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ANTHROPOMETRIC MEASURES IN PATIENTS WITH CEREBRAL PALSY IN CHILDREN WELFARE TEACHING HOSPITAL IN BAGHDAD

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Abstract

Background: Among children, cerebral palsy accounts for the vast majority of physical impairments. Children who have cerebral palsy (CP) can experience secondary health issues, such as growth and nutrition difficulties.

Patients & methods: One hundred children with cerebral palsy, ranging in age from six months to forty-eight months, who were either seen in the neurology clinic or admitted to the neurology ward at Children Welfare Teaching Hospital between January 1, 2010, and September 30, 2011, were the subjects of this cross-sectional study. The anthropometric measures used for nutritional assessment included height, weight, skinfold thickness, mid-arm circumference, and body mass index.

Results: There were 56 men and 44 females among the 100 cases of cerebral palsy. Of all the cases, 78 patients were of the spastic type; 54 of those were of the SQCP type; and the remaining cases were of less common forms. There were 13% of cases under -2 SD and 54% under -3 SD based on weight for age. By far, the subtype most impacted is SQCP. Of all the instances, 18% had a length or height that was less than -2 standard deviations, and 51% were shorter than -3 standard deviations. The SQCP subtype suffered the most. In terms of weight for length/height, 17% of the instances fell below -2 standard deviations, while 26% fell below -3 standard

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deviations. The SQCP subtype suffered the most. Eighteen percent of the cases had a body mass index (BMI) below -2 SD, and thirty-four percent fell below -3 SD. The SQCP subtype suffered the most. When adjusted for age, 23% of cases had a mid-arm circumference that was less than -2 standard deviations, and 46% had a mid-arm circumference that was less than -3 standard deviations. The SQCP subtype suffered the most. With age, the triceps skin folds. Only 15% of instances fell below -2 SD, while 25% fell below -3 SD. The SQCP subtype suffered the most.

Conclusion: Cerebral palsy is associated with an increased risk of malnutrition. People suffering from CP showed changes in all of the anthropometric measures. The most impacted subtype was SQCP, while the most impacted type was spastic. Clinical trials have shown that anthropometry is an accurate tool for evaluating dietary intake.

Aim: Using anthropometry, we wanted to find out how well children with cerebral palsy (CP) were eating. Determine the type of CP most affected by malnutrition and demonstrate this to them.

Keyword: Cerebral palsy (CP), brain lesion, Anthropometric measurements classification.

Introduction

DEFINITION: A disorder characterized by abnormal control of movement and posture, cerebral palsy (CP) typically manifests in early childhood as a result of damage or dysfunction to the central nervous system (CNS). The abnormalities in the brain can happen before, during, or after birth. This brain lesion or abnormality does not worsen over time. The brain injury is irreversible and incurable; however, it is possible to lessen its impact.

EPIDEMIOLOGY

The most common of the several diseases that significantly limit a child's ability to move about is cerebral palsy. The prevalence is 1-2 per 1000 live births in developed country birth cohorts.The likelihood of the condition increases significantly as the gestational age at birth decreases. For example, compared to infants born at full term, the risk is 100 times higher in severely premature infants (defined as a gestational age < 28 weeks), with a prevalence of approximately 100 per 1000 surviving infants. Approximately 8,000 infants are born in the US each year with cerebral palsy. five, six

CLASSIFICATION

We use the geographical distribution of CP and various types of motor disorders for classification purposes. (7)

Approximately seventy to eighty percent of CP is spastic.A. Twenty percent of spastic CP patients are hemiplegic.b. Diplegic: Spastic CP affects 50% of patients.C. In patients with spastic CP, 30% experience quadriplegia.2. 10%–15% are dyskinetic.3. Ataxic CP constitutes about 5% of CP.• Mixed CP (8, 3).

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DIAGNOSIS OF CP

1. A systematic approach You must carefully observe the child in a variety of positions, such as supine, prone, sitting, standing, running, and more. The child's mother, obstetrician, and perinatal history must also be carefully considered, along with the child's developmental milestones.The diagnosis of cerebral palsy typically occurs within the first two years of a child's life.

