

## **Valuation the biological characteristics of the spine for the children with cerebral palsy**

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### **Problem of Research**

The children with cerebral palsy are able to walk and move and speak normally and does not need that help to do any daily requirements, but they are in need of a limited amount of care and treatment and special education if there is a failure or shortage in the percentage of their smartness, generally speaking they are considered similar to their peers from the normal children. (Hassan Al Nawasra (2006))

The researchers have noticed during their visits to al Roaya School for special education and some other rehabilitation centers. that the physical and motor rehabilitation of the spine are done by a random methods without specifying the right part of the spine which is in need to be rehabilitated. Despite the fact that there are rehabilitation programs but it is not codified, this may move down the child with cerebral palsy from the first class cerebral palsy to the second

and third cerebral palsy which make it so difficult for the child to move. as well as using harmful radiations to evaluate the biological characteristics of the spine, this is what encouraged the researchers to assess the biological characteristics of the spine for the children with cerebral palsy in a simple and safe manner, Shaping the right rehabilitation programs to modify the defected spine disks to be closer to the normal shape.

### **The Aim of Research**

The research aims to assess the biological characteristics of the spine for the children with cerebral palsy:

- 1- The Biological characteristics of the spine of male children with cerebral palsy.
- 2- The Biological characteristics of the spine of female children with cerebral palsy.

### **The Research Questions**

- 1- What are the biological characteristics of the spine for the male children with cerebral palsy?
- 2- What are the biological characteristics of the spine for

the Female children with cerebral palsy?

**Research procedures**

**Research curriculum**

The researchers used the descriptive method using the survey method because it is suitable for the nature of the research.

**Sample of Research**

55 children living with cerebral palsy 50 children represent the core and the main sample of the research, featuring 25 male children and 25 female children, and 5 children represent the reconnaissance sample from the same community.

**Data Collection tools**

Restameter

Body Scale

Spinal Mouse

**Research Data collection**

**Tools**

Scale – Restmeter - Spinal Mouse

**The experience of basic research**

The researchers conducted the required measurements from 6/5/2013 to 26/5/2013

**Statistical Analysis**

Data were treated statistically using SPSS software finding the following:

SMA- Mediator

- Standard deviation

Convolution coefficient

the period of confidence

**Offer of the Results**

**Table (1)  
Shows the averages and standard deviations of the spine angles for male children cerebral palsy (C. P) of the modes (Upright – Flexion – Extension )**

Variable	Measure Unit	Upright				Flexion				Extension									
		Normal Range	Mean	Stdev	%o CL	Normal Range	Mean	Stdev	%o CL	Normal Range	Mean	Stdev	%o CL						
TH1/2	Degree	— —	11	7.7	12.0	11	1	7	7.8	12.4	1	7	7	14	12.0	7	7		
TH2/3	Degree	7	12	7.7	18.7	7	8	7	7.7	12.0	4	9	7	12	4.4	11.8	7	9	
TH3/4	Degree	7	10	7.7	14.4	7	7	7	8.8	18.0	7	12	7	12	11.2	12.4	0	12	
TH4/5	Degree	7	9	7.7	8.7	7	7	7	7.7	7.7	9	8	7	12	4.2	11.1	7	9	
TH5/6	Degree	7	8	7.7	14.4	7	11	7	8.8	14.8	7	7	7	11	7.2	9.9	7	7	
TH6/7	Degree	7	8	7.7	11.2	7	9	7	8.8	12.7	7	10	7	10	7.0	9.4	7	7	
TH7/8	Degree	7	9	4.4	7.4	7	7	7	9	11.2	7	7	7	12	7.0	8	7	0	
TH8/9	Degree	7	10	7.7	7.8	7	0	7	11	0.0	8.1	7	9	7	7.2	7.8	7	7	
TH9/10	Degree	7	8	7.7	7.7	7	7	4	12	0.2	7.4	7	8	7	11	4.9	7.1	7	7
TH10/11	Degree	7	7	4.2	7.1	4	7	11	0.7	7.8	7	7	7	0	9	1.1	9.2	7	0
TH11/12	Degree	4	7	7.7	9.7	1	7	10	7.4	0.1	7	7	0	7	7.2	7.4	7	7	
TH12/L1	Degree	4	7	7	4.7	7	7	8	0.0	7	7	8	7	7	4	7.1	7.4	0	7
L1/2	Degree	7	7	7.9	9.7	0	7	10	0.7	7.1	7	9	7	7	1.1	11.7	7.7	7	
L2/3	Degree	8	7	7.4	9.1	4	7	18	4.0	7.2	7	7	7	11	7	7.8	8.0	7	7
L3/4	Degree	7	7	7.4	7.2	12	7	4	19	7.2	11.8	7	8	7	7	4.4	8.7	8	7

