Profile of Children with Cerebral Palsy Attending Outpatient Physiotherapy Clinics in Southwest Nigeria

Ayanniyi, O.,[1] Abdulsalam, K.S.[2]

[1] *Department of Physiotherapy, College of Medicine, University of Ibadan, Ibadan, Nigeria*

[2] *Sports Medicine Department, Federal Ministry of Youth and Sport Development, Abuja, Nigeria*

Correspondence

Dr. Olusola Ayanniyi, Department of Physiotherapy, College of Medicine, University of Ibadan/ UCH, Ibadan, Nigeria • E-mail: drayanniyi@gmail.com

SUMMARY

Cerebral palsy (CP) is a major cause of childhood disability. The objective of this study was to investigate the causes, types, severity, history of pregnancy, delivery, maternal care, demographic and clinical characteristics of children with CP and their parents as seen in outpatient physiotherapy clinics of the selected hospitals in Southwest Nigeria.

A cross-sectional survey of children with CP and their parents was conducted in twelve hospitals in Southwest Nigeria. Information about the participants was obtained from hospital case records, physical examination and interviews. Data were summarized using descriptive and Chi-square tests with Alpha level put at 0. 05.

Two hundred and thirteen children with CP were seen, aged 18 months to 12 years, and most of them were male (59.2%). The majority (41.0%) of the mothers were in the age range of 28 to 33 years. Jaundice (39.9%), asphyxia (26.8%) and infection (17.4%) were the leading causes of CP and spastic CP was the most common type (81.7%). Quadriplegic CP presentation was predominant (67.1%), and leading co-morbidities were mental retardation (31%) and speech impairment (26.3%). About 50% of the children severely affected by CP fell within Levels 4 and 5 of the Gross Motor Function Classification System (GMFCS) of CP severity.

It was concluded that cerebral palsy in Southwest Nigeria is mainly associated with jaundice, asphyxia and infections. Spastic cerebral palsy was most common and quadriplegic affectation was predominant. It is recommended that factors promoting perinatal problems should be curtailed.

KEY WORDS: cerebral palsy, jaundice, asphyxia, infections, childhood disabilities

INTRODUCTION

Cerebral palsy (CP) is an umbrella term covering a group of non-progressive but often changing motor impairment syndromes that are secondary to lesions or anomalies in the brain, arising in the early stages of development (Sankar et al., 2005). It is recognized as a chronic disorder of motion and postural balance caused by a defect or damage to the immature brain (Buljina et al., 1999). According to Badawi et al. (2005), CP is a major cause of childhood disability. It has been described as one of the three most common lifelong developmental disabilities, the other two being autism and mental retardation (Sankar et al., 2005). Cerebral palsy is a symptom complex rather than a disease and it often presents with unclear aetiology (Reddihough and Collins, 2003; Jacobsson and Hagberg, 2004). In many cases, a cause cannot be found in the history of children with clear clinical evidence of CP (Rosenbaum, 2003). According to Stokes (1998), abnormalities could date from before birth (prenatal), or during birth (perinatal) but occurs after birth (postnatal) in the majority of CP cases.

The diagnosis of CP is based on a history of abnormal motor development that is not progressive coupled with examination that helps in locating the specific site of the lesion in the brain (Russman and Ashwal, 2004). The observation of the form of CP, medical history of the mother and child and onset of the disorder can reveal the cause of CP (Nucleus Catalog Medical Reference Library, 2003).

Various risk factors have been linked to the occurrence and types of CP (Waugh et al., 1996; Hutton and Pharaoh, 2002). Children of teenage mothers or fathers were reported to be at risk of CP, and a significantly higher prevalence of CP was also reported in children whose mothers were 40 years or older, especially if such children were high in parity (Cummins et al., 1993). These authors also reported an increased prevalence of CP among children born to women of African origin. According to McCarthy (2002), the clinical patterns displayed in this non-progressive motor disability are determined by the position and extent of damage to the brain. The severity of the motor impairment and the associated cognitive communicative and behavioural impairments are different for each child with CP (Voorman et al., 2006).

Cerebral palsy is usually classified based on motor disorder and the part in which the disorder is noticed (Hagberg and Hagberg, 1996; Singhi et al., 2002). The gross motor function classification system (GMFCS) is one of the recognized standardized methods of determining the severity of CP based on the gross motor function performance of children with CP. This classification expresses the severity of CP based on the child's motor disability (Rosenbaum et al., 2007).

