

Establish Registry of Cerebral Palsy in Qalubia Governorate

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Abstract

Background: Patient registry is “an organized system that uses observational study methods to collect uniform data (clinical and other) to evaluate specified outcomes for a population defined by a particular disease, condition, or exposure, and that serves a predetermined scientific, clinical, or policy purpose(s).”

Aim of Study: To establish registry of Cerebral Palsy (CP) in Qalubia governorate.

Subjects and Methods: Children with CP who are receiving physical therapy services of both genders, ranged in age from 2 months to 18 years in governmental hospitals, Health insurance hospitals and private physical therapy centers which deal with children in Qalubia governorate. The number of cases which included in this study was 181 cases. The outcomes measures were Viking speech Scale, Manual Ability Classification System (MACS), Gross Motor Function Classification System (GMFCS) and Gross Motor Function Measure (GMFM).

Results: One hundred and eighty one cases were enrolled with a prevalence of 6 per 100.000 live births. The participants in the study, spastic CP was the most common type representing, 84.60% of the total sample, while Hypotonic was 13.20%, Ataxic was 1.7% and Dyskinetik was 0.60%. Percentage of CP based on GMFCS were 1.20% for level I, 21.50% for level II, 12.70% for level III, 9.90% for level IV, and 54.70% for level V. GMFM was used to determine the score of performance for each participant. According to MACS and Viking speech scale high incidences of children with CP were classified at level IV.

Conclusion: The current study revealed that prevalence of CP in Qalubia governorate was 181 children representing 6 per 100.000 live births. The spastic type 84.60% was the most common while the ataxic type 1.7% is the least prevalence. Demography revealed 51.9% of children were boys and 48.1% were girls, high incidence of children with CP level V using GMFCS, and level IV using MACS and Viking speech scale.

Key Words: *Qalubia – Cerebral palsy – Registry – Physical therapy.*

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Introduction

PATIENT registries have been defined as “an organized system that uses observational study methods to collect uniform data (clinical and other) to evaluate specified outcomes for a population defined by a particular disease, condition, or exposure, and that serves a predetermined scientific, clinical, or policy purpose(s) [1].”

In brief, a patient registry is a collection for one or more purposes of standardized information about a group of patients who share a condition or experience. The use of “patient” in patient registries is often used to distinguish the focus of the data set on health information. Currently, there is no consistent definition of the term “patient registry” used in the health research field. Terms such as clinical registries, clinical data registries, disease registries, and outcomes registries are also used to describe the same data collection method [2].

Registers of CP are defined as “population [based] databases issuing from multiple sources, relying on a clear definition and inclusion and exclusion criteria of CP, and requiring a mix of skills with the collaboration of obstetricians, pediatricians, and epidemiologists” [3].

Cerebral Palsy (CP) is the most common severe motor disability in children, and its severity is demonstrated by the fact that 40% of children with the condition cannot walk independently, [4,5] one-third have epilepsy, [6] up to one-third are non-verbal, [7,8] and about one-half have some degree of cognitive impairment [5,9-11].

Cerebral palsy comprises a group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occur in

the developing fetal or infant brain. The motor disorders of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication, and behavior; by epilepsy; and by secondary musculoskeletal problems [12].

The onset of CP occurs very early in life, and although it is described as a non-progressive disorder, research over the past several years has highlighted a number of health conditions and functional declines experienced by individuals with CP as they age [13].

Registers of CP are defined as “population [based] databases issuing from multiple sources, relying on a clear definition and inclusion and exclusion criteria of CP, and requiring a mix of skills with the collaboration of obstetricians, pediatricians, and epidemiologists [4].

Subjects and Methods

Subjects:

181 cases of CP children of both gender from Qalubia City and its village (Baha, Tokh, Qahah, Shobra, Shibin El-Kanter, El-Khanka) participated in this study their ages ranged from 2 month to 18 years. Children with CP were selected from governmental hospitals, health insurance hospitals, university hospitals and private physical therapy centers which deal with children in Qalubia governorate. This study continues up-to six months from 1st of February up to 31 August 2018. They were subjected to confidential registry form.

