

## Pattern of cerebral palsy in Mosul

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### ABSTRACT

**Objective:** To examine the possible etiological factors, the clinical types, and the consequences of cerebral palsy in Mosul.

**Methods:** This prospective descriptive (case series study) took place in children's teaching hospitals Mosul. All children diagnosed as cerebral palsy between March 2000 and March 2005 were recruited for this study. Children without a clear diagnosis and those below the age of 12 months were excluded. Thus 306 Patients were recruited prospectively from those attending the inpatients and outpatients clinics of children's teaching hospitals in Mosul.

The caretakers of children were asked to fill in questionnaire. The patients were examined and classified. They were also assessed by an ophthalmologist and an audiologist; computerized tomography of the brain and EEG were performed when appropriate.

**Results:** There were 306 patients; 184 were females and 122 were males. The female to male ratio was 1.5:1. Birth asphyxia accounted for 118 (38.6%) of cases. Low birth weight accounted for 70 (22.9%) of cases. The etiology was undetermined in 66 (21.4%). Neonatal jaundice: 32 (10.5%), meningoencephalitis: 16 (5.2%), and brain malformations in 4 (1.3%), spastic cerebral palsy was found in 244 (79.7%) of the clinical typing, psychomotor delay was present in 96 (31.4%) and epilepsy was reported in 114 (37.3%). Ocular problems were reported in 152 (49.7%); speech problems were reported in 108 (35.3%); and hearing problems were reported in 8 (2.0%).

**Conclusion:** The etiological factors of cerebral palsy are sometimes preventable in our region. Improvement in antenatal, natal, and perinatal care is essential in the reduction of the incidence of cerebral palsy.

### الخلاصة:

**ملخص البحث:** دراسة سريرية للشلل الدماغي لدى الأطفال في مدينة الموصل  
**أهداف البحث:** يهدف هذا البحث لدراسة الأسباب المحتملة والأنماط السريرية ونتائج الشلل الدماغي لدى الأطفال في مدينة الموصل.

**تصميم البحث:** ووقت أجرته: أجريت هذه الدراسة في مستشفيات الموصل التعليمية وشملت كل الأطفال الذين شُخص لديهم شلل دماغي في الفترة من آذار ٢٠٠٠ - آذار ٢٠٠٥ وقد استبعدت الحالات التي لم يؤكد تشخيصها، بالإضافة للحالات لدى أطفال أقل من ١٢ شهرا.  
**المشاركون:** ٣٠٦ طفلا مصاب بشلل الدماغ.

**النتائج:** تضمن البحث ٣٠٦ حالة شملت ١٨٤ أنثى و ١٢٢ ذكر، بنسبة ١:١,٥ كانت نسبة نقص الأكسدة الوليدي ٣٨,٦% ونسبة نقص وزن المولود ٢٢,٩%، ولم تحدد الأسباب في ٢١,٦% من الحالات. بين الفحص السريري فرط مقوية عضلة لدى ٧٩,٧% من الأطفال، وإعاقة حركية-نفسية لدى ٣١,٤% منهم، وصرع لدى ٣٧,٣% منهم وشوهت الإعاقة البصرية والسمعية وتأخر الكلام في ٤٩,٧% و ٢% و ٣,٣٥% من الحالات على التوالي.  
**الاستنتاج:** بعض أسباب الشلل الدماغي في الموصل يمكن تجنبها والوقاية منها، فالاهتمام بمراكز رعاية الأمومة والطفولة وإنشاء مراكز جديدة هي إجراءات هامة لخفض نسبة انتشار شلل الدماغ بالإضافة إلى نشر الوعي الصحي بين الأمهات.

**C**erebral palsy (CP) is a form of static encephalopathy with impairment of motor function and posture. Basically, it is a non-episodic nonprogressive disorder that begins at birth or in early infancy. Cases of CP vary widely in their causes, manifestation, and prognosis. It is the leading cause of crippling handicaps in children and is often associated with epilepsy and abnormalities of speech, vision, and intellect<sup>(1)</sup>. Hansen<sup>(2)</sup> reported an incidence of approximately 2 per 1000 in developed countries<sup>(3)</sup>. Many patients with the diagnosis of CP have normal or above average intelligence<sup>(4)</sup>. Expression of intellectual capacity may be limited by impairment in communication due to oromotor, fine motor, and gross motor difficulties. Without appropriate compensation, these difficulties have the potential to impair the ability to fully integrate academically and socially<sup>(5)</sup>. Complications associated with CP include cognitive difficulties, GI dysfunction, dental caries, sensory deficits, and a seizure disorder. A greater understanding of CP and the realization that patients with CP have significant potential to be unmasked allows medical professionals to approach CP in a multidisciplinary manner to maximize rehabilitative efforts<sup>(6)</sup>. The objective of the study was to determine etiological factors, clinical presentation, and associated consequences. The frequency of hospitalized cases with motor and mental handicaps raised our awareness of the need for this study.

