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Prevalence of the pattern of cerebral palsy children seen in registered Zilla parishad of Sangli district

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Abstract
Background: Cerebral palsy is one of the leading cause of childhood disability. Local data on pattern of presentation of CP along with its severity level and standardized management protocols are lacking in Sangli District.
Objective: To find out the prevalence of pattern of cerebral palsy children and classify their GMFCS-ER level of registered zilla parishad of Sangli district, Maharashtra.
Materials and Methods: A cross-sectional study was conducted in inclusive education project area of school of Zilla Parishad of Sangli district. Data was collected through Pediatric Evaluation Form by caregivers help, by medical records and physical assessment. Data were analyzed using appropriate statistical test
Results: A total of 115 cerebral palsy children were seen in six months of duration. 53.9% were male and 46.1% were female children of age 0 to 18 years. Number of children seen in different talukas were 17.4% from Palus, followed by 16.5% children from Miraj, 12.2% children were from Islampur and Kadegaon taluka each, 11.3% were from Tasgaon taluka, 10.4% from Atpadi, 8.7% from Vita, 6.1% were from Kavte Mahankal taluka and 2.6% from Jath and Shirala taluka each. Spastic cp (89%) and quadriplegic cp (58%) presentations were the leading sub-types of CP. Severity level according to GMFCS- ER was level V as the highest. Birth asphyxia (54.8%) was the leading etiology of CP.
Conclusion: Severely disabled CP has been encountered in Sangli district thus early intervention and appropriate rehabilitation services should be provided to such children to limit the disability.

Keywords: cerebral palsy, GMFCS E&R, birth asphyxia, spastic cp

Introduction

Cerebral palsy is defined as a non-progressive neuromotor disorder of cerebral origin. It includes the heterogeneous clinical states of variable aetiology and severity ranging from minor incapacitation to total handicap [1]. Cerebral Palsy (CP) is a disorder of abnormal posture with scarcity of movement caused by lesions in an immature or developing brain with varying degrees of associated problems including seizure disorders, intellectual disabilities, communication difficulties, learning difficulties, visual impairment, bladder and bowel control problems and swallowing difficulties [2]. The prevalence of CP in well resources countries is between 1.5 to 2.5 per 1000 live births [3]. While in India the prevalence is 3 per 1000 live births, because of the developing nature of Indian health care system in semi-urban and rural areas and the lack of technology for early diagnosis in there areas [4]. Cerebral Palsy can occur during the prenatal, perinatal or postnatal stages [5]. In some cases, the aetiology of CP is unknown, however, some common identifiable causes include birth asphyxia, severe jaundice/ kernicterus, infections, neonatal seizures, prematurity and low birth weight [5, 6]. The complete causal path of cerebral palsy is unclear in approximately about 80% of cases, but risk factors are often identifiable from history taking about prenatal and the post neonatal period [7]. Cerebral palsy is classified on basis of topographic distribution, neurologic findings and aetiology as follows [1].

1. Spastic CP-This is the commonest form and is topographically classified into spastic quadriparesis, diplegia or hemiparesis. Spastic quadriparesis is more common in term babies. and Etiopathogenesis include bilateral severe cerebral cortical damage, cerebral malformation, hypoxic ischemic damage, intrauterine infection. Clinical presentation includes Opisthotonic posture, Pseudobulbar palsy, feeding difficulties, restricted voluntary movements and motor deficits. Spastic diplegia is commoner in preterm babies and is associated with periventricular leukomalacia. The lower limbs are more severely affected due to adductor spasticity leading to scissoring gait. Spastic hemiplegia is usually recognized after 4-6 months age associated with vascular insults, porencephaly or cerebral anomalies. Early hand preference, abnormal persistent fisting, abnormal posture or gait disturbance may be the presenting complaint.
2. Hypotonic (Atonic) Cerebral Palsy-Despite pyramidal involvement, these patients are atonic or hypotonic. They are often severely mentally retarded. In cerebellar involvement, hypotonia is not associated with exaggerated reflexes. Muscles may show fiber disproportion and delayed CNS maturation is common.
3. Extrapyramidal CP: This form accounts for less number of cases. Cerebral damage following bilirubin encephalopathy is one of the causes. The clinical manifestations include athetosis, choreiform movements, dystonia, tremors and rigidity. Arms, leg,

neck and trunk may be involved. Mental retardation and hearing deficits may be present.

