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Research Paper

Impact of aggressions from early childhood on the development of Kinshasa infants of preschool age in the community

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ABSTRACT

Context and objective: Motor impairment is the main characteristic of many neurodevelopmental disabilities and contributes greatly to its morbidity. The general objective of this study is to determine the impact of aggression from early childhood on the occurrence of disability in the Congolese community of Kinshasa. ***Methods:*** Prospective study including 92 children with disabilities at the children's pool in the city of Kinshasa. The collection lasted 3 months and lasted from March 1 to May 31, 2016. The criterion for judgment was the fact of being a child aged 6 months to 9 years then having a motor or mental handicap. Variables of interest included age, gender, history of hospitalizations or conditions, anthropometric parameters, GMFCS E&R, EDACS and MACS. ***Results:*** of 92 children included in the study, 57.8% were women, their average age was 5.9 ± 2.5 years. 80% of these children had motor disabilities and 20% intellectual disabilities. The factors associated with this motor disability were perpartal asphyxia and delayed treatment. Epilepsy had the disorder most associated with disability (43.8%). ***Conclusion:*** The study in the community of Kinshasa shows that the children are older, they have severe disorders and could not be assessed by specific psychomotor assessment tests such as the Bayley scale for children with disabilities.

Keywords: *Assaults, early childhood, Handicap, preschool age, Kinshasa*

According to the definition of the World Health Organization (WHO), "is disabled any person whose physical or mental integrity is temporarily or permanently diminished, either

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congenitally, or under the effect of age or an accident , so that his autonomy and his ability to attend school or to hold a job are compromised "[1].

The term disability refers to the limitation of the possibilities for interaction of an individual with his environment, caused by a disability causing disability, permanent or not. According to a widely used estimate, about 93 million children or 1 in 14 children under the age of 14 live with a moderate or severe type of disability [1- 4].

Cerebral palsy (PC) results from a static brain injury during pregnancy or early in life and remains the most common cause of physical disability in children (1 in 500). It is a heterogeneous group of non-progressive motor disorders caused by damage to the developing brain [5-7]. Motor impairment is the main feature, but many other neurodevelopmental disabilities are associated and contribute greatly to its morbidity [8-11].

Cerebral palsy is one of the frequent conditions which handicap children, its prevalence varies according to the environment and it is characterized by an association of several morbid situations (sensory disturbances, epilepsies, etc.) [12-16].

The risk factors and etiologies of cerebral palsy are diverse [17-25]. The classification takes into account several elements, namely: the type of neurological impairment, the topography of the lesions, the severity of the motor impairment, the severity of the associated impairments and the severity of the radiologically visible brain lesions [26-32]. Historically, the diagnosis was made between 12 and 24 months but can currently be made before the corrected age of 6 months [33, 34].

The relationship between brain structure and neurodevelopmental outcomes of CP is complex, and current evidence suggests that motor and developmental outcomes are related to the spatial structure and extent of brain damage [35]. Early intervention specific to cerebral palsy should follow an early diagnosis to optimize neuroplasticity and function [36-39].

According to the EDS 2013-2014, in the DRC, overall 35% of children 2-9 years old have at least one impairment, among which 7% have a motor disability and 4% mentally retarded and another 3% seem to have difficulty hearing [40]. Despite the high frequency of disability observed in our health facilities, the factors associated with this pathology are poorly understood. The general objective of this study is to determine the impact of aggression from early childhood on the occurrence of disability in the Congolese community of Kinshasa.

Patients and Methods

A prospective study based on Kinshasa children with disabilities. The study is carried out at the pool of children with disabilities. Our approach consisted of getting in touch with the association of parents of children living with disabilities. The latter has a legal personality and is admitted to work in the DRC. Its purpose is to identify any child with a disability, to bring together the parents of these children; it is organized and subdivided the city of Kinshasa into several pools, namely: Tshangu (Mokali), Mont Ngafula, Kingabwa, Lemba (Mont Amba), Kinshasa-Lingwala and Sangamamba.

The children were recruited at the pool level and the aim was to select any child who arrived at the recruitment site on the day scheduled for selection. The parents were informed of the

team's visit by their committee. The collection lasted 3 months and ran from March 1 to May 31, 2016.

Any child aged 6 months to 9 years with a motor or mental handicap in whom the ability and goodwill of the mother or legal guardian to give written informed consent was included in this study. Children under 6 months old and children over 10 years old and those with a degraded general condition were not retained.

