CukurovaMedicalJournal

Araştırma Makalesi / ResearchArticle

Cerebral Palsy in Pakistani Children: A Hospital Based Survey

Pakistanlı Çocuklarda Serebral Palsi: Hastane Tabanlı İnceleme

Atif Ahmed Khan[1], Khalil Ahmad[1], Saeed Bin Ayaz[2], Aisha Ayyub[3], Uzma Akhlaq[1]

[1]Armed Forces Institute of rehabilitation Medicine (AFIRM) Rawalpindi, PAKİSTAN
[2]Combined Military Hospital, Okara, PAKİSTAN
[3]National University of Science and Technology (NUST), Islamabad, PAKİSTAN

CukurovaMedicalJournal 2014;39(4):705-711.

ABSTRACT

Purpose: The prevalence of cerebral palsy is high in Pakistan, however, it needs to be further explored. This study aimed at assessing clinical presentations and etiological factors among children with cerebral palsy in a Pakistani hospital.

Materials and Methods: It was a descriptive case series recruiting 102 children who presented to cerebral palsy rehabilitation clinic of Armed Forces Institute of Rehabilitation Medicine, Rawalpindi fulfilling the criteria adopted by Surveillance of Cerebral Palsy in Europe.

Results: Of 102 children, 46 (45.1%) were male and 56 (54.9%) were female with a mean age of 5.6 ± 2.25 years. Spastic cerebral palsy was the commonest presentation (90.2%) mainly presenting as diplegia (33.3%) and quadriplegia (32.4%) followed by atonic, ataxic/mixed and athetoid CP accounting for 3.9%, 3.9%, and 2.0% respectively. Birth asphyxia was the most encountered etiologic factor (32.4%) followed by prematurity (26.5%), kernicterus (12.7%) and meningoencephalitis (10.8%). Spastic quadriplegic and diplegic CP were primarily related to birth asphyxia, hemiplegic, ataxic and mixed CP to prematurity and atonic and athetoid CP to kernicterus.

Conclusion: Spastic quadriplegia or spastic diplegia are the commonest presentations in Pakistani children diagnosed with CP. The frequent etiological factors in CP development are birth asphyxia, prematurity, meningoencephalitis and kernicterus.

Key Words: Cerebral Palsy, Clinical presentation, Etiology, Birth asphyxia, Prematurity, Low birth weight, Kernicterus, Pakistan.

ÖZET

Amaç: Pakistan'da serebralpalsi frekansı yüksektir ancak bu durumun daha fazla araştırılması gerekmektedir. Bu çalışmanın amacı Pakistan'da hastanede serebralpalsili çocuklar arasında klinik sunumların ve etyolojik faktörlerin değerlendirilmesidir.

Materyal ve Metod: Bu çalışmaya dahil edilen 102 çocuk, Avrupa'daki Surveillance of CerebralPalsyde gözetim altında bulunan çocuklarla aynı kriterlere sahiptir ve Rawalpindi'de Silahlı kuvvetler rehabilitasyon merkezi enstitüsünde bulunmaktadır.

Bulgular: 102 çocuktan 46'sı (%45.1) erkek, 56'sı (%54.9) kızdır, çocukların ortalama yaşları 5.6 ± 2.25' tir. En sık spastik serebralpalsi (%90.2) görülmektedir, bu da dipleji (%33.3), kuadriplejiyi (%32.4) takip eden 3.9% atonik, % 3.9 ataksik/karışık ve %2 atedoit CP olarak görülmektedir. Doğum asfiksisi en sık karşılaşılan etyolojik faktördür (%32.4) bunu prematürite (%26.5), kernikterus (%12.7) ve meningoensefalit (%10.8) takip etmektedir. Spastik kuadriplejik ve

diplejik CP, ana olarak doğum asfiksisi, hemiplejik, ataksik ve karışık CP prematurite, atonik ve atedoit CP ise kernikterus ile ilişkilidir.

Sonuç: Spastik kuadripleji veya spastik dipleji ,CP teşhisi konulan Pakistanlı çocuklarda en sık karşılaşılan durumlardır. CP gelişiminde en sık karşılaşılan etyolojik faktörler doğum asfeksisi, prematürite, meningoensefalit ve kernikterustur.

