

# Ambulatory Potential in Children with Cerebral Palsy

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## ABSTRACT

Ambulation is a major concern in cerebral palsy (CP) rehabilitation. The present study was carried out in 175 CP cases, belonging to the age group of 2 years and above. The aim of the article was to identify the independent ambulators in different types of CP, to study the age of achieving independent ambulation, and to determine some parameters that affect ambulatory outcome.

Among 175 cases, 69 (39.4%) cases were found to be able to walk independently. Of this, the maximum number of cases were children with spastic hemiplegia, 37 of 39 (94.9%), followed by children with spastic paraplegia, 7 of 18 (41.1%) and diplegia, 15 of 45 (33.1%). Majority of these children were found to have either normal intelligence or mild degree of mental retardation (MR). Degree of spasticity was mild in these cases. Majority of the children who were able to walk had achieved independent sitting by 2 years of age, i.e., in 54 of 69 (78.3%) cases.

The present study highlights that CP children with spastic hemiplegia had the highest potential for independent walking. Spasticity of mild degree in association with a normal intelligence or mild degree of MR and achievement of independent sitting by 2 years of age appear to be favorable for ambulation.

**Keywords:** Ambulation, Cerebral palsy, Potential.

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## INTRODUCTION

Functional outcome including ambulation is an important concern for the parent as well as the doctor. Prediction of ambulatory outcome is important in planning the short-term and long-term goals in rehabilitation program for the cerebral palsy (CP) child.

## MATERIALS AND METHODS

A total of 175 children with CP of both sexes belonging to age group of 2 years and above, attending the Department of Physical Medicine and Rehabilitation, in a tertiary care hospital, New Delhi, India, from January 1994 to August 1996 were studied to determine some parameters that may help to prognosticate their ambulatory potential. The cases diagnosed as CP included those cases who had suffered brain damage in the "developing brain" as per definition of the American Academy for Cerebral Palsy and Developmental Medicine.<sup>1</sup> The classification of CP was based on the major grouping as described by Mitchell.<sup>2</sup> Degree of spasticity was graded as mild, moderate, or severe based on clinical examination. The level of intelligence was graded as normal or mentally retarded of mild, moderate, severe, or profound degrees. Assessment of developmental motor milestones was in accordance with Denver Developmental Screening Test.<sup>3</sup> Only those cases of CP of congenital origin were included in the study. The child was considered to have independent ambulation when he/she was able to walk without the help of ambulatory aids like walker, crutch, or stick.

## OBSERVATIONS

Of 175 children with CP, there were 137 males and 38 females. Spastic quadriplegia was observed in maximum number of cases, i.e., 69 (39.4%) followed by spastic diplegia and spastic hemiplegia in 45 (25.7%) cases and 39 (22.3%) cases respectively. Other types of CP were less in number, e.g., spastic paraparesis 18 (10.3%), spastic triplegia 2 (1%), and mixed 2 (1%) (Table 1). Of 175 cases, 69 (39.4%) cases were found to be able to achieve independent ambulation. Among these 69 cases, the maximum numbers were of spastic hemiplegia (Table 2). While 37 of 39 cases (94.9%) of hemiplegics could walk independently (Table 3), 7 of 18 (41.1%) cases of spastic paraplegia (Table 4) and 15 of 45 (33.1%) cases of diplegia (Table 5) were ambulatory. Only 10 of 69 (14.5%) cases of quadriplegia

**Table 1:** Types of CP (n = 175)

	No.	%
Spastic quadriplegia	69	39.4
Spastic diplegia	45	25.7
Spastic hemiplegia	39	22.3
Spastic paraparesis	18	10.3
Spastic triplegia	2	1.0
Mixed (spastic + dyskinetic)	2	1.0

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**Table 2:** Ambulators in different types of CP (n = 69)