4. Cerebellar Involvement-There is hypotonia and hyporeflexia. Ataxia and intention tremors appear by the age of 2 yr. Nystagmus is unusual; mental status may be near normal in some of these patients.
5. Mixed Type- A proportion of the patients have features of diffuse neurological involvement of the mixed type.

Functional limitations are common and disabling, including chronic pain, epilepsy, intellectual disability, musculoskeletal problems (eg. hip displacement), behavioural disorders, sleep disorders, functional blindness, and hearing impairment [8]. The severity of neuromuscular and musculoskeletal impairment associated with cerebral palsy is extremely variable, and consequently, gross motor function varies from the ability to walk in the community and perform skills to the complete dependence on the caregiver for the personal care and mobility [9].

The traditional classification systems related to body topography and motor abnormality, although useful for clinical and epidemiological proposals, provide limited information about mobility, in addition to not useful for indicating the level of severity and, therefore contributing little towards the prognosis [10]. Thus, it is recommended that the categorization of cerebral palsy is also accompanied by functional classification [11], such as Gross Motor Function Classification System [12]. The GMFCS- ER (Gross motor function classification system expanded and revised) is a reliable and valid tool for assessment of the severity of CP, is a five-level classification system based on voluntarily initiated movement, with an emphasis on sitting, transfers and mobility [12]. Cerebral palsy children require lifelong healthcare, by a range of professional disciplines including paediatrician, neurologist, orthopaedic surgeon, physiotherapist, occupational therapist and speech therapy using substantial human and financial resources [13, 14]. Physiotherapy plays a major role in the management of children with CP [15]. Physiotherapy treatment approaches include neurodevelopmental therapy, sensory integration therapy, conductive education, constraint induced movement therapy, context focused therapy, advance neuromotor rehabilitation, biofeedback and physical activity training [15, 16].

Despite the important rehabilitative role of physiotherapy in the management of cerebral palsy the guidelines regarding the severity of cerebral palsy in Sangli district is lacking. Although there are records present with the prevalence of all the neurological conditions in Zilla Parishad (ZP) of Sangli district, there is a lack of study that records the pattern along with severity of cerebral palsy. Therefore, this study will help us to find out the prevalence of the pattern of cerebral palsy and classify the GMFCS E and R level to inform the development of a standardised clinical guidelines for the physiotherapy management of the CP children.

Materials and Methodology

Ethical approval was obtained from the ethics and research committee. Approval was also obtained from Head of Department of Physiotherapy. Informed consent for participation of the children in the study was obtained from the parents or caregiver prior to enrolment. Parents/caregivers accompanying the children were asked to provide information to fill the Pediatric Evaluation Form that included demographic data, developmental history and neurodevelopmental evaluation.

Information obtained from the medical records and physical assessment included: classification of CP based on the topographical distribution (diplegia, hemiplegia and quadriplegia); type of the movement disorder (spastic, hypotonic, extrapyramidal, cerebellar involment and mixed type) and severity of CP calculated using the Gross Motor Function Classification System – Expanded and Revised (GMFCS-ER).

This was a Primary school-based, cross-sectional, descriptive study of consecutive children of registered zilla parishad of Sangli district for 6 months of duration.

It is seen that there are primary and secondary healthcare facilities available but the physiotherapy services are inadequate. Children were eligible for inclusion if they were in between age group of 0 and 18 years, children of only Sangli district, documented referral from a pediatrician or neurologist confirming the diagnosis of CP, and both male and female children. Children with other neurological condition were excluded like down's syndrome, hydrocephalus, spina bifida, poliomyelitis.

