Development of Simulated Hippotherapy System and Investigation of the Effectiveness in Children with Cerebral Palsy

Study Protocol with Statistical Analysis Plan (SAP) and Informed Consent Form (ICF)

February 28, 2019

Development of Simulated Hippotherapy System and Investigation of the Effectiveness in Children with Cerebral Palsy

Study Protocol

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February 28, 2019

Study Protocol

Study titled “Development of Simulated Hippotherapy System and Investigation of the Effectiveness in Children with Cerebral Palsy”was approved by Marmara University Faculty of Medicine Clinical Researches Ethics Committee meeting on 07.04.2017 with approval number: 09.2017.297 (Annex-1).

The legal representatives of the children who participated in the study were informed about the aim, duration and the programs to be applied throughout the study. Volunteer Information Form has been signed and approved in accordance with the standards deemed appropriate by the Clinical Researches Ethics Committee of Marmara University Faculty of Medicine (This form can be seen on Informed Consent Form (ICF) section). The study was conducted in accordance with the Declaration of Helsinki.

Hypothesis of the Study

H_0: Addition of the exercises performed with Simulated Hypotherapy device to the neurodevelopmental (NDT) based rehabilitation program in children with cerebral palsy does not contribute positively in improving the efficiency of lower extremity functions, body control and spasticity.

H_1: Addition of the exercises performed with Simulated Hypotherapy device to the neurodevelopmental (NDT) based rehabilitation program in children with cerebral palsy contributes positively to improve the efficiency of lower extremity functions, body control and spasticity.

Randomization of the Study Groups

Children with Cerebral Palsy who applied to the Bulgurlu Unimpeded Life Center for rehabilitation were invited to participate in the study. Children who volunteered to participate and whom met the criteria for participation were randomized with simple random sampling method and divided into two groups. Individual Neurodevelopmental (NDT) based rehabilitation programs were applied to the participants in Group I for 8 weeks. After 8 weeks of only Neurodevelopmental therapy (NDT) based rehabilitation, Simulated Hypotherapy system was added to the rehabilitation program, and the name of the was changed into Group II (the study group).

Inclusion Criteria

- Having a diagnosis of Spastic Cerebral Palsy,
- Children aged between 5 - 18 years,
- GMFCS level is I, II or III,
- Independent seating
- Walking at least 10 meters independently,
- Can understand simple verbal instructions,
- Those with a spasticity level less than 2 according to MAS,
- Having bilateral hip abduction enough to sit on the hippotherapy device,
- Voluntary acceptance to participate in the study

Exclusion Criteria

- Having hip dislocation,
- Severe contracture or deformity,
- Scoliosis (above 20 degrees),
- Acute uncontrolled acute seizures,
- Epilepsy,
- Visual and auditory problems,
- Injection of botulinum toxin in the last 6 months,
- History of surgical operation such as muscle relaxation, tendon extension and selective dorsal rhizotomy in the last 6 months.

Applied Evaluations

Evaluations are applied three times: before treatment, in week 8 (end of NDT) and in week 16 (end of simulated hippotherapy training). All evaluation data are noted to 'Participants Tracking Form' (Annex-2). Primary outcome measures and applied evaluations are shown in Table 1.

Table 1. Primary outcome measures and applied evaluations

Primary Outcome Measures	Applied Evaluations
Functional Level	Gross Motor Functional Classification System (GMFCS)

Spasticity	Modified Ashworth Scale (MAS)
Range of Motion (ROM)	Goniometer
Gross Motor Function	Gross Motor Function Measure - 88
Trunk Movements	Trunk Impairment Scale (TIS)
Functional Independence	The Functional Independence Measure for Children (WeeFim)
Balance	Pediatrics Balance Scale (PDS)
Soft Tissue Assessment	Myoton PRO® Device
Gait Analysis	FreeMed®
Balance in Daily Living Activities	Pedalo® Balance Device

Functional level will be defined with ‘Gross Motor Functional Classification System (GMFCS), spasticity with 'Modified Ashworth Scale', lower extremity joint range of motion (ROM) with ‘goniometer', gross motor functions with ‘Gross Motor Function Measure (GMFM-88)’, the functional strength of the body, its postural control and the nature of the trunk movements with ‘Trunk Impairment Scale’, functional independency for activities in children with ‘The Functional Indepence Measure for Children (WeeFim)’, the balance with an assessment tool adapted from the Berg Balance Scale (BDS) for the children in daily living activities ‘Pediatric Balance Scale (PDS)’, superficial skeletal muscles, connective tissues such as tendons and ligaments and other soft tissues with ‘Myoton®PRO Digital Palpation Device’, gait analysis with ‘FreeMed® (Sensör Medica)’ and the balance during sitting and standing positions with ‘Pedalo Balance Device’.

Treatment Program

The participants in the study will be rehabilitated in Bulgurlu Unimpeded Life Center twice a week for 16 weeks in total (Duration of one session is 45 minutes).

Group I (Control Group) will receive individual Neurodevelopmental (NDT) based rehabilitation program.

Group II (Study Group) will receive individual NDT based rehabilitation program (25 minutes) + Simulated Hippotherapy System (20 minutes).