**Follow Table (1)**  
**Shows the averages and standard deviations of the spine**  
**angles for male children cerebral palsy (C. P) of the modes**  
**(Upright – Flexion – Extension)**

Variable	Measure Unit	Upright				Flexion				Extension									
		Normal Range	Mean	Stdev	%± CL	Normal Range	Mean	Stdev	%± CL	Normal Range	Mean	Stdev	%± CL						
L4/5	Degree	– 13	0	0.4	18.3	10	2	3	19	1.4	12.2	4	3	– 18	1	0.76	13.4	0	3
L5/S1	Degree	– 3	1	0.7	15.2	21	4.7	7	14	3.2	24.1	7	13	– 2	0	0.4	13.7	11	0
Sac/Hip J.	Degree	3	29	22.8	30.9	3	30	14	24	26.7	20.4	46	27	– 33	20	3.8	19.2	12	4
Thoracic spine	Degree	24	09	17.8	27.7	3	0	34	22	29.4	19.9	23	38	33	21	28.8	24.1	29	49
Lumbar Spine	Degree	– 43	4	17.7	24.3	24	0	19	28	23.8	21.8	10	22	– 21	7	10.1	18.8	23	7
Incl.	Degree	7	10	24.9	10.2	21	29	08	12	10.2	12.0	28	92	– 43	2	2.1	11.7	11	1
Length	CM			212.8	88.3	27.2	27.2			224.2	70.2	248	270			204.2	80.3	27.2	242

Table (1) shows that there is a biological defect in (Hip / Sac , Thoracic Spine and Inclination) and angles deflection from upright (Hip / Sac , Thoracic

Spine, Lumbar Spine), and a biological malfunction in Flexion Position (Thoracic Spine and Inclination) from the Extension Position.

**Table (2)**  
**Shows the averages and standard deviations of the spine angles**  
**for male children cerebral palsy (C. P) during ( U – F , U – F , E – F )**

Variable	Measure Unit	Upright – Flexion				Upright – Extension				Flexion – Extension									
		Normal Range	Mean	Stdev	%± CL	Normal Range	Mean	Stdev	%± CL	Normal Range	Mean	Stdev	%± CL						
TH1/2	Degree	5	7	3.2	17.0	4	3	8	12	4.5	14.2	3	11	– 12	3	1.2	3	7	4
TH2/3	Degree	– 3	7	3.0	10.7	8	13	7	11	4.9	12.2	4	14	– 3	3	1.8	3	8	0
TH3/4	Degree	7	0	3.5	22.7	7	13	4	8	8.2	15.2	0	12	5	3	4.7	3	– 14	4
TH4/5	Degree	7	4	4.2	17.0	– 11	3	7	8	0.2	11.7	4	0	8	4	4.7	4	– 12	3
TH5/6	Degree	0	0	3.5	14.2	4	8	4	7	4.7	12.0	3	10	7	4	3.1	4	– 10	4
TH6/7	Degree	4	0	3.0	12.1	7	4	4	6	2.7	14.7	5	3	0	4	3.4	4	0	8
TH7/8	Degree	4	5	4.5	14.2	– 10	2	0	7	2.7	12.0	8	3	7	5	3.4	5	0	7

**Table (2)**  
**Shows the averages and standard deviations of the spine angles**  
**for male children cerebral palsy (C. P) during ( U – F , U – F , E – F )**