Results

A total of 155 children with CP were included during this six month's of study period.

Table and fig 1 shows that, there were 1(0.9%) children < 2 years of age, 6(5.2%) between 2+ to 4 years of age, 14(12.2%) between 4+ to 6 years, 76 (66.1%) children between 6+ to 12 years and 18(15.7%) children between 12+ to 18 years of age with Cerebral palsy. Thus, we find that higher number of cerebral palsy children are found in age group of 6+ to 12 years.

Table 1: Age group wise distribution of Cerebral palsy children of Sangli district

Age groups	Frequency	Percent
< 2 years	1	0.9
2+ to 4 years	6	5.2
4+ to 6 years	14	12.2
6+ to 12 years	76	66.1
12+ to 18 years	18	15.7
Total	115	100

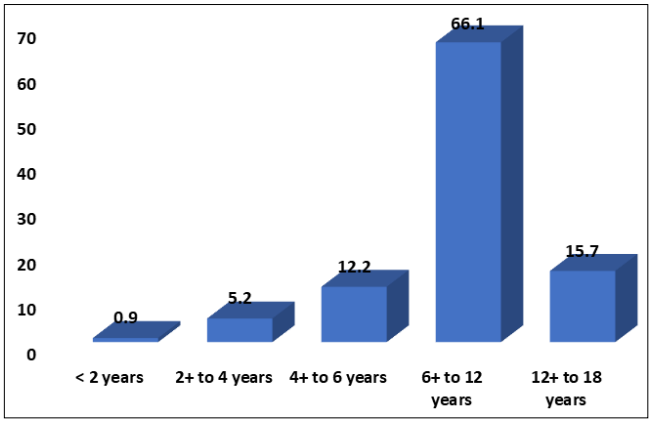

Fig 1: Bar diagram representing age group wise distribution of Cerebral palsy children of Sangli district.

Fig 2 explains gender wise distribution of Cerebral palsy children of Sangli district, it shows that, there were 53 (46.1%) female children and male children of 62 (53.9%)

that constituted the highest prevalence of CP cases in Sangli district.

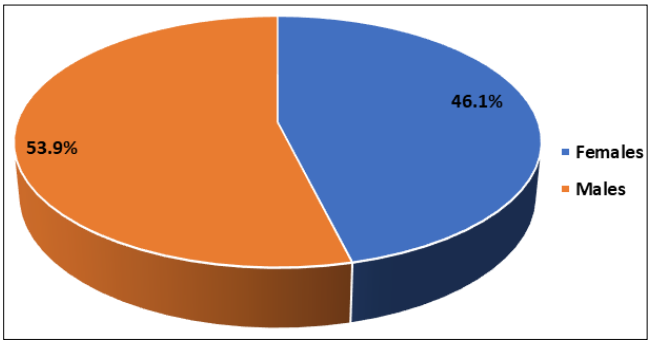

Fig 2: Pie diagram representing gender wise distribution of Cerebral palsy children of Sangli district.

Table 2 and fig 3 depicts 20 (17.4%) cerebral palsy children were from Palus taluka, followed by 19(16.5%) children from Miraj, 14 (12.2%) children were from Islampur and Kadegaon taluka each. 13 (11.3%) cerebral palsy children were from Tasgaon taluka, followed by 12(10.4%) from Atpadi, followed by 10(8.7%) from Vita. 7(6.1%) children were from Kavte Mahankal taluka, followed by 3(2.6%) from Jath and Shirala taluka each. Thus, this study shows higher prevalence of cp in palus taluka.

