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Research Article

Comorbidities And Quality Of Life In Cerebral Palsy Children Attending GB Pant Children Hospital, Srinagar Hospital Based Observational Study

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ABSTRACT

Background: Cerebral palsy (CP) is a non-progressive neurological disorder of movement and posture resulting from early brain injury. It is associated with varying degrees of motor impairment, comorbidities, and diminished quality of life. Understanding the clinical profile, functional status, and lifestyle impact is essential for guiding multidisciplinary management and rehabilitation strategies. **Aim**: To evaluate the demographic characteristics, clinical subtypes, functional classification, comorbidities, and quality of life among children with cerebral palsy. **Methods**: A cross-sectional observational study was conducted on 50 children diagnosed with CP. Demographic data, clinical types, Gross Motor Function Classification System (GMFCS) levels, and comorbidities were recorded. Mental retardation was assessed using standard developmental scales. Quality of life was evaluated using the Lifestyle Assessment Questionnaire for Cerebral Palsy (LAQ-CP). Data were analyzed to identify patterns of motor impairment, comorbid burden, and factors influencing lifestyle outcomes. **Results**: The majority of children were ≤5 years (76%), with a slight male predominance (56%). Spastic CP was the most prevalent type (82%), with quadriplegia being predominant. Functional assessment revealed that 60% of children were in GMFCS levels IV and V, indicating severe motor disability. Mental retardation was present in 96% of patients, predominantly moderate to profound in severity. Common comorbidities included speech problems (90%), orthopedic deformities (78%), visual impairment (56%), epilepsy (48%), and gastrointestinal issues (36%). Quality of life assessment revealed that children with bilateral spastic and dyskinetic CP had the highest Lifestyle Assessment Scores, reflecting greater functional and lifestyle limitations. A significant association was observed between higher GMFCS levels, comorbid burden, and poorer quality of life.**Conclusion**: Children with cerebral palsy demonstrate a high prevalence of severe motor impairment, mental retardation, and multisystem comorbidities, resulting in compromised quality of life. Early diagnosis, regular functional assessment, and multidisciplinary rehabilitation tailored to individual needs are essential to improve mobility, communication, and overall lifestyle outcomes. Emphasis on family-centered care and management of comorbidities can substantially enhance the quality of life in this population.

Keywords: *Cerebral palsy, spastic quadriplegia, GMFCS, comorbidities, quality of life, Lifestyle Assessment Score.*

INTRODUCTION

Neuromotor disorders are developmental or acquired conditions that primarily affect movement, posture, and fine motor skills due to damage to the central nervous system. Such damage may involve the cortex, basal ganglia, thalamus, cerebellum, brainstem, or spinal cord and may arise from developmental issues or injuries to motor pathways. The most common neuromotor disorders in childhood include cerebral palsy (CP), muscular dystrophy, and spina bifida, with CP being the most prevalent [1,2].

Cerebral palsy is defined as a group of permanent disorders of movement and posture development, causing activity limitation, attributable to non-progressive disturbances occurring in the developing fetal or infant brain. These disorders can present with global physical and mental dysfunction [1,3]. CP results from brain injury occurring before cerebral development is complete, encompassing prenatal, perinatal, or postnatal periods [3,4]. Approximately 70–80% of cases are acquired prenatally, often from unknown causes, while birth complications such as asphyxia account for a smaller proportion. Neonatal risk factors include preterm birth (<32 weeks gestation), low birth weight (<2,500 g), intrauterine growth restriction, intracranial hemorrhage, and trauma [3].

Diagnosis of CP relies on observation of delayed motor development, abnormal muscle tone, and atypical postures. Persistent infantile reflexes beyond six months or early hand preference may indicate motor deficits. Differential diagnosis is essential to exclude progressive hereditary or metabolic disorders, with investigations including laboratory tests and neuroimaging such as CT, MRI, or ultrasound [3,4]. Surveillance for associated disabilities—including visual and hearing impairments, seizures, sensory perception problems, and cognitive dysfunction—is integral to the assessment [4,5].