Methods:

1- The Gross Motor Function Classification System (GMFCS): The GMFCS describes the functional characteristics of CP patients in five levels, from I to V, level I being the mildest in the following age groups: Up to 2yrs. 2-4yrs., 4-6 years and between 6 to 12 years. For each level, separate descriptions are provided. Children in level III usually require orthoses and assisting mobility devices, while children in level II do not require assisting mobility devices after age 4. Children in level III sit independently, have independent floor mobility, and walk with assisting mobility devices. In level IV, affected children function in supported sitting but independent mobility is very limited. Children in level V lack independence even in basic antigravity postural control and need power mobility [14].

2- Gross Motor Functional Measurement (GMFM): It is a standardized observational instrument designed and validated to measure change in

gross motor function over time in children with cerebral palsy. The GMFM consists of 88 items grouped into 5 dimensions: 1- Lying and rolling (17 items), 2- Sitting (20 items), 3- Crawling and kneeling (14 items), 4- Standing (13 items) and 5- Walking, running and jumping (24 items) all items generally could be completed by age 5 years in children without motor delay. The scoring is recorded by percentage [15].

3- Manual Ability Classification System for Children with Cerebral Palsy (4-18) years is a functional description that can be used in a way that is complement to the diagnosis of cerebral palsy and its subtypes [16].

4- The Viking Speech Scale is developed for use with children aged 4 years and above, the scale has four levels [17].

Procedure:

Consent form was taken from children's parents. Approval letter from the Faculty of Physical Therapy, Cairo University to start this research was obtained.

Data collected from 1- Birth information of each child obtained from parents or medical reports. 2- Examination of CP children. Time of data collection for each case ranged one and half hour up to two hours for each case divided from 2 up to 3 sessions.

Results

Total number of children under age of 18 years old was 2, 701, 716 (48%) of total study (target population for this study) according to 2017 census. The number of CP sampled cases who CP patient was 181 representing about 6 per 100,000 live births, their ages ranged from 2 months to 17 years old.

Analysis was done based on a chi-square test for the relationship between CP prevalence and main sample characteristics. A 95% confidence interval for GMFM score was computed. The collected data were statistically processed and analyzed using the Statistical Package for Social Sciences (SPSS V-20).

Characters of the study sample:

1- Place of residence:

Results of the study showed that the place of residence for all the children, was (44.8%) from children lived in Rural areas and (55.20%) from children lived in Urban areas.

2- General medical information:

As shown in Table (2) (11.6%) from mothers had multiple birth while the percentage (88.4%) represent mother's hadn't multiple births. According to type of delivery intervention about (38.7%) was normal labor and (61.3%) was cesarean section. Furthermore, (2.2%) of mothers had zero previous birth, (22.1%) had one previous birth, (32.6%) had two previous birth and about (43.1 %) had more than three previous births. Regarding giving the delivery by who there was about (98.3%) by obstruction and (1.7%) midwife. As shown at (Table 2) about (24.3%) from mother's had complication during pregnancy and (75.7%) hadn't complications during pregnancy. About (80.1%) from mother's didn't take any medications during pregnancy while (19.9%) took medications during pregnancy. For the gestational age this study showed that about (79.5%) of children were full term babies, while (17.7%) were preterm babies and about (2.8%) were post term gestational age. This study also shows that about (11.6%) of mothers had multiple birth and (76.2%) of this multiple birth was twins and (23.5%) was triplet, finally location of delivery was (98.3%) at hospital and (1.7%) at home.

