EFFICACY OF CONSTRAINT-INDUCED MOVEMENT THERAPY FOR CHILDREN WITH CEREBRAL PALSY WITH ASYMMETRIC MOTOR IMPAIRMENT AT CRP

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Session: 2012-2013

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February, 2017

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EFFICACY OF CONSTRAINT-INDUCE MOVEMENT THERAPY FOR CHIILDREN WITH CEREBRAL PALSY WITH ASYMMETRIC MOTOR IMPAIRMENT AT CRP

Submitted by **Liton Malo**, for the partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy.

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Declaration

I declare that the work presented here is my own. All sources used have been cited appropriately. Any mistakes or inaccuracies are my own. I also declare that for any publication, presentation or dissemination of information of the study. I would be bound to take written consent from the Department of Physiotherapy, Bangladesh Health Professions Institute.

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Acknowledgement

First of all I would like to express my gratitude to the almighty Allah. When I started the study I didn't know whether I could complete it or not but I believed, 'Fortune favors the brave'. So, I was determined to try my best to make it a success and I am most grateful to almighty Allah.

I would like to express the deepest appreciation to my supervisor **Mst. Fatema Akter**, Senior Lecturer, Department of Physiotherapy, BHPI, who has the attitude and the substance of a genius: She continually and convincingly conveyed a spirit of adventure in regard to research and an excitement in regard to teaching. Without his guidance and persistent help this research would not have been possible.

I would like to thank my honorable teacher **Md. Obaidul Haque**, Associate Professor & Head of the Department of Physiotherapy, BHPI, **Mohammad Anwar Hossain**, Associate Professor of BHPI & Head of the Department of Physiotherapy CRP, **Mohammad Habibur Rahman**, Assistant Professor, Department of Physiotherapy, BHPI, CRP, **Md. Shofiqul Islam**, Assistant Professor, Department of Physiotherapy. I would like to thanks **S. M. Joynul Abedin** to help this study and intern Physiotherapists specially for helping me in data collection procedure. I would pay to special gratitude to the staffs of the BHPI library that helps me to find out books for collecting literature of the study.

Also, it's my honor to mention Assistant Professor **Ehsanur Rahman** for the good advice, support and guide to conduct this research.

I specially thank to all Clinical Physiotherapist Pediatric Unit specially **Samira Akter Kakuli** Sr.CPT for helping me throughout the study.

Lastly I would like to thanks all of my friends and all participants those entire individual who are directly or indirectly involve with this study.

Acronyms

BHPI	**:**	Bangladesh Health Professions Institute.
BMRC	**:**	Bangladesh Medical Research Council
CIMT	**:**	Constraint Induce Movement Therapy
CRP	**:**	Center for the Rehabilitation of the Paralysed
CP	**:**	Cerebral Palsy
IRB	**:**	Institutional Review Board
SPSS	**:**	Statistical Package for the Social Science
PT	**:**	Physiotherapy
WHO	**:**	World Health Organization

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Abstract

Purpose: The purpose of the study was to identify the efficacy of CIMT for the children with cerebral palsy with asymmetric motor impairment in CRP. *Objectives:* To determine the efficacy of CIMT on motor function of hemiplegic CP children characterized by restraining the unaffected hand with short elbow bag up to wrist. *Methodology*: 10 children's (age: 7 to 96 months) from pediatric unit Physiotherapy Department, CRP, Savar with hemiplegic CP were included in the study. CIMT was applied to unaffected side. The intervention was given for 3 hours/session and home program which running into 2 weeks. Pre and Post outcome measure by using PMAL (Pediatric Motor Activity Log) scale. *Result*: Significant difference between Pre and Post values of all components of PMAL ($p \leq 0.05$) showing the efficacy of CIMT in improving motor function and in ADL activities *Conclusion*: CIMT yields statistically as well as clinically significant improvements in both motor function and functional use of the affected upper extremity in children between the ages of 7 to 96 months with hemiplegic CP.

Keywords: Hemiplegic CP, CIMT, Motor Function.

CHAPTER-I: INTRODUCTION

1.1 Background

Cerebral palsy is the well-recognized neuro- developmental motor disability condition in children. The condition requires medical, educational, social, and rehabilitative resources throughout the lifetime (Hurley et al., 2011).It is not a specific diagnosis that describes a number of neurological conditions resulting in abnormal development of movement and postural control. Cerebral palsy (CP) is the most common condition that is responsible for the child disability. According to World Health Organization 10% of populations in Bangladesh are disabled. Bangladesh has recently seen an increase number of children diagnosed with cerebral palsy. Most of the population are illiterate and not be aware about health (Ackerman et al., 2005).

Cerebral palsy (CP) is now familiar to most health and social service professionals, as well as to many members of the general public as a physically disabling condition. In fact, although CP only affects between 2 and 3 per 1000 live births it is thought to be the most common cause of serious physical disability in childhood (Morris, 2007).

There are many types of cerebral palsy. Hemiplegic cerebral palsy is a common type of cerebral palsy which is characterized by unilateral motor impairment. Hemiplegia accounts for 35% (1 in 1300) of the children with CP and upper limb (UL) involvement is usually more noticeable than the lower limb. If hemiplegic stroke occurs in-utero, or any time between birth and two years of age, it is considered hemiplegic CP (Thakkar, 2004).The most common cause of hemiplegic CP is a CVA (Cerebrovascular accidents) commonly known as a stroke. Children with hemiplegia have unilateral involvement of upper and lower extremities opposite to the side of cerebral injury, often characterized as muscle weakness and spasticity (WHO, 2001). As result these factors may affect movement efficiency, especially in the use of the upper extremity, which can also limit performance in functional activities at home and school (Gordon et al., 2005).

At the time of growth and development, children with hemiplegic cerebral palsy learn process and techniques to manage daily tasks (e.g. play) with one hand. Performance of tasks is frequently discovered to be more proficient and effective using the non-affected hand, even if there is only mild impairment in the affected limb.

(Kuhtz-Buschbeck et al., 2010).All forms of human activity like self-care, school or work and engagement in play or leisure activities are affected due to impairment of the upper limb (Slow and week, with uncoordinated movements, incomplete finger fractionation, spasticity and impaired tactile sensibility are common characteristics of the hemiplegic hand .The cause of hemiplegic CP is heterogeneous: timing, location, and extent of the brain damage vary from one child to another.

Therapy must, therefore, create the opportunity, experience and environment in which a child can learn how to use their affected limb. This experience must stakes the behavioral aspect of suppression of use of the affected limb and reward use of that limb in even the simplest tasks, such as stabilization of an object. Constraint-induced movement therapy is raised as a method of achieving this (DeLuca, 2002).

Constraint induced movement therapy (CIMT) is a relatively new intervention derived from the basic sciences. It was suggested that a promising new therapy for adults with hemiparesis consequent to stroke, known as Constraint-Induced Movement therapy. CIMT is a process of teaching a child to use his/her affected upper limb through use of a restraint on the non-affected limb and massed practice of movements of the affected limb (Hoare, et al., 2007).CIMT involves a restraint on the unaffected hand along with forced use of the affected hand, thereby improving the unilateral capacity of the latter. Regarding the action mechanism of CIMT, recent evidence suggests that the repetition of practice, immediate feedback during treatment, and enjoyable and functional shaping activities designed to promote a child's Engagement–rather than the use of a restraint that immobilizes the unaffected hand–are key elements for causing a change of cortical activation and for sustaining improvements in upper limb functions. (VAQ Dong et al, 2013).

Conventionally, constraint-induced therapy involves constraining the unaffected upper limb with a splint or cast for most or all of the day, for a period of 2 to 3 weeks (Taub et al., 2004). Constraint is combined with structured adjunct therapy for 6 or more hours per day. The premise underpinning this intervention is that constraint of the unaffected arm increases use of the affected arm, upper limb function for children with hemiplegic CP but insufficient evidence exists to recommend it be adopted as standard clinical practice. It is not yet clear whether constraint-induced therapy, a unilateral intervention, can improve the ability to complete activities of daily living that require bimanual coordination for successful execution. Nor is it clear whether the apparent effects of constraint-induced therapy are attributable to the

implementation of constraint rather than the extra intensity of therapy that usually accompanies this intervention. There are two different but linked mechanisms are considered to be responsible for enhanced use of the more affected extremity as a result of CIMT: overcoming learned non-use and inducing use-dependent cortical re-organization .CIMT try to change the contingencies of behavioral reinforcement so that the learned non-use of the more affected upper limb.

Researchers found that constraint induced movement therapy (CIMT) has been supported as an effective intervention program for adults who have had a stroke resulting in upper-limb-dysfunction. The fundamentals of CIMT are: constraint of the unaffected hand to encourage the use of the affected hand; massed practice of the affected hand, and use of intensive techniques to train the affected hand (Sankar, 2015). Literature found that CIMT is effective method of treatment in hemiplegic cerebral palsy.

Risk factor using CIMT are: Some temporary loss of independence as the child will be using the affected arm to complete daily activities; There may be possible increase in frustration; Possible increase risk of injury to the involved arm and hand because the child is using the affected arm more but has decreased sensory awareness and motor control; In some children if a cast was used there have been reports of mild stiffness of the uninvolved hand upon cast removal (Sankar, 2015). In order to avoid risk factors in CIMT, current study modified the CIMT method and conducted the study to identify effectiveness of Modified Constraint Induced Movement Therapy (mCIMT).

1.2 Rationale

Cerebral palsy is one of the most commonly occurring long time disability conditions around the globe that causes functional limitation in our day to day life. Considering the variety of proposed therapeutic and the limited evidence for their clinical efficacy, it is often difficult to make light of the actual treatment approach. To develop evidence based study to strengthen physiotherapy practice as well as the betterment of the patients. As a student of B.Sc. in Physiotherapy and being a researcher, my interest is to work in this area and to establish an evidence based physiotherapy treatment technique for hemiplegic type of cerebral palsy. To date evidence argues and proves different theories and concepts regarding treatment of CP based on its different types and their complexity. However, one therapy technique recently reflected most in the management of hemiplegic types of CP but in limited research there is controversy in its efficacy.

Constraint Induce Movement Therapy (CIMT) has been successfully used by Paediatric physiotherapists in management of Hemiplegic CP child in many developed and developing countries. But in our country few paediatric physiotherapists have known this effective technique. But for evidence based physiotherapy, there is absolutely needed some guideline in which hemiplegic cerebral palsy child will get proper treatment. It has been suggested that Constraint Induce Movement therapy (CIMT) can be used to treat diseases like hemiplegic type of Cerebral Palsy however there is a lack of evidence. Some research articles have been published about physiotherapy interventions of children with hemiplegic type of cerebral palsy but there's no well-developed research on this area in our country. On the other hand this study will be helpful for professions and professionals of physiotherapy & with this connection to other professionals will have a chance to gather their knowledge from this study.

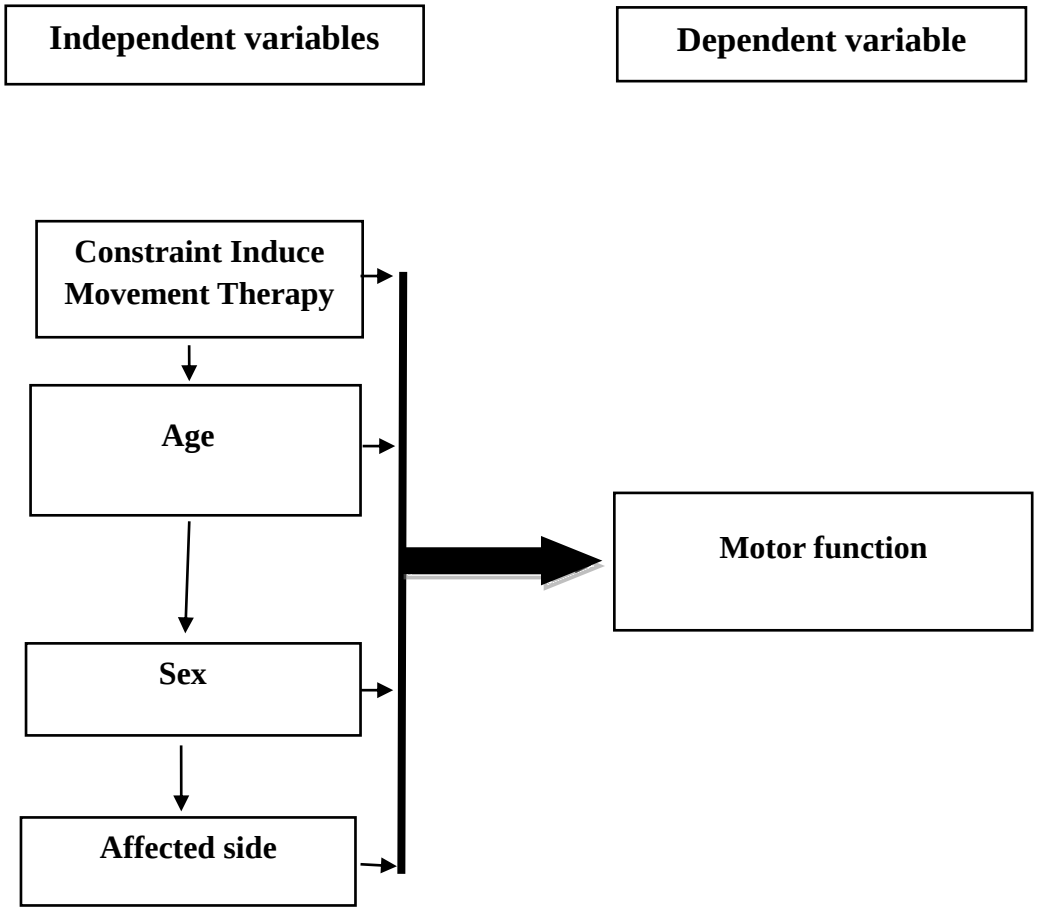
1.3 Operational Definition

Cerebral Palsy: Cerebral palsy is the well-recognized neuro- developmental motor disability condition in children. The condition requires medical, educational, social, and rehabilitative resources throughout the lifetime.

