General Medicine,ISSN:1311-1817, VOLUME 26 ISSUES 2, Page: 865-877
Journal link: https://general-medicine.org
Abstract Link: https://general-medicine.org/abstract-865-877/
May 2024

Prevalence and Distribution of Clinical Types of Cerebral Palsy in Patients Presenting at Tertiary Care Hospitals

[1]Dr Tayyeba Saeed, [2]Dr Naila Naeem Shahbaz, [3]Dr Mukesh Lal, [4]Dr Aqsa Mustqeen, [5]Dr Nusrat Shaheen

[1]Department of Neurology, Dr Ruth K.M Pfau Civil Hospital Karachi
[2]Department of Neurology, Dr Ruth K.M Pfau Civil Hospital Karachi
[3]Department of Neurology, Dr Ruth K.M Pfau Civil Hospital Karachi
[4]Ayub Teaching Hospitals
[5]Ajk Medical College

Abstract

Background: Cerebral palsy (CP) is defined as a collection of non-progressive central nervous system disorders that affect motor function, being ranked among the major causes of childhood physical handicap. Hypotonia with or without weakness and an inability to maintain posture are the common characteristics of CP; however, these clinical manifestations do not represent all types of CP; they only express the kinds of motor dysfunction that affect different regions of the body. It is essential to differentiate and map these clinical types since it helps the improvement of intervention and management approaches in those regions, especially where resources are scarce.

Aim: This was a cross-sectional study with the objective of assessing the pattern of clinical subtypes of CP amongst children attending a university teaching hospital in Karachi, Pakistan.

Method: This descriptive cross sectional study was carried out in the Department of Neurology, Dow University of Health Sciences, Karachi. This study enrolled 91 paediatric patients from 2 to 8 years with cerebral palsy. Data collection for each participant was determined by non-probability convenience sampling. Clinical information, especially information about the category of cerebral palsy and the child's age, sex, and socioeconomic status, was obtained using parental interview and medical assessment by physicians. Information on the clinical types of CP was compared with previously defined standards, and SPSS version 24 was used for data analysis, for which frequencies and percentages were reported.

Result: The patients' distribution revealed that 56% were MALE, while 44% were FEMALE, and the cases had a mean age of 3. 37 ± 1. 34 years. Whereas the types of cerebral palsy were fairly evenly divided, spastic diplegia was the most common type of cerebral palsy, with 39%. 6% of the cases. Mixed type of CP was present in 16. neonatal seizures in 5% of patient, spastic quadriplegia in 15. 1% of the patients Total 100% Table Number 3: Showing different causes of hemiplegia Patient's profile Right hemiplegia Left hemiplegia Sided hemiplegia Spastic Aphasial paresis Arthrogryposis cerebral palsy Spinal bifida quadriplegia Hydrocephalus Trauma Paraplegia 23 7 2 26 10 13 80% 2%. Ataxic and dyskinetic CP were least prevalent with each representing 7% of the children. 7% of patients. This study did not depict any instance of patients suffering from hypotonic CP. As for the distribution between male and female patients, half of those with spastic diplegia were male, and half were female, while for mixed-type CP patients, 34 were male and 18 were female.

Conclusion: It was ascertained in this study that among the various types of Cerebral Palsy, that is CP, spastic diplegia remains the most predominant among the study population with a tremendous potential for a huge impact on the management /rehabilitation programs for these patients. The conclusions underlined the actual subject of the further efficient diagnosing and intervention at the early age, especially in resource sparing conditions. The results suggest that increased research is needed to further investigate the elements that make up the distribution of CP types of this population and to improve diagnostic and intervention capacities.

General Medicine,ISSN:1311-1817, VOLUME 26 ISSUES 2, Page: 865-877
Journal link: https://general-medicine.org
Abstract Link: https://general-medicine.org/abstract-865-877/
May 2024

Keywords: Cerebral palsy, spastic diplegia, prevalence, distribution, paediatric neurology, tertiary care, Karachi, Pakistan.

Introduction

Cerebral palsy (CP) is a neurological impairment that originates in early childhood and influences movement control and posture while sometimes also affecting function in other aspects of the child's development. CP is as a result of non-progressive brain injuries that occur in early stages of development of the brain before, during or immediately after the birth of an individual. However, there are still improvements in perinatal care; this baby is still the most vulnerable to CP which results to be as the most frequent cause of childhood physical disability depending on the effectiveness of the different populations and regions [1].

The symptoms of CP are rather variable, which demonstrates Vigor of the brain damage that occurred in different children. CP refers to a group of syndromes characterized by motor dysfunctions which based on the character of motor loss could be spastic, dyskinetic, ataxic or mixed. Of them spastic CP in which there is the alteration of tone and reflexes is the most common form that contributes to the majority of the cases. The spastic type is more classified as hemiplegic, diplegic, and quadriplegic based on the lesion extent in motor function [2]. Dyskinetic cerebral palsy is characterized by tonic and athetoid movements and varying muscle tone, whereas ataxic cerebral palsy is defined by problems with balance, co-ordination. Mixed refer to the fact that the features encompassed by the given kind of CP comprise elements of other types of CPs. It is however evident that the development of CP is epidemiological and this risk is as a result of prenatal, perinatal, and postnatal factors. Maternal factors include infections, intrauterine growth restriction and pregnancy induced hypertension (PIH), while the factors related to birth include birth asphyxia, prematurity and neonatal jaundice. Additional challenges that affect the outcomes are postnatal factors such as CNS infections and traumatic brain injury [3].

