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Sarah Razaq

Combined Military Hospital, Quetta, Pakistan, docsrazaq@gmail.com

Muhammad Aleem Arshad

Combined Military Hospital, Quetta, Pakistan

Tahira Amjad

FUMC (FUI), Islamabad, Pakistan

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THE NATURAL PREDOMINANT SLEEPING POSITIONS IN CEREBRAL PALSY; DOES IT CORRELATE WITH THE TYPE OF CEREBRAL PALSY?

Sarah Razaq¹, Muhammad Aleem Arshad², Tahira Amjad³

1: Consultant Rehabilitation Medicine Combined Military Hospital, Quetta, Pakistan 2: Classified Pediatrician, Combined Military Hospital, Quetta, Pakistan 3: Assistant professor, FUMC (FUI), Islamabad, Pakistan

Correspondence to: Dr Sarah Razaq, Consultant Rehabilitation Medicine Combined Military Hospital, Quetta, Pakistan E-mail: docsrazaq@gmail.com

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ABSTRACT:

Objective: To see the natural positions of cerebral palsy subjects during sleep and their correlation with the particular type of cerebral palsy.

Material and methods:

Institution: Pakistan Aeronautical Complex Hospital Kamra, Pakistan

Study design: Descriptive cross sectional study

Duration of study: 1.5 years

Place of study: Pakistan Aeronautical Complex Hospital Kamra, Pakistan

Method: All consecutive patients of cerebral palsy (CP) fulfilling the inclusion criteria were enrolled for this study. The detailed interview was taken from the parent/caregiver of the child and the demographic data was also noted. The most commonly adopted posture during sleep (more than half of the time spent in sleep at night) was recorded along with sleep duration, daytime naps, bruxism and nocturia. A total of 162 patients with various types of cerebral palsy were enrolled. Detailed information about the type of cerebral palsy, spasticity, associated problems like mental retardation, seizures, visual impairment, hearing impairment, dental problems and speech problems was endorsed in the proforma. The data was analyzed using SPSS V21.

Results: A detailed analysis of various sleep positions was obtained which revealed lateral decubitus position (37.7%) to be most common, followed by supine (24.7%) and prone (10.5%). A combination of lateral decubitus along with supine positioning (11.2%) was also noted. In remaining (6.2%) subjects, no definite pattern could be established due to frequent change of positions while asleep. Spastic diplegia (36.4%) was predominant type of cerebral palsy followed by spastic quadriplegia (17.9%), spastic hemiplegia (16.7%), hypotonia (19.8%) and dystonia/dyskinesia (9.3%).

Conclusion: No statistical association was found between a particular type of cerebral palsy and different positions during sleep.

Key Words: sleeping positions, cerebral palsy, Spastic cerebral palsy

INTRODUCTION: Cerebral palsy (CP) is defined as a disorder of movement control and posture resulting from a non-progressive lesion to an immature brain, occurring in utero, near the time of delivery or within the first 3 years of life¹. Cerebral palsy is a leading cause of lifelong disability. The prevalence of cerebral palsy ranges from 1.7 to 2.0 per 1000 live births in developing world and is a leading cause of lifelong

disability². There is limited but growing evidence regarding sleep disorders among children with cerebral palsy. Sleep quality may be vulnerable to several factors that are common in CP like increased tone, muscle spasms, contractures leading to poor posturing and musculoskeletal pain, the effects of antiepileptic drugs and muscle relaxants, and psychosocial factors³⁻⁵. Most common type of cerebral palsy is spastic diplegic,

followed by spastic hemiplegic, spastic quadriplegic, dyskinetic and mixed CP⁶. If we compare the prevalence of sleep problems among CP children and those with normal development, it is 4 times more common in CP than non CP³. The musculoskeletal problems like increased tone, contractures and pain may lead to a particular positioning during sleep, which may be the position of maximum ease, and it may exacerbate an already existing deformity. Additionally the decreased ability to change body position during the night may contribute to sleep difficulties and is related to the primary motor impairment³.

Sleep is the time in which the patient can be placed in the desired posture to achieve beneficial therapeutic outcome, and vice versa. The aim of this study was to identify, if any, correlation between the sleep positioning and specific type of cerebral palsy. Additional information regarding sleep disorders and associated impairments was also collected. There are a variety of sleep positioning systems and orthotic supports which can be used overnight to achieve various goals like preventing or reducing hip migration or reducing tone in hamstrings/ Gastro-soleus complex. It has been advocated since long to use pillows, cushions or towels to assist the sleeping position of children with postural deformities⁷. It is still controversial to use commercial sleep positioning systems at night. The literature about various sleep positions in CP patients is lacking. We carried out this study to see if any correlation exists between a specific sleep position and a particular type of cerebral palsy.