Hemiplegia: Hemiparesis is unilateral paralysis of the entire left or right side of the body (hemi means "half"). Hemiplegia is, in its most severe form, complete paralysis of half of the body.

Constraint-induced movement therapy (CI or CIMT): CIMT is a process of teaching a child to use his/her affected upper limb through use of a restraint on the non-affected limb and massed practice of movements of the affected limb.

1.4: List of variables



1.5 Aim

The aim of study to identify Efficacy of Constraint-Induced Movement Therapy for Children with Cerebral Palsy with Asymmetric Motor Impairment.

1.6 Objectives

General Objective

To analyze and identify Efficacy of Constraint-Induced Movement Therapy for Children with Cerebral Palsy with Asymmetric Motor Impairment.

Specific Objectives

- To demonstrate the effect of motor function at rest and after introducing Constraint Induces Movement therapy (CIMT).
- To find out the rate of improving motor function of completed sessions.
- To find out the effect of motor function at PMAL Scale after introducing CIMT therapy.

1.7 Hypothesis

Alternative Hypothesis

CIMT with conventional physiotherapy is more effective than only conventional physiotherapy for the treatment of children with hemiplegic type of cerebral palsy with asymmetric motor impairment.

H_a: $\mu_1 - \mu_2 \neq 0$ or $\mu_1 \neq \mu_2$

Null hypothesis

CIMT with conventional physiotherapy is no more effective than only conventional physiotherapy for the treatment of children with hemiplegic type of cerebral palsy with asymmetric motor impairment.

H_o: $\mu_1 - \mu_2 = 0$ or $\mu_1 \geq \mu_2$

Where,

H_o= Null hypothesis

H_a =Alternative hypothesis

μ_1 =mean difference in initial assessment

μ_2 = mean difference in final assessment

CHAPTER-II : LITERATURE REVIEW

Cerebral palsy (CP) is a familiar neuro-developmental condition starting in early childhood and persisting through the whole life. Cerebral palsy means at least a group of complaints of the development of movement and posture, causing activity limitation, which are recognized to non-progressive disturbances that occurred in the developing Fetal or infant brain. (Rosenbaum et al., 2007).

Cerebral palsy (CP), defined broadly as "a non-progressive motor impairment syndrome caused by a problem in the developing brain''. Cerebral palsy is the most common chronic motor disorder of childhood affecting approximately 2 to 2.5 infants per 1,000 live births. The increase in survival rates for preterm infants has amplified the risk of brain injuries that potentially cause CP. In addition to immeasurable health, social and psychological problems that the affected children and their families suffer CP has a huge economic impact (Faria et al., 2011).

About 70 % cases disturbance of normal developmental brain before birth is the main cause of cerebral palsy. According to American College of Obstetricians and Gynecologists (ACOG) and the American Academy of Pediatrics (AAP) conflicting to common belief that lack of oxygen reaching the fetus during labor and delivery contributes to only a small minority of cases of cerebral palsy. Brain injury in the first months or years of life may occurred in cerebral palsy. In child the cause of cerebral palsy is unknown in many cases. There is no definite cause of cerebral palsy rather some risk factors contribute to the development CP prenatal, natal or postnatal period (Tatla et al., 2013). 70 to 80% of cerebral palsy cases are acquired prenatally with unknown causes and birth complications, including asphyxia, are currently estimated to account for about 6 % of patients with congenital cerebral palsy, on the other hand neonatal risk factors for cerebral palsy include first cousin marriage birth after fewer than 32 weeks gestation, birth weight of less than 5 lb with intrauterine growth retardation, intracranial haemorrhage and trauma and about 10 to 20% patients (Chen et al., 2013), Pre-eclampsia affects 3-5% of pregnant women and is characterized by maternal hypertension and proteinuria occurring after 20 weeks of gestation (Melheim et al., 2013). The pathological changes start when the specific causes resulting in neural damage and ending up with impaired neural connectivity as well as transmission. 10-15% of cerebral palsy cases are found during birth including

prolongs labour, sudden birth, birth asphyxia, baby did not cry immediate after birth or by forceps delivery (Bangash et al., 2014). Postnatal causes include toxic, infectious meningitis, encephalitis, traumatic such as drowning. There is also a relation between coagulopathies causing cerebral infarction and particularly hemiplegic type of CP. Postnatal events account for 12% – 21% of CP.

Brain injury or brain malformation is the cause of cerebral palsy that occurs while the Brain is developing before, during or after birth. Muscle control, muscle coordination, muscle tone, reflex, posture and balance also disturbed due to cerebral palsy. It can also impact fine motor skills, gross motor skills and oral motor functioning. At the reason of motor function impairment sensation, perception, cognition, communication behavior can be changed of cerebral palsy child, by epilepsy and by secondary musculoskeletal problems (Rosenbaum et al., 2007).

In many cases, the cause of congenital cerebral palsy is not identified. According to the timing of the brain insult, CP is valuable to classify the known causes where the prenatal, perinatal or postnatal. Congenitally brain malformations which including malformations of cortical development are caused by antenatal of CP. In general congenital malformations are strongly connected with cerebral palsy and children with congenital brain malformations also have more anomalies outside of the central nervous system. Metabolic disorders, maternal ingestion of toxins and rare genetic syndromes are less common cause of CP (Tan et al., 2010). During a baby's development in the womb congenital cerebral palsy results from brain injury. It is present at birth although it may not be detected for months. It is responsible for about 70% of children of cerebral palsy.

Children are more likely to develop cerebral palsy when any of the following circumstances is present: Bleeding in the brain, Illnesses that cause an infant to go into shock, Infections of the central nervous system (such as meningitis or encephalitis), Interruptions in oxygen supply or blood flow to the brain, Maternal infections (chorioamnionitis), Physical trauma or injury, Poisoning from drugs or other toxic substances, Premature birth and Seizures. Although cerebral palsy isn’t inherited, some genetic disorders can cause brain damage early in life. Such damage, in turn can lead to cerebral palsy. In addition, research is uncovering genetic components to diseases that mimic the effects of cerebral palsy (Stephens & Vohr, 2009). CP is classified into four categories. They are Spastic, Athetoid, Ataxia and Mixed type of CP. Spastic cerebral palsy is the most common

type of CP. Spastic cerebral palsy refers to the increased tone or tension in a muscle when normal muscles work in pairs. Allowing free movement in the desired direction when one group contracts and the other group relaxes. The flow of muscle tension is disrupted due to complications in brain-to-nerve-to-muscle communication. Muscles affected by spastic cerebral palsy become active together and restricted in actual movement. This causes the muscles in spastic cerebral palsy patients to be constantly tense or spastic. Mild cases of spastic cerebral palsy patients may have affect only a few movements or severe cases that can affect the whole body .

The second most common type of cerebral palsy is athetoid or dyskinetic. Injuries to the basal ganglia can result in athetoid cerebral palsy which causes involuntary muscle movements. The movements often interfere with speaking, feeding, grasping, walking and other skills requiring coordination. Now-a-days about 4% of people have cerebral palsy. Inability to activate the correct pattern of muscles during movement ataxia is defined. Injuries to the cerebellum can result in ataxic cerebral palsy which causes poor coordination. That in turn affects balance, posture and controlled movements. Ataxic cerebral palsy can cause unsteadiness when walking and difficulties with motor tasks. Other type of CP is mixed CP. Injuries to multiple brain areas usually the cerebral cortex and basal ganglia can result in more than one kind of abnormal muscle tone. For example someone could have spasticity, dystonia and rigidity.

Russell et al. (2011) stated the percentage of spastic, ataxic, dyskinetic and mixed types of CP. Spastic CP is the commonest and accounts for 70%-75% of all cases, dyskinetic – 10% to 15% and ataxic is less than 5% of cases. CP can also be classified according to the part of the body affected: quadriplegia (affects all four limbs), diplegia (affects both legs) and hemiplegia (one side of the body is affected).Cerebral palsy is a neurological disorder the signs or symptoms of cerebral palsy may appear soon after birth or may take several months (Mandal, 2013). The most common early sign of cerebral palsy is developmental delay. Delay in reaching key growth milestones such as rolling over, sitting, crawling and walking are cause for concern. Physicians will also look for signs such as abnormal muscle tone, unusual posture, persistent infant reflexes and early development of hand preference Common signs of severe CP that may be noticed shortly after birth include: problems sucking and swallowing, weak or shrill cry, seizures and unusual positions. Often the body is either very relaxed or floppy or very stiff. In some severe

cases many signs and symptoms are not readily visible at birth except and may appear within the first three to five years of life as the brain and child developed Severe motor and coordination impairment also occur (Mandal, 2013). Drooling is another but common symptom among children with CP. Children have movement and postural disorder associated with many disabilities such as- including intellectual disability, hearing and visual deficits, nutrition, feeding, swallowing problems, respiratory infections and epilepsy. Cerebral palsy child suffers for long term and it affect activities of daily living and quality of life (Bell et al., 2010).

The symptoms of cerebral palsy include: excessive drooling, difficulty swallowing, sucking or speaking, tremors, and trouble with fine motor skills such as fastening buttons or holding a pencil, stiff or tight muscles, low muscle tone, exaggerated reflexes, uncontrolled body movement, toe walking, limping or dragging a foot while walking, walking with a scissor gait, turning in their legs as they walk. Children with cerebral palsy can also have feeding problems, mental retardation, seizures, learning disabilities and problems with their vision and hearing. The symptoms don't worsen with age but symptoms can range from mild to severe (Iannelli, 2008).

Drooling's can appear during several stages of early life. They include: neonatal aryl Infancy (0-3 Months): high pitched cry, poor neck control, excessive lethargy or irritability, weak suck or tongue thrust or tonic bite, oral hypersensitivity, decreased interest in surroundings, stiff or floppy posture and abnormal or prolonged reflexes. Later infancy-inability to perform motor skills control of hand grasp by 3 months, rolling over by 5 months and independent sitting by 7 months. Abnormal developmental patterns: hand preference by 12 months, excessive arching of back, prolonged or abnormal parachute response and logrolling. Abnormal developmental patterns after 1 year of age: W sitting means both knee flexion, legs extremely rotation, bottom shuffling means scoots along the floor, tiptoe walking or hopping (Gershon et al., 2013).

Constraint Induced Movement Therapy (CIMT) is a non-invasive, focused alternative to medication and surgery for treatment of children with hemiplegic CP. Children with hemiplegic CP have impairment on one side of the brain hemisphere causing "developmental disregard" of the impaired extremity (Hoare et al., 2007).Constraint-induced movement therapy (CIMT) is a moderate-to-strong evidence-based intervention in children with hemiplegic CP (Novak et al., 2013).

Hoare et al., (2007) showed that CIMT is a multi-faceted intervention and studies describing its use in children with cerebral palsy present wide variation in its application in relation to: method of restraint; length of restraint (per day, number of weeks); type and duration of therapy; intervention environment (that is home, school, or clinic) and intervention provider (therapist, parent, or teacher). Children included in studies have also varied in age, diagnosis, severity of motor and sensory impairment, cognitive abilities and behavior.

