IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

"TO FIND OUT THE EFFECTIVENESS OF HAND ARM BIMANUAL INTENSIVE THERAPY (HABIT) ON IMPROVING FINE MOTOR FUNCTION IN CHILDREN WITH SPASTIC CEREBRAL PALSY"

DR. PUTTA SNEHAJA[1] **DR.** DR. A HEMACHAND[2]
MPT (NEURO) PG Student 1 , MPT (NEURO) (Assistant prof) (Narayana College)2
NARAYANA COLLEGE OF PHYSIOTHERAPY , AP , NELLORE

ABSTRACT

Objectives of the study: The main objective of the study is to determine the effect of hand arm bimanual intensive therapy on improving fine motor function in children with spastic cerebral palsy.

Methods: Thirty children clinically diagnosed with spastic bilateral hand dysfunction were taken in the study and given treatment. Treatment duration for one session is 40 min five days per week for 6 weeks. Patients are selected by random sampling method and are taken from Department of paediatrics, Narayana medical college and hospital.

Results: The Result of this study shows that Hand arm bimanual intensivetherapy (HABIT) is effective in improving fine motor function performance scores ($p<0.5$) in children with spastic cerebral palsy which was measured by PDMS scale.This Study also shows that reduce in Spasticity which was measured by modified by Ashworth scale (Bohannon & Smith).

Conclusion: In this study patients with spastic cerebral palsy showed improvement in fine motor function after using the hand arm bimanual intensive therapy (HABIT)intervention. As patients are advised to perform task-oriented activities like grasping, holding, removing pegs, fine motor skills were improved.

The study was for 6 weeks spasticity showed to be reduced with improved grip. Using modified ashworth scale spasticity was checked and PDMS is used to check fine motor function.

Keywords: Hand arm bimanual Intensive therapy(HABIT), Spastic Cerebral Palsy, Fine Motor Function.

INTRODUCTION

- Cerebral palsy (CP) refers to non-progressive disease with single or multiple lesions in the cerebral cortex, resulting in motor and some degree of sensory abnormality, as well as other associated disabilities.
- It occurs as a result of maternal factors or events at the time of labour and delivery (congenital cerebral palsy), or a variety of factors in early developing years (antenatal cerebral palsy).
- Cerebral palsy is a group of permanent, irreversible posture and movement disorders, which leads to limitation of activities which is due to non-progressive problems that aroused in the immature fetal brain.
- The motion disorders sometimes associated with defects in sensory system are awareness, thinking, speech, language, behavior, and musculoskeletal problems.
- The prevalence of this disorder ranges from 2 to 2.5 per thousand children, being the most prevailing neuro developmental disorder in children. It is more common in boys.
- The incidence of cerebral palsy has increased over years with the in success of medical intervention in keeping premature and low birth babies alive.
- Cerebral palsy is a group of neurological disorders that appear in infancy or childhood and permanently affect body movement and muscle contraction. It is caused by damage to the brain or anomalies inside developing brain that disrupts brain ability to control and maintain posture and balance. The term cerebrum refers to brain and palsy refers to the loss of motor function.
- Cerebral palsy is a disorder of movement and posture that appear during early childhood. It is caused by non-progressive damage to brain before, or during, or shortly after birth. It is a not a single disease, but a name given for wide variety of static neuromotor impairment syndromes occurring secondary to lesion in developing brain.

ETIOLOGY

- The etiology of cerebral palsy (CP) is very diverse and multi factorial. The causes are congenital, genetic, inflammatory, infectious, anoxic, traumatic and metabolic. The injury to the developing brain may be prenatal, natal, or post- natal.
- Factors may operate prenatally, during delivery or in the post-natal period. Mal development and disorderly organized brain, perinatal hypoxia, birth trauma, chorioamnionitis, prothrombic factors, acid base imbalance, indirect hyper bilirubinemia, metabolic disturbances and intrauterine or acquired infections. Most of the infants have multiple risk factors.

PRENATAL CAUSES:

- Intrauterine infections–such as toxoplasma, cytomegalovirus, rubella etc.
- Cerebrovascular accidents–due to maternal hypertension during pregnancy.
- Low birth weight babies.
- Trauma–physical or emotional.
- Neural tube defects.
- Microcephaly
- Other cerebral abnormalities.
- Multiple gestation(twins, triplets).
- Teratogenic exposures.
- Placental complications.

- Maternal conditions such as mental retardation, seizures, or hyperthyroidism.