CP is classified based on neuromuscular deficits into spastic, dyskinetic (choreo-athetoid or dystonic), hypotonic, ataxic, and mixed types. Spastic CP, the most common type (70–80%), is characterized by increased reflexes, hypertonicity, weakness, and gait abnormalities. Dyskinetic CP affects 10–20% of patients with slow, writhing movements, while ataxic CP (5–10%) primarily impairs balance and coordination [4,5]. Intellectual impairment occurs in approximately two-thirds of patients, and about half experience seizures. Growth disturbances and neurological deficits, including abnormal vision, hearing, and sensory perception, are also common [5,6].

Assessment of CP and its impact on daily life employs standardized instruments, including the Gross Motor Function Classification System (GMFCS) [7], Pediatric Evaluation of Disability Inventory (PEDI) [8], Functional Independence Measure (FIM) and WeeFIM [8], Child Health Questionnaire (CHQ) [9], and spasticity scales like the Ashworth and Modified Ashworth scales [10]. These tools quantify functional abilities, track developmental milestones, and measure quality of life (QOL).

Management of CP focuses on enhancing functionality, cognitive development, social interaction, and independence rather than cure. Early, intensive, and multidisciplinary interventions—including physical, occupational, speech, behavioral therapies, pharmacologic and surgical treatments, and assistive devices—yield the best outcomes [3,5,11]. Improving QOL has emerged as a central treatment goal, with interventions guided by parent- and child-reported measures [12,13].

Despite global research, limited data exist on QOL and comorbidities in children with CP in Kashmir. Evaluating these factors is essential for developing evidence-based, culturally sensitive interventions to improve the well-being of affected children and their families.

AIMS AND OBJECTIVES

The primary aims of this study were:

1. To determine the prevalence and pattern of comorbidities in children with cerebral palsy.
2. To evaluate the quality of life of the study population using the Lifestyle Assessment Questionnaire-Cerebral Palsy (LAQ-CP).

MATERIALS AND METHODS

Study design: This was a hospital-based prospective observational study.

Study area: The study was conducted at the Postgraduate Department of Pediatrics, G.B. Pant Hospital, Srinagar, an affiliated hospital of Government Medical College Srinagar.

Study duration: November 2018 to November 2020.

Study population: Children aged 3–10 years diagnosed with cerebral palsy attending the Pediatric Outpatient Department of G.B. Pant Hospital.

Sample size: Fifty children with cerebral palsy were enrolled.

Inclusion criteria:

- Children aged 3–10 years with a confirmed diagnosis of cerebral palsy.

Exclusion criteria:

* Children with known metabolic, neurodegenerative, or genetic disorders.
* Children requiring emergency care due to severe illness.

Procedure:
Eligible children were screened, and informed consent was obtained from parents after explaining the study objectives. Confidentiality was assured. Detailed histories, including sociodemographic characteristics and ongoing therapies, were collected using a predesigned proforma. Children underwent comprehensive neurological examinations and were classified into spastic, dyskinetic, hypotonic, or ataxic cerebral palsy. Comorbidities such as seizures, hearing or vision impairment, cognitive deficits, feeding difficulties, contractures, and behavioral issues were documented. Etiology was determined based on history, prior records, and investigations.

Motor disability severity was assessed using the Gross Motor Function Classification System. Primary caregivers were interviewed in a distraction-free environment, and the Lifestyle Assessment Score was calculated according to the LAQ-CP manual. Correlation between LAS and GMFCS levels was statistically analyzed.

Diagnosis criteria:
Three essential criteria were used for cerebral palsy diagnosis:
* Impairment of neurological function, particularly voluntary motor activity.
* Non-progressive, non-hereditary disorder.
* Presence of disorder since birth or early infancy.

Assessment tools:
Screening for comorbidity
* Motor function: GMFCS was used to classify motor impairment into five levels, ranging from walking without limitations to transported in a manual wheelchair.
* Developmental abilities: The Denver Developmental Screening Test assessed gross motor, fine motor, language, adaptive, and personal-social development.
* Vision and hearing: Vision was assessed using toy fixation, convergence tests, strabismus evaluation, refractive error check, and fundus examination. Hearing assessment included impedance audiometry and brainstem evoked responses when necessary.
* Language and communication: Expressive and receptive language, phonology, articulation, and oro-facial movements were evaluated.
* Behavior screening: Play, attachment, social behaviors, attention, hyperactivity, and autistic traits were assessed using standardized criteria for autism and attention deficit disorders.