Despite the emerging popularity of CIMT in children with hemiplegic cerebral palsy, a Cochrane review identified a significant treatment effect in only a single trial which adopted a less intensive modified form of CIMT (Hoare & Russo, 2009). The CIMT involved the application of a restraint on the unaffected upper limb and less than three hours per day of therapy provided to the affected limb (Hoare et al., 2007). While a positive trend was found favoring CIMT and Forced Use, no significant treatment effect was demonstrated for these interventions when compared with traditional services. In occupational therapy, Neuro Developmental Therapy, Roods Approach, Biomechanical Approach and visuomotor priming are used to train the upper extremity functions in Hemiplegic cerebral palsy. The effect of different types of hand function intervention program is uncertain due to lack of randomized controlled studies. Researchers found that constraint induced movement therapy (CIMT) has been supported as an effective intervention program for adults who have had a stroke resulting in upper-limb-dysfunction. Literature found that CIMT is effective method of treatment in hemiplegic cerebral palsy.

Liepert et al., (2000) mentioned that Constraint-induced movement therapy (CIMT) has been used to promote functional gains in individuals with neurological dysfunctions. CIMT consists of constraining movement of the non-affected upper extremity and providing intensive training to the involved upper extremity. Intensive training is based on shaping principles, which include the selection of activities suited to the client's individual abilities, with progressive increase in difficulty and complexity. Procedures also involve providing assistance and support when the individual is unable to perform the task independently, as well as verbal rewards for observed improvements. One of the main objectives of the intervention is to overcome the learned non-use, defined as the diminished use of the affected extremity due to the perception of failure during the performance of manual tasks. The original CIMT protocol consists of 2 or 3 weeks of daily intensive training of the affected

extremity for 6 hours in association with restriction of the non-affected extremity for 10 hours a day. According to Gordon et al., (2005) the original CIMT protocol consisting of six hours of daily training and use of restraint for 90% of waking hours could be tiring for children. Thus, modifications in specific aspects of the original CIMT protocol have been proposed by some authors. These adaptations include decreased training time and/or decreased use of the restriction which are often compensated for with increased protocol lengths.

A protocol in which the use of the restriction occurred only during the intensive training of 6 hours daily, for 12 days. They documented significant improvements in children's manual dexterity and parents reported improvements in the amount and quality of use of the affected extremity.

Eliasson et al., (2006) studied the effects of a two-month intervention protocol with two hours of training and restriction use every day in young. Similarly, as children with hemiplegic cerebral palsy grow and develop they learn strategies and techniques to manage daily tasks (for example play) with one hand. Performance of tasks is discovered to be more efficient and effective using the non-affected hand, even if there is only mild impairment in the affected limb. Recently (DeLuca, 2002) introduced the term developmental disregard to describe a child with hemiplegia who may disregard, or learn not to use, the affected limb during the development of motor function. Despite the similar behavioral mechanisms of reinforcement of the unaffected hand and suppression of the affected hand, as identified in adults.

Eliasson et al., (2005) suggested that the learned non-use may be a different phenomenon in children who sustain an early brain lesion. Unlike an adult who has had a neurological insult later in life, a child with hemiplegia has not had the experience of normal motor function of the limb. There is not the potential to unmask motor function that is inhibited. Therapy must, therefore, create the opportunity, experience and environment in which a child can learn how to use their affected limb. This experience must reverse the behavioral aspect of suppression of use of the affected limb and reward use of that limb in even the simplest tasks, such as stabilization of an object. CIMT is proposed as a method of achieving this. (Deluca, 2002).Cerebral Palsy (CP) is a neurodevelopmental disorder caused by no progressive lesions in the immature brain. The early central nervous system (CNS) damage results in chronic physical disabilities and often includes sensory impairments. The

prevalence of congenital CP is approximately 2 per 1000 births; with hemiplegia accounting for approximately 25% of all new cases worldwide (Winstein et al., 2003). Reid et al., (2005) suggested that Hemiplegic cerebral palsy, characterized by a clinical pattern of unilateral motor impairment, accounts for 35.1% of all cerebral palsy types in Victoria, Australia , 15.3% in Ontario, Canada, 40% in Sweden and 31.2% in North England, United Kingdom. Along with muscle spasticity and hypertonia, children with hemiplegic cerebral palsy experience a loss of upper motor neuron excitation that is typically associated with poor selective motor control and weakness, and in some instances, sensory deficits. These additional impairments significantly impact on a child's ability to perform daily tasks (Hoare & Russo, 2009). For people with hemiplegia, characterized by unilateral upper and lower-extremity involvement, impaired manual dexterity is often among the most disabling motor symptoms. Treatment options include physical therapy (PT), occupational therapy(OT), conductive education, neurodevelopmental therapy, peripheral splinting and casting, pharmacotherapy (e.g., botulinumtoxin type A), and surgery. There is no strong evidence of successful treatment with of any of these approaches.

Recent evidence suggests that children with CP may improve motor performance if provided with sufficient opportunities to practice. One treatment approach that provides those opportunities and that is becoming increasingly popularise forced use or constraint-induced movement therapy.

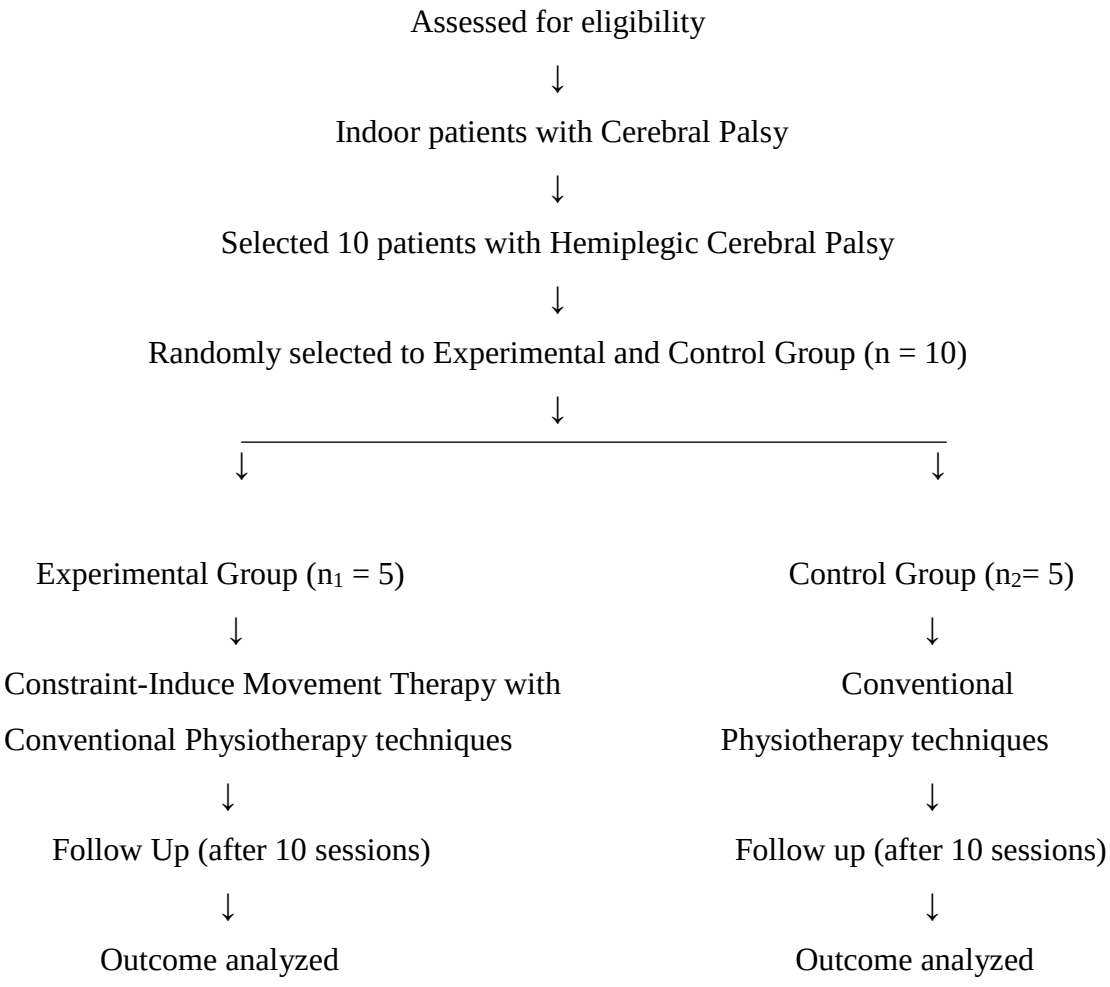
CHAPTER-III METHODOLOGY

This research was an experimental design to evaluate the efficacy of Efficacy of Constraint-Induced Movement Therapy for Children with Asymmetric Motor Impairment Cerebral Palsy at CRP, Savar. To identify the efficacy of this treatment regime, PMAL Scale and modified ashworth scale Questionnaire will be used as measurement tools for measuring the efficacy of motor function activity for children with Cerebral Palsy.

3.1 Study Design

The study was conducted by using Randomized Control Trail (RCT). From the indoor Paediatric unit children with CP, 10 CP children selected and then 5 children with CP were randomly assigned to CIMT with conventional physiotherapy group and 5 children with CP to the only conventional physiotherapy group for this randomize control trial study. The study was a single blinded study which has been conducted at Paediatric Department of CRP, Savar, Dhaka. A pre-test (before intervention) and post-test (after intervention) was administered with each subject of both groups to compare the motor function before and after the treatment.

Flow-chart of the phases of Randomized Controlled Trial



3.2 Study Area

The researcher is a 4th year B.Sc in Physiotherapy student of Bangladesh Health Professions Institute (BHPI) and the research was conducted as part of the course curriculum. For this reason the researcher had to collect data within short time to maintain the contrasts of the course module time. The study was conducted in Pediatric unit of Center for the Rehabilitation of the Paralysed (CRP). It is a nongovernment organization working for the development of health care delivery system of Bangladesh through providing Physiotherapy, Occupational therapy, Speech and Language therapy services in indoor and outdoor programs. Pediatric unit provides service for child with different types of disability. The unit had indoor and outdoor program, 40 cerebral palsy children with their mother or career accommodate two weeks' time.

3.3 Study Population

The study population was the patients diagnosed as hemiplegic Cerebral Palsy attended in the Inpatient Paediatric unit of Physiotherapy Department at CRP, Savar, Dhaka.

3.4 Sample Size

Researcher has taken 10 participants as sample. Obviously this is a small sample but still I believe they will be provide a representative picture of the study. Due to time limitation the researcher has to choose 10 participants to conduct this study within the short time it could not be possible to conduct the study with a large number of study

3.5 Sampling Technique

Simple Random sampling technique. Subjects, who met the inclusion criteria, were taken as sample in this study. 10 patients with Hemiplegic Cerebral Palsy were selected from Inpatient Paediatric unit of Physiotherapy Department of CRP, Savar, Dhaka. Then 5 patients were randomly assigned to Experimental group comprising of treatment approaches of Constraint Induce Movement Therapy along with conventional Physiotherapy techniques and 5 patients to the Control group treated with only the conventional Physiotherapy techniques for this study. The study was a single blinded technique.

3.5.1 Randomization

After the completion of sample collection, the researcher had randomly assigned the participants into experimental and control group, because it improves internal validity of experimental research. The samples was given numerical number C_1, C_2, C_3 etc. for the control group and E_1, E_2, E_3 etc. for experimental group. Total 10 samples were included in this study, among them 5 patients were selected for the experimental group (received Constraint Induce Movement Therapy along with conventional physiotherapy techniques) and rest 5 patients were selected for control group (received only the conventional physiotherapy techniques).

3.6 Inclusion criteria

1. Participants with diagnosis of spastic hemiplegic cerebral palsy as diagnosed and reported in the medical history by paediatric Physician.
2. Age between 7 to 96 months.
3. Active movement of the shoulder, elbow, wrist, digits and thumb of the affected upper limb, such that the: child is able to reach forward to an elevated position in front with mid-range of shoulder flexion.
4. Able to attend the tasks and follow simple commands. Muscle tone (i.e. 1, 2 modified Ashworth scale)
5. Parents who are willing to commit for an intensive therapy program and agree to cease all other upper limb therapeutic interventions for the 2 weeks period of the trial.