Simulated Hippotherapy System Training Protocol

In addition to the 25-minute neurodevelopmental treatment program, a 20-minute simulated hippotherapy system will be used. Programs that can be controlled by software and prepared according to the needs of the participants will be used. The simulated horse will be directed to reveal the contraction in the desired area. It is aimed to increase the strength of the desired muscles and to improve the body control, relaxation of muscles. EMG will be used to monitor how the muscles respond to action.

Neurodevelopmental Therapy (NDT) Based Rehabilitation

In accordance with the needs of the patients for their gross motor functions, the children in both groups were included in the NDT program, which was determined according to the age, sex, mental status and preferences of the individual. NDT program will include; rehabilitation of muscle tonus disorders, sensory-perception-motor integrity enhancement, exercises to increase extremity functions and body control, stretching and strengthening exercises due to muscular tightness and weakness, exercises to accommodate movements in daily life, and training of activities such as standing up, walking, body care.

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Statistical Analysis Plan (SAP)

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Statistical Analysis Plan (SAP)

The statistical program Statistical Package for Social Sciences (SPSS) Version 11.5 (SPSS Inc., Chicago, IL, USA) will be used in the data analysis of the study. The p value of $p<0.05$ will be considered to be statistically significant in the data analysis. One sample Kolmogorov-Smirnov test will be used to investigate the appropriateness of the variables to normal distribution.

Intra-group analysis of the evaluation parameters that conform to the normal distribution will be done by Paired t-test and the intergroup analysis will be done by Independant t-test. Wilcoxon t-test will be used for intragroup analysis of parameters that do not comply with normal distribution, and Mann Whitney-U Test will be used for intergroup analysis.

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Informed Consent Form (ICF)

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Informed Consent Form (ICF)

Description of the Physiotherapist

This study, if you accept your child to be participated, is a scientific research and it is titled as "Development of Simulated Hippotherapy System and Investigation of the Effectiveness in Children with Cerebral Palsy". In this study, functional level will be defined with 'Gross Motor Functional Classification System (GMFCS), spasticity with 'Modified Ashworth Scale', lower extremity joint range of motion (ROM) with 'goniometer', gross motor functions with 'Gross Motor Function Measure (GMFM-88)', the functional strength of the body, its postural control and the nature of the trunk movements with 'Trunk Impairment Scale', functional independency for activities in children with 'The Functional Indepence Measure for Children (WeeFim)', the balance with an assessment tool adapted from the Berg Balance Scale (BDS) for the children in daily living activities 'Pediatric Balance Scale (PDS)', superficial skeletal muscles, connective tissues such as tendons and ligaments and other soft tissues with 'Myoton®PRO Digital Palpation Device', gait analysis with 'FreeMed® (Sensör Medica)' and the balance during sitting and standing positions with 'Pedalo Balance Device'. The study, which is planned to last in 16 weeks, requires participants to attend the study regularly for twice a week and each day for one session which is 45 minutes. There will be no disruption of the body during the process.

This research will be carried out by Neslihan KARABACAK, PT (Tel: +90 534 [redacted]), Canan Günay YAZICI, PT, MSc (Tel: +90 538 [redacted]) and will be under the supervision of Zübeyir SARI, PT, MSc, PhD, Assoc. Prof. at Marmara University, Institute of Health Sciences, Department of Physiotherapy and Rehabilitation.

Your child is being invited to a research project. It is very important for you to understand why and how this research will be done before making a decision. Please take some time and read the following informations carefully, discuss it with others if you wish. If you have an unclear section or need more detailed information, you can get information from us. You are invited to our research because we think your child matches the criterias to be included. We would like to note that participation is voluntary and that refusal to participate does not lead to any penalty or loss of any benefit. In the same way, you can withdraw from the research at any time.

After getting the demographic information of the participants, the upper extremity functions will be measured by the above physiotherapist and with the mentioned tests. The evaluation tests will be repeated 3 times throughout the treatment. The data obtained from the assessments will be recorded in the computer and the changes during pre- and post-treatment will be analyzed. The assessments applied to the participants in our research do not have any known harm. In the event of any unexpected damage in the evaluation process or during the rehabilitation process, the information will be given immediately to you. In case of any damage to the participants, the necessary applications shall be covered by the researchers without any recourse. For this, you will not be charged any fees, neither you nor your social security insurance.

While participation in the research does not help you immediately, it is hoped that our research results will have benefits for the organization, society or science in the future. You will not be charged any fees for the purposes of the research or for the social security institution to which you are affiliated.

Consent of the Participant

I have read the entire information form clearly and understood or because I do not know how to read/not able to or do not understand the language it was read or translated to me. I was given the opportunity to ask, evaluate and decide on my health status both during and after my application and when filling this form in. All kinds of treatment and diagnostic alternatives, including the possibility of not getting the treatment, their risks and dangers are explained.

Name and the Surname of the Participant and Legal Representative:

Date: **Signature:**

Name and Surname of the Withness:

Date: **Signature:**

Declaration of the Physiotherapist

I gave the patient the necessary information about the study and the procedures to be performed. I believe that the patient understood this information, asked me the questions that she/he wanted to ask, and accepted the process with her/his free will.