The prevalence of CP is estimated at 2 - 2.5 cases per 1,000 live births (Nelson, 2003), while according to some studies it is a common neurodevelopmental condition and the most common paediatric neurological disorder accounting for about 50.3% of all cases seen in the clinics (Ogunlesi et al., 2008; Omole et al., 2013). Cerebral palsy is recognized as a common childhood problem in Nigeria; however, most of the available data on CP in Nigeria are those generated from the limited area of practice of clinicians from various parts of Nigeria: Ibadan (Nottidge and Okogbo, 1991; Lagunju et al., 2006; Peters et al., 2008), Sagamu (Ogunlesi et al. 2008), Port Harcourt (Frank-Brigges and Alikor, 2011). The main focus of the present study is to investigate the profile of children with CP referred for physiotherapy within wider practice settings embracing twelve selected secondary and tertiary hospitals in Southwest Nigeria. The Southwestern region is one of the six geo-political regions in Nigeria. The region consists of six states and has some of the largest hospitals with physiotherapy facility in Nigeria.

METHODS

Participants

Children aged twelve years and below with cerebral palsy, together with their parents were recruited from 12 selected hospitals with physiotherapy facility located in the Southwest region of Nigeria. Eligible children who had none of their parents present during the period of data collection were excluded from the study. The purpose of the study was to capture the regional profile of children with CP, thus, sample size was not calculated.

Instruments

Data collection form

A data collection form was used to gather information on the children and their mothers, such as gender, age, diagnosis, probable causes of CP, age of mother at gestation and delivery, position of the child in birth order, type of CP and co-morbidities associated with the CP and severity of CP according to the Gross Motor Function Classification System (GMFCS). Pregnancy history and delivery history of the mother with respect to maternal health, antenatal care received, history and nature of ill health during pregnancy, time, place of delivery and factors associated with delivery of the baby. History of post-natal care received by the baby from birth to the time of diagnosis of CP was also captured in the data collection.

Gross Motor Function Classification System (GMFCS)

The Gross Motor Function Classification System (GMFCS) was used to assess the severity of cerebral palsy in the affected children (Palisano et al., 1997). The Gross Motor Function Classification System (GMFCS) was developed to classify functional mobility in children diagnosed with cerebral palsy by levels of functional mobility. It consists of five levels, ranging from I, which includes children with minimal or no dysfunction relative to community mobility, to V, which includes children who are totally dependent and need help to move around (Palisano et al., 1997).

Procedure

Ethical approval for the study was obtained from the University of Ibadan/University College Hospital Ethics Committee. Permission was also obtained from the heads of the physiotherapy departments of the various hospitals where the study was conducted. The study was conducted prospectively and participants for the study were recruited from twelve tertiary and secondary hospital settings from the Southwestern region of Nigeria. The recruitment was restricted to children with CP that were brought/ accompanied by their mothers and receiving physiotherapy at such designated physiotherapy facilities at the period of the study. The rationale and procedure for the study were explained to the participants (parents of the involved children), and their consent to participate in the study was sought and obtained before they were recruited into the study. Participants were recruited over a period of four months. Clinical information concerning the children, such as diagnosis and types of CP were obtained from the children's case records. Other relevant information to corroborate clinical documentation was obtained through oral interviews of the mothers and documented by means of a data collection form/questionnaire designed for the study.

Assessment of severity of CP

The Gross Motor Function Classification System (GMFCS) was used to assess the severity of CP in the affected children (Rosenbaum et al., 2007); this classifies the child's ability and limitation in motor function. The scale is an ordinal scale (Palisano et al., 1997) with a five- level classification system and each level has separate descriptions for children of four age bands — before 2 years of age, between 2 and 4 years of age, between 4 and 6 years of age and between 6 and 12 years of age. All the children were assessed by one of the researchers, (KSA), who used the specific description that best fit the child's age as prescribed in GMFCS.

Data analysis

Data generated from each of the medical facilities were pooled for analysis. Alpha level was set at 0.05. The data analyses were carried out using SPSS 13.0 version software (SPSS Inc., Chicago, Illinois, USA).

RESULTS

Demographic characteristics of the participants

As shown in table 1, the majority (57%) of the children were less than 2 years of age while the ages of a larger percentage (41%) of the mothers were between 28 to 33 years. Out of the 213 children with CP, 126 (59.2%) were male. With respect to position in birth order, first to third born children were predominant in the population of children with CP.