Study variables included age, gender, history of hospitalizations or conditions, anthropometric parameters, GMFCS E&R, EDACS and MACS.

The data were collected by interview and by a physical examination carried out by the team of investigators which consisted of a pediatrician, principal investigator, 2 medical trainees, 1 psychologist, a member of the management team, the association of parents of children living with disabilities, a nurse and a physiotherapist.

Each child underwent a neurological examination, assessments for classification of motor disability and eating skills. The study procedures are detailed below: informed consent, written upon enrollment; history to collect socio-demographic and clinical characteristics; then neurological examination and evaluation of the handicap.

Statistical analyzes

The socio-demographic, clinical and anthropometric characteristics of the participants were described using standard descriptive statistics (frequencies, means / standard deviation). The comparison of the proportions was carried out with the Pearson or exact Fischer chi-square test. The logistic regression test looked for factors associated with children's motor disability with the odds ratio calculation and 95% confidence intervals to estimate the degree of this association. The value of $p < 0.05$ was the threshold of statistical significance.

RESULTS

General characteristics of children

Table 1. General characteristics of the study population

Variables	n=92	%
Sex		
Male	39	42.2
Female	53	57.8
Age		
Mean ± SD	5.9±2.5	7 month-9 years
<3 years	12	13.0
3-4,9 years	21	22.8
5-6,9 years	17	18.5
≥7 years	42	45.7
Antecedents		
Pathology during pregnancy		
None	48	52.2
Malaria	27	29.3
IUG 3nd trimester	10	10.9
Preeclampsia/eclampsia.	3	3.3

Variables	n=92	%
Delivery		
Eutocic	73	79.3
Dystocia	10	10.9
Caesarean	9	9.8
Family disability concept	29	32.2
Neonatal history		
None	38	41.3
Prematurity	8	8.7
Neonatal infection	3	3.3
Perpartal asphyxia	23	25.0
Neonatal Jaundice	14	15.2
Postnatal history		
None	50	54.3
Bacterial meningitis	8	8.7
Cerebral malaria	11	12.0

This table indicates a predominance of female children with sex ratio F / M of 1.4 or 14F / 10H. The average age of children is 5.9 ± 2.5 years with extremes ranging from 7 months to 9 years. Children over 7 years of age represent the most frequent class with 45.7% of cases. The neonatal ATCD encountered are perpartal asphyxia (25%), neonatal jaundice (15.2%) and prematurity (8.7%). The most common postnatal ATCDs are cerebral malaria (12%) and bacterial meningitis (8.7%).

Type of handicap

The majority of children had motor disabilities, 80.0% of the cases.

