু ঘুমানোর সময় ঘন ঘন পায়ের সংকোচন বা ঝাঁকুনি অনুভব করে, বা প্রায়ই রাতে অবস্থান পরিবর্তন করে, বা বিছানার চাদরে লাথি দেয়	১	২	৩	৪	৫
১৩	শিশু রাতে শ্বাস নিতে অসুবিধা অনুভব করে	১	২	৩	৪	৫
১৪	শিশুটি নিঃশ্বাসের জন্য হাঁপায় বা ঘুমের সময় শ্বাস নিতে অক্ষম হয়	১	২	৩	৪	৫
১৫	শিশু নাক ডাকে	১	২	৩	৪	৫

১৬	শিশু রাতে প্রচুর ঘামে	১	২	৩	৪	৫
১৭	আপনি আপনার সন্তানকে ঘুমের মধ্যে হাঁটতে দেখেছেন	১	২	৩	৪	৫
১৮	আপনি আপনার সন্তানকে ঘুমের মধ্যে কথা বলতে দেখেছেন	১	২	৩	৪	৫
১৯	শিশু ঘুমের সময় দাঁত পিষে	১	২	৩	৪	৫
২০	শিশু চিৎকার করে বা বিভ্রান্ত হয়ে স্বপ্ন থেকে জেগে ওঠে	১	২	৩	৪	৫
২১	শিশুটি এমন দুঃস্বপ্ন দেখে যা পরের দিন তারা মনে রাখতে পারে না	১	২	৩	৪	৫
২২	শিশুর সকালে ঘুম থেকে উঠতে অসুবিধা হয়	১	২	৩	৪	৫
২৩	সকালে শিশু ঘুম থেকে উঠে ক্লান্ত বোধ করে	১	২	৩	৪	৫

২৪	সকালে ঘুম থেকে উঠার সময় শিশুটি নড়াচড়া করতে অক্ষম বোধ করে	১	২	৩	৪	৫
২৫	শিশু দিনের বেলায় তন্দ্রা অনুভব করে	১	২	৩	৪	৫
২৬	শিশু হঠাৎ অনুপযুক্ত মুহূর্তে ঘুমিয়ে পড়ে	১	২	৩	৪	৫

মোট স্কোর ……………………..

বাংলাদেশ হেলথ্ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The Academic Institute of CRP)

Ref: CRP-BHPI/IRB/12/2024/1044 Date: 15/12/2024

To
Md Shidul Islam Patowary
4th Year B.Sc. in Physiotherapy
Session: 2019-2020, Student ID: 112190517
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal "Sleep disorders among children with cerebral palsy: characteristics and associated factors as reported by their mothers" by ethics committee.

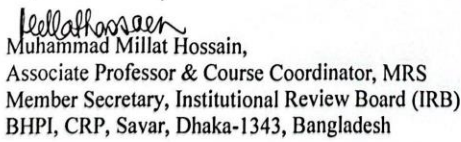
Dear Shidul,
Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned dissertation, with yourself, as the author and Muhammad Millat Hossain, Associate Professor & Course Coordinator, Department of Rehabilitation Science, BHPI, CRP, Savar, Dhaka-1343 as thesis supervisor. The Following documents have been reviewed and approved:

Sl. No.	Name of the Documents
1	Thesis Proposal
2	Questionnaire (English version)
3	Information sheet & consent form

The purpose of the study is to examine the characteristics and associated factors of sleep disorders in children with cerebral palsy, based on reports from their mothers. The study involves use of a questionnaire that may take 20 to 30 minutes to answer. Any instruction or precaution for collection of specimen and there is no likelihood of any harm to the participants and participation in the study may benefit the participants. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 9 AM on July 15, 2024 at BHPI (44th IRB Meeting).

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and ask to be provided a copy of the final report. This Ethics committee is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,



Muhammad Millat Hossain,
Associate Professor & Course Coordinator, MRS
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ। ফোন: +৮৮ ০২ ২২৪৪৪৫৪৬৪-৫, +৮৮ ০২ ২২৪৪৪১৪০৪, মোবাইল: +৮৮ ০১৭৩০ ০৫৯৬৪৭
CRP-Chapain, Savar, Dhaka-1343, Bangladesh. Tel: +88 02 224445464-5, +88 02 224441404, Mobile: +88 01730059647
E-mail : principal-bhpi@crp-bangladesh.org, Web: bhpi.edu.bd

2th January, 2025

Head

Department of Physiotherapy

Centre for the Rehabilitation of the Paralysed (CRP)

Chapain, Savar, Dhaka-1343

Through: Head, Department of Physiotherapy, BHPI.

Subject: Prayer for seeking permission to collect data for conducting research project.

Sir,

With due to respect and humble submission to state that I am Md Shidul Islam Patowary, a student of 4th year B.Sc. in physiotherapy at Bangladesh Health Professions Institute (BHPI). The Ethical committee has approved my research project entitled: "Sleep disorders among children with cerebral palsy: characteristics and associated factors as reported by their mothers" under the supervision of Muhammad Millat Hossain, Associate Professor & Course Coordinator, Department of Rehabilitation Science, BHPI, CRP, Savar, Dhaka-1343. I want to collect data for my research project from the Department of Physiotherapy at CRP. So, I need permission for data collection from the Paediatric Unit of Physiotherapy Department at CRP-Savar, Dhaka-1343. I would like to assure that anything of the study will not be harmful for the participants and the Department itself.

I, therefore pray and hope that you would be kind enough to grant my application and give me permission for data collection and oblige thereby.

Yours faithfully,

SHIDUL

Md Shidul Islam Patowary

4th Year B.Sc. in Physiotherapy

Class Roll: 37; Session: 2019-20

Bangladesh Health Professions Institute (BHPI)

(An academic Institution of CRP)

CRP-Chapain, Savar, Dhaka-1343.

Forwarded

Dr. Shazal Kumar Das, PhD
Assistant Professor and Head
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka-1343.

Recommended & forwarded 11/01/2025

Muhammad Millat Hossain
Associate Professor
Project & Course Coordinator
Dept. of Rehabilitation Science
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Approved 21/1/25

Prof. Dr. Mohammad Anwar Hossain, PhD
Professor Physiotherapy Department BHPI
Senior Consultant & Head
Physiotherapy Department
CRP, Savar, Dhaka-1343