Lifestyle assessment questionnaire-Cerebral Palsy (LAQ-CP)
The LAQ-CP, originally a 46-item questionnaire translated into 37 items, evaluates six dimensions: physical independence, mobility, clinical burden, schooling, economic burden, and social integration. Responses are scored 0–4 and converted to a Lifestyle Assessment Score, expressed as a percentage. LAS scores categorize quality of life as good (<30%), mildly affected (30–50%), moderately affected (51–70%), and severely affected (>70%).

Statistical analysis:
Data were recorded in Microsoft Excel and analyzed using SPSS v23. Continuous variables are expressed as mean ± standard deviation (range), while categorical variables are presented as numbers and percentages. Statistical significance was assessed at the 5% level.

RESULTS
A clinical study with 50 patients with cerebral palsy was conducted. The demographic characteristics, clinical features, functional classification, comorbidities, and quality of life were analyzed.

Majority of patients (76%) were aged 5 years or younger, while 24% were older than 5 years. Males were predominant in the study population (56%) compared to females (44%) [Table 1].

Table 1: Demographic characteristics of children with cerebral palsy

Parameter	Frequency	Percentage
Age distribution		
≤ 5 years	38	76
> 5 years	12	24
Gender distribution		
Male	28	56
Female	22	44

The distribution of different clinical types of cerebral palsy in male and female children is shown below. Spastic cerebral palsy was the most common type (82%), with quadriplegia being the predominant subtype [Table 2].

Table 2: Clinical types of cerebral palsy

Clinical type of CP	Total (n=50)	Male (n=28)	Female (n=22)
Spastic quadriplegia	24 (48.0)	11 (39.3)	13 (59.1)
Spastic diplegia	12 (24.0)	8 (28.5)	4 (18.2)
Spastic hemiplegia	3 (6.0)	2 (7.1)	1 (4.5)
Spastic double hemiplegia	1 (2.0)	1 (3.5)	0 (0.0)
Choreoathetoid	5 (10.0)	4 (14.3)	1 (4.5)
Spastic monoplegia	1 (2.0)	1 (3.6)	0 (0.0)
Dystonia	2 (4.0)	1 (3.5)	1 (4.5)
Hypotonic/atonic	2 (4.0)	0 (0.0)	2 (9.1)

The gross motor function classification system was used to assess severity. The majority of children were classified in GMFCS class V (34%), followed by class IV and III (26% each) [Table3].

Table 3: Functional classification (GMFCS)

Functional classification	Total (n=50)	Male (n=28)	Female (n=22)
I	4 (8.0)	1 (3.6)	3 (13.6)
II	3 (6.0)	2 (7.1)	1 (4.5)
III	13 (26.0)	8 (28.5)	5 (22.0)
IV	13 (26.0)	7 (25.0)	6 (27.3)
V	17 (34.0)	10 (35.7)	7 (31.8)

A total of 96% of children had some degree of mental retardation, more common in males than females [Table 4].

Table 4: Mental retardation

Mental retardation	Total (n=50)	Male (n=28)	Female (n=22)
Normal	2 (4.0)	0 (0.0)	2 (9.1)
Borderline	6 (12.0)	2 (7.1)	4 (18.2)
Mild	10 (20.0)	5 (17.9)	5 (22.7)
Moderate	9 (18.0)	6 (21.4)	3 (13.6)
Severe	13 (26.0)	9 (32.1)	4 (18.2)
Profound	10 (20.0)	6 (21.4)	4 (18.2)

Various comorbid conditions were assessed in children with cerebral palsy. The most common comorbidities were speech problems (90%), orthopedic problems (78%), and visual impairment (56%) [Table 5].