2. Extra evaluations.Investigations in a controlled environment: There aren't any lab tests that can be used to diagnose cerebral palsy yet, but they can be ordered to rule out other possible causes of symptoms, like metabolic or genetic disorders, when a physical exam suggests they may be present.(13) Methods used in neuroimaging include:

A. Cranial ultrasonography: This type of imaging test looks for signs of white matter ischemia and intraventricular hemorrhage in the corpus callosum, basal ganglia, and ventricles. the third

B. A computed tomography (CT) scan: This imaging method produces pictures that reveal the brain's anatomy and the locations of harm.14. Magnetic resonance imaging (MRI): In most cases with CP, an MRI of the brain can detect a lesion. (15) To identify the site and size of structural lesions or any congenital defects that may be present. (16) Diffusion-tensor MR imaging (DTI) and fiber tractography (FT) are cutting edge ways to see the path and shape of white matter fibers in living things.The neurological system generates electric impulses, known as evoked potentials (17) F, in response to sensory events. We can more easily identify problems with hearing and vision by taking their measurements.

MANAGEMENT

While there is currently no cure for cerebral palsy, treatment can significantly enhance a child's functional abilities. After a variety of specialists in medicine have confirmed a diagnosis of cerebral palsy, a multidisciplinary team of therapists, including occupational therapists, speech pathologists, social workers, educators, developmental psychologists, and physical therapists, plays a crucial role in the treatment of these children. In order to lessen the impact of aberrant muscle tone, parents should learn how to assist their kid with everyday tasks, including eating, carrying, dressing, bathing, and playing. 4

Targeted Interventions

Physical therapy is the primary form of treatment for most children with CP. Physiotherapy can help a child keep working as they are now while also decreasing the risk of serious problems such as dislocations, joint contractures, and abnormalities. (19) Occupational therapy so that strategies for coping with daily tasks, including getting dressed, going to school, and participating in other activities, can be developed. Speech therapy helps improve the control and communication of the pharyngeal and maxillofacial muscles. For many children, speech therapy begins well before the start of the school year and continues all through the academic career. (20) Psychological and emotional support, such as counseling and behavioral treatment, is provided to assist children in adjusting emotionally and mentally to living with a disability. (4) Instruments for expression include computers, voice synthesizers, and symbols. (4) Medication that reduces pain, calms violent muscle spasms, and stabilizes seizures. (4) Surgery to alleviate muscular tension or fix structural defects. (4) With the use of orthoses, standing frames, and supported sitting, one can improve their function while still maintaining excellent posture. (19)

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Patients and methods

The research took place at Baghdad's Children Welfare Teaching Hospital from January 1, 2010, to September 30, 2011, and was cross-sectional in nature.The study enrolled one hundred children diagnosed with cerebral palsy (CP) by trained pediatric specialists at the Children's Welfare Teaching Hospital's neurology ward and pediatrics neurological outpatient clinic. The children's ages ranged from six months to forty-eight months.A thorough physical and developmental evaluation, as well as anthropometric measurements, was conducted after in-depth interviews with parents or other caretakers were conducted using a data-collecting form specifically designed for this research.The data collection sheet included clinical, anthropometric, and socio-demographic information.A child with cerebral palsy had their anthropometric measurements taken in the following ways: weight, height, midarm circumference, and triceps skinfold thickness.❖ We used appropriate standard scales to assess weight. We measured the weight of young toddlers using an infant scale (Seca®, Germany). For older children, a different scale (the ZT-160 scale) was utilized to gauge their standing weight. It can be challenging to weigh larger children with disabilities using a regular scale if they are too big for an infant scale and can't stand up on their own. We would weigh the child and the caretaker together, then subtract the caretaker's weight. We recorded the patient's weight to the nearest 0.1 kg while they wore loose clothing and exposed their feet.Children under the age of 24 months had their recumbent length measured while lying down on their backs using a standard measuring tape.The height of each individual was recorded to the nearest half centimeter using a stadiometer that was permanently fastened to the wall of the examination room. When taking a height measurement while standing proved challenging, the subject was asked to lie down and use a standard measuring tape to record their length.