Variable	Measure Unit	Upright – Flexion					Upright – Extension					Flexion – Extension						
		Normal Range		Mean	Stdev	%± CL	Normal Range		Mean	Stdev	%± CL	Normal Range		Mean	ξ	%± CL		
		TH8/9	Degree	1-	7	1.0	Δ.V	7-	0	7-	7	Δ.Δ	1-	7	0-	Δ	1.Δ	Δ
TH9/10	Degree	7-	Δ.	7.	Δ.Δ	7-	7	7.	Δ.V	Δ.V	1-	7	1-	Δ.Δ	Δ.Δ	Δ.Δ	7-	7
TH10/11	Degree	-	Δ.Δ	Δ.Δ	Δ.Δ	7-	Δ	7.	Δ.Δ	Δ.Δ	7-	Δ	7-	Δ.Δ	Δ.Δ	Δ.Δ	7-	Δ
TH11/12	Degree	-	Δ.Δ	Δ.Δ	Δ.Δ	7-	Δ	Δ.Δ	Δ.Δ	Δ.Δ	7-	Δ	7-	Δ.Δ	Δ.Δ	Δ.Δ	7-	Δ
TH12/L1	Degree	Δ	Δ.	Δ.0	Δ.0	Δ	Δ	7.	Δ.V	7-	-	-	Δ.Δ	Δ.V	Δ.Δ	Δ.Δ	Δ	Δ.Δ
L1/2	Degree	7	Δ.0	Δ.V	Δ.Δ	0	Δ.Δ	Δ.	Δ.Δ	7-	Δ	7	Δ.Δ	Δ.Δ	Δ.Δ	Δ	Δ.Δ	
L2/3	Degree	Δ	Δ.Δ	0.Δ	Δ.V	-	Δ.Δ	Δ.	Δ.Δ	7-	Δ	7	Δ.Δ	Δ.V	Δ.Δ	Δ	Δ.Δ	
L3/4	Degree	Δ	Δ.0	7.Δ	Δ.Δ	7-	Δ.	-	Δ.Δ	Δ.Δ	Δ	Δ	7.Δ	Δ.Δ	Δ.Δ	7	Δ.Δ	
L4/5	Degree	7	Δ.V	Δ.Δ	Δ.Δ	7-	Δ.V	-	Δ.Δ	Δ.Δ	7-	Δ.Δ	7	7.	7.	7.	Δ.	Δ
L5/S1	Degree	7-	Δ.Δ	Δ.Δ	7.	Δ.	Δ.Δ	-	Δ.Δ	Δ.Δ	7-	Δ.Δ	7-	Δ.V	Δ.V	Δ.V	Δ.	Δ.Δ
Sac/Hip J.	Degree	Δ-	0.Δ	Δ.Δ	Δ.Δ	Δ	Δ.Δ	-	Δ.Δ	Δ.Δ	-	-	7	Δ.Δ	Δ.Δ	Δ.Δ	Δ.Δ	Δ.Δ
Thoracic spine	Degree	-	Δ.V	Δ.Δ	Δ.Δ	Δ	Δ.Δ	-	Δ.Δ	Δ.Δ	-	Δ.Δ	-	Δ.Δ	Δ.Δ	Δ.Δ	-	7
Lumbar Spine	Degree	7.Δ	Δ.Δ	Δ.Δ	7.0	0.Δ	Δ.V	-	Δ.Δ	Δ.Δ	-	Δ.Δ	7.V	Δ.Δ	Δ.Δ	Δ.Δ	Δ.Δ	Δ.Δ
Incl.	Degree	0.Δ	Δ.Δ	Δ.Δ	Δ.Δ	Δ.Δ	Δ.V	-	Δ.Δ	Δ.Δ	-	-	Δ.Δ	Δ.Δ	Δ.Δ	Δ.Δ	Δ.Δ	Δ.Δ
Length	CM			Δ.Δ	Δ.Δ	Δ-	Δ.V		Δ.Δ	Δ.Δ	-	-		Δ.	Δ.	Δ.	Δ-	Δ.Δ

Table (2) shows the existence of a biological defect in ( U – F , U – E , E - F ) as well as the absence of chromatic corners of the spine, and the presence of a biological defect in most of the discs of

the spine for male children C.P and angles deflection as its shown in the table ( Lumbar Spine during U – f, angles deflection Sac / Hip , Lumbar Spine ) during the E – F .

**Table (3)**  
Shows the averages and standard deviations of the spine angles to female children cerebral palsy (C. P) of the modes (Upright – Flexion – Extension)