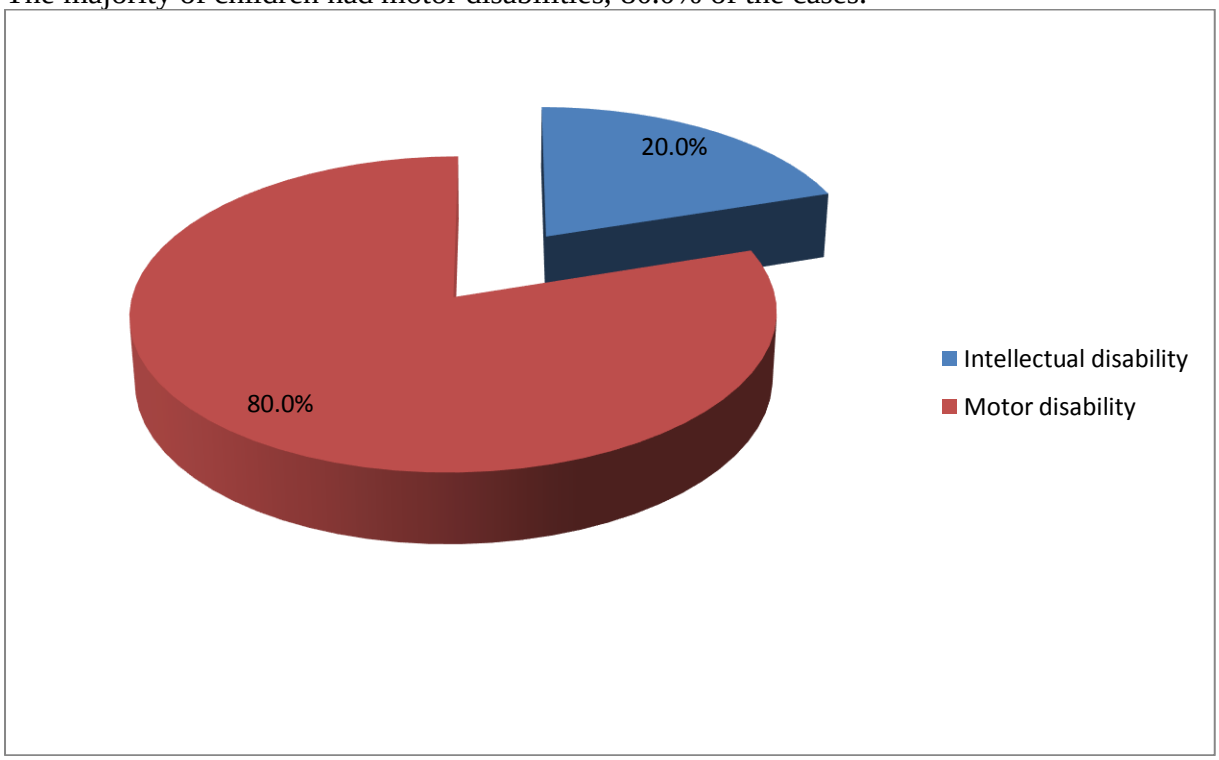

Figure 1. Distribution of patients by type of disability

Table 2. Distribution of children in the study according to risk factors and type of disability

Variables	**Intellectual disabilty n=11**	**Motor disability n=81**	**p-value**
Maternal antecedent			
Malaria	2(18.2)	25(30.9)	**0.031**
IUG 3nd trimester	1(9.1)	9(11.1)	0.658
Preeclampsia/eclampsia	1(9.1)	2(2.5)	0.321
Dystocia	0(0.0)	10(12.3)	**0.026**
Caesarean	1(9.1)	8(9.9)	0.708
Family disability concept	4(36.4)	25(31.6)	0.499
Neonatal history			
Prematurity	1(9.1)	7(8.6)	0.654
Neonatal infection	0(0.0)	3(3.7)	0.679
Perpartal asphyxia	2(18.2)	21(25.9)	**0.044**
Neonatal Jaundice	0(0.0)	14(17.3)	**0.014**
ATCD postnataux			
Bacterial meningitis	0(0.0)	8(9.9)	**0.034**
Cerebral malaria	3(27.3)	8(9.9)	**0.012**
Epilepsy	1(9.1)	8(9.9)	0.708

Risk factors for disability

It emerges from this table that maternal malaria during pregnancy, dystocia during childbirth, perpartal asphyxia, neonatal jaundice, bacterial meningitis and cerebral malaria are risk factors for motor disability; cerebral malaria leads more to mental handicap.

Table 3. Risk factors for disability in uni and multivariate analysis

	Univariate analysis		**Multivariate analysis**	
Variables	**p**	**OR (I95%C)**	p	**aOR (95% IC)**
Dysticia				
No		**1**		1
Yes	0.023	4.51(2.77-9.95)	0.673	1.16(0.59-2.29)
Perpartal asphyxia				
No		1		1
Yes	0.030	1.76(1.06-2.94)	**0.027**	1.82(1.07-3.01)
Neonatal Jaundice				
No		1		1
Yes	0.049	1.80(1.02-3.25)	0.058	1.82(0.98-3.4)
Bacterial meningitis				
No		1		1
Yes	0.003	2.24(1.59-5.57)	0.915	0.96(0.44-2.07)
Supported				
Yes		1		1
No	0.001	3.67(1.68-8.03)	**0.003**	3.33(1.50-7.39)

Perpartal asphyxia and lack of care are the most important risk factors for motor disability, with the risk being multiplied by 2 for asphyxia and by 3 for the lack of care.

Table 4. Distribution of children according to associated disorders

Associated disorders	n	%
Epilepsy	28	43.8
Behavioral issues	16	25.0
Language disorders	10	15.6
Vision problems	8	12.5
Hearing impairment	6	9.4

It appears from this table that epilepsy is the most encountered associated disorder, ie 43.8% of cases followed by behavioral disorders in 25% of cases, language disorders in 15.6% of cases. Sensory disturbances represent 21.9% of cases with a predominance for visual disturbances.

Distribution of children with cerebral palsy according to assessments. Three scales were used to assess gross motor skills, manual skills (fine motor skills) and the ability to eat. For the GFMCS, all the levels are represented with a predominance of level II then V and IV. For the MACS, all the levels are found but with a predominance for the level IV then V. This scale being used after the age of 4 years, 37.5% of the children were not evaluated because they were of a lower age . For EDACS, levels 4 and 3 were no longer found, no child was at level V.