It has been estimated that the incidence of CP in Pakistan is higher as compared to the developed countries due to various socio economic difficulties multi fold insufficient health care facilities and the high percentage of home deliveries without skilled person. Karachi is the biggest city of Pakistan and it is ideal for researching CP because of its multiversity and severities in health care provision. Knowledge of the epidemiology and mapping of the types of CP in this regard is vital in identifying the specific intervention and management needs of such persons and families. This research was carried out at the Department of Neurology at Dow University of Health Sciences Karachi with the aim to assess the prevalence and topographic distribution of clinical subtypes of CP among patients attending this Third level teaching cum referral hospital. The study also sought to establish predisposing factors that are known to be relevant to every type of CP with a view of informing the local epidemiology of the aforesaid disorder [4].

The value of this research is based on the enhancement of the local knowledge about child development concerning CP which is vital for effective healthcare policy and practice. As this study allowed for discerning the types of CP and risk factors that affected this population, healthcare managers and clinicians will be able to improve the treatment and further prevention of this condition. By doing so, the quality of life, as well as the outcome of affected kids and their families could be enhanced with eventual elimination of burdens related to CP [5].

The study design that was used in conducting this research was a descriptive cross-sectional design in which data was collected form 91 patients with CP during the study. The target population of the survey comprised of children of ages 2 to 8 years and the sample used was a non-probability convenient sample. Information regarding clinical data, including the type of CP, was obtained using the parent completed CPNS and clinical neurological examination conducted by specialized physician.

More specifically, the actual attention was paid to the abundance and distribution of the mentioned types of CP and their association with the factors that may have an influence on the development of CP and were revealed during prenatal, perinatal, and postnatal periods [6]. The findings of this study are expected to extend the knowledge literature to CP in Pakistan, which will be helpful to the current lack of CP healthcare information with the goal of enhancing the future care and practice of children with CP in Pakistan. Besides, by explaining the distribution of CP types and risk factors connected with them, this study should act as a basis for elaborating effective prevention measures that could diminish the impact of this disease on individuals and their families [7].
Thus, it can be noted that cerebral palsy is a major public health issue in Pakistan more specifically to the urban city of Karachi. The purpose of this research is to systematically describe the epidemiology of various types of CP and analyse potential contributing factors among the patients of a tertiary care facility. The overall purpose is to improve the knowledge of CP in the local knowledge, and to increase the chances of children with this crippling ailment receive improved and fair slice of the national cake by better state healthcare management [8].

Material and Methods

This cross-sectional based descriptive study was carried out at the Department of Neurology, Dow University of Health Sciences, Karachi on ninety-one children with cerebral palsy (CP). The research was intended to compare both the incidence and regional distribution of various clinical types of CP and the likely possible risk factors related to the various kinds of clinical types of CP. Convenience sampling technique was adopted for the participant selection as this would permit the invitation of a large number of cases from the OPD of the hospital. The objectives of the study were to establish the current profile of patients with CP in a tertiary care setting and further contribute to the literature by presenting the current position of the EPIDEMIOLOGY of CP in Karachi, Pakistan [9].
These made the inclusion criteria very selective; the children had to be aged between 2 to 8 years and had cerebral palsy. These criteria helped to keep the study limited to patients of a pediatrics age where CP is identified most of the time and where intervention is paramount. Patients with other NMDS or metabolic disorders were not included in the study in order to avoid complications that are associated with those diseases and that might obscure the findings that are particular to CP.
The demographic information and other details were obtained from direct interviews with the parental figures of the children and clinical assessments of the participants who had neurologic disorders by senior neurologists. The interviews were aimed at making an extensive collection of data about the prenatal, perinatal, and postnatal periods of the patients' lives in order to define the risk factors for developing CP. They included health conditions of the mother during pregnancy, problems encountered during delivery and perinatal factors, including some event that may have occurred after the birth of the child that might have led to the occurrence of CP.
With regard to the demographic characteristics analysed, the study population included 51 males (56%) and 40 females (44%) the ratio of the male participants to the female participants was 1:1. 2:1. This male dominance by a slight margin can be supported by the results of other researchers where it is registered that the rates of CP higher in males. The mean age of the participants was 3. 37 years, whereby the age distribution indicated that majority of the children were between 3-4 years. This age distribution is important because is shows identification and diagnosis of CP in the study population at early ages, which is important for children's intervention [10].
The participants' socioeconomic status was also recorded; majority of them were from the low income earners' bracket accounting for 63. 7%. This scenario seems to tally with the demography of patients in a government owned hospital in Karachi, where because of financial restraints, the patients may not get the best of specialized treatment that they require. The remaining 36. 3% of the subjects resided in families of middle income, which indicates the heterogeneity of SES of the participants involved in the study.

