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Original Article

Assessment of Children with Cerebral Palsy Using Common Brief Core Set of International Classification of Functioning, Disability and Health for Children and Youth (ICF-CY)

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ABSTRACT

Objective: To assess children with cerebral palsy using the Common Brief Core Set of International Classification of Functioning, Disability and Health for Children and Youth (ICF-CY).

Study Design: Cross-sectional study

Place and Duration of Study: Children Hospital & Institute of Child Health, Lahore Pakistan, from Nov 2020 to Jan 2021.

Methodology: Fifty-nine children with cerebral palsy (CP) aged 0-18 years were included. Common Brief Core Set of International Classification of Functioning, Disability, and Health in Children and Youth (ICF-CY) was administered to children with cerebral palsy to assess their functional status. Strengths and weaknesses in body structure, body function, activity and participation and environmental factors were evaluated using the Common Brief Core Set of ICF-CY.

Results: The majority of study participants were 38(64.4%), were spastic quadriplegic. Periventricular leukomalacia was noted in 36(67.9%) cases on MRI brain. Moderate to severe impairment was noted in body functions like intellectual function 46(78%). In addition, 26(44.1%) children with cerebral palsy had mild to moderate impairment in walking, while 4(6.8 %) could walk without any impairment. Social attitudes, construct, and design of buildings were the major barriers affecting the functionality of children with cerebral palsy.

Conclusion: It was found that the Common Brief Core Set of ICF-CY in children with different types of cerebral palsy is a useful tool for assessing their functional level.

Keywords: Cerebral Palsy, Common Brief Core Set, Disability, Health in Children and Youth (ICF-CY), International Classification of Functioning.

How to Cite This Article: *Hina H, Maqbool S, Azhar H, Fatima S, Farid A, Ullah E. Assessment of Children with Cerebral Palsy using Common Brief Core Set of International Classification of Functioning, Disability and Health for Children and Youth (ICF-CY) Pak Armed Forces Med J 2023; 73(1): 159-163. DOI: https://doi.org/10.51253/pafmj.v73i1.7023*

INTRODUCTION

Cerebral Palsy (CP) is one of the most frequent causes of motor disability in children. The overall prevalence is 2.08 per 1000.[1] It is a disorder of movement and posture caused by static injury to the developing brain for the first two to three years of life.[2] There are several types of cerebral palsy. The most prevalent form is spastic or pyramidal CP which accounts for up to 75% of all cases. Other types include extrapyramidal, hypotonic and mixed CP.[3]

To standardize the interpretation of the functionality of individuals in terms of their abilities and disabilities to health, the World Health Organization (WHO) developed the International Classification of Functioning, Disability and Health (ICF).[4,5] Worldwide it provides a framework to code a wide range of information about health by using a common language that allows communication about various health-related domains.[6] The Child and Youth version of ICF (ICF-CY) covered the age range of 0 to 18 years. There are five ICF-CY Core Sets for cerebral palsy, Common Brief and Comprehensive Core Sets (for 0-18 years), and three age-specific Core Sets (0-<6 years, 6-<14, 14-18) describing relevant functional developmental information.[7-9] A study used the Comprehensive and Common Brief Core Sets of ICF-CY for assessment of children with CP at a national level in Russia and found it very useful.[10]

This study aimed to analyse children with CP's functionality in different areas by administering Common Brief Core Sets of ICF-CY. It can help professionals to assess children with cerebral palsy beyond their impairments and strengthen their abilities by providing them with rehabilitation in a more structured way.

METHODOLOGY

The cross-sectional study was conducted at the Department of Developmental- Behavioral Pediatrics, Children Hospital and Institute of Child Health, Lahore, from November 2020 to January 2021 after approval from Institutional Review Board (Ref No. 2021-223-CHICH). Children diagnosed with cerebral palsy were enrolled using a consecutive sampling

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Received: 05 Jun 2021; revision received: 02 Oct 2021; accepted: 07 Oct 2021

technique. The sample size of 59 children with cerebral palsy was calculated through the WHO calculator using the prevalence of 2.08 per 1000 live births of cerebral palsy.[1]

Inclusions Criteria: The study included children of aged 1-18 years, having cerebral palsy.