### **Patients and methods:**

This is a descriptive, epidemiological, hospital-based study. Patients were recruited prospectively from those attending the inpatient and outpatient clinics of the Children Teaching Hospitals in Mosul.

There were 306 children enrolled in the study. Those without a definitive diagnosis and patients under the age of 12 months in whom clear signs of CP might not have become manifest, e.g. spasticity, were excluded<sup>(3)</sup>. The study was carried out between March 2000 and March 2005. The caretakers of children were asked to fill in a questionnaire that included demographic data and medical history like age, sex, gestational age, age of the mother at birth, educational state, antenatal care, associated conditions like

asphyxia, neonatal jaundice.. ect. The patients were examined and classified according to the Copenhagen Classification<sup>(7)</sup>. They were also assessed clinically by an ophthalmologist, and audiologist. Computerized tomographic brain scan and electroencephalography were performed for some of them when indicated.

### **Results**

Of the 306 children with CP, 184(60.1%) were females, and 122(39.9%) were males, giving a female to male ratio of 1.5:1. (table1).

Most of the children 214 (69.9%) were born at home. and the rest were born in hospitals.

Four cases were older than 10 years and 258 (84.3%) were less than 5 years. There were 52 preterm births and the remaining 258(83%) were term. Initiation of respiration was delayed with obvious pallor or cyanosis in 118 cases (38.6%).

Demographic information about the mothers is shown in Table 2. Sixteen (5.2%) were under the age of 16 at the time of childbirth. The majority were between 17-35 of age, forty-six (15%) were illiterate. Ninety-four (30.7%) received no prenatal care. Seventy-four (24.5%) had irregular visits to antenatal clinics. The majority 214 (69.9%), lived in rural or semi-rural areas.

Some associated etiological factors are shown in Table 3. Birth asphyxia was reported in 118 cases (38.6%). Sixteen (5.2%) had a history of meningoencephalitis. The etiology was uncertain in 66 (21.7%) of the cases.

The pattern of neurological deficit is shown in Table 4. Spastic CP was the most common type occurring in 244 of the 306 cases (79.7%). Atonic and mixed varieties of CP were reported in 32 (10.5%) and 22(7.2%) of the cases respectively.

Delay in achieving developmental milestones at the appropriate time associated with behavioral disorders was reported in 96(31.4%). Recurrent seizures were present in 114 (37.3%). Variable ocular problems were detected in 152(49.7%) of the patients. Strabismus was the most common ocular complication occurring in 88 (58.0%), and optic atrophy was the least common occurring in 8(5.3%). Sixty-two (20.3%) had musculoskeletal complications, mainly tendon contractures, as shown in Table 5.

Condition	Number	Percentage
<b>Criteria</b>	<b>Number</b>	<b>percentage</b>
<b>Sex</b>		
Male	122	39.9
Female	184	60.1
<b>Age group</b>		
1-5years	258	84.3
>5 years	48	15.7
<b>Gestational</b>		
Term	254	83
Preterm	52	17
<b>Initiation of respiration</b>		
Immediate	188	61.4
Delayed	118	38.6

Table1. Epidemiological and

Table 2. Demographic information about mothers (n=306)

Criteria	Number	Percentage
<b>Age at childbirth (years)</b>		
≤16	16	5.2
17-35	252	82.4
>35	38	12.4
<b>Education</b>		
Illiterate	46	15.0
Primary school	154	50.3
Secondary school	84	27.5
University	22	7.20
<b>Rural</b>	214	69.9%
<b>urban</b>	92	30.1%
<b>Antenatal care</b>		
None	94	30.7
Irregular	74	24.2
Regular	138	45.1

Table 3. Etiological Conditions associated with CP(n=306)

Condition	Number	Percentage
<b>Asphyxia</b>	118	38.6
<b>Low birth weight</b>	70	22.9
<b>Meningoencephalitis</b>	16	5.2
<b>Neonatal jaundice</b>	32	10.5
<b>Brain malformation</b>	4	1.3
<b>Unknown</b>	66	21.7

Table 4. Clinical classification of CP (n=306)