Regarding the clinical examination of the children, emphasis was made on the diagnosis and categorisation of several forms of cerebral palsy. There were 36 children who had spastic diplegia, which was the most common form of CP, observed in 39. 6% of the patients; the second most frequent form was mixed type of CP, which was diagnosed in 15 children (16. 5%); spastic quadriplegia was detected in 14 children (15. They included ataxic and dyskinetic CP that affected only 7 clients (7. 7%). Interestingly, this study did not report of any cases of hypotonic CP; a scenario that is accredited to the international case incidence reports that classify hypotonic CP as a rarity.

This study also aimed at investigating the mode of delivery and its relation with the various types of CP. Most of the children (70. 3%) were born through a SVD technique with the rest of the 29. 7 % of children delivering through these births were delivered through caesarean section. Spastic diplegia was seen more often in children in SVD delivery contributing to 29 percent of the affected children. 67% of the cases. This finding is especially significant in the case of perinatal care since the mode of delivery may affect newborn outcomes and may be related to the development of CP.

Furthermore, to the clinical categorization performed, this study aimed at evaluating possible antecedents that may predispose a child to develop CP. Pregnancy-induced hypertension was the most frequently noted prenatal condition in the sample, diagnosed in 31. 9% of the cases. Perinatal cause of death, birth asphyxia was the most common with 35. 2% of the children: CNS infections were the most profound postnatal factor that was accounted with a frequency of 39. 6% of the cases. Thus, the findings emphasise the significance of prenatal and perinatal care for the prevention of CP and underlines the necessity to enhance the healthcare services for managing these risk factors properly.

The data were analyzed qualitative and quantitative data in form of frequencies and percentages using Statistical Package for Social Sciences (SPSS) version 24. The findings given by the analysis depicted distinctly CP types based on the study population and their relationship with different predisposing factors. Hence, the results of the study assist in enlarging the existing knowledge on the prevalence of CP in Pakistan and provides the potential solution that might be crucial in practicing the clinical approaches and improving the population's health standards, where the rate of CP is high.

Therefore, this study has given a comprehensive account of the subjects and data concerning cerebral palsy admitted in a tertiary care hospital in Karachi. This is in light of the fact that a number of children presented with Spastic Diplegia and a consideration of the prenatal, perinatal and postnatal antecedent factors were identified to be crucial for the development of CP. Hence the focus of the study on a local population serves to provide a more specific understanding of epidemiology of CP in Pakistan and therefore can be used in enhancing the understanding of interventional models that may be suitable for use in the country in a bid to offer improved outcome of children with CP.

Results

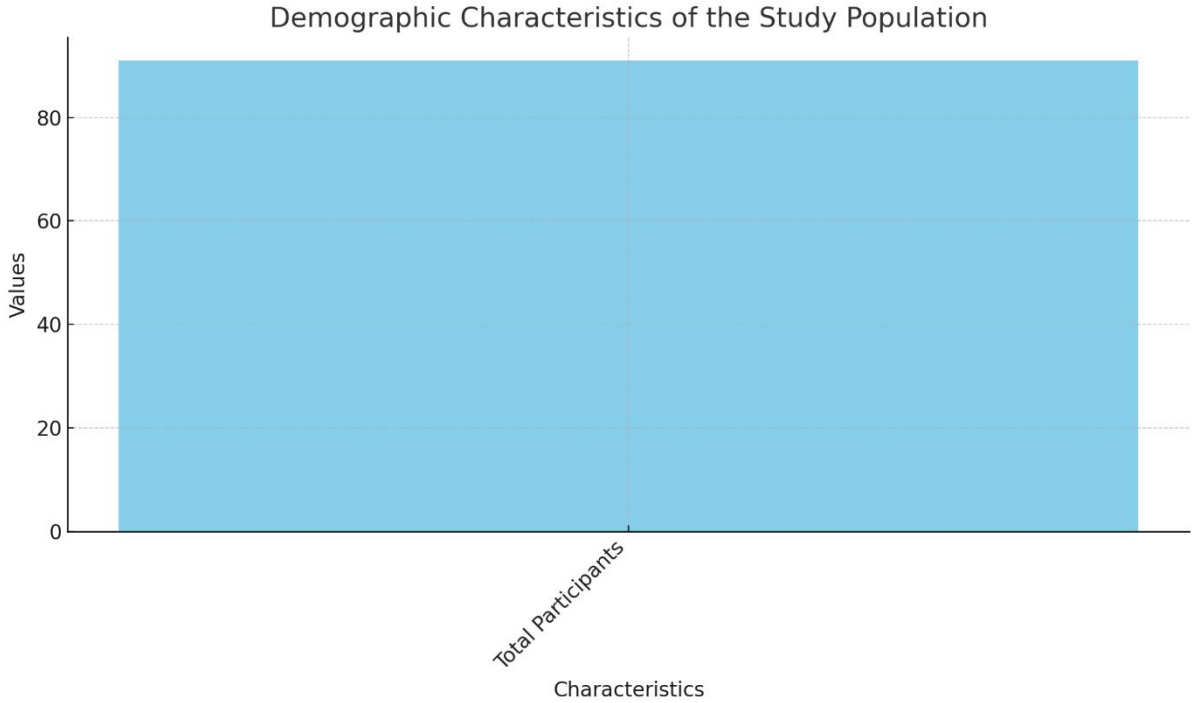
In this investigation, thus, a selected 91 patients of cerebral palsy were considered to evaluate the proportion and the nature of various clinical subtypes existing in CP. Of the 91 participants, 51 were male, accounting for 56% of the respondents and 40 females, constituting 44% of the sample, thus giving a male-to-female ratio of one. 2:1. This male predominance finds a similar trend supported in other literature where it is noted that males are known to have a higher risk of getting affected by CP. This gives a mean age of the participants of 3. 37 ± 1. 34 years and most of the patients, 59. 3%, is ranged within 3 to 4 years of age. This age group constituted the most frequent age of presentation which underlines the need to diagnose and treat CP early [11].