3.7 Exclusion Criteria

1. Known case of seizure and on anti–epileptic drugs
2. Visual problems interfering with treatment
3. Any surgery on the paretic hand within past 1year
4. Botulinum toxin therapy in the upper extremity within the past 6 month

3.8 Treatment Regime

Experimental Group

a. Conventional Physiotherapy Techniques

b. Constraint Induce Movement Therapy (CIMT)

Control Group

Conventional Physiotherapy Techniques

Procedure of CIMT

- Holding a bottle/cup.
- Eating finger foods.
- Pushing a button.
- Turing a knob.
- Throwing/stop a ball.
- Reach out activities (forward, Lateral and backward reach).
- Grasping and releasing activities (using different size of cubes and different shape things e.g. Pencil, eraser, toys, glass etc.).
- Fine motor movements.
- Coordination exercises.
- Protective function exercise.
- Hand weight bearing exercise (forward, lateral, backward).
- Functional ADL and play activities.
- Goal oriented activities.

Activities which will be facilitated by using simple verbal commands, encouragement, toys, demonstration and assistance which will be given when needed. Family members and care givers will be explained to undertake an intensive home program for 3 hours per day. Families will be provided with specific goals after each session. Logbook (Work diary) –will be given to primary care giver for collecting details of child activity during that 3 hour time period.

3.10 Data Processing

3.10.1 Data Collection Tools

- Record or Data collection form
- Informed Consent
- Papers, pen, pencil, diary, computer, internet modem etc.

3.10.2 Measurement Tools

The motor outcome was measured by using, PMAL (Pediatric motor activity scale) (How often and how well).

3.10.3 Data Collection Procedure

The study procedure has conducted through assessing the patient, initial recording, treatment and final recording. After screening the patient at the department, the patients were assessed by a qualified Physiotherapist. 10 sessions of treatment was provided for every subject. 10 subjects were chosen for data collection according to the inclusion criteria. The researcher divided all participants into two groups and was coded C_1, C_2, C_3, C_4, C_5 for control group and E_1, E_2, E_3, E_4, E_5 for experimental group. Data was gathered through a pre-test, intervention and post-test and the data was collected by using a written questionnaire form which has been formatted by the researcher. Pre-test was performed before beginning the treatment. The same procedure was performed to take post-test at the end of 10 sessions of treatment. The researcher has collected the data of both experimental and control group in front of the qualified Physiotherapist in order to reduce the biasness. At the end of the study, parametric unrelated *t*-test has been done for statistical analysis.

3.11 Data Analysis

Statistical analysis was performed by using Microsoft Office Excel 2013 and scientific calculator. Data was analyzed by using SPSS version 20.00 to compute the descriptive statistics using pie chart and also percentage and parametric test were conducted using unrelated t-test.

The researcher had calculated the variables mean, mean difference, standard deviations, standard error, degree of freedom and significant level. In the between group, the data shows that the mean difference was greater than the control group. The researcher had tested mean variables stating problem to test using unrelated t-test.

3.11.1 Statistical Test

In order to ensure the research have some values, the meaning of collected data has to be presented in ways that other research workers can understand. Statistical analysis has performed by using SPSS 20, Microsoft Excel 2013 and scientific calculator. To find out the 'p' value for the significance of the result, the examiner used a unrelated t-test. Dependent variables of the treatment group will be statistically tested by unrelated t-test and eventually give a 'p' value. In this study, using a same subject group, where conveniently allocated to the treatment program group. The same subjects will be used for each level of the independent variable. As the subjects are the same for all levels of the independent variables, they are their own controls. Outcomes are measured by collecting the scores of different variables and the scores are considered of interval data. The common methods of analyzing data from pretest-posttest research design are unrelated t-test on the difference score between two group post -test. If the variables are quantitative, the mean of each group are calculated. The application of statistical inference test may or may not be required. Unrelated t-test is a common device used to find out the differences between means. For this reason, the study used parametric unrelated t-test to calculate the significance level of the study. The unrelated t-test is used to find out whether the unrelated t-test value represented a significance differences between the results from before received treatment & after received treatment of the same group of subjects.

Unpaired t-test

Unpaired t-test was used to compare difference between two means of independent variables. Selection of test of hypothesis was two independent mean differences under independent t distribution.

Assumption:

Different and independent variables

Variables are quantitative

Normal distribution of the variables

Formula: test statistic t is follows:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{S\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}}$$

Where,

$\bar{x_1}$ = Mean of the Experimental Group,

$\bar{x_2}$ = Mean of the Control Group,

n_1 = Number of participants in the Experimental Group,

n_2 = Number of participants in the Control Group

S = Combined standard deviation of both groups

Calculation unrelated t value for pick up and hold a small item while in sitting in a chair:

Where,

$$S = \sqrt{\frac{\sum(\bar{x}_e - x_1) + (\bar{x}_e - x_2)}{n_1 + n_2 - 2}}$$

$$= \sqrt{\frac{1.2+4}{5+5-2}}$$

$$= \sqrt{\frac{5.2}{8}}$$

$$= \sqrt{0.65}$$

$$= 0.808$$

Here,

$\bar{x_e}$ = Mean of experimental group

$\bar{x_c}$ = Mean of control group

x_1 = Individual value of experimental group

x_2 = Individual value of control group

n_1 = Number of participants in the Experimental Group

n_2 = Number of participants in the Control Group

So,

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$= \frac{2.4-2}{0.8\sqrt{\frac{1}{5} + \frac{1}{5}}}$$

$$= \frac{0.4}{0.8\sqrt{0.2+0.2}}$$

$$= \frac{0.4}{0.8\sqrt{0.4}}$$

$$= \frac{0.4}{0.505}$$

$$= 0.784$$

Table 1: In this way researcher has calculated all the t value and have presented in the following tables-

No.	**Variables PMAL (HOW OFTEN & WELL SCALE)**	**Observed "t" value**	**df**	**Significance Level**
01	Hold a bottle/cup	0.00	8	0.198
02	Pick up and hold a small item while sitting in a chair	0.784	8	0.159
03	Pick up and hold a large item while sitting in a chair	0.632	8	0.252
04	Eat finger foods	1.117	8	0.318
05	Push a button	0.00	8	1.00
06	Open a door or cabinet	2.44	8	0.00*
07	Use arm to move across floor	1.00	8	0.029*
08	Pick up an object an arm reach	1.789	8	0.447
09	Pull a toy with a string	1.265	8	0.252
10	Take off shoes or socks	0.00	8	0.198
11	Pick up a cylindrical object (eg, crayon, marker, or drumstick)	2.357	8	0.198
12	Turn a knob	0.447	8	0.447
13	Hold a handle on a riding, pulling, or push toy	0.577	8	1.00
14	Throw a ball or similar objects	1.633	8	0.00*
15	Hold an item while in standing position	0.885	8	0.008*
16	Push up front of the body with weaker arm while on stomach	0.316	8	1.00
17	Stop or roll a ball	0.894	8	0.447
18	Pop bubbles	0.632	8	0.252
19	Carry an item from place to place	0.426	8	0.222
20	Push into sitting position	1.63	8	0.00*
21	Reach to be picked up by parent	0.632	8	0.252
22	Push arm through sleeve of clothing	0.00	8	1.00

3.11.2 Level of Significance

In order to find out the significance of the study, the "p" value was calculated. The 'values refers to the probability of the results for experimental study. The word probability refers to the accuracy of the findings. A 'p' value is called level of significance for an experiment and a 'p' value of ≤0.05 was accepted as significant result for health service research. If the 'p' value is equal or smaller than the significant level, the results are said to be significant.

3.12 Ethical Considerations

The whole process of this research project was done by following the Bangladesh Medical Research Council (BMRC) guidelines and World Health Organization (WHO) Research guidelines. The proposal of the dissertation including methodology was presented to the Institutional Review Board (IRB) of BHPI and obtained permission from the IRB authority of ethical committee of Bangladesh Health Professions Institute (BHPI). Again before the beginning of the data collection, researcher has obtained the permission from the concerned authorities ensuring the safety of the participants. The researcher strictly maintained the confidentiality regarding participant's condition and treatments.

3.13 Informed Consent

The researcher has obtained consent to participate from every subject. A signed informed consent form was received from each participant. The participants were informed that they have the right to meet with outdoor physiotherapist if they think that the treatment is not enough to control the condition or if the condition become worsen. The participants were also informed that they are completely free to decline answering any question during the study and are free to withdraw their consent and terminate participation at any time. Withdrawal of participation from the study did not affect their treatment in the physiotherapy department and they still had got the same facilities. Every subject had the opportunity to discuss their problem with the senior authority or administration of CRP and have any questioned answer to their satisfaction.

CHAPTER-IV RESULTS

Initially in the research, 10 patients were enrolled in the study. 5 in the CIMT with conventional treatment group (experimental group) and 5 in the only conventional treatment group (control group). The whole subject of both experimental and control group scored their motor function on PMAL scale before and after completing treatment.

Age of the participants:

Children in the study were aged between 7 to 96 months (the mean age was experimental group 49.4 months and control group 57 months).The minimum age range was 18 months and maximum age range was 96 months.

Table- 2: Mean age of the participants of experimental and control group.

Experimental Group		**Control Group**	
Subjects	**Age (Months)**	**Subjects**	**Age (Months)**
E1	33	C1	26
E2	96	C2	31
E3	60	C3	48
E4	40	C4	84
E5	18	C5	96
Mean Age	**49.4 Months**	**Mean Age**	**57 Months**

Gender:

Among 10 patients with Hemiplegic CP 70% (n=7) were Boy and 30% (n=3) were Girl. The feature is given below.

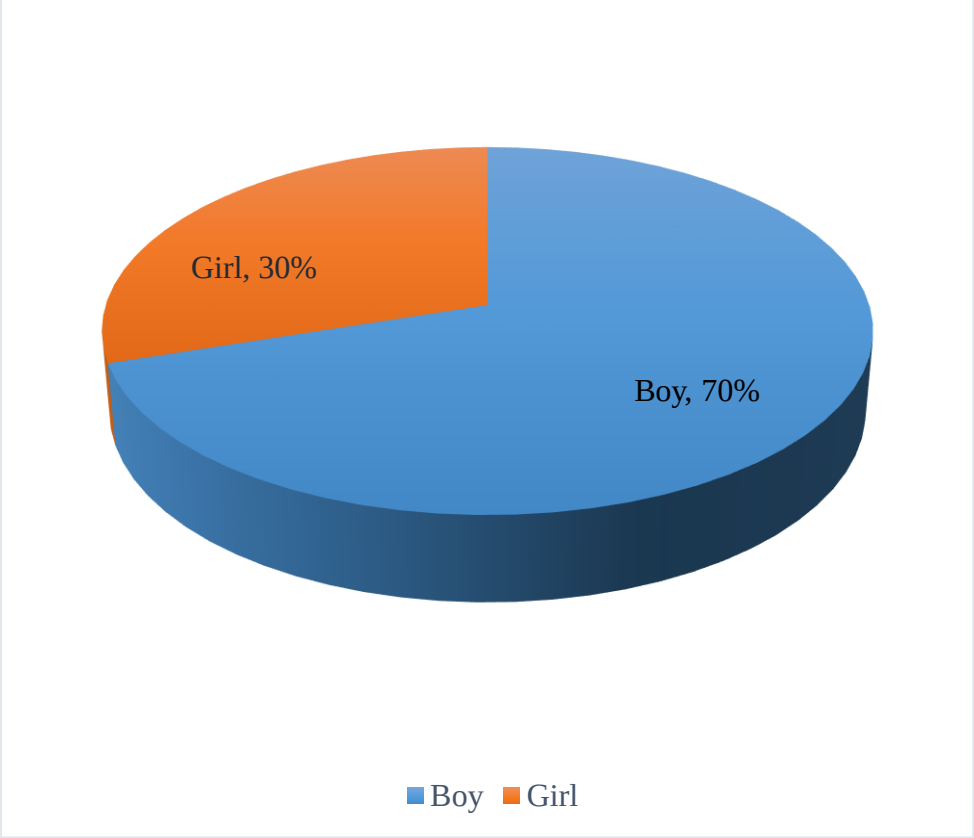


Figure – 1: Sex Ratio of the Participants.

Affected side:

Among 10 patients with Hemiplegic CP 60% (n=6) were Right and 40% (n=4) were Left. The feature is given below.