Type of CP	No. of ambulators	%
Spastic hemiplegia (n = 39)	37	94.9
Spastic paraparesis (n = 18)	7	41.1
Spastic diplegia (n = 45)	15	33.3
Spastic quadriplegia (n = 69)	10	14.5
Spastic triplegia (n = 2)	0	0
Mixed (spastic + dyskinetic) (n = 2)	0	0

learnt to walk (Table 6). None of the cases of triplegia and mixed type could walk independently (Tables 7 and 8). Of 37 cases of spastic hemiplegia who were ambulators, 28 (71.9%) cases had normal intelligence, 7 (17.9%) cases had mild mental retardation (MR), and 2 (5.1%) cases had moderate MR (Table 3). Among the 7 paraplegia cases who could walk independently, 6 (85.7%) cases had normal intelligence and 1 (14.3%) had mild MR (Table 4). Two (13.3%) of 15 cases of spastic diplegia who were ambulators had normal intelligence, while in the rest, 12 (80.0%) cases had mild MR and 1 (6.7%) case had

**Table 3:** Ambulatory status in CP with spastic hemiplegia (n = 39)

	Walking No. (age in months)	Walking with support No. (age in months)
Spastic hemiplegia with normal intelligence (n = 28)		
a. Sitting by 2 years and less	27 (10–30)	0
b. Sitting after 2 years	1 (42)	0
Spastic hemiplegia with mild MR (n = 7)		
a. Sitting by 2 years and less	7 (24–36)	0
b. Sitting after 2 years	0	0
Spastic hemiplegia with moderate MR (n = 2)		
a. Sitting by 2 years and less	2 (24–54)	0
b. Sitting after 2 years	0	0
Spastic hemiplegia with severe-profound MR (n = 2)		
a. Sitting by 2 years and less	0	0
b. Sitting after 2 years	0	2 (36)

**Table 4:** Ambulatory status in CP with spastic paraplegia (n = 18)

	Walking No. (age in months)	Walking with support No. (age in months)	Standing No. (age in months)	Standing with support No. (age in months)	Walking-standing nil No. (age in months)
Spastic paraplegia with normal intelligence (n = 12)					
a. Sitting by 2 years and less	4 (24–54)	1 (36)	0	1 (30)	1
b. Sitting after 2 years	2 (36)	–	0	2 (36)	1
Spastic paraplegia with mild MR (n = 2)					
a. Sitting by 2 years and less	0	1 (30)	0	0	0
b. Sitting after 2 years	1 (60)	0	0	0	0
Spastic paraplegia with moderate MR (n = 1)					
a. Sitting by 2 years and less	0	1 (48)	0	0	0
b. Sitting after 2 years	0	0	0	0	0
Spastic paraplegia with severe-profound MR (n = 3)					
a. Sitting by 2 years and less	0	0	0	0	0
b. Sitting after 2 years	0	0	0	0	3

**Table 5:** Ambulatory status in CP with spastic diplegia (n = 45)

	Walking No. (age in months)	Walking with support No. (age in months)	Standing No. (age in months)	Standing with support No. (age in months)	Walking-standing nil No. (age in months)
Spastic diplegia with normal intelligence (n = 12)					
a. Sitting by 2 years and less	1 (54)	3 (30–36)	0	0	0
b. Sitting after 2 years	1 (52)	2 (66–72)	0	3 (36–48)	1
Spastic diplegia with mild MR (n = 25)					
a. Sitting by 2 years and less	6 (36–42)	5 (24–48)	0	1 (48)	0
b. Sitting after 2 years	6 (36–72)	4 (42–144)	0	1 (42)	2
Spastic diplegia with moderate MR (n = 6)					
a. Sitting by 2 years and less	0	2 (54–66)	0	1 (36)	0
b. Sitting after 2 years	1 (36)	0	0	0	2
Spastic diplegia with severe-profound MR (n = 3)					
a. Sitting by 2 years and less	0	0	0	0	0
b. Sitting after 2 years	0	1 (60)	0	0	2