❖ Measurements were taken to the nearest 0.1 cm of the midarm circumference with the left arm hung down and of the circumference over the point halfway between the olecranon and the acromion, using non-stretchable measuring tape. The non-affected arm was utilized in patients who suffered from hemiplegia.

❖One kind of caliper, the PONDERAX®, was used for children under the age of 8, while the other, the SYNDEX electronic caliper, was used for children aged 8 and up. To measure the triceps skinfold thickness, the caliper jaws were closed over a pinched skinfold located in the triceps area, halfway between the olecranon and the acromion.We determined the Body Mass Index (BMI) by rounding up the square of a person's height or weight to the nearest half kilogram (0.5 kg/m).There are a number of factors that relate to age, including height, weight, skinfold thickness, MAC, and body mass index (BMI). Z-scores for both sexes were determined by comparing the data to standards set by the World Health Organization and the Centers for Disease Control and Prevention. To find out how well the study participants were eating, their anthropometric measurements were compared to their own charts, and the World Health Organization's Child Growth Standards model was used to figure out their Z-scores.

The meaning of a Z-score is the number of standard deviations it represents from the median (0 Z-score).Patients' nutritional status was shown by Z-scores with a median value and a standard deviation. We set the interval limits at three standard deviations above or below the median Z-score.A Z-score of -3 standard deviations or lower indicates significant undernourishment.Less than -2 standard deviations indicates malnutrition.

Statistical analysis:

All of the data from the various variables were input into the Statistical Package for the Social Sciences (SPSS) software for Windows V.16.3.5 US and analyzed using the proper tests and procedures. (44), To compare means, we utilized the chi-square (X^2) test for categorical variables and the student's t-test for continuous variables.We evaluated the connections among the variables using the bivariate Pearson's correlation coefficient.By utilizing Epi-calc software (CDC, WHO) V.3.5.1, we were able to compare the means and percentages.A P-value of less than or equal to 0.05 is required for statistical significance in all analyses.

RESULTS

This study enrolled 100 patients with cerebral palsy , who were diagnosed by specialist paediatricians, those patients were 56(56%) males and 44 (44%) females table(1) and figure(1) ,there was no significant association between sex and cerebral palsy (P.value> 0.05).
The age of studied children ranged from (6 – 48) months with a mean age of 43.9 months.
The anthropometric measurements mean values and the ranges were described by table 1.

Table1 .Mean values of Anthropometric measurements and sex distribution.

Parameters		statistics	P.value
Sex	Male	56 (56%)	0.23
	Female	44 (44%)	
AGE month	(Mean)	44 month	
	Range	6 – 48 month	
Weight (kg)	(Mean ± SD)	11.2 ± 5.13	
	Range	3 – 30	
Height (cm)	(Mean ± SD)	85.9 ± 18.8	
	Range	42 – 147	
BMI	(Mean ± SD)	14.1 ± 2.3	
	Range	8 – 22.3	
M.A.C. (cm)	(Mean ± SD)	13.24 ± 2.4	
	Range	9 – 20	
Skin fold thickness (mm)	(Mean ± SD)	7.7 ± 3.4	
	Range	3 - 15	

Distribution of types of cerebral palsy

Among all types of cerebral palsy, Spastic type was the most prevalent; 78(78%) of patients, on the other hand spastic-quadriplegic was the predominant subtype, it was present in (54%) of all cases, the spastic-diaplegic was present in (17 %) while spastic-hemiplegic was found in (7%) of all cases.

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Other types of CP were represented only (22%) of all cases, (19%) was hypotonic,(2 %) were Dyskinetic and only one female patient aged 15 month presented with mixed type.

There was a highly significant difference in the frequencies of the different types of CP, (the overall comparisons P.value was< 0.001), table (2).

Table (2). Distribution of types of Cerebral palsy.