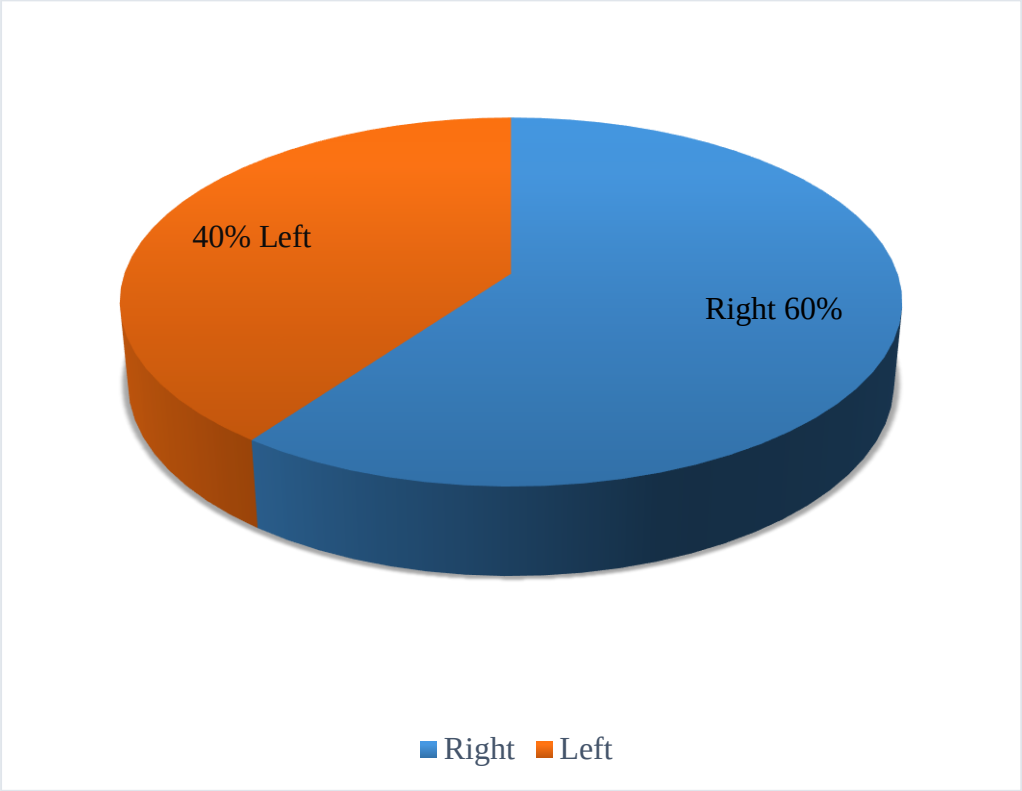


Figure – 2: Affected side Ratio of the Participants.

PMAL Scale Questionnaire:

Hold a bottle/cup:

This study found that in the Hold a bottle/cup the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.00 (0.00±.732) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Pick up and hold a small item while sitting in a chair:

This study found that in the Pick-up and hold a small item while in a sitting the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.784 (0.40±0.547) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Pick up and hold a large item while sitting in a chair:

This study found that in the Pickup and hold a large item while sitting in a chair the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.632 (0.20±0.447) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Eat finger foods:

This study found that in the Eat finger foods the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 1.117 (0.60±0.707) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Push a button:

This study found that in the Push a button the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.00 (0.00±0.547) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Open a door or cabinet:

This study found that in the Open a door or cabinet the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 2.44 (0.60±0.547) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was greater than the table value that means the null hypothesis is rejected and alternative hypothesis is accepted which means there is difference between CIMT and conventional Physiotherapy.

Use arm to move across floor:

This study found that in the Use arm to move across floor the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 1.00 (0.20±0.447) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Pick up objects an arm reach:

This study found that in the Pick up an object an arm reach the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 1.7890 (0.80±0.547) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Pull a toy with a string:

This study found that in the Pull a toy with a string the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 1.265 (0.40±0.547) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Take off shoes or socks:

This study found that in the Take-off shoes or socks the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.00 (0.00±0.836) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Pick up a cylindrical object (crayon, marker, or drumstick):

This study found that in the Pick up a cylindrical object (crayon, marker, or drumstick) the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 2.357 (1.00±0.836) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was greater than the table value that means the null hypothesis is rejected and alternative hypothesis is accepted which means there is difference between CIMT and conventional Physiotherapy.

Turn a knob:

This study found that in the Turn a knob the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.477 (0.20±0.547) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Hold a handle on a riding, pulling, or push toy:

This study found that in the Hold a handle on a riding, pulling, or push toy the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.577 (0.20±0.547) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Throw a ball or similar objects:

This study found that in the Throw a ball or similar objects the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 1.633 (0.60±0.547) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Hold an item while in standing position:

This study found that in the Hold an item while in standing position the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.885 (0.60±0.547) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Push up front of the body with weaker arm while on stomach:

This study found that in the Push up front of the body with weaker arm while on stomach the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.316 (0.20±1.09) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Stop or roll a ball:

This study found that in the Stop or roll a ball the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.894 (0.40±0.836) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Pop bubbles:

This study found that in the Pop bubbles the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.632 (0.20±0.447) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Carry an item from place to place:

This study found that in the Carry an item from place to place the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.426 (0.20±0.547) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Push into sitting position:

This study found that in the Push into sitting position the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 1.63 (0.40±0.547) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Reach to be picked up by parent:

This study found that in the Reach to be picked up by parent the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.632 (0.20±0.547) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

Push arm through sleeve of clothing:

This study found that in the Push arm through sleeve of clothing the independent t test in between group at 5% level of significant and 8 degree of freedom observe t value was 0.00 (0.00±0.447) and at the same significant level and same degree of freedom standard table value was 2.306.The observe t value was less than the table value that means the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between CIMT and conventional Physiotherapy.

CHAPTER-V DISCUSSION

The purpose of this study was to evaluate the effectiveness of Constraint Induced Movement Therapy (CIMT) with conventional physiotherapy compare to only conventional physiotherapy for hemiplegic CP patients. In this experimental study 10 patients with hemiplegic CP were randomly assigned to the experimental group and to the control group. Among these 10 patients, 5 patients were included in the experimental group who received Constraint Induced Movement Therapy (CIMT) with conventional physiotherapy and the rest of the 5 patients were included in the control group, who received conventional physiotherapy only. In physiotherapy paediatric indoor department of CRP, Savar each group attended for 1 hours of physiotherapy treatment but only experimental group received both conventional treatment and Constraint Induced Movement Therapy (CIMT) for a total of 3 hours including the time of physiotherapy session and at home every day within two weeks in the in order to demonstrate the improvement. The outcome was measured by using Paediatric Motor Activity Log which included Amount score and How well score.

Constraint-induced movement therapy (CIMT) and Forced use are emerging as treatment approaches for children with hemiplegic cerebral palsy. In this treatment protocol, upper extremity with CIMT which had been used successfully in patient with hemiplegic CP. The intervention produces improvement in the use of more affected extremities at least as great as that obtained with adults. It may well have been greater because the children exhibited new motor behavior's and patterns of functional behavior's that had not been observed before the treatment approaches. Control subjects showed less improvement on the PMAL from pre- to post treatment which is not significant. Verbal descriptions by parents of major changes in quality of life and general development confirmed the more formal quantification of parental reports obtained on the PMAL. Results from this study are consistent with other studies in showing a significant improvement in upper limb function after CIMT in children (Naylor & Bower, 2005) .In this study most families did not find it easy to complete even CIMT. Some children disliked wearing the glove and some have complaint of uneasiness due to close glove. Studies in adults following stroke have provided evidence of adaptation in the brain following CIMT (Liepert, 2006). From

the literatures used in this study suggest that the main mechanism of CIMT is development of neuroplasticity. The neuroplasticity seems to be developed as a result of repetitive movements by and long-term practice. Synaptic efficient is increased as a plastic change, presumably involves an increase in, and permits reduction in the excitability of the neuronal connections. Probably CIMT is effective in producing these changes as the patient overcomes the "learned nonuse" and also because it increases the motivation in using of the extremity as CIMT therapy provides opportunities for positively reinforcing the use of the more affected extremity by training the more affected arm and constraining the less affected arm, and adverse consequences for its non-use. Expansion of the contralateral cortical area that controls movement of the more affected extremity occurs and it also cause the recruitment of new ipsilateral areas. This use-dependent cortical reorganization could serve as the neural basis of the permanent increase in the use of the more affected arm. The patients in the experimental group were also very motivated than the control group because the tasks became easier in each different session. These patients were able to carry object showed improvements in fine motor control. The effect sizes between post-test and pre-test in the above-mentioned outcome measures were moderate to large in CIMT. Current study suggest that CIMT is a feasible alternative intervention for patients with upper-extremity dysfunction after CP because the current study revealed that compared with only conventional physiotherapy, CIMT could improve the ability to use the paretic upper extremity, and increase the use of the paretic upper limb in daily living. However, evidence is still limited about the effectiveness of CIMT in our country as it is not familiar to all physiotherapists. More RCTs are necessary to confirm the efficacy of this treatment and overcome the limitation of the current trial.. Application of CIMT might bring a significant change of the health-related quality of life of patients with hemiplegic CP .So it can be said that modified constraint induced movement therapy (CIMT) which includes massed practice (i.e., intense, concentrated, repetitive exercises with increasing speed or difficulty following improvements of performance) and the use of the paretic upper limb is found to be effective for performance improvement of the paretic upper limb (Bang et al., 2015).Since the potential for central nervous system plasticity in young children is increased relative to adults, it is postulated that this approach might prove to be especially effective in children (Sutclife et al.,2007). In one study found that bilateral cortical activation was increased following CIMT

including higher levels of activity in the contralateral sensorimotor cortex. This suggests that with CIMT, cortical reorganization occurs as new pathways between the damaged and healthy cortical hemisphere are made and control of the affected moves towards coming from the contralateral (lesion) hemisphere rather than solely from the ipsilateral hemisphere (Sutclife et al.,2007). Secondly, the motor learning literature suggests that CIMT employs massed practice to increase the tendency of patients to use their more impaired limb, and thereby induces a use-dependent functional reorganization of brain structures. The study involved restraining children in casts for 24 hours per day for 1 month, with and without structured practice. Our study, succeeded in being 'child friendly' by reducing the number of hours that children were restrained while still improving motor performance in the involved hand and embedding practice in play activities with intensive rehabilitation programme. Although Improvement in motor function is not captured by any one measure. The effectiveness of this intervention is promising but may be dependent on the age, severity of the impairment, cognitive abilities and behavior (Charles, et al., 2001). In this study no side effects of restraint was found. This result in this study shows that the improvement of CIMT for motor function. Stevan et al., (2008) reported that the CIMT showed greater improvement in motor changes than regular therapy.

The main limitation of this study was its short duration. The study was conducted with 10 patients of hemiplegic CP, which was a very small number of samples in both groups and was not sufficient enough for the study to generalize the wider population of this condition. Not all patients received 5 days of Physiotherapy in a week, for these missing therapy days the treatment protocol was focused only on home exercise as supervised physiotherapy was not possible. The research was carried out in CRP Savar such a small environment, so it was difficult to keep confidential the aims of the study for blinding procedure. Therefore, single blinding method was used in this study. There was no available research done in this area in Bangladesh. So, there was no relevant information about application of constraint induced movement therapy in Bangladesh.

CHAPTER-VI CONCLUSION AND RECOMMENDATION

In conclusion, the planning and implementation of this multisite study on the efficacy of CIMT in hemiplegic CP children shows that interventions are safe, effective and worthwhile. Constraint Induced Movement Therapy yields clinically as well as statistically significant improvements in both motor function and functional use of the affected upper extremity in children between the ages of 7 and 96 months with hemiplegic cerebral palsy. In this study we found that CIMT is a feasible and tolerable intervention for children with Hemiplegic CP children. The results obtained seem particularly important for the current rehabilitation practice for hemiplegic CP with CIMT.

For future studies, a larger sample size may improve the statistical significance of some of the results. A longer time frame and long-term follow-up examination may prove valuable in showing the long-term effect of the treatment.

It is recommended that other outcome measurement tools should be used along with PMAL scale to find out any other improvements that may occur due to treatment.

It is also recommended that patient or career should maintain a diary or log to make sure the patients is performing daily tasks at home.