3- Children characteristics:

Regarding the age of children there were (64.1%) from children their age ranged from (1-4) years, (32%) from (4-10) years, (1.1%) from (10-15) years and (2.8%) from (0-1) years. Also, children sex was represented by (51.9%) male and (48.1%) female. And children weight from (5-10) kg represented by (18.8%), from (10-15) kg, represented by (51.4%), from (15-20) kg represented by (24.3%) and above 20kg represented by (2.2%).

About birth order for children it was represented by (9.9%) for 1st birth order, (23.2%) for 2nd birth order, (32.1%) for 3rd birth order, (23.2%) for 4th birth order and (11.6%) for more than 4 birth order.

According to birth defects and known syndromes, about (72.4%) of children hadn't any birth defect, (27.6%) had birth defect, (88.4%) hadn't any known syndromes and only (11.6%) had known syndrome.

Regarding weight at time of delivery (55.2%) of the children had normal birth weight (2500-4200) gm, (42%) had low birth weight (<1500gm), (0.6%) had very low birth weight (<1000gm) and finally (2.2%) had high birth weight (more than 4200gm).

On the other hand, onset of CP presented on this study shows that (16%) had perinatal causes

(77.9%) had postnatal causes and (6.1%) had pre-natal causes.

4- Associated disorders:

As show at (Table 4) associated disorders with cerebral palsy (40.3%) of children affected with epilepsy, (59.7%) not affected with epilepsy. Concerning the intellectual disorders (63%) affected, (37%) not affected. Concerning the visual disorder (35.4%) affected, (64.6%) not affected. Concerning the hearing disorder (14.9%) affected and (85.1%) not affected. Regarding the speech disorder (81.8%) affected, (18.2%) not affected. concerning swallowing disorder (35.4%) affected and (64.6%) not affected by swallowing disorders.

5- Cerebral palsy subtypes:

(49.7%) of children had spastic diplegia, (23.8%) had spastic quadriplegia, (7.2%) had spastic hemiplegia right side, (2.8%) spastic hemiplegia left side, (1.1%) had dystonia, (0.6%) had athetosis, (1.7%) had ataxia, (12.1 %) had hypotonia as show at (Table 5).

6- Gross motor function classification system:

Table (6) show that (1.2%) of children were at level I gross motor function classification system GMFCS, (21.5%) of children were at level at II GMFCS, (12.7%) were at level III of GMFCS, (9.9%) were at level IV of GMFCS and (54.7%) were at level V of GMFCS.

A- Motor function levels:

B- Total GMFM Score:

As shown in (Table 7) total GMFM scores have a mean of 95.87 and standard deviation of 70.93 (95.87 ± 70.93) for which 95% confidence interval for the CP population of Qalubia can be estimated by (70.93 ± 10.54), which means in 95% of the cases children in Qalubia governorate with CP expected to have a GMFM Score between (60.39) and (81.39).

7- Manual ability:

Table (8) show that (14.9%) of children at level I manual ability classification system MACS, (19.3%) at level II MACS, (22.1%) at level III MACS, (26%) at level IV MACS, (17.7%) at level V MACS.

8- Viking speech scale:

Table (9) show that (8.3%) of children were at level I Viking scale, (17.7%) were at level II viking scale, (34.8%) were at level III viking scale, (39.2%) were at level IV viking.

Table (1): Place of residence of cerebral palsy children in Qalubia Governorate.

Variable	Freq.	%	Rank
Urban	100	55.2	1
Rural	81	44.8	2
Total	181	100	-

Table (2): General medical information concerning participants.