Researcher: Physiotherapist Neslihan KARABACAK

Address: Marmara University, Institute of Health Sciences, Department of Physiotherapy and Rehabilitation- Başıbüyük . Maltepe /Istanbul/TURKEY

Mobile Phone: +90 534 [redacted] **E-mail:** neslikarabacak@gmail.com

Date: **Signature:**

Researcher: Physiotherapist Canan GÜNAY YAZICI

Address: Marmara University, Institute of Health Sciences, Department of Physiotherapy and Rehabilitation - Başıbüyük . Maltepe/Istanbul/TURKEY

Mobile Phone: +90 538 [redacted] **E-mail:** cnngnyzc@gmail.com @gmail.com

Date: **Signature:**

Declaration of the Participant / Legal Representative

I understand that a medical research will be carried out and the above information about this research was explained to me. I know my child is invited to this research as a participant. If I participate in this research, I believe that the confidentiality of the information of my child during research will be treated with great care and respect. I was given enough information that my child's personal information would be protected with care during the use of the research and the results will only used for educational and scientific purposes. During the research I can withdraw my child from the study at any time without any cause (But in that case I am aware of the difficult situation it would cause to the reaseachers if I do not give any notice). I don't take any financial responsibility for the research expenses. There will be no payment for me. Whether directly, indirectly arised any health problem that may occur during the research, I will not undergo any monetary burden. When we encounter any health problem during the research; at any hour, I know I can call my physiotherapist. My child does not have to be participated in this research or may not participate. We have not experienced any compelling behavior to participate in the research. If we refuse to participate, I know that this will not bring any harm to our medical care and our relationship with my physiotherapist.I have understood all the explanations made to me in detail. At the end of a certain period of thinking on my own, I decided that my child could take part in this research project as a participant. On behalf of my child, I accept this invitation voluntarily.

I have read the text above which shows the information that should be given to the volunteer before investigating. These were written and was explained verbally. With these conditions, I agree to participate in this research without any pressure or compulsion on me and my child. A signed 2 copies of this form, which consists of 4 pages, a copy of the documents will be given to me.

Name and the Surname of the Participant and Legal Representative:

Date: **Signature:**

Name and Surname of the Withness (who have witnessed the process of receipt until the end**):**

Date: **Signature:**

The researcher who made the explanations,

Researcher: Physiotherapist Neslihan Karabacak

Address: Marmara University, Institute of Health Sciences, Department of Physiotherapy and Rehabilitation - Başıbüyük . Maltepe/Istanbul/TURKEY

Mobile Phone: +90 534 [redacted] **E-mail:** neslikarabacak@gmail.com

Date: **Signature:**

Researcher: Physiotherapist Canan GÜNAY YAZICI

Address: Marmara University, Institute of Health Sciences, Department of Physiotherapy and Rehabilitation - Başıbüyük . Maltepe/Istanbul/TURKEY

Mobile Phone: +90 538 [redacted] **E-mail:** cnngnyzc@gmail.com @gmail.com

Date: **Signature:**

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Annex

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Annex 1. Marmara University Faculty of Medicine Clinical Researches Ethics Committee Approval (Approval made at the meeting on 07.04.2018 with number: 09.2017.297)

Marmara Üniversitesi Tıp Fakültesi
Klinik Araştırmalar Etik Kurulu

BAŞVURU BİLGİLERİ	PROTOKOL KODU	09.2017.297
	PROJE ADI	Simüle Hippoterapi Sisteminin Geliştirilmesi ve Serebral Palsi'li Çocuklarda Etkinliğinin Araştırılması
	SORUMLU ARAŞTIRICI ÜNVANI/ADI	Doç. Dr. Zübeyir SARI

KARAR BİLGİLERİ	Tarih 07.04.2017 Yukarıda başvuru bilgileri verilen araştırma başvuru dosyası ve ilgili belgeler araştırmanın gerekçe, amaç, yaklaşım ve yöntemleri dikkate alınarak incelenmiş ve gerçekleştirilmesinde sakınca bulunmadığı için Kurulumuzca onaylanmasına oy birliği ile karar verilmiştir. Onay sonrasında yapılacak her türlü proje değişiklikleri (katılımcılar, başlık vb.) veya protokol değişikliklerinin Etik Kurula bildirilerek proje onayının yenilenmesi gerekmektedir.