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APPENDIX

1. Informed Consent (Bangla)
2. Informed Consent (English)
3. Questionnaire (Bangla)
4. Questionnaire (English)
5. Permission Letter
6. IRB From

সম্মতিপত্র

আসসালামুয়ালাইকুম / নমস্কার,

আমি লিটন মালো, ঢাকা বিশ্ববিদ্যালয়ের চিকিৎসা অনুষদের অধিভুক্ত বাংলাদেশ হেলথ প্রফেশনস্ ইন্সিটিটিউট এর বি.এস.সি ইন ফিজিওথেরাপি কোর্সের চূড়ান্ত বর্ষের একজন শিক্ষার্থী। অধ্যায়নের অংশ হিসেবে আমাকে একটি গবেষণা সম্পাদন করতে হবে এবং এটা আমার প্রাতিষ্ঠানিক কাজের একটা অংশ। নিম্নোক্ত তথ্যাদি পাঠ করার পর অংশগ্রহণকারীদের গবেষণায় অংশগ্রহনের জন্য অনুরোধ করা হলো।

আমার গবেষণার বিষয় হল **"হেমিপ্লেজিক সেরিব্রাল পালসি সম্বলিত বাচ্চাদের কনস্ট্রেইন্ট ইনডিউস থেরাপি এর কার্যকারিতা"** এই পরীক্ষামূলক গবেষণার মাধ্যমে আমি একটি অনুমান পরীক্ষা করব যে, হেমিপ্লেজিক সি, পি, বাচ্চাদের ক্ষেত্রে শুধুমাত্র প্রচলিত ফিজিওথেরাপি অপেক্ষা প্রচলিত ফিজিওথেরাপির সাথে কনস্ট্রেইন্ট ইনডিউস থেরাপি বেশি কার্যকরী । আমার গবেষণার উদ্দেশ্য হলো থেরাপি দেবার পূর্বে ও পরে বাচ্চাদের কাজ করার ক্ষমতা পরিমাপ করা। আমি যদি আমার গবেষণাটি সার্থক ভাবে সম্পূর্ণ করতে পারি তবে যেসব বাচ্চারা হেমিপ্লেজিক সেরিব্রাল পালসিরোগে ভুগছেন তারা উপকৃত হবেন এবং এটি হবে একটি পরীক্ষামূলক প্রমাণ। গবেষণাটি সম্পাদনের জন্য, আমার তথ্য সংগ্রহ করা প্রয়োজন হবে। গবেষণার ক্ষেত্র বিবেচনা করে আপনার বাচ্চার মাঝে আমার গবেষণায় অংশগ্রহণ করার জন্য প্রয়োজনীয় বৈশিষ্ট্য লক্ষ্য করা গেছে। এজন্য, আপনি আমার গবেষণার একজন সম্মানিত অংশগ্রহণকারী হতে পারেন এবং আমি আপনাকে আমার গবেষণায় অংশগ্রহন করতে অনুরোধ জানাচ্ছি।

আমি প্রতিজ্ঞা করছি যে,এই গবেষণা আপনার জন্য ঝুঁকিপূর্ণ হবে না অথবা আপনার কোন ক্ষতি করবে না। গবেষণা চলাকলীন সময়ে কোন রকম দ্বিধা বা ঝুঁকি ছাড়াই যেকোন সময়ে আপনি এটাকে বাদ দিতে পারবেন। এই গবেষণার প্রাপ্ত তথ্য সম্পূর্ণভাবে গোপনীয় থাকবে এবং অংশগ্রহণকারীর ব্যক্তিগত তথ্য অন্য কোথাও প্রকাশ করা হবে না।

শুরু করার আগে আপনার কি কোন প্রশ্ন আছে ?

আমি কি শুরু করতে পারি ?

☐ হ্যাঁ ☐ না

বাচ্চার অভিভাবকের স্বাক্ষরও তারিখ .....

গবেষকের স্বাক্ষরও তারিখ .....

সাক্ষীর স্বাক্ষরও তারিখ .....

তথ্য সংগ্রহকারীরস্বাক্ষর ও তারিখ.....

পর্ব-ক:ব্যক্তিগত তথ্যাবলী

এই প্রশ্নপত্রটি গড়ে তলা হয়েছে হেমিপ্লেজিক সেরিব্রাল পালসি সম্বলিত বাচ্চাদের জন্য। ব্যক্তিগত তথ্যাবলী অংশটি রুগী কিন্তু বিশেষ বিবেচনায় ফিজিওথেরাপিস্ট কালো কলমের দ্বারা পূরণ করবেন। সঠিক জবাবটির বাম পার্শে টিক (√) চিহ্ন দিন।

রোগীর কোড নং: তারিখ :

১। বাচ্চার নামঃ রোগীর নামঃ

২। বাচ্চার বয়সঃ

৩। লিঙ্গঃ i. ছেলে ii. মেয়ে

৪। ঠিকানাঃ

গ্রাম : পোস্ট অফিসঃ

থানা : জেলাঃ

মোবাইল নম্বর:

৫. আপনার বাচ্চা কি প্রতিদিন তিন ঘন্টা করে ফিজিওথেরাপি চিকিৎসা পায়?

i. হ্যাঁ

ii. না

চিকিৎসা পূর্ববর্তী উপাত্ত সমূহ

হাতের দক্ষতার পি, এম, এ, এল মাপ কাঠি

কোন প্রতিক্রিয়া না পাওয়াতে PMAL **সংকেতসমূহ**:

১. "শিশু সম্পূর্ণরূপে শক্তিশালী বাহু ব্যবহার করেছে।"

(নির্দিষ্ট করুন "০")

২. "শিশুর জন্য অন্য কেউ এটা করেছে।"

(নির্দিষ্ট করুন "০")

৩. "ঐ কাজ করার মত সুযোগ শিশুটির ছিল না।"

(নির্দিষ্ট করুন "০" এবং দেখাশুনা কারীকে বলুন সুযোগ করে দিতে।)

৪. "শিশুটি মাঝে মধ্যে ঐ রকম কাজ করে, কিন্তু আগের প্রশ্নগুলোর উত্তর দেওয়ার পর থেকে আমি তাকে করতে দেখি নি। "

(আগের স্কোরের সাথে যুক্ত করুন।)

৫. শিশুটি শুধুমাত্র থেরাপি দেওয়ার সময় কাজটা করে।

(আগের স্কোরের সাথে যুক্ত করুন।)

৬ . এটা করা শিশুটির জন্য অসম্ভব বা বৃদ্ধিজনিত অনুপযুক্ত।

(স্কোরিং থেকে আইটেম মুছুন; সঠিক স্কোর পেতে মোট স্কোর থেকে আইটেমটি বাদ দিন।)

পুনরাবৃত্তির স্কেল কেমন?

০ – ব্যবহার হয় নি -আপনার শিশু কাজটির জন্য দুর্বল বাহু ব্যবহার করে নি।

১ – খুবই কম – ৫ -১০ ভাগ সময় – আপনার শিশুটি মাঝে মাঝে দুর্বল বাহু ব্যবহার করে,কিন্তু খুব কম।

২ - কম – প্রায় ২৫ ভাগ সময় - আপনার শিশুটি সময়ে দুর্বল বাহু ব্যবহার করে, কিন্তু বেশির ভাগ সময় শক্তিশালী বাহু দিয়ে কাজটি করে।

৩ – কখনো কখনো– প্রায় ৫০ভাগ সময় – দুর্বল বাহু ব্যবহৃত হলেও শক্তিশালী বাহুর অর্ধেক।

৪ -- প্রায়ই – প্রায় ৭৫ভাগ সময় – দুর্বল বাহুটি ব্যবহৃত হত নিয়মিত, কিন্তু সবল বাহুর তিন-চতুর্থাংশ।

৫ - স্বাভাবিক – ৯০-১০০ভাগ সময় – দুর্বল বাহুটি সবল বাহুর মতই ব্যবহৃত হয়েছে।

‘ভাল’ এর স্কেল কেমন?

০ – ব্যবহার হয় নি – আপনার শিশু কাজের জন্য দুর্বল বাহুটি মোটেও ব্যবহার করে নি।

১ – খুব কম –আপনার শিশুর বাহুতে কাজ করার সামর্থ্য কম। হয়ত কাজের সময় নড়েছে কিন্তু কাজে কোন অবদান নেই।

২ - খারাপ –কাজটি করাতে দুর্বল বাহুর সামান্য অবদান ছিল। তা সক্রিয়ভাবে কাজটি করতে আসে, কিন্তু শক্তিশালী বাহু বা দেখাশুনা কারী বেশি অংশ করে দেয়।

৩ - মোটামোটি- দুর্বল বাহুটি সবসময় কাজে ব্যবহৃত হত, কিন্তু কাজটি ধীরে বা খুব জটিলতার সাথে সম্পন্ন হত।

৪ – প্রায় স্বাভাবিক – স্বাধীণভাবে বাহুটি কাজ করতে পারে, কিন্তু সমস্যা বা জটিলতা দেখা দেয়।

৫ – স্বাভাবিক –দুর্বল বাহুটি স্বাভাবিকভাবেই কাজটি করে।

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জীবনের নিয়মিত কর্মকান্ডে আক্রান্ত হাত ব্যবহারের ক্ষেত্রে সকল কাজ ও স্কোরিং বিন্যাসের একটি তালিকা দেওয়া আছে। (উল্লেখ্য, এই পরীক্ষা একটি সংশোধিত সংস্করণ যা আপাতত ব্যবহার হচ্ছে।)

সিরিয়াল নং	নির্দেশনা	**পুনরাবৃত্তির স্কেল কেমন?**	**‘ভাল’ এর স্কেল কেমন?**
১।	বোতল বা কাপ ধরতে দিন।		
২।	চেয়ারে বসিয়ে একটি ছোট জিনিস ধরতে ও তুলতে দিন।		
৩।	চেয়ারে বসিয়ে একটি বর কিছু ধরতে অ তুলতে দিন।		
৪।	আঙুল দিয়ে খেতে দিন।		
৫।	হাতের নাগালের বাইরে কিছু ধরতে দিন।		
৬।	বোতামে টিপ দিতে বলুন।		
৭।	দরজা বা জানালা খুলতে দিন।		
৮।	মেঝেতে নড়তে বাহু ব্যবহার করতে দিন।		
৯।	জুতা বা মোজা খুলতে দিন।		
১০।	তারে বাধা পুতুল উঠাতে দিন।		
১১।	দরজার নব ঘুরাতে দিন।		
১২।	নলাকার বস্তু ধরতে দিন।(যেমন, খড়ি, মার্কার, বা ড্রামস্টিক)		
১৩।	বল বা বলের মত কিছু ছুঁড়ে মারতে দিন।		
১৪।	একটি অশ্বচালনা, পোলিং, বা ধাক্কা খেলনা একটি হ্যান্ডেল		

	ধরতে দিন।		
১৫।	দুর্বল হাত যখন পেটের সঙ্গে তখন শরীরের সামনে ধাক্কা দিতে বলুন।		
১৬।	দাঁড়িয়ে কোন কিছু ধরতে দিন।		
১৭।	এক জায়গা থেকে অন্য জায়গায় কিছু নিয়ে যেতে বলুন।		
১৮।	বল ঘুরাতে বা ঘুরান থামাতে দিন।		
১৯।	বুদবুদ ফুটাতে দিন।		
২০।	বসে ধাক্কা দিতে বলুন।		
২১।	পিতামাতা দ্বারা কোলে তোলার জন্য তাদের কাছে পৌছাতে বলুন।		
২২।	জামার হাতা দিয়ে হাত দিতে বলুন।		

স্বন/টান এর মূল্যায়ন

এই প্রশ্নাবলী নির্ধারন করা হয়েছে সেরিব্রাল পলসি বাচ্চাদের মাংশপেশীর টান নির্ণয় করার জন্য। প্রথম অ্যাসওয়ারথ মাপকাঠি তৈরী করা হয় ১৯৬৪ সালে ৫ টি ভাগে মাংশপেশীর অনৈচ্ছিক টান মূল্যায়নের জন্য। পরবর্তীতে ১৯৮৭ সালে বহনন ও স্মিথ এই মাপকাঠিকে পরিবর্তীত করে এর সংবেদনশীলতা বাড়ানোর জন্য ৬ টি ভাগে ভাগ করেন।

প্রশ্নাবলীর এই অংশটি ফিজিওথেরাপিস্ট পূরণ করবেন।

অ্যাসওয়ারথ স্কেলঃ-

স্কোর	অ্যাসওয়ারথ মাপকাঠি(১৯৬৪)	পরিবর্তীত অ্যাসওয়ারথ মাপকাঠি বহনন ও স্মিথ (১৯৮৭)
০	টানের বৃদ্ধি নেই	মাংশপেশির টানের বৃদ্ধি নেই
১	অঙ্গের ভাজ বা প্রসার এর ফলে টান হালকা বৃদ্ধি পায়।	আক্রান্ত অংশ ভাজ বা প্রসারের সময় মুক্তি বা সংক্ষিপ্ত প্রতিরোধ এর ফলে মাংশপেশীর হালকা টান বাড়ে।