Materials and methods

Participants

This was a cross-sectional study at rehabilitation unit of this hospital, where 162 children with established diagnosis of CP were investigated. Patients were recruited from our pediatric and rehab outpatient clinics during the period from Jan 2017 to Jun 2018. Our participants were established cases of cerebral palsy, inclusive of all age groups and both genders. These patients of cerebral palsy were enrolled consecutively. The childhood disabilities other than CP like leukodystrophy, myopathies, hereditary neuropathies were excluded from this study. The patients who were unwilling despite of falling in inclusion criteria were also not interviewed. After obtaining written informed consent, and informing the nature and scope of study to the main caregiver, the detailed interview was taken regarding demographic data and clinical history including the history of prematurity, delayed cry, kernicterus/fits after being born and incontinence;

Pertinent physical examination was carried out for detailed assessment. The milestones were recorded including neck holding, sitting balance and standing balance. Gait analysis was also done in patients who were able to walk with or without support and orthoses. The detailed interview was taken about the sleep habits, the maximum time spent in a particular position during sleep (More than half of the time spent in a particular position during sleep), daytime naps, bedwetting and bruxism. The associated impairments were also recorded including mental retardation, seizures, visual impairment, hearing impairment, dental problems and speech problems.

Statistical analysis: The data was analyzed using SPSS V21.

Results:

We analyzed the responses of 162 patients including 111 males (68.5%) and 51 females (31.5%). The study population was divided into three groups 0-5 yrs (38.3%), 6-10 yrs (40.7%), and more than 10 years (21.0%). Spastic diplegia (36.4%) was predominant type of cerebral palsy followed by spastic quadriplegia (17.9%), spastic hemiplegia (16.7%), hypotonia (19.8%) and dystonia/dyskinesia (9.3%).

Among all cases, 41 (25.3%) were born prematurely while 121 (74.7%) were born at term. Incontinence was present in 86 children (53.1%), while 76 (46.9%) were continent for sphincters. The duration of sleep in hours was recorded, which showed that 25.3% children had sleep duration of less than 6 hours, 61.1% between 6-10 hrs, and 13.6% more than 10 hours. Daytime naps were common in 47.5% children, rest had no history of naps. Bedwetting at night (54.3%) and bruxism (33.3%) were also recorded.

Associated impairments were also recorded including mental retardation (25.3%), speech problems (6.8%), epilepsy (6.2%), and visual impairment (1.9%). Two or more impairments also coexisted in many cases (48.8%), while the remaining population had no impairment other than the physical deficit. A detailed analysis of various sleep positions was obtained which revealed lateral decubitus position (37.7%) to be the most common, followed by supine (24.7%) and prone (10.5%). A combination of lateral decubitus along with supine positioning (11.2%) was also noted. In remaining (6.2%) subjects, no definite pattern could be established due to frequent change of positions while asleep. No statistical association was found between a particular type of cerebral palsy and the position acquired during sleep, as value of Pearson Chi Square 19.253 at df 24 was 0.738 which is more than p value

0.05. Linear by Linear association among these two variables was also not found statistically significant at value 0.380 df 1 and significance level at 0.537 which is also more than 0.05. There is no significant negative relationship between posture and type of cerebral palsy as Spearman's rho correlation coefficient value $r = -.019$ at p value 0.806 is more than p-value 0.05. Posture of CP patients association with age and gender was also found insignificant.

Regression Note: if there is no significant correlation then regression analysis will not be required as it will also stand insignificant.

Discussion:

Although there is growing evidence that structural brain lesions in infants and children are often associated with sleep disruption either of initiating and maintaining sleep or parasomnias, or even respiratory problems as compared to normal pediatric population⁸. But the literature on specific positions adapted during sleep among CP children is lacking. To the best of our knowledge, this is the first study to see the correlation between sleep positions in cerebral palsy patients and the specific type of CP. Cerebral palsy, being the disorder of movement control and posture leads to difficulties in alignment and stabilization against gravity, hence around half of the population uses some sort of assistance to achieve proper alignment and stability. There is an increased risk of tissue adaptation, leading to contracture formation and progressive deformities affecting spine, pelvis and hip secondary to asymmetric posture. Nonambulant patients are more prone to develop contractures resulting from prolonged posturing⁹. It has been suggested that establishment of asymmetrical postural pattern in growing children with CP particularly results from positioning of infant in first year of life. Postural deformity in young people with delayed motor development may not be due to neurological pathology itself, but secondary to immobility¹⁰. Hence it is important to identify the natural positions adapted by the patient particularly while sleeping, which is the maximum time for sustained posturing. For this study, we consecutively enrolled all patients of cerebral palsy reporting to the department of physical medicine & rehabilitation. A detailed analysis of various sleep positions among CP children was obtained which revealed lateral decubitus position (37.7%) to be the most common, followed by supine (24.7%) and prone (10.5%). A combination of lateral decubitus along with supine positioning (11.2%) was also noted. In a small group (6.2%), frequent change of positions was noticed including supine,