Clinical type	Number	Percentage
<b>Spastic</b>	244	79.7
-Quadriplegia	102	41.8
-Diplegia	90	36.9
-Hemiplegia	52	21.3
<b>Atonic</b>	32	10.5
<b>Extrapyramidal</b>	4	1.3
<b>Ataxic</b>	4	1.3
<b>Mixed</b>	22	7.2

Table 5. Associated clinical conditions with cerebral palsy

Ocular problem	152	49.7
-Strabismus	88	58.0
-Nystagmus	22	14.4
-Optic Atrophy	8.0	5.3
-Mixed	34	22.3
Epilepsy	114	37.3
Speech problems	108	35.3
Psychomotor delay	96	31.4
Feeding problem	80	26.1
Orthopedic complication	62	20.3
-Muscle/tendon contracture	54	87.1
-Hip dislocatio	2.0	3.3
-Scoliosis	6.0	9.6
Hearing	8.0	2.0

### Discussion:

The study analyzed 306 children with cerebral palsy. There were more females with a ratio of 1.5:1, this is in contrast to published data from Nigeria and Saudia Arabia, both of which showed male predominance<sup>(7,8)</sup>. It is interesting to note that 69.9% were home births. Almost 50% of the mothers had attended an antenatal clinic on a regular basis. Trained midwives are available in most of Mosul at present time. The fact that very young mothers constituted a minority reflects the current trend away from early marriage in Mosul.

Cerebral palsy is not a static condition at the age of one year<sup>(9-10)</sup>. For this reason children under the age of 1 year were excluded from the study. Preterm infants, especially those who are small for gestational age, are at greater risk of developing CP<sup>(11-13)</sup>. The low rate obtained in this study, 52(17.0%) premature and 70(22.9%) low birth weight (small for gestational age), can be attributed to the high perinatal, neonatal and early infancy mortality rates<sup>(14)</sup>. Most of these deaths were due to preventable causes<sup>(15-16)</sup>. Very few CP patients have survived beyond the 5th birth day. This is due to inappropriate medical care. Also there is lack of rehabilitation centers for handicapped children. The cerebral palsy rate in low birth weight infants is yet to be determined<sup>(17)</sup>.

Birth asphyxia, as indicated by delayed initiation of respiration, pallor, or cyanosis after a difficult birth, was reported in 118 (38.6%) of cases. This is similar to the result published by Kurumuna in Dar Es Salaam<sup>(18)</sup>. This high rate reflects the lack of antenatal and perinatal care.

Neonatal jaundice and kernicterus are occasionally associated with CP<sup>(19)</sup>. In this study, a history of jaundice and exchange transfusion was reported in only 32(10.5%) of cases. In contrast is a report from West Africa where jaundice is a significant problem accounting for 88.0% of cases of cerebral palsy<sup>(20)</sup>.

As a group, children with CP have an unexpectedly higher incidence of congenital malformations. In one MRI study,<sup>(21)</sup> one third of children with CP had cortical dysgenesis and neuronal migration. In this study, four children with severe mental retardation and microcephaly showed severe cortical atrophy on CT of the brain.

Meningoencephalitis was reported in 16(5.2%) of cases. All of these cases were from rural or semi rural areas suggesting the possibility of delay in presentation for medical care. In 66(21.7%) of the patients, the cause of the CP was not determined. Lubis<sup>(22)</sup> reported a similar percentage in a retrospective study of CP. Based on the predominant motor deficit, this study showed that 244(79.7%) of cases were spastic CP, mainly quadriplegia, and diplegia, 102(41.8%) and 90(36.9%) respectively. Similar data were reported from a number of countries<sup>(3)</sup>. In one study, spastic diplegia was detected in 53% and it was the commonest clinical type, regardless of birth weight and gestational age<sup>(22)</sup>. Seizures were reported in 104 (37.3%) of patients. Recurrent seizures were reported in one third of CP with hemiplegia in another published study<sup>(23)</sup>.

**Conclusion and recommendation**

We believe that the actual prevalence of CP is higher than that reported here. The designation of CP as an entity, regardless of underlying conditions, is valuable because medical care and rehabilitation requirements are similar. Rehabilitation centers should be established at the community level to offer integrated services to children with CP in order to reduce morbidity and mortality in this group, Cerebral palsy in Mosul is mostly secondary to preventable or remediable factors. More effort is needed to educate mothers about the value of antenatal and perinatal care. The cost of such programs is far less than those associated with treatment and rehabilitation.

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