Anahtar Kelimeler: Serebral Palsi, Klinik sunum, etyoloji, doğum asfiksisi, prematurite, düşük doğum ağırlığı, kernikterus, Pakistan.

INTRODUCTION

Cerebral palsy (CP) is a disorder of movement control and posture caused by damage to the developing brain that may occur during pregnancy, around delivery or within the first three years of life[1]. Though the tone and postural abnormalities may become more evident in later years, the condition is characteristically neither progressive nor episodic. World-wide prevalence of CP is approximately 2-2.5 per 1000 live births[2,3]. The spastic CP is found to be the commonest presentation followed by athetoid, ataxic and mixed types[4,5]

Major etiological factors linked to the development of CP vary in terms of their relationship to the time of delivery (i.e. prenatal, perinatal and postnatal periods). These factors include birth asphyxia, prematurity, birth trauma, maternal infections and drug abuse, intracranial infections and kernicterus[4] In recent years, improvement in pregnancy care, upgraded obstetric techniques and better neonatal nursing have influenced the over-all incidence of CP[6]. Pakistan being a low-resourced country and having an under-developed health care system still faces a high prevalence of CP children. The information about prevalence, demographics and management needs to be upgraded in Pakistan to improve health-care of such children. This study was therefore planned, with the primary focus on presentation and etiological factors associated with CP.

MATERIALS and METHODS:

It was a cross-sectional study carried out at Armed Forces Institute of Rehabilitation Medicine (AFIRM),Rawalpindi from July 2011 to June 2013.

Through non-probability purposive sampling we enrolled 102 children of both genders presenting at the CP rehabilitation clinic and fulfilling the standardized criteria adopted for classification and descriptions of children with CP by Surveillance of Cerebral Palsy in Europe (SCPE)[7]. We excluded children under one year of age because comments on developmental milestones cannot be given confidently in these children. Children with conditions like neurodegenerative disorders, myopathies, metabolic disorders, neuropathies and syndrome of early hypotonia were also excluded. Parents were taken into confidence about study proceedings and informed consent was taken. Approval from the local ethical committee was also obtained.

A detailed history from the mother or caregivers (in case mother was not available) was taken about pregnancy, place and mode of delivery, birth weight, family history, developmental milestones, health status and gestational age record. Apgar scores, if available, were used for labeling birth asphyxia. Where Apgar scores were not available, birth asphyxia was assigned based on positive information in the history i.e. positive history of delayed cry for >5 minutes after birth, baby turning blue and requiring oxygen supplementation or history of lethargy and/or seizures with-in 72 hours of delivery[6]. Live-born infants delivered before 37 weeks from the first day of the last menstrual period were termed premature and a birth weight of ≤ 2500g was considered low birth weight (LBW)[8].

Kernicterus was considered if the patient's history indicated brain involvement along with development of jaundice requiring phototherapy, exchange transfusion or other treatment modality. Meningoencephalitis was considered positive if

there was a history of altered consciousness, fits, fever, neck stiffness, and proven diagnosis on cerebrospinal fluid examination.

Complete physical, neurological and developmental examination including fundoscopy were done in all patients. Films of X-Ray skull, computerized tomography (CT) and magnetic resonance imaging (MRI) of brain were evaluated to rule out intracranial growth, hemorrhage, infarcts, calcifications and cortical atrophy, peri-ventricular leukomalacia or hydrocephalus. Thyroid function tests, urinary metabolic screening and TORCH screening were also checked out. Children with history of birth trauma or head injury and infarct or hemorrhage in CT scan of brain were labeled as having traumatic brain injury.

Data was analyzed with the help of SPSS version 20. The collected data was statistically treated to acquire the mean, range and standard deviation for age. Frequency and percentages were calculated for categorized variables, for instance: gender, type of cerebral palsy, body segments involved and etiological factors.