Table 5: Comorbidities

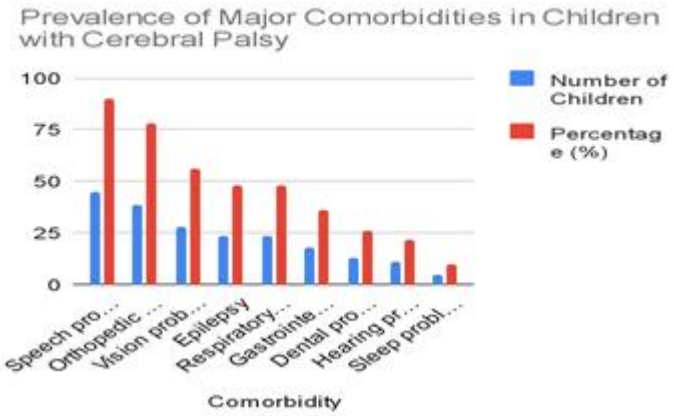
Comorbidity	Total (n=50)	Male (n=28)	Female (n=22)
Epilepsy	24 (48.0)	15 (53.6)	9 (40.9)
Hearing problem	11 (22.0)	8 (28.6)	3 (13.6)
Vision problem	28 (56.0)	17 (60.7)	11 (50.0)
Speech problem	45 (90.0)	25 (89.3)	20 (90.9)
Gastrointestinal problem	18 (36.0)	12 (42.9)	6 (27.3)
Respiratory problem	24 (48.0)	24 (48.0)	11 (50.0)
Orthopedic problem	39 (78.0)	23 (82.1)	16 (72.7)
Sleep problem	5 (10.0)	3 (10.7)	2 (9.1)
Dental problem	13 (26.0)	8 (28.6)	5 (22.7)

The quality of life of children was evaluated using the LAQ-CP questionnaire. There was a significant association between GMFCS and LAS scores, with higher LAS scores in children with dyskinetic and bilateral spastic CP. Mean LAS scores were similar between males and females [Table 6].

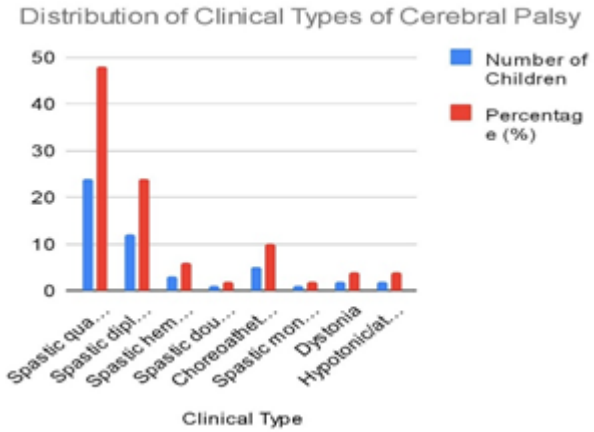
Table 6: Quality of life (Lifestyle Assessment Score)

Parameter	Value
Mean LAS (95% CI)	**45.11 (40.85–49.36)**
Median (SD)	**47.07 (21.76)**
Good QOL (LAS <30%)	**33**
Mildly affected QOL (LAS 30–50%)	**22**
Moderately affected QOL (LAS 51–70%)	**24**
Severely affected QOL (LAS >70%)	**21**
Mean LAS males	**44.58**
Mean LAS females	**45.29**

Unilateral spastic CP	**23.69**
Bilateral spastic CP	**51.5**
Dyskinetic CP	**67.9**



Bar graph 1: Prevalence of Major Comorbidities in children with Cerebral Palsy.



Bar graph 2: Distribution of Clinical Types of Cerebral Palsy.

DISCUSSION

The present study examined 50 children with cerebral palsy (CP) to analyze demographic patterns, clinical subtypes, comorbidities, functional status, and quality of life (QOL). The majority of children (76%) were ≤5 years, consistent with findings by Ashiyat et al. [13] and Padinjattethil et al. [14], highlighting early diagnosis in CP and the tendency for clinical manifestations to appear in early childhood. Male predominance (56%) was observed, similar to previous studies reporting male-to-female ratios of approximately 1.5:1 [15,16]. This may reflect both biological vulnerability and referral patterns for males in developing countries [17].

Spastic CP was the most prevalent type in this cohort (82%), with quadriplegia being the dominant subtype (48%). This aligns with multicenter studies reporting spastic forms in 70–90% of cases [13,18,19], and the higher prevalence of quadriplegia in our study mirrors the findings of Kumar et al. [20]. Dyskinetic CP accounted for 10% of cases, while hypotonic and dystonic types were less common, corroborating the distribution reported in previous Indian and international studies [21,22]. The predominance of severe motor involvement in spastic quadriplegia likely contributes to associated comorbidities and impaired functional outcomes [23].