Variable	Freq.	%	Rank
<i>Complication during pregnancy:</i>			
Yes	44	24.3	1
No	137	75.7	2
Total	181	100	-
<i>Medications during pregnancy:</i>			
Yes	36	19.9	1
No	145	80.1	2
Total	181	100	-
<i>Gestational age:</i>			
Preterm <37 week	32	17.7	2
Full term 37-42 week	144	79.5	1
Post term <42 week	5	2.8	3
Total	181	100	-
<i>Number of previous births:</i>			
Zero	4	2.2	4
One	40	22.1	3
Two	59	32.6	2
Three +	78	43.1	1
Total	181	100	-
<i>Multiple births:</i>			
Yes	21	11.6	2
No	160	88.4	1
Total	181	100	-
<i>Multiple births, if yes:</i>			
Twins	16	76.2	1
Triplet	5	23.8	2
Total	21	100	-
<i>Giving delivery by:</i>			
Obstruction	178	98.3	1
Midwife	3	1.7	2
Total	181	100	-
<i>Location of delivery:</i>			
Home	3	1.7	2
Hospital	178	98.3	1
Total	181	100	-
<i>Delivery intervention:</i>			
Normal	70	38.7	2
Cesarean	111	61.3	1
Total	181	100	-

Table (3): Children characteristics.

Variable	Freq.	%	Rank
<i>Child age:</i>			
From 0-1 year	5	2.8	3
From 1-4 years	116	64.1	1
From 4-10 years	58	32	2
From 10-15 years	2	1.1	4
Total	181	100	-
<i>Child sex:</i>			
Male	94	51.9	1
Female	87	48.1	2
Total	181	100	-
<i>Child weight:</i>			
Less than 5kg	6	3.3	4
From 5-10kg	34	18.8	3
From 10-15kg	93	51.4	1
From 15-20kg	44	24.3	2
More than 20kg	4	2.2	5
Total	181	100	-
<i>Child birth order:</i>			
1 st	18	9.9	5
2 nd	42	23.2	2
3 rd	58	32.1	1
4 th	42	23.2	2
More	21	11.6	4
Total	181	100	-
<i>Onset of cerebral palsy:</i>			
Prenatal	11	6.1	3
Perinatal	29	16	2
Postnatal	141	77.9	1
Total	181	100	-
<i>Were any birth defects present?</i>			
Yes	50	27.6	2
No	131	72.4	1
Total	181	100	-
<i>Is there a known syndrome?</i>			
Yes	21	11.6	2
No	160	88.4	1
Total	181	100	-
<i>Weight at delivery</i>			
Very low birth of weight <4-1000gm	1	0.6	4
low birth of weight <1500gm	76	42	2
Normal birth of weight 2500-4200gm	100	55.2	1
High birth of weight >4200gm	4	2.2	3
Total	181	100	-

Table (4): Frequency and percentage of associated disorders with cerebral palsy cases.

Variable	Freq.	%	Rank
<i>Epilepsy:</i>			
Affected	73	40.3	2
Not affected	108	59.7	1
Total	181	100	–
<i>Intellectual:</i>			
Affected	114	63	1
Not affected	67	37	2
Total	181	100	–
<i>Visual (by following object):</i>			
Affected	64	35.4	2
Not affected	117	64.6	1
Total	181	100	–
<i>Hearing (by following sounds):</i>			
Affected	27	14.9	2
Not affected	154	85.1	1
Total	181	100	–
<i>Speech:</i>			
Affected	148	81.8	1
Not affected	33	18.2	2
Total	181	100	–
<i>Swallowing (according to age):</i>			
Affected	64	35.4	2
Not affected	117	64.6	1
Total	181	100	–

Table (5): Distribution of participants according to topography and motor type.

Variable	Freq.	%	Rank
Quadriplegia	43	23.8	2
Diplegia	90	49.7	1
Triplegia	2	1.1	7
Right hemiplegia	13	7.2	4
Left hemiplegia	5	2.8	5
Mainly athetosis	1	0.6	9
Mainly dystonia	2	1.1	7
Ataxia	3	1.7	6
Hypotonia	22	12.1	3
Total	181	100	–

Table (6): Frequency and percentage of each GMFCS level of the participants.

Variable	Freq.	%	Rank
Level I	2	1.2	5
Level II	39	21.5	2
Level III	23	12.7	3
Level IV	18	9.9	4
Level V	99	54.7	1
Total	181	100	–

Table (7): Total GMFM score of the participants.