ÜYELER

Unvanı / Adı / Soyadı	Uzmanlık Dalı	Kurumu / EK Üyeliği	Onaylanan Proje ile İlişkisi	Toplantıya katılım	İmza
Prof.Dr. Haner DİRESKENELİ	Romatoloji	M.Ü Tıp Fakültesi/ Başkan	Var Yok	Evet Hayır	
Prof.Dr. Tülin ERGUN	Dermatoloji	M.Ü Tıp Fakültesi/Başkan Yrd.	Var Yok	Evet Hayır	
Prof. Dr. Şefik GÖRKEY	Tıp Tarihi ve Etik	M.Ü Tıp Fakültesi/Üye	Var Yok	Evet Hayır	
Prof.Dr. Handan KAYA	Patoloji	M.Ü Tıp Fakültesi/Üye	Var Yok	Evet Hayır	
Prof.Dr. M.Bahadır GÜLLÜOĞLU	Genel Cerrahi	M.Ü Tıp Fakültesi/Üye	Var Yok	Evet Hayır	
Prof.Dr. Atila KARAALP	Farmakoloji	M.Ü Tıp Fakültesi/Üye	Var Yok	Evet Hayır	
Prof.Dr. Semra SARDAŞ	Eczacı	M.Ü Eczacılık Fak./Üye	Var Yok	Evet Hayır	
Prof.Dr. Başak DOĞAN	Diş Hekimi	M.Ü Diş Hekimliği Fak./Üye	Var Yok	Evet Hayır	
Prof. Dr. Beste Melek ATASOY	Radyasyon Onkolojisi	M.Ü Tıp Fakültesi/Üye	Var Yok	Evet Hayır	
Doç. Dr. Elif KARAKOÇ AYDINER	Çocuk Sağlığı ve Hastalıkları	M.Ü Tıp Fakültesi/Üye	Var Yok	Evet Hayır	
Doç.Dr. Meltem KORAY	Diş Hekimi	İstanbul Üniv. Diş Hekimliği Fak./Üye	Var Yok	Evet Hayır	
Doç. Dr. Görkan SERT	Hukukçu	M.Ü Tıp Fakültesi/Üye	Var Yok	Evet Hayır	
Yrd.Doç.Dr. Figen DEMİR	Halk Sağlığı	Acıbadem Üniv. Tıp Fak.	Var Yok	Evet Hayır	
Yrd.Doç.Dr. Pınar Mega TİBER	Biyofizik	M.Ü Tıp Fakültesi/Üye	Var Yok	Evet Hayır	
Gözde Aynur MİRZA	Sağlık Mensubu olmayan kişi	Serbest	Var Yok	Evet Hayır	

Annex 2. Participants Tracking Form

No.		Date.	
Name-Surname			
Adress			
Phone			
Gender	Female ☐ Male ☐	Age	
Height		Weight	
CP Type	Hemiparetic ☐ Diparetic ☐ Quadriparetic ☐		
GMFCS Level	I ☐ II ☐ III ☐		
Education Level			
Having surgery/date			
Botulinum toxin injections and date of apply			
Auxiliary tool use			
Orthesis / device use			
History of any disease / trauma			
Any drug use at the moment?			

RANGE OF MOTİON

MEASURE	**BEFORE**		**WEEK 8**		**WEEK 16**	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
Hip flexion						
Hip extansion						
Hip internal rotation						
Hip external rotation						
Hip abduction						
Hip adduction						
Knee flexion						
Knee extansion						
Dorsi flexion						
Plantar flexion						

Modified Ashworth Scale

MEASURE	BEFORE		WEEK 8		WEEK 16	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
Hip adduction						
Hamstring						
Gastrocnemius						
Soleus						

Myoton®PRO Digital Palpation Device

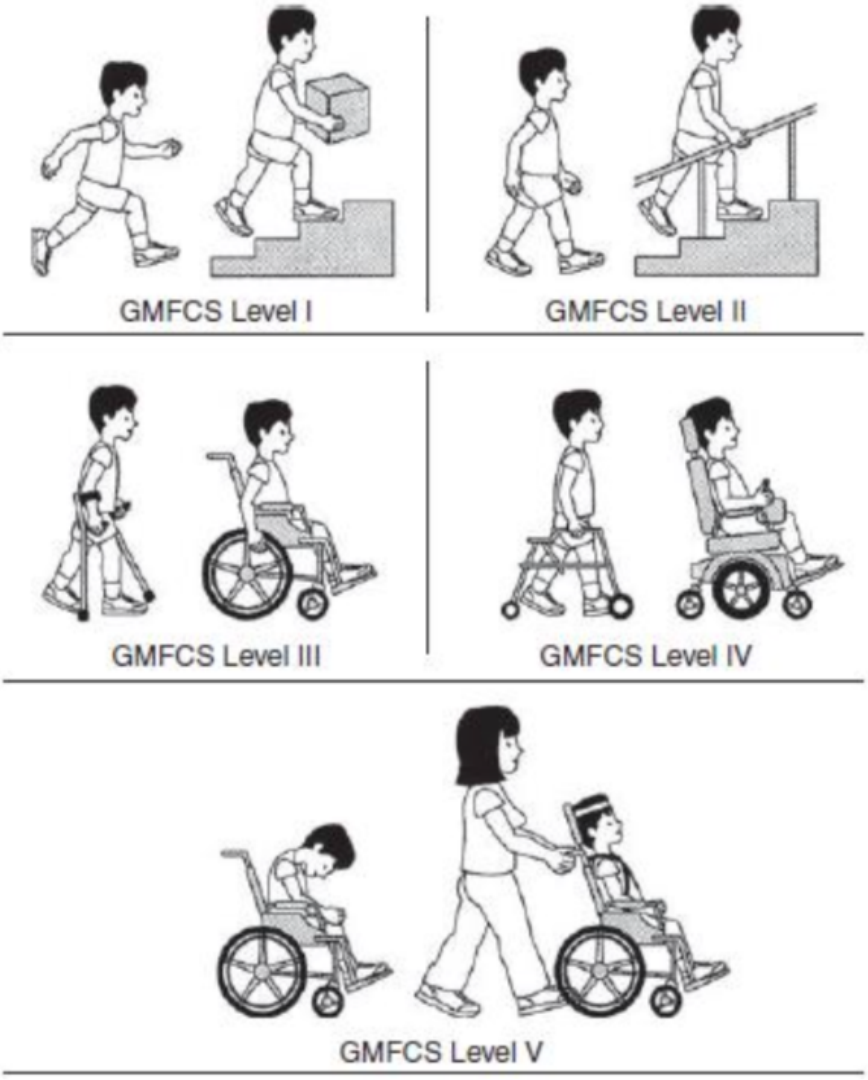
MEASURE	BEFORE		WEEK 8		WEEK 16	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
Hip flexion						
Hip adduction						
Hamstring						
Quadriceps						
Gastroknemius						
Soleus						