Cerebral palsy type	Frequency	%	P.value
Spastic			< 0.001
Quadriplegic	54	54%	
Diaplegic	17	17%	
Hemiplegic	7	7%	
Hypotonic	19	19%	
Dyskinetic	2	2%	
Mixed	1	1%	
Total	100	100%	

Weight for age Z-scores: Table (3) shows the Z-scores of all cases in each type of CP. it had been found that 49 out of the 54 about (91%) child with SQCP subtype had Z score of ≤ -2 and the severely malnourished children < -3 SD was present in 42 out of 49case .

The 17 child with spastic-diaplegic type were the least affected and they were less malnourished ; only 2 cases with (-3 SD) and 2 cases with(-2 SD) Z-score below median.

There were two children with dyskinetic type of CP, one case < – 2SD and one case < – 3SD.and only one case with mixed type < -3 SD. The association among the type of CP and the weight for age Z- score was highly significant and the overall comparison P.value = 0.0001)

Table 3: Distribution of study sample according to Z-scores Wt.for Age among CP types.

Cerebral palsy type	Wt for Age Z – score						Mean ± SD
	-3	-2	-1	0	1	Total	
Spastic							
Quadriplegic	42	7	3	2	0	54	-2.65 ± 0.76
Diaplegic	2	2	4	6	3	17	-0.71 ± 1.2
Hemiplegic	2	1	1	2	1	7	- 1.14 ±1.38
Hypotonic	6	2	6	4	1	19	-1.32 ± 1.4
Dyskinetic	1	1	0	0	0	2	- 2.5 ± 0.71
Mixed	1	0	0	0	0	1	-3
Total	54	13	14	14	5	100	

P.value = 0.0001

Height\length for Age Z score: The Height\ length for age was (≤ -2 SD) in 69% of cases, most of them were with spastic type (58%) from total cases.

On the other hand children with Spastic-quadriplegic subtype were the most common in this study with (72%)39 of all quadriplegic have Z -score ≤ -3 SD, the overall comparison P.value =0.000013, table(4).

Table 4: Distribution of study sample according to Z-scores of length/height for age among CP types.

Cerebral palsy type	Height\length for Age Z score						Total	Mean ± SD
	-3	-2	-1	0	1	2		
Spastic								
Quadriplegic	39	9	3	2	1	0	54	- 2.43 ± 1.31
Diaplegic	3	4	5	4	1	0	17	-1.24 ± 1.2
Hemiplegic	3	0	2	1	0	1	7	-1.3 ± 1.9
Hypotonic	4	5	5	4	1	0	19	-1.37 ± 1.2
Dyskinetic	1	0	0	1	0	0	2	-1.5 ± 2.1
Mixed	1	0	0	0	0	0	1	-3
Total	51	18	15	12	3	1	100	

P.value =0.000013

Weight for height\ length Z- scoresanalysis. Table 5 shows that there were (26%) of cases with Z-score ≤ -3 SD, while (17%) of cases with Z-score ≤ -2.most of them were having SQCP. 20case out of 54 spastic type with Z-score <-3SD and 11case out of 54 with Z-score <-2SD.

There was a significant difference within the CP types, Dyskinetic and SQCP patients had had lower mean z-scores than other types (-2.50SD) and (-1.04 SD) respectively (P.value = 0.001).

Table 5: Distribution of study sample according to Z-scores for wt. for length/height among CP types.

Cerebral palsy type	Wt for Ht - length Z- score							Mean ± SD
	-3	-2	-1	0	1	2	Total	
Spastic								
Quadriplegic	20	11	10	12	0	1	54	-1.04±1.893
Diaplegic	0	3	3	5	4	2	17	- 0.24 ±1.480
Hemiplegic	0	0	2	2	2	1	7	-0.95±1.615
Hypotonic	5	2	4	4	3	1	19	0.29±1.113
Dyskinetic	1	1	0	0	0	0	2	-2.50±0.707
Mixed	0	0	1	0	0	0	1	-1.00
Total	26	17	20	23	9	5	100	-0.82 ± 0.21

P.value = 0.001

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BMI for age Z-scores among CP types for patients with age more than 3 years:

Among the total number of CP. there were 62 case with age > 3 years for them the BMI were calculated.

there were19 (30%) of cases with Z-score ≤ -3 SD, while10 (16%) of cases with Z-score ≤ -2.most of them were having SQCP.The remaining 54% of all cases were having Z-score within -1 and above, there was no significant difference had been noticed among means and the overall comparison was P.value >0.05.(table 6) and

Table 6: Distribution of study sample according to Z-scores for (BMI) for age among CP types for patients with age more than 3 years.