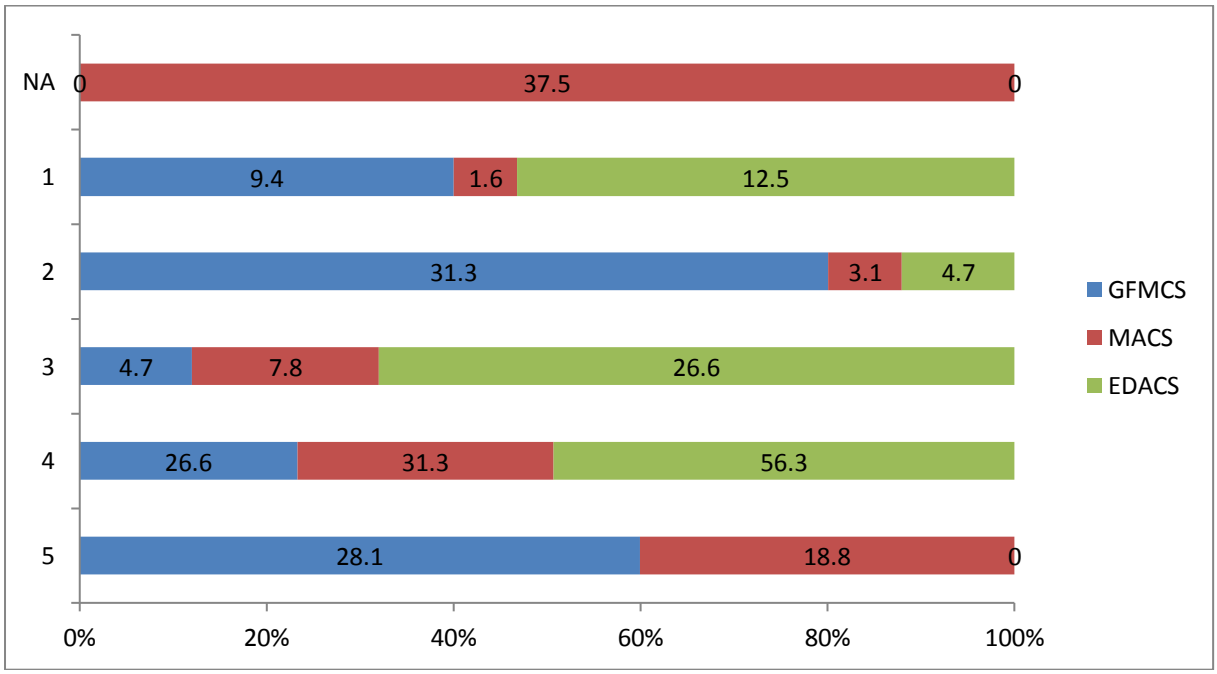

Figure 2. Distribution level of the 3 scales

Distribution of children by age and severity of scales
For the GFMCS: level 5 is distributed equally to all ages, level 2 is more common in children over 6 years old, and level 4 in children under 4 years old, For the MACS: level 1 is less found, levels 2 and 5 are more found in children over 6 years old.

For EDACS: level 4 is the most encountered and is more frequent in children over 6 years of age, level 2 is the least found.