Modified Ashworth Scale (Please mark)

Grade	Description
0	No increase in muscle tone
1	Slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the range of motion when the affected part/s is/are moved in flexion or extension.
1+	Slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the ROM.
2	More marked increase in muscle tone through most of the ROM, but affected part(s) easily moved.
3	Considerable increase in muscle tone, passive movement difficult.
4	Affected part(s) rigid in flexion or extension.

ROM, range of motion.

Gross Motor Functional Classification System (GMFCS) (Please mark)



Trunk Impairment Scale (Please mark)

Item			
	Static sitting balance		
1	Starting position	Patient falls or cannot maintain starting position for 10 seconds without arm support	☐ 0
		Patient can maintain starting position for 10 seconds	☐ 2
		If score = 0, then TIS total score = 0	
2	Starting position Therapist crosses the unaffected leg over the hemiplegic leg	Patient falls or cannot maintain sitting position for 10 seconds without arm support	☐ 0
		Patient can maintain sitting position for 10 seconds	☐ 2
3	Starting position Patient crosses the unaffected leg over the hemiplegic leg	Patient falls	☐ 0
		Patient cannot cross the legs without arm support on bed or table	☐ 1
		Patient crosses the legs but displaces the trunk more than 10 cm backwards or assists crossing with the hand	☐ 2
		Patient crosses the legs without trunk displacement or assistance	☐ 3
		Total static sitting balance	/7
	Dynamic sitting balance		
1	Starting position Patient is instructed to touch the bed or table with the hemiplegic elbow (by shortening the hemiplegic side and lengthening the unaffected side) and return to the starting position	Patient falls, needs support from an upper extremity or the elbow does not touch the bed or table	☐ 0
		Patient moves actively without help, elbow touches bed or table	☐ 1
		If score = 0, then items 2 and 3 score 0	
2	Repeat item 1	Patient demonstrates no or opposite shortening/lengthening	☐ 0
		Patient demonstrates appropriate shortening/lengthening	☐ 1
		If score = 0, then item 3 scores 0	
3	Repeat item 1	Patient compensates. Possible compensations are: (1) use of upper extremity, (2) contralateral hip abduction, (3) hip flexion (if elbow touches bed or table further then proximal half of femur), (4) knee flexion, (5) sliding of the feet	☐ 0
		Patient moves without compensation	☐ 1
4	Starting position Patient is instructed to touch the bed or table with the unaffected elbow (by shortening the unaffected side and lengthening the hemiplegic side) and return to the starting position	Patient falls, needs support from an upper extremity or the elbow does not touch the bed or table	☐ 0
		Patient moves actively without help, elbow touches bed or table	☐ 1
		If score = 0, then items 5 and 6 score 0	
5	Repeat item 4	Patient demonstrates no or opposite shortening/lengthening	☐ 0
		Patient demonstrates appropriate shortening/lengthening	☐ 1
		If score = 0, then item 6 scores 0	

6	Repeat item 4	Patient compensates. Possible compensations are: (1) use of upper extremity, (2) contralateral hip abduction, (3) hip flexion (if elbow touches bed or table further then proximal half of femur), (4) knee flexion, (5) sliding of the feet	☐ 0
		Patient moves without compensation	☐ 1
7	Starting position Patient is instructed to lift pelvis from bed or table at the hemiplegic side (by shortening the hemiplegic side and lengthening the unaffected side) and return to the starting position	Patient demonstrates no or opposite shortening/lengthening	☐ 0
		Patient demonstrates appropriate shortening/lengthening If score = 0, then item 8 scores 0	☐ 1
8	Repeat item 7	Patient compensates. Possible compensations are: (1) use of upper extremity, (2) pushing off with the ipsilateral foot (heel loses contact with the floor)	☐ 0
		Patient moves without compensation	☐ 1
9	Starting position Patient is instructed to lift pelvis from bed or table at the unaffected side (by shortening the unaffected side and lengthening the hemiplegic side) and return to the starting position	Patient demonstrates no or opposite shortening/lengthening	☐ 0
		Patient demonstrates appropriate shortening/lengthening If score = 0, then item 10 scores 0	☐ 1
10	Repeat item 9	Patient compensates. Possible compensations are: (1) use of upper extremities, (2) pushing off with the ipsilateral foot (heel loses contact with the floor)	☐ 0
		Patient moves without compensation	☐ 1
		Total dynamic sitting balance	/10