Cerebral palsy type	z- score								Mean ± SD
	-3	-2	-1	0	1	2	3	Total	
Spastic									
Quadriplegic	14	6	7	5	4	0	0	36	-2.03± 1.1
Diaplegic	1	1	2	3	2	0	1	10	-0.2± 1.3
Hemiplegic	0	1	1	1	1	0	0	4	-0.5 ±1.5
Hypotonic	4	2	0	1	2	1	1	11	-1 ± 2.1
Dyskinetic	0	0	1	0	0	0	0	1	-1 ± 0.93
Mixed	0	0	0	0	0	0	0	0	0
Total	19	10	11	10	9	1	2	62	

P. value>0.05

Mid arm circumference for age Z-score: Regarding the MAC for age there was a highly significant difference (P.value was < 0.001. (69%) of cases were <-2 SD below median (46) case out of (69) had z-score, < -3 , about two third of them were spastic quadriplegic.

There was a highly significant association between the type of CP and the mean MAC Z-score, SQCP patients were the more affected groups among all CP types

(table7)

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Table 7: Distribution of study sample according to Z-scores for MAC for age among CP types. P.value = (0.001)

Cerebral palsy type	MAC for Age Z-score						Total	Mean ± SD
	-3	-2	-1	0	1	2		
Spastic								
Quadriplegic	30	12	8	4	0	0	54	-2.26 ± 0.98
Diaplegic	4	4	2	4	2	1	17	-1.1 ± 1.6
Hemiplegic	1	2	3	1	0	0	7	-1.43 ± 0.98
Hypotonic	9	4	2	2	2	0	19	-1.84 ± 1.42
Dyskinetic	1	1	0	0	0	0	2	-2.5 ± 0.71
Mixed	1	0	0	0	0	0	1	-3
Total	46	23	15	11	4	1	100	

Skinfold thickness for age Z-scores: Regarding the SFT for age (40%) 40 case of all cases were <-2 SD below median (25) case out of (40) had z-score, < -3SD

The comparison among mean Z-score of different types of CP, showed a highly significant difference, SQCP patients were the most affected and the spastic diaplegic patient were the least affected , rather as other types (Pvalue < 0.001), table(8).

Table 8: Distribution of study sample according to Z-scores for SFT for age among CP types.

Cerebral palsy type	Skinfold thickness for Age Z-score						Total	Mean ± SD
	-3	-2	-1	0	1	2		
Spastic								
Quadriplegic	17	10	11	11	4	1	54	-1.78 ± 1.3
Diaplegic	2	2	5	1	4	3	17	-0.16 ± 1.7
Hemiplegic	0	1	1	2	2	1	7	- 0.57 ± 1.7
Hypotonic	3	2	6	3	4	1	19	-0.23 ± 1.78
Dyskinetic	2	0	0	0	0	0	2	-3
Mixed	1	0	0	0	0	0	1	-3
Total	25	15	23	17	14	6	100	

P.value < 0.001

DISCUSSION

The gender breakdown of the participants in this study was rather comparable to that of Bülentipek et al., where males made up 61.2% of the cases and females 38.8%. (45) .The spastic CP type was the most common cerebral palsy (78%). The most common types of cerebral palsy were spastic quadriplegic (54%), spastic diplegic (17%), hemiplegic (7%), hypotonic-ataxic (19%), and