Variable	Measure Unit	Upright				Flexion				Extension			
		Normal Range	Mean	Stdev	%± CL	Normal Range	Mean	Stdev	%± CL	Normal Range	Mean	Stdev	%± CL
TH1/2	Degree	2- 17	2.2	17.2	3- 1	2- 2	1	17.2	2- 2	2- 12	12.2	11.2	2- 1
TH2/3	Degree	3- 17	3.2	16.2	2- 3	2- 1	1	16.2	1- 2	1- 12	11.2	11.2	2- 2
TH3/4	Degree	3- 17	3.1	15.2	1- 2	2- 1	1	15.2	1- 2	1- 12	11.2	11.2	2- 2
TH4/5	Degree	3- 4	2.2	4.2	2- 1	2- 1	1	4.2	1- 2	1- 12	11.2	11.2	2- 2
TH5/6	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
TH6/7	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
TH7/8	Degree	1- 2	1.2	1.2	1- 2	2- 1	1	1.2	1- 2	1- 12	11.2	11.2	2- 2
TH8/9	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
TH9/10	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
TH10/11	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
TH11/12	Degree	1- 2	1.2	1.2	1- 2	2- 1	1	1.2	1- 2	1- 12	11.2	11.2	2- 2
TH12/L1	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
L1/2	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
L2/3	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
L3/4	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
L4/5	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
L5/S1	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
Sac/Hip J.	Degree	1- 2	1.2	1.2	1- 2	2- 1	1	1.2	1- 2	1- 12	11.2	11.2	2- 2
Thoracic spine	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
Lumbar Spine	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
Incl.	Degree	1- 2	1.2	1.2	1- 2	2- 1	1	1.2	1- 2	1- 12	11.2	11.2	2- 2
Length	CM		112.1	11.2	112.1	112.1	112.1	112.1	112.1	112.1	112.1	112.1	112.1

Table (3) shows that there is a biological defect in (Hip/ Sac) from upright position and angles deflection from upright (Hip/ Sac,

Thoracic Spine) from Flexion, and a biological malfunction in some discs from Extension Position .

**Table (4)**  
Shows the averages and standard deviations of the spine angles to female children cerebral palsy (C. P) during ( U – F , U – E , E – F ).

Variable	Measure Unit	Upright – Flexion				Upright – Extension				Flexion – Extension			
		Normal Range	Mean	Stdev	%± CL	المدى الطبيعي للفرات	س	ع	%± CL	Normal Range	Mean	Stdev	%± CL
TH1/2	Degree	2- 17	2.2	17.2	3- 1	2- 2	1	17.2	2- 2	2- 12	12.2	11.2	2- 1
TH2/3	Degree	3- 17	3.2	16.2	2- 3	2- 1	1	16.2	1- 2	1- 12	11.2	11.2	2- 2
TH3/4	Degree	3- 17	3.1	15.2	1- 2	2- 1	1	15.2	1- 2	1- 12	11.2	11.2	2- 2
TH4/5	Degree	3- 4	2.2	4.2	2- 1	2- 1	1	4.2	1- 2	1- 12	11.2	11.2	2- 2
TH5/6	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
TH6/7	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2
TH7/8	Degree	1- 2	1.2	1.2	1- 2	2- 1	1	1.2	1- 2	1- 12	11.2	11.2	2- 2
TH8/9	Degree	2- 2	2.2	2.2	1- 2	2- 1	1	2.2	1- 2	1- 12	11.2	11.2	2- 2

**Follow Table (4)**

**Shows the averages and standard deviations of the spine angles to female children cerebral palsy (C. P) during ( U – F , U – E , E – F ).**

Variable	Measure Unit	Upright – Flexion				Upright – Extension				Flexion – Extension									
		Normal Range	Mean	Stdev	%95 CL	القياس القدرات	س	ع	%95 CL	Normal Range	Mean	Stdev	%95 CL						
TH9/10	Degree	70	5	1.8	2.4	70	7	70	7	2.5	11.2	1	12	70	11	3.8	11.2	10	1
TH10/11	Degree	70	11	2.4	4.3	70	7	70	7	2.8	11.2	2	12	70	12	3.5	11.2	70	1
TH11/12	Degree	70	10	2.3	3.0	70	8	70	6	1.2	11.2	1	12	70	12	3.4	11.2	70	3
TH12/L1	Degree	70	10	2.0	2.8	70	7	70	4	1.5	11.2	1	12	70	11	3.1	11.2	70	1
L1/2	Degree	70	10	11.5	1.0	10	10	10	10	1.1	11.2	1	12	70	11	12	11.2	10	11
L2/3	Degree	4	15	2.1	1.4	1	1	10	3	1.4	11.2	1	12	70	11	11	11.2	10	1
L3/4	Degree	7	14	11.1	11.0	1	11	11	7	1.8	11.2	1	12	70	11	11	11.2	10	11
L4/5	Degree	3	10	2.8	1.3	1	10	11	1	1.1	11.2	1	12	70	11	11	11.2	10	11
L5/S1	Degree	30	11	1.7	1.7	10	1	11	12	1.1	11.2	1	12	70	11	11	11.2	10	11
Sac/Hip J.	Degree	40	11	11.1	10.7	10	12	11	11	1.1	11.2	1	12	70	11	11	11.2	10	11
Thoracic spine	Degree	70	11	1.8	1.6	11	1	11	11	1.1	11.2	1	12	70	11	11	11.2	10	11
Lumbar Spine	Degree	12	11	11.0	11.1	10	11	11	11	1.1	11.2	1	12	70	11	11	11.2	10	11
Incl.	Degree	10	111	11.7	11.2	11	11	11	1	1.1	11.2	1	12	70	11	11	11.2	10	11
Length	cm			11.1	11.2	11	11			11.1	11.2	11			11.1	11.2	11	11	11