Exclusion Criteria: Children with syndromes and degenerative brain diseases were excluded.

Common Brief Core Set of ICF-CY was administered to children having cerebral palsy to assess their functional status. Common Brief Core Set has 25 categories describing the most relevant areas of functioning with minimal data set. It includes body structures (1), body functions (8), activities and participation (8) and environmental factors (8).[11] All of them have specific codes. For evaluation, we selected assessment tools acknowledged in the literature that could qualify certain items of the Common Brief Core Set of ICF-CY.[12] Those items that specific scales could not assess were assessed by asking a series of open-ended questions from parents and guardians. For example, to assess the body structure that only includes the structure of the brain, Magnetic resonance imaging (MRI) was performed.

Finally, each item qualified from 0 to 4 for body functions (b), body structures (s), and activities and participation (d). This is a negative scale where 0 depicts no impairment, and four shows complete impairment. Finally, the environmental factors (e) are qualified from +0 to +4 and 0 to 4, depicting the range to which an environmental factor acts as an obstacle or a facilitator. In this scale, 0 represents no barrier, four complete barriers, +0 no facilitator and +4 a complete facilitator.[13]

Children who have already been diagnosed as CP by the Developmental Paediatrician were assessed using the Common Brief Core Set of ICF-CY. Study participants were enrolled after taking written informed consent from each child's parent/guardian. Demographic form and all measures were administered individually on the participants while maintaining confidentiality.

Statistical Package for Social Sciences (SPSS) version 25.0 was used for the data analysis. Mean and standard deviations were calculated for numerical variables. In addition, frequency and percentages were calculated for age, gender, type of cerebral palsy and different variables in body structures, body functions, activities and participation and environmental factors.

RESULTS

The total sample comprised 59 children with cerebral palsy with an age range between 0-18 years with a mean age (in years) of 5.49±2.71. A history of asphyxia was present in 32 (54.2%). The mean value of occipitofrontal circumference (in cm) was 45.9±2.89 SD (minimum=38cm, maximum=51cm). Demographic characteristics were shown in Table-I.

Table-I: Demographic Characteristics of Children with Cerebral Palsy (n=59)

Characteristics		n(%)	Mean±SD
Age	-	-	5.49±2.71
Gender	Male Female	40(67.8) 19(32.2)	-
Mode of delivery	SVD LSCS	41(69.5) 18(30.5)	-
Consanguineous marriage of parents	Yes No	39(66.1) 20(33.9%)	-
Family system	Joint Nuclear	37(62.7%) 22(37.2.5)	-
Mother education	Literate Illiterate	17(28.8%) 42(71.2)	-
Father education	Literate Illiterate	13(22%) 46(78%)	-
Gestation	Full term preterm	55(93.2%) 4(6.8%)	-
OFC	-	-	45.9±2.89
Asphyxia	Yes No	32(54.2%) 27(45.8%)	
Neonatal jaundice	Yes No	9(15.3) 50(84.7%)	-
No. of siblings	<3 3-5 >5	34(56.9%) 21(35.6%) 4(6.8%)	-
Disability in other sibling	Yes No	3(5.1%) 56(94.9%)	-
Type of cerebral palsy	Spastic Dyskinetic	55(94.2%) 4(6.8%)	-

The body functions of the participants were assessed by applying the eight codes of the Common Brief Core Set of ICF-CY. Moderate to severe disability was revealed in the majority of body function categories like intellectual functions (b117), mental functions of language (b167), mobility of joints (b710), muscle tone (b735) and control of voluntary movement function (b760).

Activities and participation areas were highly affected, mainly in mobility-related categories. 4 (6.8%) could walk without impairment, while 26 (44.1%) had mild to moderate impairment and 29(49%) had severe to complete impairment in walking (d450). Severe to complete impairment in moving around different locations (d460) was found in 31(52.5%) cases. Moderate to

severe impairment was noted in toileting (d530) and eating (d550). In maintaining family relationships (d760), mild to moderate impairment was noted in 41 (69.5%) cases. 2 (3.4%) had no impairment in basic interpersonal interactions (d710), while 43 (72.9%) had mild to moderate impairment and 14 (23.7%) had severe to complete impairment in their basic interpersonal interactions (d710), Table-II.