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dyskinetic (2%). Following is the distribution of impairments.The impairments are of a mixed type (1%).The results were very similar to the study by Bülent İPEK et al., where the spastic CP type was shown to be the most common (83%). The distribution of their impairments was as follows: 47.2% were quadriplegic, 19.7% were diplegic, 15.6% were hemiplegic, 9.2% were mixed type, 5.7% were hypotonic-ataxic, and 2.2% were dyskinetic.(45) In this investigation, hemiplegic and mixed types were more common than hypotonic-ataxic types.Compared to the normal population, CP had significantly lower values for body weight, height, weight/height, body mass index (BMI), MAC, and triceps skinfold thickness (MAC). For 67% of the patients, the weight for age is less than -2 SD in this study. Dahlsen et al. discovered that 20% of youngsters had a Z-score for weight below -2 SD, which contradicts our findings. In this study, malnutrition was most prevalent in children with spastic quadriplegia, accounting for 90% of cases when weight was considered. The majority of children (72%), according to Ana Lúcia Alves Caram MS et al., who suffer from spastic quadriplegia, suffer from malnutrition. Perhaps higher-quality medical care and rehabilitation facilities overseas are to blame for this percentage discrepancy. In 69% of the patients with cervical cancer, the height for age is less than -2 standard deviations. The findings of Dahlsen et al., who discovered that 20% of the total youngsters had a z-score for height below -2 SD, are at odds with this. Thirty-two percent of the kids in this study who had spastic quadriplegia had problems with their height. Among children with quadriplegia, Ana Lúcia Alves Caram MS. et al. discovered that 68.9% were impacted. It is possible that the early treatment of CP patients overseas is responsible for this percentage discrepancy.Patients with CP had a weight-for-height Z-score lower than -2 SD in this study (46). Contrary to what Grammatikopoulou et al. found, SQCP was the subtype most severely impacted. The weight-for-height Z-score did not differ between the subjects and controls, according to her findings.The consensus, however, was that SQCP subtypes were the most hit. In this study, 52% of instances of CP had a body mass index (BMI) below the 2SD threshold for their age.According to E. Rosulescu et al., most cases had normal nutritional status, and only 10% showed signs of disturbed nutritional status (BMI Z-score under -2 SD). The lack of high-quality rehabilitation facilities in our area may explain why you disagree with our findings.(47) The SQCP subtype had the greatest impact on the body mass index (BMI) to age ratio, whereas the diplegic and hemiplegic subtypes had less impact. Dahlsen et al. concur with the SQCP categories; however, for reasons that remain unclear, the mixed subtype was the least impacted. The majority of CP cases (69%), specifically those with SQCP (60% of the total), had a MAC/age Z-score less than -2 SD in our study. A study conducted by Ana Lúcia Alves Caram, MS, et al. found that 68.6% of the cases were SQCP, and only 29.8% had a standard deviation below the mean. Concern for children and physical impairment may be to blame (46) for this.Forty percent of the CP patients surveyed had an SFT/age Z-score less than -2SD, and 65.5% of those patients were quadriplegic. Ana Lúcia Alves Caram MS* and colleagues discovered that 71.4% of their patients were quadriplegic and 30.7% had SFTs for age that were less than two standard deviations below the mean. (46) Jen-Wen Hung et al. suggest that paralyzed infants with CP may have larger skin folds, potentially leading to an overestimation of body fatness. Additionally, C. Parrish et al. stated in (48) that estimating body fat percentage in CP using a single skinfold measurement is not effective. The most effective method for taking skinfold

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measurements in clinical practice involves taking multiple measures over time with the patient acting as their own control. (33)

CONCLUSION

1. Brain palsy sometimes leads to malnutrition.
2. We found that CP characteristics influence all anthropometric measures.
3. the most frequently impacted subtype was SQCP.

RECOMMENDATIONS

Nutrition issues are a typical secondary concern in CP patients. In order to maintain optimal growth, a thorough assessment and intervention plan focusing on nutrition are necessary.

2. Since cerebral palsy is the leading cause of childhood physical handicap, it is crucial to construct rehabilitation clinics that have a multidisciplinary staff, including nutritional therapists.They should also teach the mother or caretaker how to feed the child and how much time to devote to nursing.

For children who have an unsafe swallow or whose intake is inadequate for growth, the factors for a gastrostomy should be carefully considered.

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