Table (4) shows that there is a biological defect at (Thoracic Spine, Lumbar Spine , Inclination ) During U – F , the spine angles was found normal with biological defect during U– E, angles deflection (Thoracic Spine, Inclination) during F - E

**The result discussion and explanation**

Table (1) shows that there is a biological defect in (Hip / Sac, Thoracic Spine and Inclination) and angles deflection from upright (Hip / Sac, Thoracic Spine, Lumbar Spine), and a biological malfunction in Flexion Position (Thoracic Spine and Inclination) from the Extension Position. for males children with cerebral palsy , in addition

to finding the spine profile for the children with cerebral palsy , The researchers refers this to : Spine muscle weakness and the slow growth . -

-The lack of physical rehabilitation programs, which works to increase muscle activity.

-The lack of using rehabilitation programs based on scientific evidences.

There is no clear standard degrees of the spine for the children with cerebral palsy which the rehabilitation programs should be build on .

Table (2) shows the existence of a biological defect in (U – F , U – E , E - F) as well as the absence of chromatic corners of the spine, and the presence of a biological

defect in most of the discs of the spine for male children C.P and angles deflection as its shown in the table (Lumber Spine during U- f, angels deflection Sac/ Hip, Lumber Spine) during the E- F in addition to finding the spine profile for the children with cerebral palsy, researchers refers this to the following :

- Muscle weakness (upper back, lower abdomen)
- Imbalance in the blood vessels which feeds the biologically defected disks
- Arthritis of the joints of the biological defected disks
- The weak growth for male children with cerebral palsy

Table (3) shows that there is a biological defect in (Hip/ Sac) from upright position and angles deflection from upright (Hip/ Sac, Thoracic Spine) from Flexion, and a biological malfunction in som discs from Extension Position for females children with cerebral palsy, the researchers refers this to the following

- . -Genetic reasons or congenital reasons
- Defects in the curves of the spine .

Table (4) shows that there is a biological defect at (Thoracic Spine, Lumber

Spine, Inclination) During U- F, the spine angles was found normal with biological defect during U- E, angles deflection (Thoracic Spine, Inclination) during F - E

The results of this research is matching Straker, Sullivan research

The researchers agree with **Nahed Abdel-Rahim (2011)** on that the proper health care for expectant mother prevent giving birth in addition to finding the spine profile for the children with cerebral palsy, this care could be as

- Premarital health care before and during pregnancy.
- reducing the exposure to environmental pollution and radiation.
- Do not take drugs, and proper nutrition.

The researchers see the effective role of taking care of the body posture of the children with cerebral palsy should be as it follows :

- Using the available media methods such as pictures and wall magazines
- Observing the children body posture and raise their awareness
- Following the right and specific rehabilitation programs and exercises

## Conclusion

- Finding the spine profile and the spine angles range for the male children with cerebral palsy in Egypt from difference position .

- Finding the spine profile and the spine angles range for the female children with cerebral palsy in Egypt from difference position

- Finding the biological defect in most of the spine discs which lead to a deflection in the angles of spine compared with the normal range of the angles of the spine in the age group from 9 to 11 years old in Egypt.

- There are differences in the spine foundation between male and female children with cerebral palsy in some biological characteristics and it is similar in others.

## Recommendations

- The necessity of raising the awareness of the health, nutrition and body shape for the children with cerebral palsy through teachers, parents and doctors .

- The researchers should conduct research aiming to

build rehabilitation programs based on spine profile.

- Preventing the children with cerebral palsy from moving down from the first class to the second and third classes, using rehabilitation programs based on scientific evidences.

- Raising the postural awareness of the children with cerebral palsy among school teachers, parents and doctors.

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