**Table 6:** Ambulatory status in CP with spastic quadriplegia (n = 69)

	Walking No. (age in months)	Walking with support No. (age in months)	Standing No. (age in months)	Standing with support No. (age in months)	Walking- standing nil No. (age in months)
Spastic quadriplegia with normal intelligence (n = 23)					
a. Sitting by 2 years and less	33 (6–48)	2 (24–36)	2 (12–15)	6 (24–30)	0
b. Sitting after 2 years	3 (36–84)	5 (30–72)	2 (30–36)	0	0
Spastic quadriplegia with mild MR (n = 24)					
a. Sitting by 2 years and less	4 (24–36)	3 (24–36)	2 (24–60)	5 (24–36)	5
b. Sitting after 2 years	0	2 (57–72)	1 (96)	0	2
Spastic quadriplegia with moderate MR (n = 13)					
a. Sitting by 2 years and less	0	0	0	0	0
b. Sitting after 2 years	0	4 (36–60)	0	4 (36–57)	5
Spastic quadriplegia with severe-profound MR (n = 9)					
a. Sitting by 2 years and less	0	0	0	0	0
b. Sitting after 2 years	0	1 (60)	0	4 (48–96)	5

**Table 7:** Ambulatory status in CP with spastic triplegia (n = 2)

	Walking No. (age in months)	Walking with support No. (age in months)	Standing No. (age in months)	Standing with support No. (age in months)	Walking-standing nil No. (age in months)
Spastic triplegia with mild MR (n = 2)					
a. Sitting by 2 years and less	0	0	0	0	0
b. Sitting after 2 years	0	1 (42)	0	0	1 (48)

**Table 8:** Ambulatory status in CP with mixed (spastic + dyskinetic) type (n = 2)

	Walking No. (age in months)	Walking with support No. (age in months)	Standing No. (age in months)	Standing with support No. (age in months)	Walking-standing nil No. (age in months)
Mixed (spastic + dyskinetic) with mild MR (n = 1)					
a. Sitting by 2 years and less	0	1 (24)	0	0	0
b. Sitting after 2 years	0	0	0	0	0
Mixed (spastic + dyskinetic) with severe-profound MR (n = 1)					
a. Sitting by 2 years and less	0	0	0	0	0
b. Sitting after 2 years	0	0	0	0	1 (60)

**Table 9:** Sitting status in spastic ambulators (n = 69)

Age of sitting	No.	%
Sitting by 2 years and less	54	78.3
Sitting after 2 years	15	21.7

moderate MR (Table 5). Degree of spasticity was mild in all the cases of successful ambulators. Majority of the children who were able to walk had achieved independent sitting by 2 years of age, i.e., in 54 of 69 (78.3%) cases (Table 9).

## DISCUSSION

One of the major roles of the physiatrist in rehabilitating a child with CP is the establishment of medical and functional prognosis for such children. Various studies<sup>4,5</sup> have been done to identify factors that affect prognosis in CP. The present study has been done to determine

some factors that will help prognosticate the walking (ambulatory) potential of a CP child. Majority of the children were males, male to female ratio was 3.6:1. Similar observation has been made in earlier studies.<sup>6,7</sup> Of 175 children with CP, 69 (39.4%) cases achieved independent walking. Of these, maximum number of cases were of spastic hemiplegia, i.e., 37 of 39 (94.9%) cases. This observation is consistent with that of Nelson<sup>4</sup> and Steinpien and Gaebler-Spira<sup>5</sup> who found that virtually all children with hemiplegia are ambulators. In spastic diplegia, Nelson<sup>4</sup> observed that more than 50% cases learn to walk, while Deborah observed that 85% with diplegia eventually ambulate. In the present study, only 33.1% cases of diplegia were successful ambulators.

Of the 69 cases who could walk, 54 (78.3%) cases had achieved independent sitting by 2 years of age. This observation is consistent with that of other studies<sup>4,5</sup> where it was observed that most children who sit by

2 years of age eventually become independent walkers. Majority of the successful ambulators were found to have normal intelligence, i.e., in 42 of 69 (60.9%) cases, or mild degree of MR, i.e., 24 (34.8%) cases. The degree of spasticity was mild in all the cases.

## CONCLUSION

The present study shows that children with spastic hemiplegia were most successful ambulators. Spasticity of mild degree in association with normal intelligence or mild degree of MR appears to be favorable for ambulation. Achievement of independent sitting by 2 years of age also serves as helpful criteria to prognosticate ambulatory potential.

The present study highlights that there are several factors that may help to determine the prognosis for ambulation in a child with CP. They include the clinical type, the degree of spasticity, the age of achieving independent sitting, and level of intelligence.

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