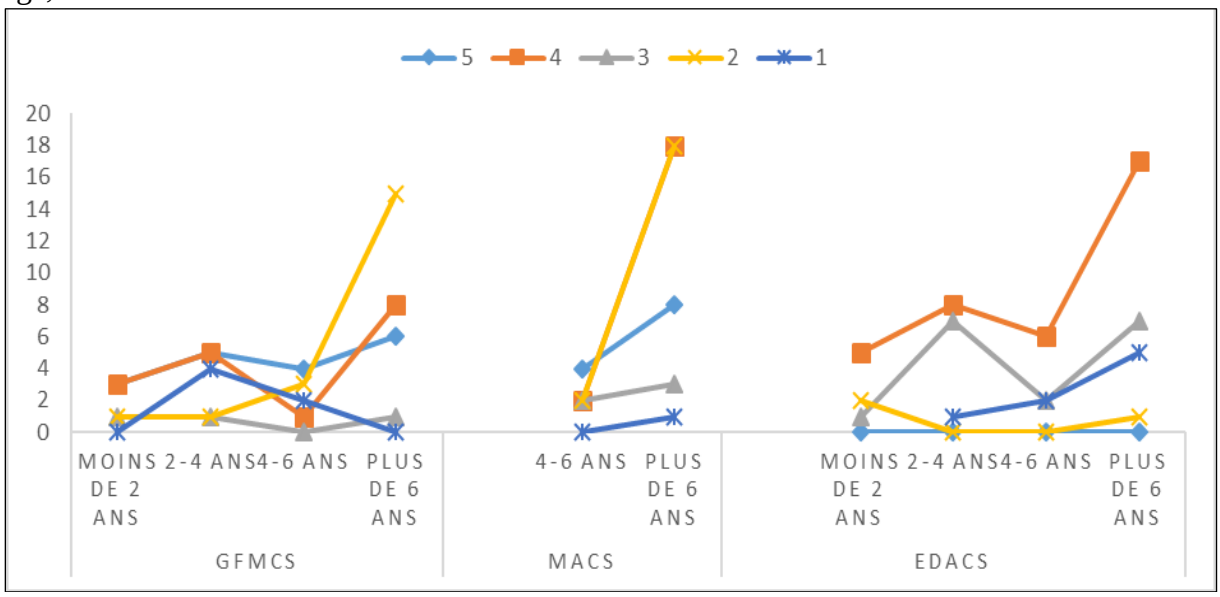

Figure 3. Distribution of children by age and severity of scales

DISCUSSION

The purpose of this study was to identify the impact of early aggression on the neurodevelopmental development of children in the community of Kinshasa. The results of our study show a predominance of the female sex with a sex ratio of 1.4; which is contrary to what is found in the literature by the majority of authors such as Kakooza in Uganda [41], Osama in Egypt [42] and Nandita Chattopadhyay in India [43].

All these results confirm the literature data which states that the frequency of cerebral palsy is relatively higher in male patients. The low frequency of cerebral palsy in female patients could be explained by genetic and hormonal factors which would be protective factors against hypoxo-ischemic cerebral lesions. In fact, an experimental study on adult animals and patients suffering from stroke has shown that sex hormones, in particular estrogens, provide protection against hypoxo-ischemic brain damage; and that there is also a neurobiological difference between the neurons of the two sexes by their responses to brain damage. The predominance of women in our study could be explained by the methodology used for recruitment in the community.

The age of the study population was 5.9 ± 2.5 years. In Uganda, a high prevalence has been noted in the age group of 2 to 7 years [44]. The children in our study are older than those in the other studies, and this difference is probably related to our methodology which consisted in evaluating PC children in the community, children for whom the parents resigned themselves and preferred to keep at home. , deprived of care.

Our results show that the most frequent risk factors are: During pregnancy: maternal malaria in 29.3% of cases and 3rd trimester GUI in 10.3% of cases. Bear et al. in a study on infections during pregnancy, showed an increased risk of developing CP in the child in the presence of chorioamniotitis or urogenital infection in the mother [45], other studies carried out also noted the increased risk of PC in women with chorioamniotitis [46-48]. In the

neonatal period, our study found perpartal asphyxia, neonatal jaundice in 25% and 15% of cases, respectively. These results are close to those of several African studies including that of Bearden et al. in Botswana [49]. Asphyxia remains one of the most common causes of cerebral palsy, however, treatment with hypothermia and the administration of magnesium sulphate have revolutionized the management and have significantly reduced mortality and the appearance impairments [50-52]. Several African studies have shown that neonatal jaundice is often considered to be commonplace and its management is poorly performed. The prematurity and neonatal infection found in small proportions can be explained by the fact of the high mortality due to prematurity and neonatal infection in the Congolese environment. Studies in Europe, on the other hand, have noted a decrease in mortality in former premature babies with a very low birth weight and even in those with a birth weight between 1500 and 2499 g, for quite different reasons [53, 54]. The explanation lies in the fact of a more adequate management consisting of taking corticosteroids during the pre and postnatal periods, improving the management of nosocomial infections and the administration of the surfactant. All of these high impact interventions have contributed to a significant reduction in mortality; as for the effect on the reduction of impairments, the data show the opposite, especially with regard to especially premature babies [55].