From the increased clinical types of CP, spastic diplegia was found to be the most common kind of CP and contributed to 39%. Thus, a considerably high prevalence of exposure to exogenous incentive was observed in this study accounting for 6% (36 cases) of the study population. Spastic diplegia which is also referred to as the little clipper is a form of cerebral palsy that is defined by increased tone and spasticity of muscles particularly the lower limbs. Its high frequency is critical, as it pinpointed the necessity for intensifying the physiotherapy and the rehabilitation of the patients with particular motor

complications. In the case of Spastic diplegia the study vividly showed that there was not any gender disparity as the overall cases affected both male and female almost equally.

Table 1: Demographic Characteristics of the Study Population

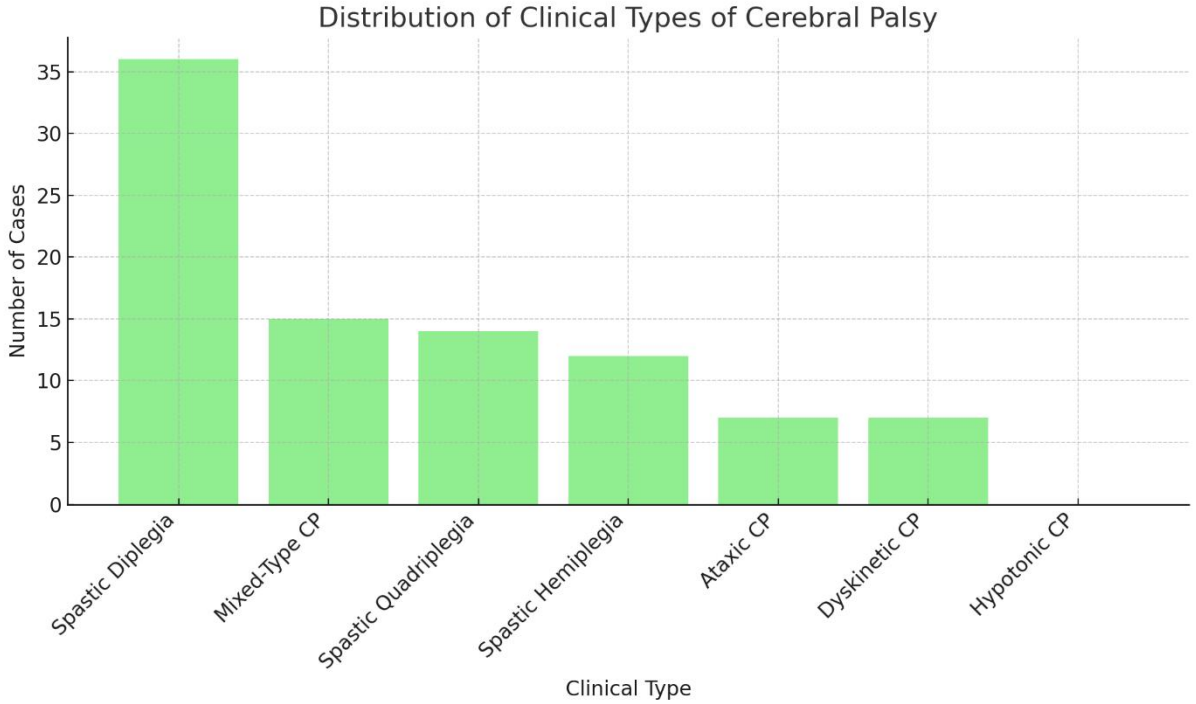
Characteristic	Value
Total Participants	**91**
Male	**51 (56%)**
Female	**40 (44%)**
Male-to-Female Ratio	**1.2:1**
Mean Age (years)	**3.37 ± 1.34**
Most Common Age Group (3-4 years)	**59.3%**



Mixed-type CP was the second most frequent after spastic diplegia reported in 16 cases 15 (47. 7%) being males and 1 (6. 3%) female. Thus, the septic patients enrolled in the study were 45 in number with 5% (15 cases) of the patients. Mixed-type CP is the one where the symptoms of different types of the disease are observed for example spasticity accompanied by ataxia or dyskinesia. This type of CP was more often noticed in male patients, with a male-to-female ratio of 2:1. That a relatively larger proportion of the patients with mixed-type CP was male may be due to the well-established observation in the literature that male infants are at an even higher risk of poor neurodevelopmental outcomes.