Functional assessment using the GMFCS showed that most children were in levels IV and V (60% combined), indicating significant limitations in mobility and independence. This distribution is similar to studies in tertiary care centers where more severely affected children are often overrepresented due to referral bias [13,24]. High GMFCS levels were significantly correlated with poorer QOL, as measured by LAS scores, supporting prior findings that motor impairment severity is a key determinant of health-related quality of life in CP [25,26].

Comorbidities were highly prevalent, with speech delay (90%), orthopedic problems (78%), visual impairment (56%), and epilepsy (48%) being the most frequent. These findings are consistent with literature indicating that spastic quadriplegia is often accompanied by multiple neurological and systemic comorbidities [14,16,23]. The high rate of speech delay reflects severe oromotor involvement, while orthopedic complications such as contractures result from spasticity and delayed physiotherapy [27,28]. Visual impairment prevalence (56%) in our cohort is higher than some

studies [15] but aligns with multi-specialty clinic reports [13,29]. Epilepsy occurred in nearly half of the children, which corresponds to reported rates of 30–50% in similar populations [14,30].

Assessment of QOL using LAQ-CP revealed that 45% of children were moderately to severely affected, and only 33% had good QOL. Mean LAS scores were higher in children with dyskinetic (67.9) and bilateral spastic CP (51.5) compared to unilateral spastic CP (23.69), emphasizing the impact of severe motor involvement on lifestyle and daily functioning. These results are consistent with findings by Dobhal et al. [31] and Lim and Wong [32], which demonstrated that increased motor severity, comorbidities, and functional limitations negatively affect QOL in CP children. Interestingly, QOL did not differ significantly by gender, in agreement with prior studies indicating that the impact of CP on daily functioning is primarily determined by severity rather than sex [13,33].

The present study also highlights the need for multidisciplinary management, early intervention, and family-centered care. Therapies targeting mobility, communication, and social integration are likely to improve overall QOL. Moreover, interventions addressing comorbidities such as seizures, visual and hearing impairments, and orthopedic complications are critical in improving functional independence and participation [27,34]. The high prevalence of comorbidities underlines the importance of a holistic approach to CP management, involving pediatricians, neurologists, physiotherapists, speech therapists, and psychologists [35].

In summary, our findings emphasize early diagnosis, comprehensive evaluation, and tailored interventions for children with CP, particularly those with severe motor impairment and multiple comorbidities. The correlation between GMFCS and LAS scores confirms that functional severity is a major determinant of quality of life, underscoring the importance of early, targeted rehabilitation strategies.

CONCLUSION

The present study highlights the clinical spectrum, functional limitations, comorbidities, and quality of life among children with cerebral palsy (CP) in a tertiary care setting. The majority of children were aged five years or younger, with a slight male predominance, emphasizing the need for early detection and intervention. Spastic CP, particularly quadriplegia, was the most prevalent subtype, consistent with global and regional data.

Functional assessment revealed that a significant proportion of children were classified in GMFCS levels IV and V, indicating severe motor impairment and dependence in daily activities. Mental retardation was highly prevalent, affecting almost all children, with moderate to profound levels being more common in males. Comorbidities such as speech delay, orthopedic problems, visual impairment, epilepsy, and gastrointestinal issues were widespread, underscoring the multisystem involvement in CP and the necessity for multidisciplinary management.

Quality of life assessment using LAS demonstrated that children with severe motor involvement, especially those with bilateral spastic or dyskinetic CP, experienced the most significant impact on daily functioning and overall lifestyle. While gender did not significantly influence QOL, higher GMFCS levels and comorbid burden were strongly associated with poorer outcomes.

These findings underscore the critical importance of early diagnosis, regular functional assessment, and individualized, multidisciplinary rehabilitation programs aimed at improving mobility, communication, and psychosocial well-being. Targeted interventions addressing comorbidities and promoting family-centered care can enhance the overall quality of life for children with CP. The study reinforces that comprehensive management strategies, particularly for children with severe CP, are essential for optimizing functional independence and participation in daily life.

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