Co-ordination

1	Starting position Patient is instructed to rotate upper trunk 6 times (every shoulder should be moved forward 3 times), first side that moves must be hemiplegic side, head should be fixated in starting position	Hemiplegic side is not moved three times	☐ 0
		Rotation is asymmetrical	☐ 1
		Rotation is symmetrical If score = 0, then item 2 scores 0	☐ 2
2	Repeat item 1 within 6 seconds	Rotation is asymmetrical	☐ 0
		Rotation is symmetrical	☐ 1
3	Starting position Patient is instructed to rotate lower trunk 6 times (every knee should be moved forward 3 times), first side that moves must be hemiplegic side, upper trunk should be fixated in starting position	Hemiplegic side is not moved three times	☐ 0
		Rotation is asymmetrical	☐ 1
		Rotation is symmetrical If score = 0, then item 4 scores 0	☐ 2
4	Repeat item 3 within 6 seconds	Rotation is asymmetrical	☐ 0
		Rotation is symmetrical	☐ 1
		Total co-ordination	/6
		Total Trunk Impairment Scale	/23

Pediatric Balance Test (Please mark)

All items are scored between 0 and 4 and the total score is calculated.

	Pediatric Balance Scale Items
1	Sitting to standing
2	Standing to sitting
3	Transfers
4	Standing unsupported
5	Sitting unsupported
6	Standing with eyes closed
7	Standing with feet together
8	Standing with one foot in front
9	Standing on one foot
10	Turning 360 degrees
11	Turning to look behind
12	Retrieving object from floor
13	Placing alternate foot on stool
14	Reaching forward with outstretched arm

The Functional Indepence Measure for Children (WeeFim) (Please mark)

Items	Descriptive Items
Domain 1: self-care (maximum = 56)	
1	Eating
2	Grooming
3	Bathing
4	Dressing-upper
5	Dressing-lower
6	Toileting
7	Bladder
8	Bowel
Domain 2: mobility (maximum = 35)	
9	Chair transfer
10	Toilet transfer
11	Tub transfer
12	Walk
13	Stairs
Domain 3: cognition (maximum = 35)	
14	Comprehension
15	Expression
16	Social interaction
17	Problem solving
18	Memory
Total scores = 126	

7 = Fully independent 6 = Modified independent	Unaided
5 = Surveillance is required 4 = Minimal aid (75% of children) 3 = Moderate help (50% of children)	Helped / Modified Dependent
2 = Maximum help (25% of children) 1 = Full help (<less than 25% of children do)	Totally Dependent

Gross Motor Functıon Measure-88 (Please mark)

	A: LYING & ROLLING	SCORE			
1.	SUP, HEAD IN MIDLINE: TURNS HEAD WITH EXTREMITIES SYMMETRICAL	0☐	1☐	2☐	3☐
2.	SUP: BRINGS HANDS TO MIDLINE, FINGERS ONE WITH THE OTHER	0☐	1☐	2☐	3☐
3.	SUP: LIFTS HEAD 45°	0☐	1☐	2☐	3☐
4.	SUP: FLEXES R HIP & KNEE THROUGH FULL RANGE	0☐	1☐	2☐	3☐
5.	SUP: FLEXES L HIP & KNEE THROUGH FULL RANGE	0☐	1☐	2☐	3☐
6.	SUP: REACHES OUT WITH R ARM, HAND CROSSES MIDLINE TOWARD TOY	0☐	1☐	2☐	3☐
7.	SUP: REACHES OUT WITH L ARM, HAND CROSSES MIDLINE TOWARD TOY	0☐	1☐	2☐	3☐
8.	SUP: ROLLS TO PR OVER R SIDE	0☐	1☐	2☐	3☐
9.	SUP: ROLLS TO PR OVER L SIDE	0☐	1☐	2☐	3☐
10.	PR: LIFTS HEAD UPRIGHT	0☐	1☐	2☐	3☐
11.	PR ON FOREARMS: LIFTS HEAD UPRIGHT, ELBOWS EXT., CHEST RAISED	0☐	1☐	2☐	3☐
12.	PR ON FOREARMS: WEIGHT ON R FOREARM, FULLY EXTENDS OPPOSITE ARM FORWARD	0☐	1☐	2☐	3☐
13.	PR ON FOREARMS: WEIGHT ON L FOREARM, FULLY EXTENDS OPPOSITE ARM FORWARD	0☐	1☐	2☐	3☐
14.	PR: ROLLS TO SUP OVER R SIDE	0☐	1☐	2☐	3☐
15.	PR: ROLLS TO SUP OVER L SIDE	0☐	1☐	2☐	3☐
16.	PR: PIVOTS TO R 90° USING EXTREMITIES	0☐	1☐	2☐	3☐
17.	PR: PIVOTS TO L 90° USING EXTREMITIES	0☐	1☐	2☐	3☐