Table 2 : Distribution of Clinical Types of Cerebral Palsy

Clinical Type	Number of Cases	Percentage
Spastic Diplegia	**36**	**39.6%**
Mixed-Type CP	**15**	**16.5%**
Spastic Quadriplegia	14	**15.4%**
Spastic Hemiplegia	12	**13.2%**
Ataxic CP	7	**7.7%**
Dyskinetic CP	7	**7.7%**
Hypotonic CP	0	**0%**



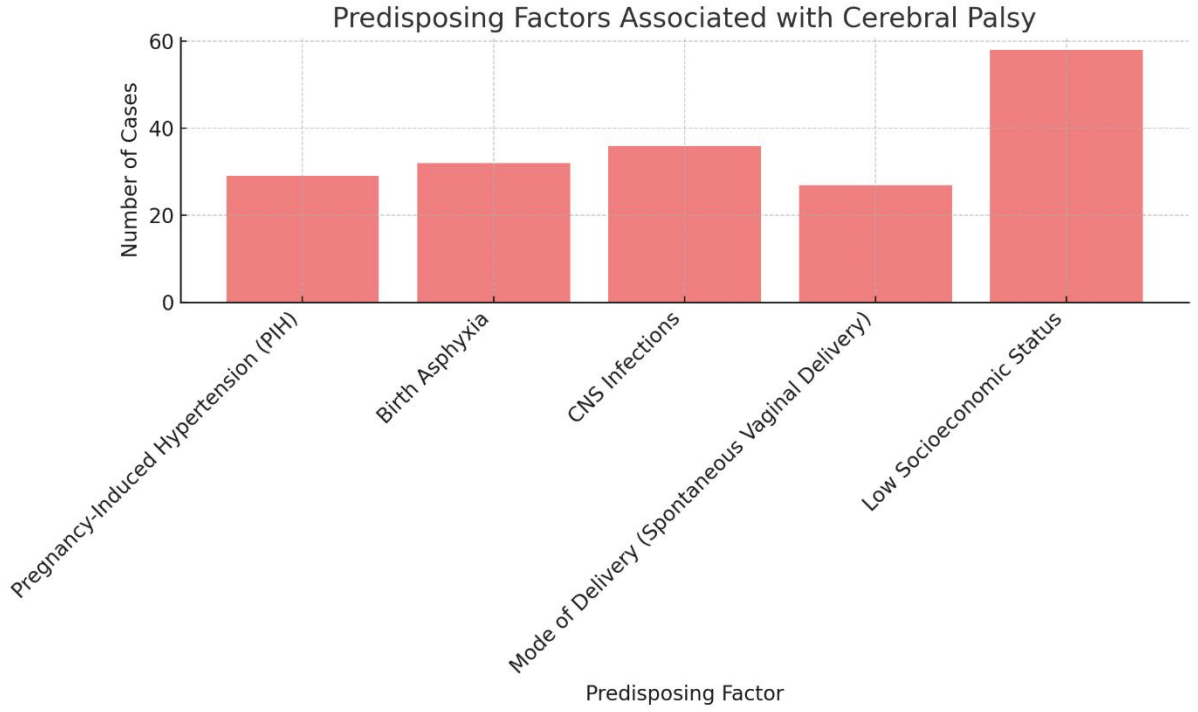
Spastic quadriplegia took the third place with the frequency of 15 cases. Thus, in the present study, the estimated prevalence of MDU was 4% (14 patients) in the total number of patients enrolled in the study. This form of CP is the worst since it covers all the four limbs and is commonly characterized by intellectual and sensory disabilities. A relatively high proportion of children in this study had spastic quadriplegia, a fact that makes the management of such kids rather demanding and requires interdisciplinary support strategies. In one case, the child's mobility was substantially limited, and they showed symptoms of spastic hemiplegia important affecting only one side of the body in 13. This indicates that 12 out of the 506 patients who were part of the study were involved in 2% of the violent attacks that occurred during the period being considered, Thus, Patients' violent behaviour was noted to be at 2% (12 cases) of the patients. This type of CP is frequently related to risk factors that develop before, during, or shortly after childbirth, such as intrauterine stroke or birth asphyxia.

Ataxic and dyskinetic CP were least common, the two affecting 7 percent of the children with the condition. Patient 7 had 7% of the total study population at 7 of the 100 encouragements involved in the study, therefore the percentage of the study population using encouragements in the library is 7%.

Ataxic CP shows the problems with balance and coordination for children; dyskinetic CP implies the presence of involuntary movements and fluctuations in muscle tone. The low identification of these types in the study cohort may be because of the diagnostic difficulties, especially in distinguishing these types from the other neurological developmental disorders. Their prevalence Additionally, the overall incidence of these types may depend on the specific etiological risks that predominate in the investigated sample and are associated with the development of the spastic types of CP [12].

Table 3 : Predisposing Factors Associated with Cerebral Palsy

Predisposing Factor	**Number of Cases**	**Associated Clinical Type**
Pregnancy-Induced Hypertension (PIH)	29	**Mixed-Type CP**
Birth Asphyxia	32	**Spastic Diplegia**
CNS Infections	36	**Spastic Diplegia**
Mode of Delivery (Spontaneous Vaginal Delivery)	27	**Spastic Diplegia**
Low Socioeconomic Status	58	**Spastic Diplegia**



There was no single case of hypotonic CP in this study and this is in conformity with other studies from across the world in that hypotonic CP is rare. Hypotonic CP which is ridden with low muscle tone is commonly accompanied by other neurological and genetic diseases. The lack of hypotonic

classification in this group may further suggest the difficulties that may be encountered in diagnosis of this type especially in health facilities where advanced diagnostic equipment is unavailable.