Table 1. Demographic characteristics of the participants

Gender of children

Male:	156(59.2%)
Female:	87(40.8%)

Age of children with cerebral palsy (N=213)

	n	%
Less than 2 years	122	57.0
2 to 4 years	69	33.0
4 to 6 years	20	9.0
6 to 12 years	2	1.0

Age of mothers with children with cerebral palsy (N=213)

	n	%
22 to 27 years	45	21.0
28 to 33 years	87	41.0
34 to 39 years	61	29.0
40 years and above	20	9.0

Birth order of children with cerebral palsy (N=213)

	n	%
1st child	81	38.0
2nd child	33	16.0
3rd child	47	22.0
4th child	22	10.0
5th child	16	7.0
6th child	8	4.0
7th child	2	1.0
10th child	4	2.0

Key: N/n = Number of participants, % = Percentage

Reported causes of cerebral palsy and types

Table 2 shows the causes and types of CP found in Southwest Nigeria. Jaundice accounted for the highest number (39.9%) of cases and traumatic incident (6.6%) was the least. Fever/infection was the major cause of CP in children aged 2 and 4 years. About 91% of the children with CP were delivered at full term while about 9% were delivered pre-term.

Table 2. Causes and types of cerebral palsy in children with cerebral palsy and its distribution according to GMFCS

Causes of Cerebral Palsy (N = 213)	
Jaundice	85 (39.9%)
Asphyxia	57 (26.8%)
Preterm delivery	20 (9.3%)
Fever / infection	37 (17.4%)
Trauma	14 (6.6%)

Types of CP	Level I	Level II	Level III	Level IV	Level V	Total N (%)
Topography						
Hemiplegic	49	0	4	0	0	53 (24.9%)
Diplegic	4	3	6	4	0	17 (8.0%)
Quadriplegic	0	3	0	37	103	143 (67.1%)
Motor type						
Spastic	51	4	10	40	69	174 (81.7%)
Hypotonic	0	0	0	1	2	3 (1.4%)
Ataxic	0	2	0	0	0	2 (0.9%)
Dyskinetic	0	0	0	0	11	11 (5.2%)
Mixed	2	0	0	0	21	23 (10.8%)
TOTAL	53	6	10	41	103	213

Key: CP = Cerebral palsy; GMFCS = Gross motor function classification system; N = Number; % = Percentage

About 27% of the mothers reported being sick during the pregnancy of the children with CP. Almost all of the mothers (98%) had regular menstrual cycle before the pregnancy of the affected child. About 5% of the mothers suffered from vaginal bleeding during the pregnancy of the affected children. The majority of the children with CP in this study were spastic (81.7%) based on motor classification. Relative to topography 67.1% were quadriplegic (table 2).

Co-morbidities associated with cerebral palsy

The co-morbidities associated with CP are shown in table 3. Only about one-third (31.5%) of the children did not have any other impairment co-existing with CP. The distribution of the children based on the level of severity as described by their GMFCS is as shown in table 4. The majority of the children with CP in this study were severely disabled and fell within GMFCS levels 4 and 5 and most of them were presented with quadriplegic type of CP. The majority (70%) of the mothers of children with CP were from the Yoruba tribe. Table 5 shows the association between each of the CP types and other variables. A test of association showed there is significant association between: (a) the types of CP and severity of CP (p=0.001); and (b) position in birth order of children with CP and mother's age (p=0.001). There was, however, no significant association between mother's tribe and any variables.

Table 3. Co-morbidities in children with cerebral palsy (N=213)

Associated impairment	N	%
Speech impairment	40	18.7
Mental retardation	27	12.7
Mental retardation and speech impairment	26	12.2
Mental, epilepsy and visual impairment	13	6.1
Epilepsy/seizure	14	6.6
Hearing impairment	14	6.6
Hearing and visual impairment	12	5.6
Nil impairment	67	31.5

Key: N = Number of participants % = Percentage

Table 4. Pattern of age distribution of children with cerebral palsy according to level of severity as determined by GMFCS (N = 213)

Age	Level I	Level II	Level III	Level IV	Level V
< than 2 yrs	4	6	17	27	68
2 to 4 yrs	5	9	11	21	23
4 to 6 yrs	0	1	06	05	08
6 to 12 yrs	0	0	0	01	01
Total	9(4.2%)	16(7.5%)	34(16.0%)	54(25.3%)	100(47.0%)

Table 5. Association between each of the cerebral palsy type, gestational age, mother's age, position in birth order, mother's tribe and severity of the cerebral palsy