TOTAL DIMENSION A ☐

	B: SITTING	SCORE			
18.	SUP, HANDS GRASPED BY EXAMINER: PULLS SELF TO SITTING WITH HEAD CONTROL	0☐	1☐	2☐	3☐
19.	SUP: ROLLS TO R SIDE, ATTAINS SITTING	0☐	1☐	2☐	3☐
20.	SUP: ROLLS TO L SIDE, ATTAINS SITTING	0☐	1☐	2☐	3☐
21.	SIT ON MAT, SUPPORTED AT THORAX BY THERAPIST: LIFTS HEAD UPRIGHT, MAINTAINS 3 SECONDS	0☐	1☐	2☐	3☐
22.	SIT ON MAT, SUPPORTED AT THORAX BY THERAPIST: LIFTS HEAD MIDLINE, MAINTAINS 10 SECONDS	0☐	1☐	2☐	3☐
23.	SIT ON MAT, ARM(S) PROPPING: MAINTAINS, 5 SECONDS	0☐	1☐	2☐	3☐
24.	SIT ON MAT: MAINTAIN, ARMS FREE, 3 SECONDS	0☐	1☐	2☐	3☐
25.	SIT ON MAT WITH SMALL TOY IN FRONT: LEANS FORWARD, TOUCHESTOY, RE-ERECTS WITHOUT ARM PROPPING	0☐	1☐	2☐	3☐
26.	SIT ON MAT: TOUCHES TOY PLACED 45° BEHIND CHILD'S R SIDE, RETURNS TO START	0☐	1☐	2☐	3☐
27.	SIT ON MAT: TOUCHES TOY PLACED 45° BEHIND CHILD'S L SIDE, RETURNS TO START	0☐	1☐	2☐	3☐
28.	R SIDE SIT: MAINTAINS, ARMS FREE, 5 SECONDS	0☐	1☐	2☐	3☐
29.	L SIDE SIT: MAINTAINS, ARMS FREE, 5 SECONDS	0☐	1☐	2☐	3☐
30.	SIT ON MAT: LOWERS TO PR WITH CONTROL	0☐	1☐	2☐	3☐
31.	SIT ON MAT WITH FEET IN FRONT: ATTAINS 4 POINT OVER R SIDE	0☐	1☐	2☐	3☐
32.	SIT ON MAT WITH FEET IN FRONT: ATTAINS 4 POINT OVER L SIDE	0☐	1☐	2☐	3☐
33.	SIT ON MAT: PIVOTS 90°, WITHOUT ARMS ASSISTING	0☐	1☐	2☐	3☐
34.	SIT ON BENCH: MAINTAINS, ARMS AND FEET FREE, 10 SECONDS	0☐	1☐	2☐	3☐
35.	STD: ATTAINS SIT ON SMALL BENCH	0☐	1☐	2☐	3☐
36.	ON THE FLOOR: ATTAINS SIT ON SMALL BENCH	0☐	1☐	2☐	3☐
37.	ON THE FLOOR: ATTAINS SIT ON LARGE BENCH	0☐	1☐	2☐	3☐

TOTAL DIMENSION B ☐

	Item	C: CRAWLING & KNEELING	SCORE				NT
	38.	PR: CREEPS FORWARD 1.8m (6')	0☐	1☐	2☐	3☐	38.
*	39.	4 POINT: MAINTAINS, WEIGHT ON HANDS AND KNEES, 10 SECONDS	0☐	1☐	2☐	3☐	39.
*	40.	4 POINT: ATTAINS SIT ARMS FREE	0☐	1☐	2☐	3☐	40.
*	41.	PR: ATTAINS 4 POINT, WEIGHT ON HANDS AND KNEES	0☐	1☐	2☐	3☐	41.
*	42.	4 POINT: REACHES FORWARD WITH R ARM, HAND ABOVE SHOULDER LEVEL	0☐	1☐	2☐	3☐	42.
*	43.	4 POINT: REACHES FORWARD WITH L ARM, HAND ABOVE SHOULDER LEVEL	0☐	1☐	2☐	3☐	43.
*	44.	4 POINT: CRAWLS OR HITCHES FORWARD 1.8m(6')	0☐	1☐	2☐	3☐	44.
*	45.	4 POINT: CRAWLS RECIPROCALLY FORWARD1.8m (6')	0☐	1☐	2☐	3☐	45.
*	46.	4 POINT: CRAWLS UP 4 STEPS ON HANDS AND KNEES/FEET	0☐	1☐	2☐	3☐	46.
	47.	4 POINT: CRAWLS BACKWARDS DOWN 4 STEPS ON HANDS AND KNEES/FEET	0☐	1☐	2☐	3☐	47.
*	48.	SIT ON MAT: ATTAINS HIGH KN USING ARMS, MAINTAINS, ARMS FREE, 10 SECONDS	0☐	1☐	2☐	3☐	48.
	49.	HIGH KN: ATTAINS HALF KN ON R KNEE USING ARMS, MAINTAINS, ARMS FREE, 10 SECONDS	0☐	1☐	2☐	3☐	49.
	50.	HIGH KN: ATTAINS HALF KN ON L KNEE USING ARMS, MAINTAINS, ARMS FREE, 10 SECONDS	0☐	1☐	2☐	3☐	50.
*	51.	HIGH KN: KN WALKS FORWARD 10 STEPS, ARMS FREE	0☐	1☐	2☐	3☐	51.