RESULTS

Out of 102 children with CP, 46 (45.1%) were male and 56 (54.9%) were female with a mean age of 5.6 ± 2.25 years. Spastic CP was the most common type of CP and was found in 92 (90.2%) followed by atonic, ataxic/mixed and athetoid CP accounting for 3.9%, 3.9%, and 2.0% respectively.(Table-1) Of spastic CP, most children presented with diplegic presentation 33.3% (n=34), followed by quadriplegic 32.4% (n=33) and hemiplegic presentation 24.5% (n=25). (Table-1)

Birth asphyxia was the most encountered etiologic factor reported in 33 (32.4%) children with CP. Prematurity, kernicterus, meningoencephalitis, LBW, intracranial bleed and TORCH infection were other important etiologies accounting for 26.5%, 12.7%, 10.8%, 6.9%, 4.9% and 1% respectively. (Table-2) No cause was identified in 5 (4.9%) of children with CP.

When the data was analyzed to determine the relationship of etiology with the type of CP, it was found that spastic quadriplegic CP was caused mainly by birth asphyxia seen in 11(33.3%) children with CP followed by kernicterus and prematurity seen in 8(24.2%) and 7(21.2%) children. Birth asphyxia and prematurity were the major contributors towards spastic diplegic CP present in 22 (64.7%) and 7(20.6%) children. Prematurity was the main contributor in spastic hemiplegic CP seen in 10 (40%) children followed by kernicterus and intracranial bleed seen in 5 (20%) cases each.

Kernicterus was the major contributor to atonic and athetoid CP. Ataxic and mixed CP were caused by prematurity and LBW. Detailed etiologic relationship with type of CP is given in Table 3.

Table 1. Presentation and demographic characteristics of thesample

Characteristics		n (%)
Gender	Male	46 (45.1)
	Female	56 (54.9)
Pattern of involvement	Spastic CP	92(90.2)
	Atonic	4(3.9)
	Ataxic/mixed	4(3.9)
	Athetoid	2(2)
Subtype of spastic CP	Diplegic	34 (33.3)
	Quadriplegic	33 (32.4)
	Hemiplegic	25 (24.5)

Table 2. Etiological factors found in children of cerebral palsy

Etilogy	n (%)
Birth Asphyxia	33(32.4)
Prematurity	27(26.5)
Kernicterus	13(12.7)
Meningoencephalitis	11(10.8)
Low birth weight	7(6.9)
Trauma/ Intra cranial bleed	5(4.9)
Idiopathic	5(4.9)
TORCH infections	1(1)
Total	102(100)

Table 3: Relationship of etiology with type of cerebral palsy

Etiology	Diplegic CP n (%)	Quadriplegic CP n (%)	Hemiplegic CP n (%)	Atonic CP n (%)	Ataxic CP n (%)	Athetoid CP n (%)
Birth Asphyxia	22(64.7)	11(33.3)	-	-	-	-
Prematurity	7(20.6)	7(21.2)	10(40)	1(25)	2(50)	-
Kernicterus	-	8(24.2)	2(8)	2(50)		1(50)
Meningoencephalitis	5(14.7)	4(12.1)	2(8)			
Low birth weight	-	-	3(12)	1(25)	2(50)	1(50)
Trauma/ Intra cranial bleed	-	-	5(20)	-	-	-
Idiopathic	-	2(6.1)	3(12)	-	-	-
TORCH infections	-	1(3)	-	-	-	-

DISCUSSION

Cerebral palsy, originally reported by Little[9] in 1861 as 'cerebral paresis' has been the subject of books and papers for the past hundred years. It is the most common neurological disorder seen in pediatric neurology clinics and the commonest physical disability in childhood[10]. The epidemiology and etiology of CP in Pakistan has been explored in few hospitals but this effort is so far not enough. This study is an endeavor to further open up the pertinent information on the subject.

The results of our study have been supported by others. Our study found the commonest presentation of cerebral palsy to be spastic CP found in 90.2% of the sample followed by atonic (3.9%) and ataxic/mixed CP (3.9%).The other Pakistani study carried out by Nazir B et al. found 72% of all CP children to be having spastic CP followed by atonic CP (19%) and athetoid CP (6.7%)[6]. Nafi OA, Tosun A, Himmelmann K, Wichers MJ and Winter S also reported commonest presentation of cerebral palsy as spastic type in Jordanian, Turkish, Swedish, Dutch and American population[11,10, 5,12,13,14].