In the postnatal period, bacterial meningitis (8.7%) and cerebral malaria (12%) are incriminated. Current evidence that the majority of cerebral palsy is due to asphyxiation or trauma as well as inflammation and that an intervention can prevent neuropathogenesis is not entirely based on the evidence. It has also been noted that metabolic acidosis is the primary cause or that intrapartal hypoxia is a secondary cause of cerebral palsy. Recent data confirms that the lesions found in cerebral palsy often begin before work or early during pregnancy, hence the importance of considering a genetic cause for this situation [57, 56] The spastic type was found in 46.9% with a predominance for the bilateral form 83.3% of the cases in this group. Dyskinesia represents 23.4% of cases and ataxic form 12.7% of cases. Our results approximate those of Osama et al. (45), who found the same predominance, Beckung et al. [58] also found the same predominances but with fewer cases of dyskinesia and ataxia; Sellier et al, who carried out a meta analysis of European populations with cerebral palsy noted that whatever the birth weight, the spastic form remains predominant [3, 59].

The brain lesions of cerebral palsy are widely described in magnetic resonance imaging and may well explain the mechanisms behind the disorders and the evolution in their prevalence [29, 51].

Comorbidities

Our study shows that epilepsy is the most common associated disorder, 43.8% of cases followed by behavioral disorders in 25% of cases, language disorders in 15.6% of cases. Sensory disturbances represent 21.9% of cases with a predominance for visual disturbances. Epilepsy is found in similar proportions in Egypt [42] and Uganda [41], and among sensory disorders, visual acuity disorders are predominant.

A study in Australia showed that the association with co-morbidities increased with the level of motor impairment (GMFCS); and epilepsy was more common in children with quadriplegia, other impairments were more common in other non-spastic forms, and deafness was more common in the dyskinetic type [60].

Persson et al note that the risk of CP and epilepsy is inversely associated with 5th and 10th minute APGAR and that the adjusted risk ratio for cerebral palsy and epilepsy increased steadily with a decrease in l 'APGAR [61].

Visual disturbances are common in PC children, and Salavati et al, as we found a high proportion of visual disturbances and that these were correlated with more severe motor impairment [62].

Disorder Rating scales

It emerges from our study that the classic assessment scales for psychomotor development could not be used, the scales available for children with motor disorders or disability are not available in the DRC [63-65].

We used conventional scales for children with cerebral palsy. The study assessed gross and fine motor skills as well as oral and facial disorders.

GMFCS

The use of GMFCS provides clinicians with a valid and reproducible method of describing overall motor function in children with CP and can be used widely with prior consensus. For the GMFCS, all the levels were represented with a predominance of level II then V and IV: level 5 is distributed equitably at all ages, level 2 is more common in children over 6 years old, and the level 4 in children under 4, Kakooza et al found a predominance of levels 1 and 2 and younger children (under 4 years of age) were more severely affected [66] while Howard et al. find a predominance of level 1 and 5 [67].

MACS

All the levels were found but with a predominance for level IV then V. This scale being used after the age of 4 years, 37.5% of the children were not evaluated because they were of a lower age. A study by Gorp et al. notes a predominance of levels I and II, with a correlation with the severity of gross motor skills [68].

EDACS

It has been noted in the literature that there are a variety of eating disorders and swallowing problems in children with CP and that these vary according to the degree of impairment and the age. Our study shows that for the EDACS scale, levels 4 and 3 were more common, and that no child was at level V. Level 4 is the most encountered and is more frequent in children over 6 years. Children with severe bilateral generalized motor impairment are likely to have larger swallowing deficits than those with diplegia, but oral and facial disorders can be found even in children with mild CP [68, 69]. CP children with orofacial motor disorders frequently have respiratory problems, nutritional problems that can affect their well-being [70]. Malnutrition was common in Ugandan children with cerebral palsy and was more common in children 5 years of age or older or in those with neonatal complications [71]. A study carried out in Brazil rather showed overweight in children with dystonic CP and mild motor impairment [72]. Respiratory disorders are strongly correlated with the severity of motor disorders [73].

CONCLUSION

The study in the Kinshasa community shows that the children are older, they have severe disorders and could not be evaluated by specific psychomotor assessment tests such as the

Bayley scale for children with disabilities. Assessment scales for children with cerebral palsy have been used to determine the level of motor impairment and eating ability. Co-morbidities are also common in the study population. The care is not effective, the parents are ignorant of the origins of their children's disability.

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Conflict of Interest
The author declared no conflict of interests.

Contributions of the Authors
MMA and NNA designed collected and analyzed the statistical data of the study. PDC, NNC; AVR and TMBBP B supervised the study. All the authors contributed to the drafting of the document and approved the final document.

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