TOTAL DIMENSION C ☐

	Item	D: STANDING	SCORE				NT
*	52.	ON THE FLOOR: PULLS TO STD AT LARGE BENCH	0☐	1☐	2☐	3☐	52.
*	53.	STD: MAINTAINS, ARMS FREE, 3 SECONDS	0☐	1☐	2☐	3☐	53.
*	54.	STD: HOLDING ON TO LARGE BENCH WITH ONE HAND, LIFTS R FOOT, 3 SECONDS	0☐	1☐	2☐	3☐	54.
*	55.	STD: HOLDING ON TO LARGE BENCH WITH ONE HAND, LIFTS L FOOT, 3 SECONDS	0☐	1☐	2☐	3☐	55.
*	56.	STD: MAINTAINS, ARMS FREE, 20 SECONDS	0☐	1☐	2☐	3☐	56.
*	57.	STD: LIFTS L FOOT, ARMS FREE, 10 SECONDS	0☐	1☐	2☐	3☐	57.
*	58.	STD: LIFTS R FOOT, ARMS FREE, 10 SECONDS	0☐	1☐	2☐	3☐	58.
*	59.	SIT ON SMALL BENCH: ATTAINS STD WITHOUT USING ARMS	0☐	1☐	2☐	3☐	59.
*	60.	HIGH KN: ATTAINS STD THROUGH HALF KN ON R KNEE, WITHOUT USING ARMS	0☐	1☐	2☐	3☐	60.
*	61.	HIGH KN: ATTAINS STD THROUGH HALF KN ON L KNEE, WITHOUT USING ARMS	0☐	1☐	2☐	3☐	61.
*	62.	STD: LOWERS TO SIT ON FLOOR WITH CONTROL, ARMS FREE	0☐	1☐	2☐	3☐	62.
*	63.	STD: ATTAINS SQUAT, ARMS FREE	0☐	1☐	2☐	3☐	63.
*	64.	STD: PICKS UP OBJECT FROM FLOOR, ARMS FREE, RETURNS TO STAND	0☐	1☐	2☐	3☐	64.

TOTAL DIMENSION D ☐

Item		E: WALKING, RUNNING & JUMPING	SCORE				NT
*	65.	STD, 2 HANDS ON LARGE BENCH: CRUISES 5 STEPS TO R	0☐	1☐	2☐	3☐	65.
*	66.	STD, 2 HANDS ON LARGE BENCH: CRUISES 5 STEPS TO L	0☐	1☐	2☐	3☐	66.
*	67.	STD, 2 HANDS HELD: WALKS FORWARD 10 STEPS	0☐	1☐	2☐	3☐	67.
*	68.	STD, 1 HAND HELD: WALKS FORWARD 10 STEPS	0☐	1☐	2☐	3☐	68.
*	69.	STD: WALKS FORWARD 10 STEPS	0☐	1☐	2☐	3☐	69.
*	70.	STD: WALKS FORWARD 10 STEPS, STOPS, TURNS 180°, RETURNS	0☐	1☐	2☐	3☐	70.
*	71.	STD: WALKS BACKWARD 10 STEPS	0☐	1☐	2☐	3☐	71.
*	72.	STD: WALKS FORWARD 10 STEPS, CARRYING A LARGE OBJECT WITH 2 HANDS	0☐	1☐	2☐	3☐	72.
*	73.	STD: WALKS FORWARD 10 CONSECUTIVE STEPS BETWEEN PARALLEL LINES 20cm (8")APART	0☐	1☐	2☐	3☐	73.
*	74.	STD: WALKS FORWARD 10 CONSECUTIVE STEPS ON A STRAIGHT LINE 2cm (3/4") WIDE	0☐	1☐	2☐	3☐	74.
*	75.	STD: STEPS OVER STICK AT KNEE LEVEL, R FOOT LEADING	0☐	1☐	2☐	3☐	75.
*	76.	STD: STEPS OVER STICK AT KNEE LEVEL, L FOOT LEADING	0☐	1☐	2☐	3☐	76.
*	77.	STD: RUNS 4.5m (15'), STOPS & RETURNS	0☐	1☐	2☐	3☐	77.
*	78.	STD: KICKS BALL WITH R FOOT	0☐	1☐	2☐	3☐	78.
*	79.	STD: KICKS BALL WITH L FOOT	0☐	1☐	2☐	3☐	79.
*	80.	STD: JUMPS 30cm (12") HIGH, BOTH FEET SIMULTANEOUSLY	0☐	1☐	2☐	3☐	80.
*	81.	STD: JUMPS FORWARD 30 cm (12"), BOTH FEET SIMULTANEOUSLY	0☐	1☐	2☐	3☐	81.
*	82.	STD ON R FOOT: HOPS ON R FOOT 10 TIMES WITHIN A 60cm (24") CIRCLE	0☐	1☐	2☐	3☐	82.
*	83.	STD ON L FOOT: HOPS ON L FOOT 10 TIMES WITHIN A 60cm (24") CIRCLE	0☐	1☐	2☐	3☐	83.
*	84.	STD, HOLDING 1 RAIL: WALKS UP 4 STEPS, HOLDING 1 RAIL, ALTERNATING FEET	0☐	1☐	2☐	3☐	84.
*	85.	STD, HOLDING 1 RAIL: WALKS DOWN 4 STEPS, HOLDING 1 RAIL, ALTERNATING FEET	0☐	1☐	2☐	3☐	85.
*	86.	STD: WALKS UP 4 STEPS, ALTERNATING FEET	0☐	1☐	2☐	3☐	86.
*	87.	STD: WALKS DOWN 4 STEPS, ALTERNATING FEET	0☐	1☐	2☐	3☐	87.
*	88.	STD ON 15cm (6") STEP: JUMPS OFF, BOTH FEET SIMULTANEOUSLY	0☐	1☐	2☐	3☐	88.

TOTAL DIMENSION E ☐