১+(২)	অঙ্গলি সরানোর ফলে উল্লেখযোগ্য টান লক্ষ্য করা যায়।	অঙ্গলির নড়চড়ার সময় সংক্ষিপ্ত প্রতিরোধের ফলে উল্লেখযোগ্য মাংশপেশীর টান লক্ষ্য করা যায়।
২(৩)	অঙ্গলি ভাজ হয় কিন্তু টান খুব বেশি বৃদ্ধি পায়।	আক্রান্ত অংশ সহজে চালিত হয়, কিন্তু মাংশপেশীর টান খুব বেশি বৃদ্ধি পায়।
৩(৪)	টান অতিরিক্ত বৃদ্ধি পায় এবং নিস্ক্রিয় নড়াচড়া কঠিন।	মাংশপেশীর টান অতিরিক্ত বৃদ্ধি পায় এবং নিস্ক্রিয় নড়াচড়া কঠিন।
৪(৫)	ভাজ এবং প্রসারের সময় অঙ্গলি শক্ত হয়ে যায়।	ভাজ এবং প্রসারের সময় আক্রান্ত অংশ শক্ত হয়ে যায়।

এই অংশটি নির্ধারন করা হয়েছে ধ্রুবক প্রয়োগ চিকিৎসা নির্ণয় করার জন্য।

মাংশপেশীর টান নির্ধারনের সাধারন নিয়মাবলীঃ-

১। সব পরীক্ষা চিৎ অবস্থায় করা উচিত। শুধুমাত্র কোয়ারডিস্পেস ফেমোরিস মাংশ বাদে যেহেতু সক্রিয় নড়াচড়া মাংশপেশীর টান বৃদ্ধি করে।

২। পরীক্ষার সময় শিশু যেন সাধারন অবস্থায় থাকে এটি নিশ্চিত করতে হবে।

৩। চিৎ করে শুয়ানোর ফলে যদি লরডোসিস বাড়ে তবে মাথার নিচে বালিশ দিতে হবে।

৪। মাথার অবস্থান মাঝ বরাবর হওয়া উচিত।

৫। যতটুকু সম্ভব নড়াচড়ার সময় যেন শরীরের অংশ নিরুদ্বেগ থাকে।

৬। নিষ্ক্রিয় নড়াচড়া ১ সেকেন্ডে করা উচিত যেহেতু শক্ত হওয়াটা মাংসপেশীর টানের উপর নির্ভর করে।

৭। নড়াচড়ার পুনরাবৃত্তি কম করতে হবে যেহেতু এর ফলে শক্ত হওয়াটা কমে যেতে পারে।

৮। এই সবগুলো পরীক্ষা শুয়ে (চিৎ/উপুর) করা উচিত।

মন্তব্যঃ-

যদি শিশুকে চিৎ বা উপুর করে শুয়ানো না যায় তবে সাইডে শুইয়ে বা বসিয়ে করতে হবে।

মুল্যায়ন ফরমঃ

মাংশপেশীর নাম	পূর্ববর্তী পরীক্ষা		পরবর্তী পরীক্ষা	
	ডান	বাম	ডান	বাম
বাইসেপ্স ব্রাকাই				
রিস্ট এক্সটেন্সর				

চিকিৎসা পরবর্তী উপাত্ত সমূহ

হাতের দক্ষতার পি, এম, এ, এল মাপ কাঠি

কোন প্রতিক্রিয়া না পাওয়াতে PMAL **সংকেতসমূহ**:

১. "শিশু সম্পূর্ণরূপে শক্তিশালী বাহু ব্যবহার করেছে৷"

(নির্দিষ্ট করুন "০")

২. "শিশুর জন্য অন্য কেউ এটা করেছে৷"

(নির্দিষ্ট করুন "০")

৩. "ঐ কাজ করার মত সুযোগ শিশুটির ছিল না৷"

(নির্দিষ্ট করুন "০" এবং দেখাশুনা কারীকে বলুন সুযোগ করে দিতে৷)

৪. "শিশুটি মাঝে মধ্যে ঐ রকম কাজ করে, কিন্তু আগের প্রশ্নগুলোর উত্তর দেওয়ার পর থেকে আমি তাকে করতে দেখি নি৷ "

(আগের স্কোরের সাথে যুক্ত করুন৷)

৫. শিশুটি শুধুমাত্র থেরাপি দেওয়ার সময় কাজটা করে৷

(আগের স্কোরের সাথে যুক্ত করুন৷)

৬ . এটা করা শিশুটির জন্য অসম্ভব বা বৃদ্ধিজনিত অনুপযুক্ত৷

(স্কোরিং থেকে আইটেম মুছুন; সঠিক স্কোর পেতে মোট স্কোর থেকে আইটেমটি বাদ দিন৷)

পুনরাবৃত্তির স্কেল কেমন?

০ – ব্যবহার হয় নি -আপনার শিশু কাজটির জন্য দুর্বল বাহু ব্যবহার করে নি৷

১ – খুবই কম – ৫ -১০ ভাগ সময় – আপনার শিশুটি মাঝে মাঝে দুর্বল বাহু ব্যবহার করে,কিন্তু খুব কম৷

২ - কম – প্রায় ২৫ ভাগ সময় - আপনার শিশুটি সময়ে দুর্বল বাহু ব্যবহার করে, কিন্তু বেশির ভাগ সময় শক্তিশালী বাহু দিয়ে কাজটি করে৷

৩ – কখনো কখনো– প্রায় ৫০ভাগ সময় – দুর্বল বাহু ব্যবহৃত হলেও শক্তিশালী বাহুর অর্ধেক।

৪ -- প্রায়ই – প্রায় ৭৫ভাগ সময় – দুর্বল বাহুটি ব্যবহৃত হত নিয়মিত, কিন্তু সবল বাহুর তিন-চতুর্থাংশ।

৫ - স্বাভাবিক – ৯০-১০০ভাগ সময় – দুর্বল বাহুটি সবল বাহুর মতই ব্যবহৃত হয়েছে।

'ভাল' এর স্কেল কেমন?

০ – ব্যবহার হয় নি – আপনার শিশু কাজের জন্য দুর্বল বাহুটি মোটেও ব্যবহার করে নি।

১ – খুব কম –আপনার শিশুর বাহুতে কাজ করার সামর্থ্য কম। হয়ত কাজের সময় নড়েছে কিন্তু কাজে কোন অবদান নেই।

২ - খারাপ –কাজটি করাতে দুর্বল বাহুর সামান্য অবদান ছিল। তা সক্রিয়ভাবে কাজটি করতে আসে, কিন্তু শক্তিশালী বাহু বা দেখাশুনা কারী বেশি অংশ করে দেয়।

৩ - মোটামোটি- দুর্বল বাহুটি সবসময় কাজে ব্যবহৃত হত, কিন্তু কাজটি ধীরে বা খুব জটিলতার সাথে সম্পন্ন হত।

৪ – প্রায় স্বাভাবিক – স্বাধীণভাবে বাহুটি কাজ করতে পারে, কিন্তু সমস্যা বা জটিলতা দেখা দেয়।

৫ – স্বাভাবিক –দুর্বল বাহুটি স্বাভাবিকভাবেই কাজটি করে।

পি. এম. এ. এল

জীবনের নিয়মিত কর্মকান্ডে আক্রান্ত হাত ব্যবহারের ক্ষেত্রে সকল কাজ ও স্কোরিং বিন্যাসের একটি তালিকা দেওয়া আছে। (উল্লেখ্য, এই পরীক্ষা একটি সংশোধিত সংস্করণ যা আপাতত ব্যবহার হচ্ছে।)

সিরিয়াল নং	নির্দেশনা	**পুনরাবৃত্তির স্কেল কেমন?**	**'ভাল' এর স্কেল কেমন?**
১।	বোতল বা কাপ ধরতে দিন।		
২।	চেয়ারে বসিয়ে একটি ছোট জিনিস ধরতে ও তুলতে দিন।		
৩।	চেয়ারে বসিয়ে একটি বর কিছু ধরতে অ তুলতে দিন।		
৪।	আঙুল দিয়ে খেতে দিন।		
৫।	হাতের নাগালের বাইরে কিছু ধরতে দিন।		
৬।	বোতামে টিপ দিতে বলুন।		
৭।	দরজা বা জানালা খুলতে দিন।		
৮।	মেঝেতে নড়তে বাহু ব্যবহার করতে দিন।		
৯।	জুতা বা মোজা খুলতে দিন।		
১০।	তারে বাধা পুতুল উঠাতে দিন।		

১১।	দরজার নব ঘুরাতে দিন।		
১২।	নলাকার বস্তু ধরতে দিন।(যেমন, খড়ি, মার্কার, বা ড্রামস্টিক)		
১৩।	বল বা বলের মত কিছু ছুঁড়ে মারতে দিন।		
১৪।	একটি অশ্বচালনা, পোলিং, বা ধাক্কা খেলনা একটি হ্যান্ডেল ধরতে দিন।		
১৫।	দুর্বল হাত যখন পেটের সঙ্গে তখন শরীরের সামনে ধাক্কা দিতে বলুন।		
১৬।	দাঁড়িয়ে কোন কিছু ধরতে দিন।		
১৭।	এক জায়গা থেকে অন্য জায়গায় কিছু নিয়ে যেতে বলুন।		
১৮।	বল ঘুরাতে বা ঘুরান থামাতে দিন।		
১৯।	বুদবুদ ফুটাতে দিন।		
২০।	বসে ধাক্কা দিতে বলুন।		
২১।	পিতামাতা দ্বারা কোলে তোলার জন্য তাদের কাছে পৌছাতে বলুন।		
২২।	জামার হাতা দিয়ে হাত দিতে বলুন।		

<u>স্বন/টান এর মূল্যায়ন</u>

এই প্রশ্নাবলী নির্ধারন করা হয়েছে সেরিব্রাল পলসি বাচ্চাদের মাংশপেশীর টান নির্ণয় করার জন্য। প্রথম অ্যাসওয়ারথ মাপকাঠি তৈরী করা হয় ১৯৬৪ সালে ৫ টি ভাগে মাংশপেশীর অনৈচ্ছিক টান মূল্যায়নের জন্য। পরবর্তীতে ১৯৮৭ সালে বহনন ও স্মিথ এই মাপকাঠিকে পরিবর্তীত করে এর সংবেদনশীলতা বাড়ানোর জন্য ৬ টি ভাগে ভাগ করেন।

প্রশ্নাবলীর এই অংশটি ফিজিওথেরাপিস্ট পূরণ করবেন।

এই অংশটি নির্ধারন করা হয়েছে ধ্রুবক প্রয়োগ চিকিৎসা নির্ণয় করার জন্য।

অ্যাসওয়ারথ স্কেলঃ-

স্কোর	অ্যাসওয়ারথ মাপকাঠি(১৯৬৪)	পরিবর্তীত অ্যাসওয়ারথ মাপকাঠি বহনন ও স্মিথ (১৯৮৭)
০	টানের বৃদ্ধি নেই	মাংশপেশির টানের বৃদ্ধি নেই
১	অঙ্গের ভাজ বা প্রসার এর ফলে টান হালকা বৃদ্ধি পায়।	আক্রান্ত অংশ ভাজ বা প্রসারের সময় মুক্তি বা সংক্ষিপ্ত প্রতিরোধ এর ফলে মাংশপেশীর হালকা টান বাড়ে।
১+(২)	অঙ্গলি সরানোর ফলে উল্লেখযোগ্য টান লক্ষ্য করা যায়।-*	অঙ্গলির নড়চড়ার সময় সংক্ষিপ্ত প্রতিরোধের ফলে উল্লেখযোগ্য মাংশপেশীর টান লক্ষ্য করা যায়।
৩(৪)	টান অতিরিক্ত বৃদ্ধি পায় এবং নিস্ক্রিয় নড়াচড়া কঠিন।	মাংশপেশীর টান অতিরিক্ত বৃদ্ধি পায় এবং নিস্ক্রিয় নড়াচড়া কঠিন।
৪(৫)	ভাজ এবং প্রসারের সময় অঙ্গলি শক্ত	ভাজ এবং প্রসারের সময় আক্রান্ত অংশ শক্ত হয়ে যায়।