Variable	Freq.	%	Rank
Less 115	109	60.2	1
From 115-160	37	20.5	2
From 161-200	16	8.8	4
More than 200	19	10.5	3
Total	181	100	–
Mean	= 95.87		
Std. deviation	= 70.93		

Table (8): Frequency and percentage of impairment of each MACS level.

Variable	Freq.	%	Rank
Level I	27	14.9	5
Level II	35	19.3	3
Level III	40	22.1	2
Level IV	47	26	1
Level V	32	17.7	4
Total	181	100	–

Table (9): Viking scale.

Variable	Freq.	%	Rank
Level I	15	8.3	4
Level II	32	17.7	3
Level III	63	34.8	2
Level IV	71	39.2	1
Total	181	100	–

Discussion

There is no CP registry in Qalubia governorate, so the current study was conducted to establish data base about CP children who are receiving physical therapy services in governmental hospitals, university hospitals, insurance hospital and physical therapy privet centers, in addition to those who aren't receiving physical therapy services in Qalubia governorate. All children were diagnosed as CP included in this study. Latest information about population Qalubia in 1/1/2017 total population was (5, 627, 420). Persons are 18 years or less (2, 701, 716).

Regarding demographic classification of CP, the collected data in this study revealed that CP affects both genders. However, male were affected more than female 94 of 181 patients were male (51.9%) and 87 of 181 patients were female (48.1%). Consistent with the results of Johnson [18] who reported that boy/girl ratio in Europe is 1.33/1, and Laisram et al., [19] who reported the boy/girl ratio is 1.9/1 in India.

Regarding area, the current study shows that CP cases in urban more than CP cases in rural as 100 cases represent 55.20% in urban, and 81 cases 44.80% in rural, agree with El-Tallawy et al., [20]. reported that CP cases in urban more than rural as 32 cases (61.5%) in urban and 20 cases (38.5%) in rural, disagree with Abd El-Aziem and Morsy, [22] reported that 162 cases (81%) in rural and 38 cases (19%) urban.

Regarding the gestational age, full term delivery represented the highest frequency with percentage 79.5%. This matched the opinion of Dag Moster, et al., [21] who found that, compared with delivery at 40 weeks' gestation, delivery at 37 or 38 weeks or at 42 weeks or later was associated with an increased risk of CP. This result of study is not matched the opinion of with Oskoui et al., [22] who reported that, CP is commonly reported in children who were born before 28 weeks of gestation. Similarly, Cans et al., [23] concluded that, the prevalence of CP decreases significantly with increasing gestational age category: 14.6% at 22-27 weeks' gestation, 6.2% at 28-31 weeks, 0.7% at 32-36 weeks, and 0.1 % in term infants.

Regarding birth weight, children born with very low birth weight represented 0.60% and with low birth weight represented 42.00% while the result of normal birth weight represented 55.00% and high birth weight represented 2.20%. It comes in agreement with Jonas H. Ellenberg, Karin B. Nelson, [24] who reported Low birth weight and short gestation were important risk factors for CP, but these characteristics were uncommon, and the majority of children with CP were of normal birth weight and term gestational age. The result of this study is not matched the opinion of Platt et al., [25]; Cans et al., [26] who reported that, the highest prevalence of CP is among children whose birth weight is from 1000 to 1499 grams (g) while the lowest prevalence is in children who were born over 2500g.

Regarding to type of delivery for CP Children, 111 were delivered by cesarean section (61.30%) and 70 were represented by spontaneous normal delivery (38.70%). Regarding to this result CP children who delivered by emergency cesarean section were very high due to, low economic status, they do many trials for normal labor, as the majority of CP children from rural and lack of neonatal care so emergency cesarean section was done for live saving either to the mother or infant. There were misunderstandings that elective caesarean section could decrease rate of CP.