Table 2: Taluka wise distribution of Cerebral palsy children of Sangli district

Taluka Place	Frequency	Percent
Atpadi	12	10.4
Islampur	14	12.2
Jath	3	2.6
Kadegaon	14	12.2
Kavte Mahankal	7	6.1
Miraj	19	16.5
Palus	20	17.4
Shirala	3	2.6
Tasgaon	13	11.3
Vita	10	8.7
Total	115	100

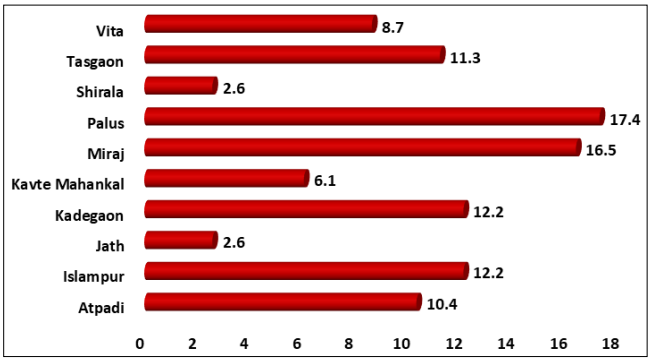

Fig 3: Bar diagram representing Taluka wise distribution of Cerebral palsy children of Sangli district

Table 3 and Fig 4 shows spastic quadriparesis is found in the greater number which is of 59 (51.3%) in all over sangli district followed by 34 (29.6%) children of spastic diplegic, 9 (7.8%) Cerebral palsy children of hemiparesis, 8 (7%) children of hypotonic and 5 (4.3%) children of extrapyramidal cp.

Table 3: Type/Pattern wise distribution of Cerebral palsy children of Sangli district

Type/Pattern	Frequency	Percent
Extrapyramidal	5	4.3
Hemiparesis	9	7.8
Hypotonic	8	7
Spastic diplegic	34	29.6
Spastic quadriparesis	59	51.3
Total	115	100

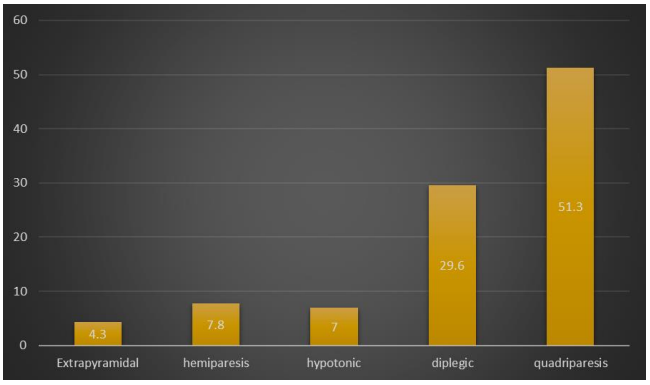

Fig 4: Bar diagram representing Type/Pattern wise distribution of Cerebral palsy children of Sangli district

Table 4 and fig 5 shows Quadriplegic CP was the most common topographical distribution of CP wit 59(58%) followed by spastic diplegic of 33% and spastic hemiparesis of 9%.

Table 4: Type of spastic cp.

Type	Frequency	Percentage
Spastic quadriparesis	59	58
Spastic diplegic	34	33
Spastic hemiparesis	9	9

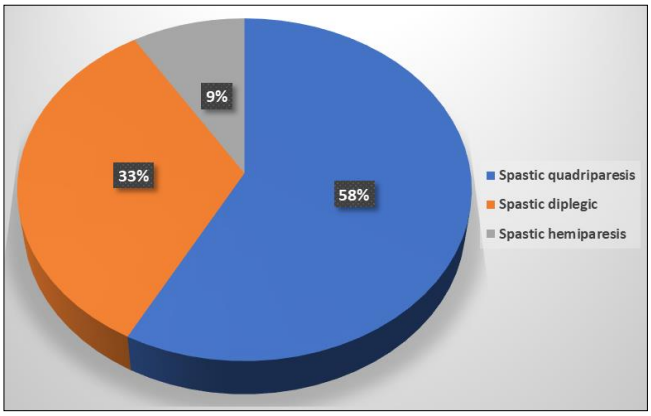

Fig 5: pie diagram representing types of spastic cerebral palsy.