মাংশপেশীর টান নির্ধারনের সাধারন নিয়মাবলীঃ-

১। সব পরীক্ষা চিৎ অবস্থায় করা উচিত। শুধুমাত্র কোয়ারডিস্পেস ফেমোরিস মাংশ বাদে যেহেতু সস্ক্রিয় নড়াচড়া মাংশপেশীর টান বৃদ্ধি করে।

২। পরীক্ষার সময় শিশু যেন সাধারন অবস্থায় থাকে এটি নিশ্চিত করতে হবে।

৩। চিৎ করে শুয়ানোর ফলে যদি লরডোসিস বাড়ে তবে মাথার নিচে বালিশ দিতে হবে।

৪। মাথার অবস্থান মাঝ বরাবর হওয়া উচিত।

৫। যতটুকু সম্ভব নড়াচড়ার সময় যেন শরীরের অংশ নিরুদ্বেগ থাকে।

৬। নিস্ক্রিয় নড়াচড়া ১ সেকেন্ডে করা উচিত যেহেতু শক্ত হওয়াটা মাংসপেশীর টানের উপর নির্ভর করে।

৭। নড়াচড়ার পুনরাবৃত্তি কম করতে হবে যেহেতু এর ফলে শক্ত হওয়াটা কমে যেতে পারে।

৮। এই সবগুলো পরীক্ষা শুয়ে (চিৎ/উপুর) করা উচিত।

মন্তব্যঃ-

যদি শিশুকে চিৎ বা উপুর করে শুয়ানো না যায় তবে সাইডে শুইয়ে বা বসিয়ে করতে হবে।

মুল্যায়ন ফরমঃ

মাংশপেশীর নাম	পূর্ববর্তী পরীক্ষা		পরবর্তী পরীক্ষা	
	ডান	বাম	ডান	বাম
বাইসেপ্স ব্রাকাই				
রিস্ট এক্সটেন্সর				

Consent Form

Assalamualaikum\ Namashker,

I am Liton Malo, Final Year B.Sc. in Physiotherapy student of Bangladesh Health Professions Institute (BHPI) under the Faculty of Medicine, University of Dhaka. To obtain my Bachelor degree, I have to conduct a research project and it is a part of my study. The participants are requested to participate in the study after a brief of the following. My research title is **"Efficacy of Constraint-Induced Movement Therapy for Children with Cerebral Palsy With Asymmetric Motor Impairment in CRP."** Through this study I will find the effectiveness of Constraint-Induced Movement Therapy in motor function along with other physiotherapy for the treatment of Children with hemiplegic type of Cerebral Palsy. If I can complete this study successfully, patients may get benefits who are suffering from hemiplegic type of Cerebral Palsy. To fulfil my research project, I need to collect data. So, you can be a respected participant of this research. I want to meet you a couple of sessions, during your regular therapy schedule. Given that exercises would be pain free and safe for you.

I would like to inform you that this is a purely academic study and will not be used for any other purposes. I assure that all data will be kept confidential. Your participation will be voluntary. You may have the rights to withdraw consent and discontinue participation at any time of the experiment. You also have the rights to answer a particular question that you don't like.

Do you have any questions before I start?

So, may I have your consent to proceed with the interview?

Yes ☐ No ☐

Signature of parents and date ……..

Signature of the researcher and Date……..

Signature of the witness and Date……..

Signature of data collector and date ……..

Questioner (English)

Subjective Information

This questionnaire is developed to measure Efficacy of Constraint-Induced Movement Therapy for Children with Cerebral Palsy with Asymmetric Motor Impairment in CRP and this section will be filled by tick (V) mark in the left of point by patients but in special consideration physiotherapist using a black or blue pen.

Code No:

Date:

1. Patients name:
2. Age:
3. Gender:
    i. Boy
    ii. Girl
4. Address:

Village:	Post office:
Police station:	District:
Mobile number:	E-mail:

5. Did your child take three hour session physiotherapy for every day?
    i. Yes
    ii. No

Pre-Test Treatment

PMAL Codes:

PMAL Codes for recording "no" responses:

1. "Child used the stronger arm entirely." (Assign "0")

2. "Someone else did it for the child." (Assign "0")

3. "Child never has the opportunity to do that activity." (Assign "0" and ask caregiver to provide an opportunity)

4. "Child sometimes does that activity, but I did not see the child do it since the last time I answered these questions." (Carry-over last assigned score for that activity)

5. Child only did activity in therapy (carry-over last assigned score for that activity)

6. Impossible for child to do/developmentally inappropriate. (Remove item from scoring; to get the mean score for the test, subtract this item from the number of total scores in the denominator)

HOW OFTEN SCALE

0 - Not Used -Your child did not use the weaker arm for the activity.

1 - Very rarely – 5% -10% of the time - Your child occasionally used the weaker arm for the activity, but only very rarely.

2 - Rarely – About 25% of the time - Your child used the weaker arm at times, but did the activity with the stronger arm most of the time.

3 - Sometimes –About 50% of the time - The weaker arm was used in performing the activity, but only about half as much as the stronger arm.

4 - Often – About 75% of the time - The weaker arm was used in performing the activity regularly, but just three-quarters as often as the stronger arm.

5 - Normal – 90%-100% of the time -The weaker arm was used as often as the stronger arm to perform the activity.

HOW WELL SCALE

0 - Not Used - Your child did not use the weaker arm at all for the activity.

1 - Very Poor - Your child had very little functional use of the

Weaker arm for the activity. The arm may have moved during the activity but was of no real functional help.

2 - Poor - Your child had minor functional use of the weaker arm for the activity. The arm actively participated in the activity, but the stronger arm or caregiver did most of the work.

3 - Fair or Moderate - The weaker arm was used to accomplish the activity, but the performance was very slow and/or involved great difficulty.

4 - Almost Normal - The weaker arm was able to accomplish the activity independently, but did so with some difficulty and/or inaccuracy.

5 - Normal -The weaker arm did the activity normally.

PMAL

The following is a list of activities and the scoring format for use of the more-affected arm in different activities in the life situation. (Note that a revised version of this test is currently in use.)

		HOW OFTEN	**WELL SCALE**
01	Hold a bottle/cup		
02	Pick up and hold a small item while sitting in a chair		
03	Pick up and hold a large item while sitting in a chair		
04	Eat finger foods		
05	Pick up an object out of arm's reach		
06	Push a button		
07	Open a door or cabinet		
08	Use arm to move across floor		
09	Take off shoes or socks		
10	Pull a toy with a string		
11	Turn a knob		
12	Pick up a cylindrical object (eg, crayon, marker, or		

	drumstick)		
13	Throw a ball or similar object		
14	Hold a handle on a riding, pulling, or push toy		
15	Push up front of body with weaker arm while on stomach		
16	Hold an item while in standing position		
17	Carry an item from place to place		
18	Stop or roll a ball		
19	Pop bubbles		
20	Push into sitting position		
21	Reach to be picked up by parent		
22	Push arm through sleeve of clothing		

Assessment of tone

This questionnaire is designed for cerebral palsy children's for assessment of muscle tone. The original Ashworth Scale (Ashworth, 1964) was first developed by Ashworth as a 5-point scale for evaluating and grading spasticity, with the purpose of creating a simple clinical tool to test the muscle tone. The scale was later modified to a6-point scale by Bohannon and Smith (1987) with the aim of increasing its sensitivity of grades at the lower end of the scale The Ashworth scale are only moderately reliable and repeatable for assessment of muscle tone (Bohannon and Smith, 1987). This section of questionnaire will be filled by the physiotherapist using a pencil.

This part is designed to determine the effectiveness of constant induce movement therapy.

The Ashworth Scale:

Score	**Ashworth Scale (1964)**	**Modified Ashworth Scale Bohannon & Smith (1987)**
0 (0)	No increase in tone.	No increase in muscle tone.
1(1)	Slight increase in tone giving a catch when the limb was moved in flexion or extension.	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 moved in flexion or extension.
1+ (2)	Slight hyper tonus noticeable catch when limb is moved.	Slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the reminder (less than half) of the ROM (range of movement).
2 (3)	More marked increase in tone but limb easily flexed.	More marked increase in muscle tone through most of the ROM, but affected part(s) easily moved.
3 (4)	Considerable increase in tone passive movement difficult.	Considerable increase in muscle tone passive, movement difficult.
4 (5)	Limb rigid in flexion or extension.	Affected part(s) rigid in flexion or extension.

General Instructions to Assessment of muscle tone:

1. All tests should be performed in the supine position except the Quadriceps femoris muscle that should be tested in the prone position as children can become easily distracted and active moving might increase the muscle tone.
2. During the examination of the children make sure that the child is in a normal state of alertness.
3. If the supine position brings the child to a position of increased lordosis, place a pillow under the head.
4. The head of the child should be placed in the mid-position.
5. Make sure that the limb you are about to move is relaxed as much as possible.
6. The passive movement should be performed within one second given the facthat spasticity is characterized by a velocity dependent increase in muscle tone.
7. Repeated movements must be kept to a minimum, since spasticity will decrease with repeated cycles of stretching.
8. It is preferred to perform all movements in lying (supine/prone) position.

Remark:

If the child's situation is not enabling you to perform the movements in supine or prone, try side lying or sitting.

Assessment Form:

Name of muscles	Pre test		Post test	
	Right	Left	Right	Left
Biceps Brachi				
Wrist Flexors				

Post-Test Treatment

PMAL Codes:

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10	Pull a toy with a string		
11	Turn a knob		
12	Pick up a cylindrical object (eg, crayon, marker, or		

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8. It is preferred to perform all movements in lying (supine/prone) position.

Remark:

If the child's situation is not enabling you to perform the movements in supine or prone, try side lying or sitting.

Assessment Form:

Name of muscles	Pre test		Post test	
	Right	Left	Right	Left
Biceps Brachi				
Wrist Flexors				

Permission letter

April 26, 2017

The Head

Department of Physiotherapy,

Center for the Rehabilitation of the Paralysed (CRP)

CRP, Chapain, Savar, Dhaka-1343.

Through: Head, Department of Physiotherapy, BHPI.

Subject: Seeking permission for data collection to conduct my research project.

Dear Sir,

With due respect and humble submission to state that I am Liton Malo a student of 4th Professional B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). The ethical board of BHPI has approved my research project entitled on **"Efficacy of Constraint-Induce Movement Therapy for Children with Cerebral Palsy with Asymmetric Motor Impairment at CRP".** To conduct this research, I want to collect data from Pediatric Unit at CRP. So, I need permission for data collection. I would like to assure that anything of my study will not be harmful for the participants.

I therefore, pray and hope that you would be kind enough to give me the permission to make this research project successful.

Sincerely

Liton Malo

Liton Malo

4th Professional B.Sc. in Physiotherapy
Class Roll-32, Session: 2012-2013
Bangladesh Health Professions Institute (BHPI)
(An academic Institute of CRP)
CRP, Chapain, Savar, Dhaka-1343.

26.04.17
Recommended & Forwarded
26/04/17
Md. Obaidul Haque
Associate Professor & Head of the Department
Department of Physiotherapy
Bangladesh Health Professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343

Approved
please contact with Samira Akter Kakuli, Senior PT as a counterpart of the data collection process.
26/04/17
Mohammad Anwar Hossain
Associate Professor &
Head of Physiotherapy Dept.
CRP, Chapain, Savar, Dhaka-1343

BANGLADESH HEALTH PROFESSIONS INSTITUTE

বাংলাদেশ হেল্‌থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The Academic Institute of CRP)

Ref. CRP-BHPI/IRB/10/17/140

Date: 15.10.2017

To
Liton Malo
B.Sc. in Physiotherapy
Session: 2012-2013, Student ID 112120033
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: "Efficacy of Constraint-Induced Movement Therapy for Children with Cerebral Palsy With Asymmetric Motor Impairment at CRP."

Dear Liton Malo,

The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application on 16/08/2016 to conduct the above mentioned thesis, with yourself, as the Principal investigator. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Thesis Proposal
2	Questionnaire (English and Bengali version)
3	Information sheet & consent form.

Since the study involves 'Paediatric Motor Activity Log' questionnaire that takes 25 to 30 minutes and have no likelihood of any harm to the. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 09:00 AM on August 17, 2016 at BHPI.

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and ask to be provided a copy of the final report. This Ethics committee is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,

Millathassain
Muhammad Millat Hossain
Assistant Professor, Dept. of Rehabilitation Science
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ, ফোন ঃ ৭৭৪৫৪৬৪-৫, ৭৭৪১৪০৪ ফ্যাক্স ঃ ৭৭৪৫০৬৯
CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404, Fax : 7745069, E-mail : contact@crp-bangladesh.org, www.crp-bangladesh.org