Regarding type of CP, the current study showed spastic CP was the most common type representing, 84.60% of the total sample. While Hypotonic was 13.20%, Ataxic was 1.7% and Dyskinetik was 1.7%. These findings come in agreement with Rosenbaum et al., [27]; Blair, [28] and Parkinson et al., [29] who stated that, spastic CP is the most common type of CP. Spasticity is the predominant type of CP, occurring in 77% to 93% of CP cases, dyskinesia ranges from 2% to 15%, and ataxia ranges from 2% to 8%. Similarly, Stanley et al., [30] stated that, spastic CP is the most prevalent of overall types, occurring in upwards of 70% of all cases.

Regarding CP subtypes, the results also showed that, diplegic type showed the highest frequency representing 49.70%, while quadriplegic represented 23.80% and hemiplegic represented 10%. The results confirmed the findings of Belonwu RO, et al., [31]; Himmelman K., et al., [32] they stated that, rates of spastic CP in these studies varied between 70% and 90%.

In the current study hypotonic CP cases represent 13.20%, it is agree with Abd El-Aziem and Morsy, [21] who reported that highly percentage of hypotonic type due to mixed with ataxia if persistent hypotonia and may be transfer to other type especially spastic type if it is transient, persistent or transient according to child age as under 3 years considered transient.

Spastic diplegic CP is the most predominant subtype representing 49.70%, of all CP cases in this study. This could be attributed to the fact that infants born prematurely and low birth weight has a heightened risk of developing diplegic CP as these babies are prone to oxygen problems during birth. Cerebral palsy guide.com, [33]. This is also matched the opinion of Ashwal et al., [34] and Tong-Wai et al., [35] reported that, spastic diplegia is one of the most common clinical subtypes of CP regardless of birth weight and gestation.

The result of study showed CP quadriplegia 23.80% which is ranked as second highest type of CP cases. This is not matched the opinion of Himmelman K, et al., [32]; Normark E, et al., [36] and Howard J, et al., [37] they reported that the proportion of children with quadriplegic CP (15%) was lower than reported in one the study from Australia (32%), whether it was higher than two study in Western Sweden (6% and 10% respectively). The result of current study is matched the opinion of Hamdy N. El-Tallawy, et al., [20] they reported the proportion of children with quadriplegic CP in

their study (42.3%) was higher than that reported in study carried out in Norway (14.9%).

Ataxic and Dyskinetik CP children in our study are representing the lowest percentage which (1.7% and 0.60% respectively), this is matched the opinion of El-Tallawy et al., [38] recorded that ataxic CP ratio was 3.9%. Ataxic CP is clinically observed in approximately 5-10% of all cases of CP, making it the least frequent form of CP diagnosed McHale et al., [39].

Regarding type of evaluation, the current study revealed that the children's GMFCS was 1.20% at level I, 21.50% at level II, 12.70% at level III, 9.90% at level IV, and 54.70% at level V. Our results are in disagreement with Beckung et al., [40] who reported that, over 60% of children with CP could walk without assistive walking devices (GMFCS levels I-II). This also comes in Himmelmann et al., [41] and Lowing et al., [42] reported that all five levels within the GMFCS-E & R were represented where of 22% children were classified in GMFCS-E & R I, 26% in GMFCS-E & R II, 16% in GMFCS-E & R III, 17% in GMFCS-E & R IV and 19% of the children were classified in GMFCS-E & R V. The results of current study is in agreement with Hesham S. Darwesh, et al., [43] who reported level of impairment according to gross motor function classification system: Level of impairment according to gross motor function classification system, level, I 6 (2.6%), level II, 28 (12.3%), level III, 58 (25.4%), level IV, 42 (18.4%), level V, 94 (41.2%).