Table 5 and fig 6 shows that maximum i.e. 34 (29.5%) Cerebral palsy children had GMFCS E and R level V, followed by 30(26%) children of level III which is second highest level found in cp children. This shows that sangli district includes severely disabled cerebral palsy children.

Table 5: GMFCS E and R level wise distribution of Cerebral palsy children of Sangli district

GMFCS and R level		Frequency	Percent
Level I	Walks without limitations	22	19.1
Level II	Walks with limitations	18	15.6
Level III	Walks using a hand held mobility device	30	26
Level IV	Self-mobility with limitations; may use powered mobility	11	9
Level V	Transported in a manual wheelchair	34	29.5
Total		115	115

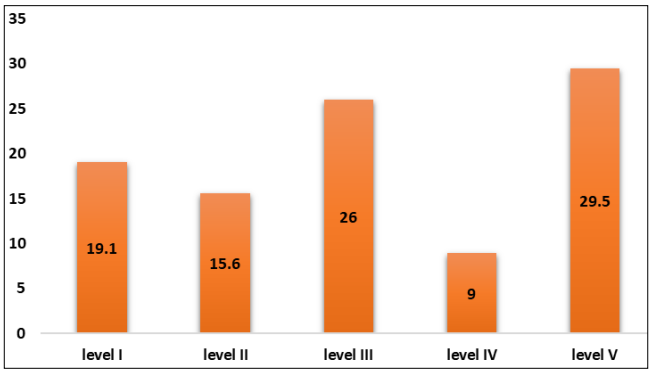

Fig 6: Bar diagram representing GMFCS E and R level wise distribution of Cerebral palsy children of Sangli district.

Table 6 and fig 7 shows the three most common etiology of CP with birth asphyxia as highest (54.8%) followed by kernicterus with (14.8 %) and central nervous system infection with (11.3%).

Table 6: Causes wise distribution of Cerebral palsy children of Sangli district

Causes	Frequency	Percent
Birth asphyxia	63	54.8
CNS	13	11.3
Kernicterus	17	14.8
PVL	8	7
Seizure	14	12.2
Total	115	100

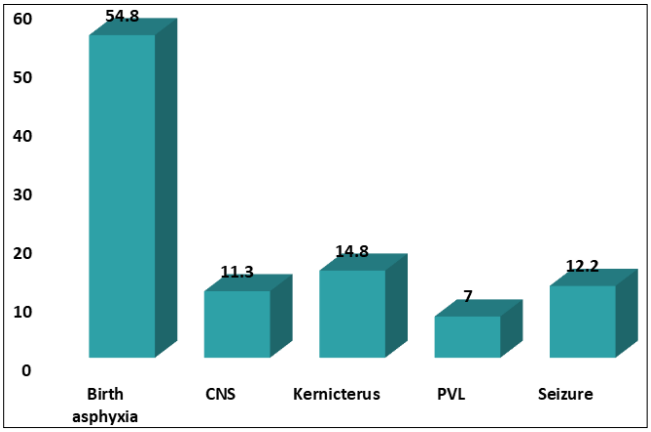

Fig 7: Bar diagram representing causes wise distribution of Cerebral palsy children of Sangli district

Table 7 explains Chi square test for independence was done to check association causes and type/ pattern of Cerebral palsy children of Sangli district. It revealed that there was association between causes and type/ pattern. The number of Children having Spastic quadriparesis were significantly higher than other children who had birth asphyxia as a major cause of Cerebral palsy (P<0.001).

Table 7: Association between type/ pattern and causes of Cerebral palsy children of Sangli district.

Type/Pattern	Causes					Total	Chi square statistic	p value
	Birth asphyxia	CNS	Kernicterus	PVL	Seizure			
Dystonic	2(40)	0(0)	3(60)	0(0)	0(0)	5	41.64	<0.001
Hemiparesis	6(66.7)	3(33.3)	0(0)	0(0)	0(0)	9		
Hypotonic	6(75)	0(0)	2(25)	0(0)	0(0)	8		
Spastic diplegic	15(44.1)	5(14.7)	3(8.8)	8(23.5)	3(8.8)	34		
Spastic quadriparesis	34(57.6)	5(8.5)	9(15.3)	0(0)	11(18.6)	59		
Total	63(54.8)	13(11.3)	17(14.8)	8(7)	14(12.2)	115		

Table 8 depicts that mean age of Cerebral palsy children of Sangli district was 9.12 years and mean GMFCS E and R level was 3.15.

