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Research Paper

Co-Relation between Body Mass Index and Gross Motor Function Classification in Children with Cerebral Palsy

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***ABSTRACT**: The study examines the relationship between body mass index and motor functions in children with cerebral palsy. Gross Motor Function Classification System Expanded and Revised (GMFCS E&R) and Body mass index was used to assess the cerebral Palsy children.Results signifies that BMI and gross motor functions are inversely proportional to eachother and there was negative correlation between above two variables.*

***KEYWORDS**: Body Mass Index, Gross Motor Function Classification System (Expanded and Revised), Cerebral Palsy*

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I. INTRODUCTION

Cerebral palsy (CP) is the most common cause of disability in childhood. Children with cerebral palsy (CP) are known to have limitations in activity and functional abilities[1].

CP has been defined as: A group of disorders affecting the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor disorders of CP are often accompanied by disturbances of sensation, cognition, communication, perception, and/or behaviour, and/or by a seizure disorder[2].

The growth pattern in children with cerebral palsy varies with motor and feeding abilities. The classification system for motor disability in children with cerebral palsy used most commonly in clinical and research settings is the 5 level gross motor function classification system expanded and revised GMFCS-ER[3].

The Gross Motor Function Classification System (GMFCS) was developed to provide a simple method for classifying children with cerebral palsy (CP) aged 12 years or less on the basis of functional abilities and limitations4. The GMFCS includes five levels and four age bands. Distinctions between levels represent differences in gross motor function that are thought to be meaningful in the daily lives of children with CP5. The age bands account for age-related differences in gross motor function. The GMFCS is intended to enhance communication between families and professionals when describing a child's gross motor function, setting goals, and making management decisions4. The GMFCS was developed for use in clinical practice and as a grouping variable for databases, registries, program evaluation, and clinical research[5].

Several factors influenced the decision to develop a 12 to 18 year age band and revise the 6 to 12 year age band of the original GMFCS3. When development of the GMFCS began in 1994, knowledge of gross motor development of youth with CP was limited. CanChild's recently completed prospective longitudinal Adolescent Study of Quality of life, Mobility, and Exercise (ASQME) provided an opportunity to create an adolescent age band by using observational data and expanded on the conceptual framework of the expanded and revised version of the GMFCS (GMFCS-E&R) to coincide with the International Classification of Functioning, Disability and Health. The 12- to 18-year age band was developed on the basis of the concept that performance of gross motor function is influenced by the physical, social, and attitudinal environment and personal factors such as preferences, interests, and motivation[28]. The GMFCS-E&R enabled us to incorporate new knowledge, clarify questions we have received throughout the years, and provide a better definition of terms[3].

The GMFCS-ER provides a method for communicating about gross motor function, based on the use of mobility aids and performance in sitting, standing and walking activities. It is intended to classify a patient's level of gross motor function based on his or her typical performance, rather than their best capability[3].

When compared with normal children, children with cerebral palsy (CP) have malnutrition, poor oral motor function, and insufficient function of the upper extremities, insufficient nutrition and growth retardation arising from cognitive disorders[6]. However, recent studies have shown that children with CP with a lower degree of involvement (hemiparetic and diparetic) and with better function have a higher rate of obesity compared to children with CP with a higher degree of involvement[4].

Body composition is a significant factor which affects the quality of life of both the child and the family and affects the child's functional ability (for example, activity and social participation) and general well-being in different dimensions in children with CP[6].

This gives rise to conflict between functional abilities & body composition. So the aim of this study is to analyze body mass index of children with cerebral palsy with respect to their GMFCS (E&R) level and to find co-relation between them.

II. MATERIALS AND METHODS

After taking the institutional Ethical clearance, 30 subjects were selected from Amarjyoti research and rehabilitation centre (permission taken) on the basis of convenient sampling .Research design used for the study was co-relational design. Variables used were height, weight, age, ambulatory and non-ambulatory CP children. Selected subjects were of age between 5-15 years with or without assistive devices and were well diagnosed, documented as cerebral palsy child (all types).Both genders were included in the study. Exclusion included CP children who require feeding via gastrostomy tube and other developmental disorders.

Outcome measures used in the study were Gross motor function classification system-expanded and revised (GMFCS-ER): The classification system for motor disability in children with cerebral palsy used most commonly in clinical and research settings is the 5 level gross motor function classification system expanded and revised GMFCS-ER. The GMFCS-ER provides a method for communicating about gross motor function, based on the use of mobility aids and performance in sitting, standing and walking activities. It is intended to classify a patient's level of gross motor function based on his or her typical performance, rather than their best capability.

Body mass index measure (BMI): Is a simple index of weight for height that is commonly used to classify underweight, overweight, and obesity. It is defined as the weight in kilograms divided by the square of the height in meters. BMI is most commonly used clinical assessment of the body composition and is recommended index to identify overweight and obesity in children, adolescents, and adults.