Regarding associated impairment of CP, this study showed that 40.30% of CP children had Epilepsy. Intellectual problems founded 35.40%, visual disorder in 35.40%, hearing disorder in 14.90%, speech disorder in 81.80% and swallowing disorder in 35.40%. This comes in agreement with Jan, [44] who found that, children with CP suffer from multiple problems and potential disabilities such as mental retardation, epilepsy, feeding difficulties, ophthalmologic and hearing impairments. More over these findings were supported by Novak et al., [45] who reported that, children with CP have a wide range of associated disabilities, including intellectual disability, hearing and visual deficits, nutritional and feeding problems, respiratory infections and epilepsy.

Regarding prevalence of CP, the current study revealed that the total CP cases in Qalubia governorate were 181 cases representing 6 per 100,000 live births, although physiotherapy often constitutes a major part of the team approach in rehabilitation

of CP. Prevalence of CP occurs at rate 2-2.5 per 1000 live births in developed countries (Shevell and Bodensteiner, [46]). Also in Egypt the prevalence was 1.2 per 1000 live births in Imbaba North Giza (Hesham S. Darwesh, et al., [43]).

Conclusion:

The current study revealed that children with CP were 181 representing 6 per 100,000 live birth have been receiving physical therapy; incidence of spastic type was major while ataxic was the least prevalence. Demography was 51.9% male and 48.1% female, high incidence of children with CP level V in GMFCS, level IV in MACS and Viking speech scale.

Prevalence of CP based on GMFCS were; 1.20% for level I, 21.50% for level II, 12.70% for level III, 9.90% for level IV, and 54.70% for level V, while prevalence of recruited children based on MACS were; 14.90% for level I, 19.30% for level II, 22.10% for level III, 26.00% for level IV, and 17.70% for level V. Viking speech scale showed; 8.30% for level I, 17.70% for level II, 34.80% for level III, and 39.20% for level IV.

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تسجيل مرضى الشلل الدماغي بمحافظة القليوبية

تم تسجيل الأطفال المصابة بمرض الشلل الدماغي الذين يتلقون خدمات العلاج الطبيعي في محافظة القليوبية، وذلك لعمل قاعدة بيانات عن مرضى الشلل الدماغي، وقد أجريت الدراسة في الأماكن الآتية: مستشفى بنها الجامعي، مستشفى النيل للتأمين الصحي، مستشفى شبين القناطر المركزي، مستشفى طوخ المركزي، مستشفى الخانكة المركزي، مراكز العلاج الطبيعي الخاصة لعلاج الأطفال بقها، مراكز العلاج الطبيعي الخاصة لعلاج الأطفال بمشتهر، وكان إجمالي هذه الحالات ١٨١ حالة بمعدل ٦ لكل ١٠٠٠٠ مولود. وقد تم تقييم هؤلاء الأطفال بمقياس الوظائف الحركية الكبرى - ونظام تقسيم المهارات اليدوية وأخيراً مقياس فايكنج.

وخلصت الدراسة إلى الآتي: بالنسبة لمقياس تقسيم الوظائف الحركية الكبرى ١.٢٠٪ في المستوى الأول، ٢١.٥٠٪ في المستوى الثاني، ١٢.٧٠٪ في المستوى الثالث، ٩.٩٠٪ في المستوى الرابع، وأخيراً ٥٤.٧٠٪ في المستوى الخامس.

وبالنسبة لمقياس تقسيم المهارات اليدوية كانت كالتالي: ١٤.٩٠٪ في المستوى الأول، ١٩.٣٠٪ في المستوى الثاني، ٢٢.١٠٪ في المستوى الثالث، ٢٦٪ في المستوى الرابع، وأخيراً ١٧.٧٠٪ في المستوى الخامس.

وبالنسبة لمقياس فايكنج كانت كالتالي: ٨.٣٠٪ في المستوى الأول، ١٧.٧٠٪ في المستوى الثاني، ٣٤.٨٠٪ في المستوى الثالث، وأخيراً ٣٩.٢٠٪ في المستوى الرابع.