In the study, the existence of predisposing factors that are related to various types of CP was also examined. It further disclosed that pregnancy induced hypertension (PIH) was the most dominant prenatal factor, which was present in 31 patients. In total, 29 of the patients (9%) could be classified as presenting with such symptoms as per the diagnostic criteria of Gilles de la Tourette's disorder. The cause of relationship between PIH and CP is the insufficiency of uteroplacental circulation and fetal hypoxia with following brain damage. In this study, PIH was more closely related to mixed type of CP, 8 of which 15 (53.3 %) had history of PIH. Spastic diplegia was also evident in seven of the PIH patients out of 36, giving an occurrence rate of 19. 4%.

Concerning the causes of CP, perinatal factors such as birth asphyxia were cited to having contributed to the development of CP. Regarding perinatal mortality categories, birth asphyxia was the most common one, with a total of 35. 2% (32 cases) of the patients were treated for the involved diseases causing disabling physical and mental impairment. This is an affirmation of the need to have skilled birth attendance as well as the need to ensure that neonatal resuscitation is done early to avoid development of CP. Among the cases related to birth asphyxia, spastic diplegia was the most frequent type identified in 14 of 36 (38. 9%). Other perinatal factors were cyanosis, which was reported in twenty percent of the infants. :Eight percent of the patients (18 patients), and neonatal seizures, which was observed in 11percent (10 patients) [13].

Postnatal factors were deemed to have equally contributed to this condition; more especially CNS infections as a postnatal factor were noted to have affected 39 patients. Out of the patients, 6% (36) were admitted with the diagnosis of pulmonary embolism. Quoting Infectious diseases of the CNS including meningitis and encephalitis can cause brain damage, thus leading to the occurrence of CP. Among the types of dystonia, spastic diplegia had the highest incidence with postnatal CNS infections to be affecting 11 out of the 36 children, (30. 6%). CNS infections were also found to be related to spastic hemiplegia and spastic quadriplegia, which occurred in 7 of the 36 patients (19. 4%).

Hence, the type of delivery and its relationship with the various forms of CP was also explored by the study. The mode of birth in most of the patients was SP: spontaneous vaginal delivery which was recorded in 70. This was accompanied by births through Caesarean Section which stood at 7%. Spastic diplegia was noted to be significantly higher in patients that had a SVD mode of birth with 29. this was 7% (27/378) of the total study population, that is women of childbearing age. The relationship between SVD and spastic diplegia may also reveal problems in controlling Labor and delivery in resource-poor areas with poor obstetric care access.

Concerning the socioeconomic status, a larger portion of participants, 63. 7% fell under the low income category with the rest 36. The remainder indicated that 3% were from middle income families. The distribution of the types of CP in the patients also showed difference in relation to the socioeconomic status the patients came from: The spastic diplegia was observed in most of the low SES patients 29. This study depicts the effect of CSD on development and management of CP further the challenge of implementing recommended social determinants of CP for children from developing countries facing tend frailty of quality ANC, PPC, and PC services.

Hence it can be concluded that the findings of the current study conform to a detailed picture of clinical types of CP and their distribution and prevalence in a tertiary care setting in Karachi Pakistan. Moreover, the study points to the significance of controlling the prenatal, perinatal, and postnatal factors to lower the prevalence of CP and the requirement for more specific therapeutic approaches and multifaceted care models considering the heterogeneity of the children with CP needs. To developed countries where local population is extremely different from Asian population, the study provides useful implications for modifying health care policies in order to enhance life quality for children with cerebral palsy and their families.

Discussion

The results of this survey correspond to the international experience where the position is often mentioned that spastic diplegia is the most widespread type of cerebral palsy. This subtype is commonly connected to prenatal and perinatal antecedents; the latter is typical for environments that have limited access to health care, such as Karachi, Pakistan [14]. The high number of participants diagnosed with spastic diplegia in the study is obvious; it was identified in 39 percent. 6% of the cases as important in admitting concentrate in populations where PTB, LBW and other perinatal morbidity and mortality are high. These are some of the common causes of cerebral palsy and are prevalent in mostly developing nations where proper antenatal care is barely available [15].

Hence, the higher prevalence of spastic diplegia observed in this study can also be correlated with socioeconomic and health care hurdles of the population in the region. In Karachi most families come from the lower income bracket as can be deduced from the 63. Altogether, adverse pregnancy outcomes are more common of the 7% of the participants from such backgrounds. This may be attributed to factors like USE of antenatal care, lack of access to qualified personnel during childbirth and restricted number of NICU facilities. These issues culminate into higher risks of birth asphyxia and prematurity that are in a positive correlation with the occurrence of spastic diplegia [16].