III. RESULTS AND DISCUSSION

Gross motor function classification system (expanded and revised) and BMI were used to assess the level of ambulation and body mass status respectively on 30 subjects of age group 5-15years. The mean and standard deviation of BMI and GMFCS are listed in table 1.

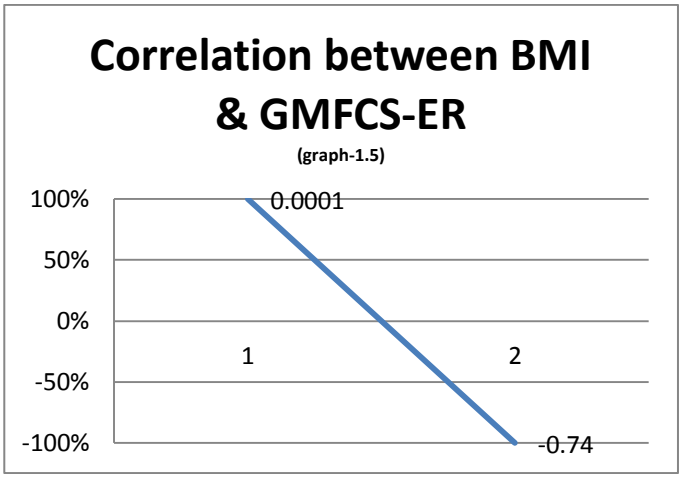
N		Mean	±S.D
30	BMI	16.80	4.75
	GMFCS	2.80	.961

Table 1: Descriptive information of BMI and GMFCS

Pearson correlation coefficient (r) calculated for GMFCS E&R and BMI was r= (-0.74) and p value is .000 which is less than0.01. So correlation is significant at the 0.01 level (2 tailed). This explains that BMI and gross motor functions are inversely proportional to each other. That is if GMFCS E&R level increases then the BMI decreases and have the negative correlation between the two variables as reflected in table 2 and graph 1.

N	Variable		Pearson correlation (r)	Sig (2 tailed)
30	BMI	GMFCS	-.740**	.000
	GMFCS	BMI		

Table 2:Co- Relationand significance between BMI and GMFCS scores



Graph 1: Graphical representation of co-relation between BMI and GMFCS

This shows that ambulatory children (level 1-2) would be with higher BMI levels (overweight or at the risk of being overweight) where as non-ambulatory children (level 4-5) would be with low BMI levels (underweight or at risk of being underweight).

Although children with CP are often viewed as undernourished and growth impaired, a number of studies propose mechanisms that may place children with CP at a high risk of becoming overweight. First, children with CP are often born either small for gestational age or prematurely; both of these are shown to be independently related to obesity[7].

In other study of body composition on children with spastic quadriplegic cerebral palsy (SQCP) have shown a decrease in body cell mass and expansion of the extracellular compartment. Also, the rate of accretion of fat-free mass is lower in children with SQCP[7].

Fourth, some children with SQCP who require feeding via gastrostomy tube become overweight even though they are consuming energy intakes per unit of body weight that are less than their predicted resting metabolic rate by the World Health Organization equations.

Fifth, individuals with CP encounter a unique set of medical and social issues specific to their disability that often restricts participation in physical activities[7].

This gives rise to conflict between undernourishment & overweight. So the aim of this study was to analyze body mass index of children with cerebral palsy with respect to their GMFCS (E&R) level and to find co relation between them.

This finding was supported by Hurvitz EA et al who investigated the prevalence of overweight in clinical based population of children with cerebral palsy related to gross motor function classification using a retrospective chart review calculated BMI and recorded gross motor function classification scale on the basis of clinical descriptions in clinical notes for 137 children (2-18yrs) with cerebral palsy and concluded that ambulatory children are overweight or at high risk of overweight[7].

Risk levels for overweight in children and adolescents with CP are likely related, at least in part, to sedentary behaviour. Van den berg-Emons et al have evaluated daily activity in children with CP, using the ratio of total energy expenditure to resting energy expenditure measured via the doubly labelled water technique, in ten children with spastic diplegia compared with ten children without disabilities. Children with CP were considerably less active than their peers, and, in the opinion of the authors, the type of physical activity that the children engaged in was not at a high-enough intensity level to improve their physical fitness.

The child with a disability faces unique problems when considering issues related to physical activity. In general, individuals with disabilities who wish to increase their activity levels face problems of accessibility or improper training. It is therefore not surprising that many types of disabilities lead to a higher prevalence of overweight and obesity in individuals who have them than in their able-bodied peers[8].

IV. CONCLUSION

30 children with cerebral palsy of age group (5-15) were taken in the study, gross motor function classification system (expanded and revised) and body mass index measures were taken of each child. Negative co relation was found between the body mass index measures and gross motor function classification system which indicates that non ambulatory children have a high rate of being under weight or at the risk of being under weight, whereas ambulatory children tend to be overweight or at a risk of being overweight.

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