Most of the study participants reported moderate to complete facilitation by immediate family members (e310), while friends reported mild to moderate facilitation (e320). Participants reported no facilitation or mild facilitation for health services, systems and policies (e580) and products and technology required for daily living (e115), mobility (e120), and communication. Social attitude (e460) served as a mild to moderate barrier for the majority of participants 39 (66.1%).

DISCUSSION

Our study was aimed to use the International Classification of Functioning, Disability and Health for Children and Youth (ICF-CY) to describe the functionality of children with cerebral palsy by considering its utility for organizing rehabilitative plans for these children.

Routinely in order to assess the functionality of children, four classification systems are used; the Gross Motor Function Classification System (GMFCS)12, the Manual Ability Classification System (MACS)13, the Eating and Drinking Ability Classification System

Table-II: ICF-CY Qualifiers Frequency Distribution among children with Cerebral Palsy (n=59)

Brief ICF Core Set for CP	ICF Qualifiers Frequency (n) Distribution Among Children with Cerebral Palsy : n(%)								
Body function			0	1	2		3	4	
b117 (Intellectual function)			0.0	3(5.1)	21(35.6)		25(42.4)	10(16.9)	
b134 (Sleep functions)			45(76.3)	3(5.1)	9(15.3)		2(3.4)	0.0	
b167 (Mental function of language)			2(3.4)	8(13.6)	13(22.0)		24(40.7)	12(20.3)	
b210 (Seeing function)			35(59.3)	6(10.2)	14(23.7)		3(5.1)	1(1.7)	
b280 (Sensation of pain)			33(55.9)	11(8.6)	11(18.6)		4(6.8)	0.0	
b710 (Function of joint mobility)			1(1.7)	11(18.6)	21(35.6)		19(32.2)	7(11.9)	
b735 (Function of muscle tone)			1(1.7)	15(25.4)	15(25.4)		22(37.3)	6(10.2)	
b760 (Function related to control of voluntary movement)			0.0	10(16.9)	15(25.4)		25(42.2)	9(15.3)	
Activity and participation			0	1	2		3	4	
d415 (Maintaining the body position)			3(5.1)	13(22.0)	13(22.0)		18(30.5)	12(20.3)	
d440 (Fine hand use)			0.0	12(20.3)	20(33.9)		18(30.5)	9(15.3)	
d450 (Walking)			4(6.8)	9(15.3)	17(28.8)		13(22.0)	16(27.1)	
d460 (Moving to different locations)			5(8.5)	5(13.6)	15(25.4)		12(20.3)	19(32.2)	
d530 (Toileting)			10(16.9)	10(16.9)	12(20.3)		16(27.1)	11(18.6)	
d550 (Eating)			9(15.3)	12(20.3)	20(33.9)		14(23.7)	4(6.80	
d710 (Basic interpersonal interactions)			2(3.4)	19(32.2)	24(40.7)		10(16.9)	4(6.8)	
d760 (Family relationship)			18(30.5)	27(45.8)	14(23.7)		0.0	0.0	
Environmental factors	+4	+3	+2	+ 1	0	1	2	3	4
e115 (Product and technology for personal use in daily living)	0.0	0.0	2(3.4)	25 (42.4)	32(54.2)	0.0	0.0	0.0	-
e120 (Product and technology for personal indoor & outdoor mobility and transportation)	0.0	0.0	0.0	20 (33.9)	39(66.1)	0.0	0.0	0.0	-
e125 (Product and technology for communication)	0.0	0.0	12(20.3)	28 (47.5)	19(32.2)	0.0	0.0	0.0	-
e150 (Design, construction and building products & technology of building for public use)	0.0	0.0	0.0	0.0	9(15.3)	32(54.2)	18(30.5)	0.0	-
e310 (Immediate family)	4(6.8)	19(32.2)	23(39.0)	8 (13.6)	5(8.5)	0.0	0.0	0.0	-
e320 (Friends)	4(6.8)	5(8.5)	18(30.5)	29(49.2)	3(5.1)	0.0	0.0	0.0	-
e460 (Social attitude)	0.0	4(6.8)	2(3.4)	4(6.8)	9(15.3)	25(42.4)	14(23.7)	1(1.7)	-
e580 (Health services, systems and policies)	0.0	0.0	13(22.0)	24(40.7)	22(37.3)	0.0	0.0	0.0	-