Diplegia was the commonest presentation of spastic CP in our study, found in 33.3%. Percentage of quadriplegia was also nearby i.e.32.4%. Hemiplegic CP was seen in 24.5%. Nazir B et al. established spastic quadriplegia as the most common type (46.7%) followed by diplegia (12.5%) and hemiplegia (9.2%)[6]. A study from Bangladesh discovered spastic diplegia to be

the predominant presentation (34.5%) followed by spastic quadriplegia (25.5%)[11].Nafi OA recognized quadriplegia to be the frequent presentation (34.4%) followed by hemiplegia (26.2%) and diplegia (22.1%) in children with spastic CP.(10) A study from India found spastic CP presenting as quadriplegia in 61% and diplegia in 22%[4]. A Saudi study discovered the common presentation to be diplegia and quadriplegia in 31% and 26.3% respectively of the CP children presenting in a Riyadh hospital[15]. The spastic diplegia is largely the commonest form reported from developed countries[14].

Birth asphyxia was the most encountered etiologic factor in our study established in 32.4% of the CP children followed by prematurity, kernicterus, meningoencephalitis, LBW, intracranial bleed and TORCH infection accounting for 26.5%, 12.7%, 10.8%, 6.9%, 4.9% and 1% respectively. No cause was identified in 4.9%. Nazir B recognized birth asphyxia, meningoencephalitis, prematurity and low birth weight and kernicterus as important etiologies accounting for 36%, 34%, 8% and 5.5% respectively[6].Singhi P et al. in a recent study from India determined brain infection to be the major etiological factor followed by birth asphyxia and kernicterus in 57.4%, 52% and 30% of the sample respectively[16]. Anwar S et al. also found birth asphyxia to be the major causative factor in Bangladeshi CP children, reported in 53.6% cases[11].

In terms of etiological factors correlated with the type of CP, birth asphyxia and prematurity were the major contributors in our study towards spastic quadriplegic and diplegic CP, prematurity was the main contributor towards spastic hemiplegic CP while kernicterus was the major contributor towards atonic and athetoid CP. Ataxic and mixed CP were caused by prematurity and LBW. These results were relatively similar to those of Nazir B, which stated that spastic quadriplegic CP was caused mainly by birth asphyxia (48%) and meningoencephalitis (43%), spastic diplegic CP by prematurity (53%) and birth asphyxia (27%) and spastic hemiplegic CP by birth asphyxia (44%) and intracranial bleed (28%). Atonic CP was related to meningoencephalitis (26%) and kernicterus (13%), athetoid CP to kernicterus and meningoencephalitis (38% each) and ataxic and mixed CP to meningoencephalitis and birth asphyxia[6].

Birth asphyxia, prematurity and meningoencephalitis have emerged to be the major causative factors in development of quadriplegic and diplegic CP in the above mentioned studies of the Indian Subcontinent. Rural dominant population with non-existing hospital facilities seem to be the key reason. The deliveries are conducted here by midwives or lady health workers (LHWs) at the mother's home without aseptic instruments and measures or parenteral antibiotics. Neonatal resuscitation is also not taken into consideration. The incidence of CP can be lowered by providing health care facilities in small towns and villages and concurrently educating the community in general and midwives and LHWs in particular to identify high risk deliveries and conduct such deliveries at properly equipped hospitals as has been done in developed countries[14]. CP due to meningoencephalitis can be lowered by early diagnosis and prompt treatment of Central Nervous System infections and including the use of immunization against H. influenza type b into routine immunization program of the country[6].

Kernicterus in above studies also appeared to be a major relevant factor in CP development, particularly in athetoid type. The explanations could be careless approach from the parent's side, local taboos, delayed referral from general practitioners and lack of awareness regarding blood group incompatibility of mothers and babies. Asphyxia, acidosis and septicemia also are predisposing factors to kernicterus development. With early diagnosis and aggressive management of hyperbilirubinemia, the incidence of cerebral palsy due to kernicterus can be decreased.

More information about the causes of cerebral palsy is likely to come from further exploration. Ongoing research into risk factors and causes of cerebral palsy will promote development of preventive strategies for CP.

CONCLUSION

Spastic quadriplegia or spastic diplegia CP are the commonest presentations in Pakistani children diagnosed with CP. The frequent etiological factors in CP development are birth asphyxia, prematurity, meningoencephalitis and kernicterus.