Variables		Cerebral palsy type	Gestational age	Mother's age	Position in birth order	Mother's tribe	Severity
Cerebral palsy type	χ^2						
	P	1.000					
Gestational age	χ^2	2.713					
	P	0.910	1.000				
Mother's age	χ^2	35.459	7.879				
	P	0.025**	0.049**	1.000			
Position in birth order	χ^2	17.801	5.193	74.443			
	P	0.216	0.075	0.001**	1.000		
Mother's tribe	χ^2	18.636	0.878	6.732	2.901		
	P	0.608	0.678	0.665	0.821	1.000	
Severity	χ^2	45.892	6.706	6.939	4.939	7.400	
	P	0.001**	0.035**	0.327	0.291	0.285	1.000

*Key:***Indicates statistical significant at $p < 0.05$; χ^2 Critical value, p: Probability value

DISCUSSION

Demographic Characteristics of the Participants

Male children with CP predominated in this study. This is consistent with previous findings (Waugh et al., 1996; Lagunju et al., 2006; Hamzat and Fatudimu 2008; Boskabadi et al., 2010; Frank-Briggs and Alikor, 2011). However, this is at variance with the findings of Buljina et al. (1999), who reported an insignificant gender difference in children with CP in their study.

With respect to age, none of the mothers was a teenager (at delivery of child) and only ten parents were 40 years old and above. The fact that teenage motherhood or having children at an older age increases the risk of birth defects in the children delivered has been established (Cummins et al., 1993). However, from the demographic findings in this study, it seems that the problems of teenage motherhood and having children at an older age are not predominant among the study population, therefore, other factors are likely to play major roles in the causes of CP.

Health Related Issues During Pregnancy

Sickness during pregnancy has been suspected as a probable cause of CP in children born by such women. In the present study, about one third of mothers of children with CP were sick during pregnancy, with lesser numbers reporting fever and infection. However, no data is available to link these reported illnesses as the probable cause of CP among the children. However, previous studies have identified maternal infection as one of the most well known risk factors for CP (Grether et al., 2003; Himmelmann et al., 2009; O'Callaghan et al., 2011; Stoknes et al., 2012) and in many instances, it is under-reported by mothers.

Birth Order of Children with Cerebral Palsy

The role of birth order in the aetiology of CP is not clear. Many of the children in this study were in first to third born position in the family. This range of birth order does not fall within the high parity range that has been implicated as a probable cause of CP (Cummins et al. 1993). According to Cummins et al. (1993), a high number of parity is a risk factor for CP and not low parity as witnessed in the present study. However, this finding is consistent with that of Ogunlesi et al. (2008), who implicated poor maternal health care during pregnancy and after delivery as a possible reason for high cases of CP in low parity children. Hence, there is a need for sustained health care education for women of child bearing age to make them aware of the importance of pre- and post-natal care in the control and prevention of factors that may predispose the developing foetus and new-born baby to CP.

Reported Causes of Cerebral Palsy

Perinatal events (jaundice, asphyxia and infections) are the leading causes of CP among the participants in the present study, which according to Ogunlesi et al. (2008) is a problem in resource-poor settings like Nigeria. This finding is consistent with previous findings from different parts of Nigeria: Zaria – North Central (Sathiakumar and Yakubu, 1987); Ibadan and Sagamu – Western Region (Lagunju et al., 2006; Ogunlesi et al., 2008; Hamzat and Fatudimu, 2008); and Port Harcourt – South-South Region (Frank-Briggs and Alikor, 2011) where the problem of CP has been linked to poor maternal care from incompetent carers. However, this is at variance with the report of a predominance of brain infections from India (Gangil et al., 2001; Singhi et al., 2002) and problems of low birth weight from the Netherlands (Wichers et al., 2001; Odding et al., 2006) and Saudi Arabia (al-Rajeh et al., 1991). In the present study, jaundice was reported as the major causative factor of CP among the sampled population. This is consistent with the finding of Nottidge and Okogbo (1991), but at variance with others (Lagunju et al., 2006; Ogunlesi et al., 2008; Frank-Briggs and Alikor, 2011) who reported asphyxia as the predominant cause of CP followed by jaundice in their studies. With respect to CP caused by asphyxia as found in this study and others, Ogunlesi et al. (2008) opined that this may be related to the high rate of poorly supervised deliveries, as has been demonstrated previously (Thomberg et al., 1995; Etuk and Etuk, 2001). This is most relevant in developing countries where available health care facilities are over-stretched. Proactive measures are therefore needed to strengthen maternal care in other to curtail perinatal causes of CP.

Full-term deliveries were more in this study than in some other studies (Suzuki et al., 1999; Bringas-Grande et al., 2002) where a higher number of pre-term delivered children had CP. The causes of CP in full-term births are difficult to elucidate. It has been postulated that they are predominantly pre-natally derived, with only a small proportion, around 10%, originating around labour and birth (Hagberg et al., 2001). There is a high probability that most pre-term cases that could have developed CP died in early childhood due to the poor level of facilities available

for the management of pre-term babies. As reported in previous studies, certain age bands (less than 28 weeks) carry a higher risk of CP than the 31 to 36 weeks band (Tommiska et al., 2001; Drummond and Clover, 2002) even with the availability of state of the art facilities.