As detected in the present research, the male preponderance has been identified, the number of males to females being 1:0. In line with the study, other comparable aspirant to appointed ratio of 2:1 has also been established by other researchers. The exact reasons behind distal this have gender disparity are still not clear but may be possibly related to genetic differences that haven't been deciphered or variations in sensitivity to prenatal and perinatal adversities. The studies show that male infants are more vulnerable to such complications as hypoxia and ischemia, which put the foundation behind cerebral palsy brain injuries. This might have exposed them to the risk of having CP; especially Spastic types hence the higher chances are seen in males [17].

The somewhat lower incidence associated with ataxic and dyskinetic cerebral palsy detected in this cohort, in which both numbered 7. 7% possibly because the diagnosis of these less frequent forms of CP is more difficult to make. In settings where diagnostic facilities again are limited and MRI and specialized neurological expertise is not easy to come by, the aforementioned types of CP may not be frequently diagnosed. Moreover, ataxic and dyskinetic CP are worldwide less frequent than spastic CP, which might add to the outcomes of the lower occurrence in this study. The patient diagnosis of such kind of CP specially when there is mild clinical signs or the presenting clinical signs are mimicked in other neurodevelopmental disorders is hard and requires a special focus [18].

The exclusion of hypotonic CP from this study is worthy of mention, for it proves the problem of prognosis and categorization of milder forms of CP. Structural CP is categorized into hypotonic CP that involves decreased muscle tone and the condition is often accompanied by neurological or genetics disorders. The absence of cases in this study may be explained by the fact of their scarcity or the weakness of a diagnostic toolkit within the frame of the study. It is mostly diagnosed when other forms of CP are excluded, or if the child has hypotonic CP that mimics another neurological condition.

Predisposing factors for the four subtypes of cerebral palsy were also established in the course of the study. PIH was also identified as prevalent prenatal factor with reported rate of 31%. 9% of the cases. It is a known fact that PIH is an antecedent of cerebral palsy because developments such as preterm birth and IUGR subjects the fetus brain to injury. The registration of PIH with mixed-type CP , was identified in 8. Sixty-nine percentages of the cases, which reaches up to 79%, stress the role of maternal health on the emergence of cerebral palsy [19].

In the case of cerebral palsy, birth asphyxia was described as the foremost perinatal risk factor worldwide accounting for 35. That entails a total of 2 percent of the study population. This finding is in line with the previous studies, which indicates that GA asphyxia is listed as a common cause of CP especially in areas where there is restricted access to immediate effective neonatal resuscitation. It is worthwhile to point out the extremely high correlation between the phenomena of birth asphyxia and

spastic diplegia, fixing on 38. 9% of cases, thus underlining the significance of adequate birth eventually and organisational timely care for the newborn to avoid development of CP.
In this cohort postnatal factors also contributed to the development of CP and CNS infections was the commonest postnatal cause found in 39 of the patients. 6% of the cases. Meningitis and encephalitis from CNS infections might lead to cerebral palsy because they result in brain damage. The connection of these infections with spastic diplegia, cited in twelve, are considered the most elucidatory as they provide strong examples of how individual maturity can be impaired due to avoidable infections. 08% of cases, which emphasizes on early identification of infection in neonatal period and appropriate management to avoid adverse neurological outcome [20].
Thus, the study/ research results can be of great benefit for practical clinical recommendations and guidelines for population health decisions for Karachi and other comparable cities. Huge figures of SD and the impact of prenatal, perinatal as well as postnatal factors for developing CP underlines the importance of appropriate antenatal and neonatal care. Therefore, in an effort to achieve the above goal and reduce cases of cerebral palsy in newborns; the following has been considered as meagre targets: increasing the coverage and quality of prenatal care, increasing birth assistance by skilled personnel and enhancing the value of neonatal care.
Thus, the results of the given study raise the question of early identification and effective interventions for children with CP. Thus, understanding the predisposing factors that may be related to development of particular types of CP can be used to direct prevention and management plans. For instance, by early identification and management of risk factors such as PIH in maternal health, it would be possible to minimize the occurrence of CP linked to such conditions [21].
Hence, conclusions of this study are useful in understanding the current status and trends of cerebral palsy types in a tertiary care centre of Karachi, Pakistan. Thus, as the present study seek to identify the needs and risk factors for children with CP in low income countries, the value for focusing on the major risk factors cannot be overemphasized. The study also poses the question that more research needs to be done in the diagnosis and treatment of other forms of CP that are not as prevalent as spastic CP including ataxic and dyskinetic CP to ensure that nobody with CP is left behind.

Conclusion

In the present study, the broad objective of demonstrating a high incidence and distribution of clinical types of cerebral palsy has been addressed by the patients attending a tertiary care hospital in Karachi, in which of the clinical subtypes of cerebral palsy, namely, spastic diplegia was found to be most dominantly affected. The present results bear significant implication on the identification of appropriate management and rehabilitation interventions specific to these patients. The study reemphasizes the significance of early identification and the utilization of interventions as they are applicable in countries with limited resources and proves that the difficulties of cerebral palsy are more than those of any other diseases in such regions due to lack of facilities and diagnostic equipment. To overcome these challenges, it is necessary to work on the enhancement of the healthcare system and the availability of the necessary measures for children with CP from the starting age. Thus, there appears a need for empirical research that focuses more on exploring the determinants of the above-mentioned distribution of the types of CP within this population in an effort to gain deeper understanding on how the health of these children could be enhanced, and possible occurrences of the condition avoided if any. Better access to diagnostic services and available specialized care may also prove to be of more benefit to patients with spastic CP to hence improve the quality of life to families with such patients.