(EDACS)14 and the Communication Function Classification System (CFCS)15, These classification systems are all reliable, systematic, and compatible to one another. However, they are not addressing the environmental factors and do not give clues for underlying aetiology. Therefore, the ICF-CY has the benefit of describing multiple factors affecting the functionality of children with cerebral palsy. In addition, providing the detail of body structures can provide the clue regarding underlying aetiology and co-morbidities.

Our study shows that the Common Brief Core Set of ICF-CY has been suggested as a useful guiding tool by utilizing its short content (25 ICF categories) and the target age group (from 0 to 18 years of age) in children with cerebral palsy to acquire medical and social information systematically. Similarly, another study by Ferreira et al. described the abilities and limitations in the functionality of children with microcephaly who are affected with congenital ZIKA virus by using a Common Brief Core Set of ICF-CY.[16] In our study out of 59 patients with cerebral palsy, majority of them were with spastic cerebral palsy. Half of the children (49.6%) suffered from spastic quadriplegia. In body functions, we observed moderate to severe impairment in certain areas of functioning like intellectual functions (b117), mental function of language (b167), muscle tone functions (b735), mobility of joints (b710) and control of voluntary movement function (b760). Similarly, in most patients, moderate to severe impairment was noted in activity and Participation. Mukhtiar *et al* documented severe to complete impairment in the domains of body functions, activity and participation.[17]

A study by Walker *et al*. stated that for individuals with cerebral palsy, Caregiver's involvement and support facilitate them in their activity and participation.[18] While various attitudes, overprotection, indulgence, acceptance and negligence of parents while providing care to children with cerebral palsy were reported in the literature.[19]

Social attitude (e460) proved mild to moderate, while moderate to severe barriers were observed in the design, construct and building products (e150) for our study participants. In an African setting like Nigeria, this is worrisome, as the society that is supposed to provide support is often negative towards the children with CP., attributing the fault to the mother or spiritual problems. Some family members perceive the child as a burden.[20] Making changes in building and construct (adapted toilets, larger size rooms, parking spaces, transport facilities, and ramps in public places) can facilitate children with cerebral palsy in their daily living, which is one of the major barriers in our study participants.

Our study showed that ICF-CY provides a comprehensive functional approach to the patient rather than the usual diagnostic or impairment-based approach. ICF-CY is not routinely used in clinical practice. Our study showed that its use in clinical practice could guide healthcare professionals to plan rehabilitative services organised to achieve the maximum potential of children with cerebral palsy.

LIMITATIONS OF STUDY

Despite doing a comprehensive functional assessment of children with cerebral palsy, our study has some limitations. First, we conducted this study on children with cerebral palsy in only one clinical setting, the developmental behavioural paediatrics department of CHICH Lahore. All healthcare professionals working with children with cerebral palsy were not aware of this coding system of comprehensive functional assessment of ICF-CY. Therefore, we cannot generalize the utility of ICF-CY to other clinical settings. There is a need to conduct more studies regarding the knowledge and utility of ICF-CY in other clinical settings to get the maximum potential of children with cerebral palsy. Secondly, the number of details required in ICF-CY was extensive and burdensome, so a multidisciplinary team can do further studies with knowledge of ICF-CY to minimize the burden of details required.

CONCLUSION

Common Brief Core Set of ICF-CY for children with cerebral palsy is a useful and standardized tool in illustrating their functional profile. In our study, moderate to severe impairment was noted in most areas of body functioning, activity and participation. The major barriers affecting the functionality of children with CP were environmental factors. Thus, it helps to determine how the environment in which a child is living is affecting the functional capabilities of children with cerebral palsy. The functional assessments of CP can be standardized by implementing these core sets worldwide.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

AH & SM: Data acquisition, data analysis, data interpre-tation, approval of the final version to be published.

HA & SF: Conception, study design, drafting the manuscript, approval of the final version to be published.

AF & EU: Critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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