prone and lateral decubitus. In remaining (9.7 %), the positioning pattern was not well defined secondary to considerable contractures and deformities. In normal children, lateral and supine positions are equally represented with prone positions occupying a somewhat lower percentage of time¹¹. The CP children staying at home showed prolonged immobilized posture at night when their caregivers would also be likely to sleep¹². Elsayed et al studied frequency of sleep problems in CP children both preschool and school going group. The result revealed high incidence of sleep problem in both pre-school and school age groups. They found that pre-school children had more prevalence of early insomnia and sleep bruxism while school group suffer more sleep disordered breathing, more nightmares, more sleep talking and more excessive daytime sleepiness (EDS). They also studied the correlation between clinical subtypes of CP children and different types of sleep disorders and found that sleep disordered breathing was the most common complaint in all clinical subtypes¹³. Sleep habits in children with CP were significantly different from sleep habits in normal children. One study describing postural asymmetries in adults in supine, sitting and standing correlated with inability to change position independently. All adults at GMFCS level I to III maintained lying position independently, while 10% of those at GMFCS level IV and 60% at GMFCS level V needed support. Fifty percent of the adults at GMFCS levels IV and V had only one lying position, the other half changed between two or three positions. Only eight adults, all at GMFCS level I to III, changed between all four positions prone, supine, and side lying left and right¹⁴. The prevalence of symptoms suggesting sleep disorders including bruxism, snoring, breathing pauses, awakening from night sleep and nocturnal enuresis are higher in CP than non CP population¹⁵. We searched the literature, but could not find sufficient details on the positions and postures during sleep among CP children. The limitation of this study is the restricted number of participants when analyzing the results for each type of CP separately. Another limitation is that there was no control group and it was based on interviewing the caregiver/ parent, which may be subject to risk of reporter bias, directly observed sleep positioning of CP children would provide more precise information.

Conclusion

Although no significant association was found between the type and a particular sleep position, but this study has opened a new vista to look into the sleeping positions in CP and future studies can be carried out to understand any correlation.

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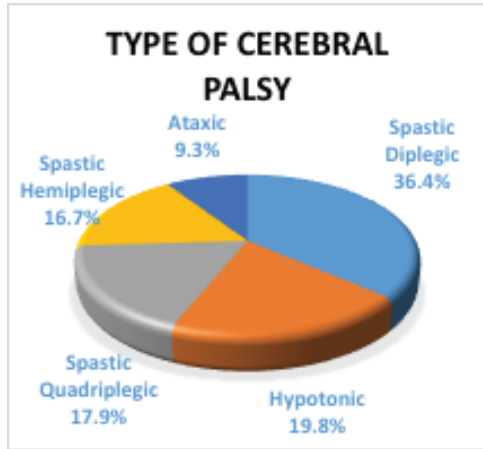


Fig 1. Types of cerebral palsy in the cohort

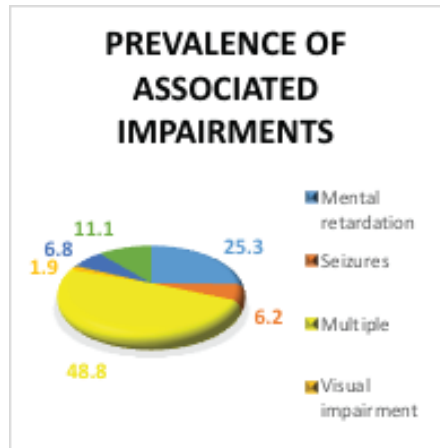


Fig 2. Prevalence of associated impairments

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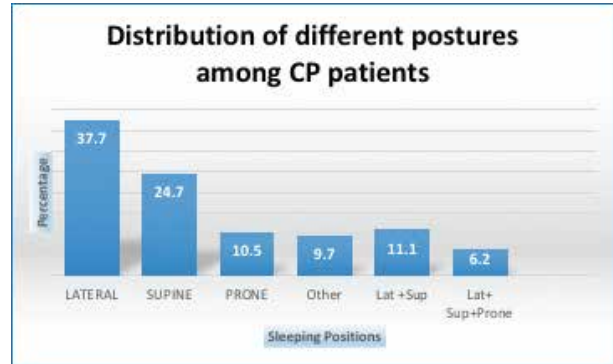


Table 1. Distribution of sleep positions among cerebral palsy subjects

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Author's contribution:

Sarah Razzaq; concept, data collection, data analysis, manuscript writing, manuscript review

Muhammad Aleem Arshad; data collection, data analysis, manuscript writing, manuscript review

Tahira Amjad; data analysis, manuscript writing, manuscript review