Acknowledgement/Disclaimers

Nil

Conflict of interest

The authors of the article did not mention any conflict of interest.

Abbreviations

AFIRM: Armed forces institute of rehabilitation medicine

CP: Cerebral palsy

LBW: Low birth weight

LHW: Lady health worker

CT; Computerized tomography

MRI: Magnetic resonance imaging

REFERENCES

1. Niemann G, Michaelis R. Cerebral palsy (II)--clinical symptoms and etiopathogenesis. (article in German with an abstract in English) KlinPediatr. 1996;208:280-4.
2. Hagberg B, Hagberg G, Olow I, von Wendt L. The changing panorama of cerebral palsy in Sweden. VII. Prevalence and origin in the birth year period 1987-90. ActaPaediatr 1996;85:954-60.
3. Platt MJ, Cans C, Johnson A, Surman G, Topp M, Torrioli MG, Krageloh-Mann I. Trends in cerebral palsy among infants of very low birth weight (<1500 g) or born prematurely (<32 weeks) in 16 European centres: a database study. Lancet 2007;369:43-50.
4. Singhi PD, Ray M, Suri G. Clinical spectrum of cerebral palsy in north India--an analysis of 1000 cases. J Trop Pediatr 2002;48:162-6.
5. Tosun A, Gökben S, Serdaroğlu G, Polat M, Tekgül H. Changing views of cerebral palsy over 35 years: the experience of a center. Turk J Pediatr. 2013;55:8-15.
6. Nazir B, Butt MA, Ayesha H, Shamoon M, Sheikh S, Bhatti MT. Relationship of type of cerebral palsy with the etiology. Professional Med J. 2006;13:133-7.
7. Surveillance of cerebral palsy in Europe: a collaboration of cerebral palsy surveys and registers. Surveillance of cerebral palsy in Europe (SCPE). Dev Med Child Neurol. 2000;42:816-24.
8. Carlo WA. Prematurity and intrauterine growth restriction. In: Kliegman RM, Stanton BF, St. Geme JW, Schor NF, Behrman RE (editors). Nelson Textbook of Pediatrics. 19th ed. Philadelphia, PA, USA: Saunders; 2011;555-63.
9. Little WJ. On the influence of abnormal parturition, difficult labours, premature birth, and asphyxia neonatorum, on the mental and physical condition of the child, especially in relation to deformities. ClinOrthopRelat Res 1966;46: 7-22.
10. Nafi OA. Clinical spectrum of cerebral palsy in south Jordan; Analysis of 122 cases. J Med J. 2012;46:210-5.
11. Anwar S, Chowdhury J, Khatun M, Mollah AH, Begum HA, Rahman Z, Nahar N. Clinical profile and predisposing factors of cerebral palsy. Mymensingh Med J. 2006;15:142-5.
12. Himmelmann K, Hagberg G, Beckung E, Hagberg B, Uvebrant P. The changing panorama of cerebral palsy in Sweden. IX.Prevalence and origin in the birth-year period 1995-1998. ActaPaediatr. 2005;94:287-94.
13. Wichers MJ, Odding E, Stam HJ, van Nieuwenhuizen O. Clinical presentation, associated disorders and aetiological moments in cerebral palsy: a Dutch population-based study. DisabilRehabil. 2005;27:583-9.
14. Winter S, Autry A, Boyle C, Yeargin-Allsopp M. Trends in the prevalence of cerebral palsy in a population-based study. Pediatrics. 2002;110:1220-5.
15. elRifai MR, Ramia S, Moore V. Cerebral palsy in Riyadh, Saudi Arabia: I. Aetiological factors. Ann Trop Paediatr. 1984;4:7-12.

16. Singhi P, Saini AG. Changes in the clinical spectrum of cerebral palsy over two decades in north India--An Analysis of 1212 Cases. J Trop Pediatr. 2013;59:434-40.

YazışmaAdresi / Address for Correspondence:
Dr.Saeed Bin Ayaz
Combined Military Hospital
Okara, PAKİSTAN
E-mail: saeedbinayaz@gmail.com

Geliş tarihi/Received on :08.03.2014
Kabul tarihi/Accepted on: 21.04.2014