References

[1] S. P. MBBS, "Determinants of Hospital-Based Health Service Utilization in Cerebral Palsy: a

Systematic Review," *Archives of Physical Medicine and Rehabilitation,* vol. 103, no. 8, pp. 1628-1637, 2022.

[2] D. C. K. Mangamba, "Epidemiological, clinical, and treatment-related features of children with cerebral palsy in Cameroon: A hospital-based study," *Archives de Pédiatrie,* vol. 29, no. 3, pp. 219-224, 2022.

[3] F. Prem Chand MBBS, "Spectrum of Common Pediatric Neurological Disorders: A Cross-Sectional Study From Three Tertiary Care Centres Across Pakistan," *Pediatric Neurology,* vol. 138, pp. 33-37, 2023.

[4] A. K, "The Profile of Epilepsy and its characteristics in Children with Cerebral Palsy," *Seizure: European Journal of Epilepsy,* vol. 101, pp. 190-196, 2022.

[5] P. Clément Chollat MD, "Cerebral Palsy in Very Preterm Infants: A Nine-Year Prospective Study in a French Population-Based Tertiary Center," *The Journal of Pediatrics,* vol. 237, p. The Journal of Pediatrics, 2021.

[6] M. Wasay, "Neurological disorders and disability in Pakistan: A cross-sectional multicenter study," *Journal of the Neurological Sciences,* vol. 452, p. 120754, 2023.

[7] V. N. A. Bharuchi, "Development and feasibility testing of the mental status examination scale to assess functional status of young, hospitalized children in Pakistan," *SSM - Mental Health,* vol. 2, p. 100126, 2022.

[8] S. Badgujar, "Epidemiological predictors of quality of life and the role of early markers in children with cerebral palsy: A multi-centric cross-sectional study," *Pediatrics & Neonatology,* 2024.

[9] H. G. M. BS, "Total Hip Arthroplasty in Patients With Cerebral Palsy: A Matched Comparison of 90-Day Adverse Events and 5-Year Implant Survival," *The Journal of Arthroplasty,* vol. 36, no. 10, pp. 3534-3537, 2021.

[10] A. G. S. MD, "Hyperbilirubinemia and Asphyxia in Children With Dyskinetic Cerebral Palsy," *Pediatric Neurology,* vol. 120, pp. 80-85, 2021.

[11] S. G. MD, "Prevalence and Risk Factors for Cerebral Palsy in Children With Congenital Heart Disease Based on Risk of Surgical Mortality," *Pediatric Neurology,* vol. 155, pp. 133-140, 2024.

[12] A. G. Ron, "Nutritional status and prevalence of dysphagia in cerebral palsy: usefulness of the Eating and Drinking Ability Classification System scale and correlation with the degree of motor impairment according to the Gross Motor Function Classification System," *Neurología,* vol. 38, pp. 35-40, 2023.

[13] D. M. D. M. (UCT), "The Etiologic Risk Factors for Cerebral Palsy at an Orthopedic Surgery Clinic in South Africa," *Pediatric Neurology,* vol. 154, pp. 175-178, 2024.

[14] M. R. W. BS, "Ophthalmologic characteristics and outcomes of children with cortical visual impairment and cerebral palsy," *Journal of American Association for Pediatric Ophthalmology and Strabismus,* vol. 25, no. 4, pp. 223.e1-223.e6, 2021.

[15] S. Kammar, "Hips in cerebral palsy: A clinico-radiological evaluation of hip subluxation in cerebral palsy," *Journal of Clinical Orthopaedics and Trauma,* vol. 43, p. 102224, 2023.

[16] S. Banerjee, "An audit of admissions and mortality of orthopedic indoor patients in a tertiary care hospital of India," *Journal of Clinical Orthopaedics and Trauma,* vol. 11, no. 4, pp. S518-S521, 2020.

[17] N. Fatima, "Prevalence of depression and anxiety among mothers of children with neuro-developmental disorders at a tertiary care centre, Puducherry," *Clinical Epidemiology and Global Health,* vol. 11, p. 100792, 2021.

[18] S. P. MD, "Acquired Ocular Motor Palsy: Current Demographic and Etiological Profile," *Asia-Pacific Journal of Ophthalmology,* vol. 9, no. 1, pp. 25-28, 2020.

[19] I. Papadimitriou, "Dystonia assessment in children with cerebral palsy and periventricular leukomalacia," *European Journal of Paediatric Neurology,* vol. 32, pp. 8-15, 2021.

[20] P. Jean-Christophe Rozé MD, "Effect of Early Targeted Treatment of Ductus Arteriosus with Ibuprofen on Survival Without Cerebral Palsy at 2 Years in Infants with Extreme Prematurity: A Randomized Clinical Trial," *Jean-Christophe Rozé MD, PhD,* vol. 233, pp. 33-42.e2, 2021.

[21] N. Branjerdporn, "Mothers' perspectives on the influences shaping their early experiences with infants at risk of cerebral palsy in India," *Research in Developmental Disabilities,* vol. 113, p. 103957, 2021.