Types of Cerebral Palsy

The most observed type of CP, based on motor function classification approach of assessing muscle tone, was the spastic type (91.1%) which is similar to that reported by other studies (Odding et al., 2006; Hamzat and Fatudimu, 2008; Ogunlesi et al., 2008; Frank-Briggs and Alikor, 2011), but with quadriplegic (62.9%) affectation dominating based on topography classification (pattern of paralysis) which is consistent with findings in some previous studies (Brigas-Grande et al., 2002, Singhi et al., 2002; Hamzat et al., 2008; Peters et al., 2008; Frank-Briggs and Alikor, 2011). This finding was however at variance with those of other researchers who reported a predominance of diplegic affectation among children with CP (Suzuki et al., 1999; el-Rifai et al., 1984).

Co-morbidities Associated with Cerebral Palsy

The neurological co-morbidities reported in this study are consistent with the literature on children with CP (Odding et al., 2006; Lagunju et al., 2006; Pruitt and Tsai, 2009; Frank-Briggs and Alikor, 2011). These associated co-morbidities, to a large extent, portray the severity of CP affectation. Mental retardation is the single predominant co-morbidity reported in this study and this is supported by some studies (Izuora and Okoro, 1981; Singhi et al. 2002) but is at variance with the findings of some others (Ogunlesi et al., 2008; Frank-Briggs and Alikor, 2011) where other types of co-morbidities such as seizures predominate. Presentation of a combination of co-morbidities also featured frequently in the present study which is in line with previous findings (Nottige and Okogbo, 1991; Ogunlesi et al., 2008; Frank-Briggs and Alikor, 2011). According to Ogunlesi et al. (2008), the factors responsible for the differences observed in the distribution of different specific co-morbidities in different places is difficult to explain.

More than half of the children in the present study were severely disabled based on their GMFCS assessment (LIV =25%; LV=47%), contrary to the findings of Suzuki et al. (1999) where most of the children were mildly disabled and suffering from spastic diplegia. Findings from the present study showed that children with quadriplegia were severely disabled. This may be a reflection of the extent of cerebral damage resulting in greater severity. According to Ogunlesi et al. (2008), children with CP who suffered from both kernicterus (jaundice) and asphyxia have been noted to present with more severe cases of CP. Therefore stringent efforts should be made to prevent such occurrences.

In the present study, a strong association was found between the gestational age of the children with CP and severity of CP, which is consistent with the findings is some other studies(Drummond and Clover, 2002; Pharoah et al., 1998; Stoknes et al., 2012). No association was established between the mothers' ages at delivery and severity of mental retardation in the children. Neither was any association found between birth order of children with CP and severity of CP. This suggests that birth order may not be a strong contributing factor for development of CP. However, mother's age at delivery shows strong association with other variables such as gestational age of children, position of child in birth order and types of CP. This observed association may have implications for the gestational age of the delivered child (Lao and Ho, 1997; Olausson et al., 1999).

Limitations

Like in some previous studies, the present study is hospital based and captured only cases of children with CP attending physiotherapy out-patient clinics of the designated hospitals where the study was conducted. There is also the possibility that some of the children diagnosed and referred for physiotherapy may not be presented by their mothers for physiotherapy. In view of this noted shortcoming, the profile described here should be interpreted with caution.

Clinical Implications of findings

It can be inferred from this study that the major causes of CP in Southwest Nigeria is attributable to perinatal events (jaundice, asphyxia and infections), all of which can be minimized by adequate ante-natal care. Concerted efforts must be made by all concerned stakeholders from the national to the grassroot level to embark on serious advocacy to raise national awareness on the problem of CP in Nigeria. To this end necessary mechanism must be put in place to inform and educate people on the causes and prevention of this lifelong source of childhood disabilities.

CONCLUSIONS

Cerebral palsy in Southwest Nigeria is mainly associated with jaundice, asphyxia and infections, while the most prevalent motor type of cerebral palsy was the spastic type with quadriplegia presentation (topography) dominating. The most observed co-morbidities among children with cerebral palsy were mental retardation and speech impairment. Most of the mothers of the children with CP were between the ages of 25 to 33 years at the time of birth of the affected child.

DECLARATION OF INTEREST

The authors report no conflict of interest.

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