Table 8: Descriptive statistics of age and GMFCS E and R level of Cerebral palsy children of Sangli district

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Deviation
Age (years)	115	1.5	18	9.12	3.03
GMFCS E and R level	115	1	5	3.15	1.48

Discussion

This study of 115 children from registered zilla parishad of Sangli district included children from 0 – 18 years of both male and female gender. The age group wise distribution of cerebral palsy children in this study showed 6 to 12 years age group was the most affected age group with 66.1%. As male and female both genders were included in this study male children were affected in higher number than female children. The reason may be male susceptibility to genetic mutations and variants in recessive X-linked chromosomes [17]. Male gender preponderance has been reported in a number of studies by J O Omole [18] in Nigeria and Laisram *et al.* [19] in India.

The camps were conducted in 10 talukas of Sangli district in which all the registered children were asked to attend the camp. All the camps were arranged in zilla parishad schools. Percentage of CP children varied in each taluka. Thus, taluka wise distribution showed higher prevalence of CP in

palus taluka with 17.4% followed by Miraj taluka with 16.5%. Other talukas like Vita, Tasgaon, Kadegaon, Islampur and Atpadi also showed quit higher number of cerebral palsy children. This could be due to poor healthcare delivery system in village areas, financial resource limitations and lack of awareness about the disability [4]. This shows that there is more need to focus in these all places to spread the knowledge of the causes of cerebral palsy, its guidelines to reduce its occurrence and availability of the healthcare services. This study shows spastic type of cerebral palsy children are higher in number. Topographical distribution of spastic cp shows higher prevalence of spastic quadriparesis in line with the article of Hamzat TK *et al* [20] and Ogunlesi T *et al* [21].

This study used GMFCS E&R to calculate the severity level in CP children which showed level V in higher number with 29.5%, J O Omole [18] also proved that greater number of children were severely disabled in their study. A child with a GMFCS E&R level V implies that voluntary control of movement is greatly restricted due to the child's body impairment and will require a high level of assistance from parents or relatives for mobility, usually requiring a wheelchair [22]. Due to greater number of severely disabled children in Sangli district its necessary to make people realize about the importance of medical services like physiotherapy, thus it will be beneficial for reducing their disability and helpful for parents and caregivers in taking care of their child. Children with level V also showed associated problems like intellectual disability, seizure disorders, bowel and bladder incontinence, speech disorder [2]. Children with mild disability (GMFCS ER level I and level II) also showed few associated problems.

The top most common cause of cerebral palsy in this study was birth asphyxia 54.8%. Our study is in conformity with the study of Singhi *et al*. [23] who reported in their study birth asphyxia as majority in CP patients.

This study was a Primary school-based study and so there is a possibility that our observations may not be a complete representation of all children with CP in Sangli district. Also, data of respondents without cerebral palsy during this study were not collected.

All the children who has undergone the assessment in this study show that quit less number of children are undergoing the rehabilitation. Timely diagnosis and early initiation of management should be ensured to decrease the incidence of cerebral palsy along with severity level in future. It is suggestive that rehabilitation schools for Cerebral Palsy children for the different types of cp children along with their severity level so that it becomes easier for the medical services to set proper management protocols in their treatment.

Conclusion

Children with cp have various challenges in doing their activities, thus later on parents find difficult. Developing awareness of early diagnosis and interventions will help to limit the disability. Management of children with CP by a paediatric physiotherapist is long-term and demanding. Developing locally relevant, standardised protocols/guidelines for the treatment of children with CP May optimise the physiotherapy management of these children, and improve functional outcomes.

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