PERINATAL CAUSES:

- Infections.
- Intracranial hemorrhage.
- Seizures
- Hypoglycemia and hyperbilirubinemia.
- Asphyxia due to mechanical respiratory infection.
- Drugs causing anoxia administered during labor.
- Trauma to the head during labor.
- Uterine hemorrhage.
- Forceps application.
- Poor position of infant like breech delivery.
- Anatomical abnormality in the uterus.
- Anoxia due to various problems like umbilical cord round the neck or placenta previa.
- Prematurity and complications at birth, respiratory distress.
- Eclampsia

POSTNATAL:

- Infections of central nervous system such as meningitis Encephalitis brain abscess and tuberculosis.
- Trauma to head with injury to the brain.
- Thrombosis are hemorrhage which causes vascular insufficiency.
- Anoxia due to drowning, murder attempt, strangulation, suffocation by pillos are plastic covers or carbon monoxide poisoning.
- Malignancy or space occupying lesions like cysts or tumours.
- Hydrocephalus.

CLINICAL FEATURES

- The symptoms of cerebral palsy vary from extent of damage and ranges from mild to severe. An infant with cerebral palsy have muscular and movement problems, including poor muscle tone.

- **Symptoms of cerebral palsy:**
  - Overdeveloped or underdeveloped muscles, leading to stiff of floppy movements.
  - Poor coordination and balance.
  - Involuntary, slow writhing movement or athetosis.
  - Stiff muscles that contract abnormally, known as spastic paralysis.
  - Crawling in an unusual way.
  - Lying down in awkward positions.[14]
  - Delay in reaching motor skill milestones, such as rolling over, sitting up alone or crawling
  - Delay in speech development and difficulty speaking.
  - Ataxia or a lack of muscle contraction and exaggerated reflexes.
  - Tremors or involuntary movements.
  - Excessive drooling and problems with swallowing.
  - Difficulty in walking.
  - Weakness in one or more arm or leg.

- Walking on toes, a crouched gait or a scissored gait.
- Delay in reaching motor skill mild stones.
- Difficulty with precise movements such as writhing or buttoning a shirt.

- **Other symptoms of cerebral palsy:**

- Vision and hearing problems.
- Learning disorders.
- Decreased muscle strength.
- Pain in joints that is often caused by tight muscles or poor posture.
- Seizures

- **Common neurological conditions in people with cerebral palsy include:**

- Epilepsy
- Intellectual disorders.
- Attention deficit hyper activity disorders (ADHD).
- Behavioral problems.
- Sensory impairments / pain.

- Symptoms might appear as early as 2 months of age. Parents usually notice delayed milestones as their child is not able to hold his or her head up, roll, crawl , sit, stand and walk.
- Hand arm bimanual intensive therapy (HABIT) is a part of physiotherapy used to treat fine motor disabilities in children with spastic cerebral palsy, it is a group of exercises, which include repetitive functional bimanual reach tasks using objects varying size, weight, and shape.

PEABODY DEVELOPMENTAL MOTOR SCALE- 2nd edition (PDMS):

- Peabody developmental motor scale is an early childhood motor developmental program that focuses on gross and fine motor skills, from birth to 5 years of age.
- To distinguish deficit areas and design functional intervention goals for children with disabilities.
- To evaluate the progress of fine motor function.
- To estimate child motor performance in comparison to peers.

MODIFIED ASHWORTH SCALE(MAS):(Bohannonandsmith)

Modified ashworth scale is used to asses spasticity in muscles. The ashworth scale produces a global assessment of resistance to passive movement of any extremity. It is influenced by non-contractile soft tissue properties by persistent muscle activity, intrinsic joint stiffness, stretch reflex response.

NEED OF THE STUDY

- Cerebral Palsy (CP) refers to non-progressive disease with single or multiple lesions in the cerebral cortex, resulting in motor and some degree of sensory abnormality, as well as other associated disabilities.
- The prevalence of this disorder ranges from 2 to 2.5 per thousand children, being the most prevailing neurodevelopment disorder in children. It is more common in boys.
- Cerebral palsy is a disorder of movement and posture that appear during early childhood. It is caused by non-progressive damage to brain before, or during, or shortly after birth.

It is not a single disease, but a name given for wide variety of static neuromotor impairment syndromes occurring secondary to lesion in developing brain.

- Hand arm bimanual intensive therapy (HABIT) is a part of physiotherapy used to treat fine motor disabilities in children with spastic cerebral palsy, it is a group of exercises, which include repetitive functional bimanual reach tasks using objects varying size, weight and shape.

AIM AND OBJECTIVES OF THE STUDY:

The aim and objective of this study is to determine the effect of hand arm bimanual intensive therapy on improving fine motor function in children with spastic cerebral palsy.

HYPOTHESIS:

Alternative Hypothesis: There will be significant difference by hand arm bimanual intensive therapy(HABIT) in improving fine motor function in children with spastic cerebral palsy.

Null Hypothesis: There will be no effect difference by hand arm bimanual intensive therapy (HABIT) in improving fine motor function in children with spastic cerebral palsy.

REVIEW OF LITERATURE:

- **A.R Gebhard, Kenneth Ottenbacher, s.j lane.**The interrater reliability of the Peabody developmental motor scale was examined in 23 children with developmental disabilities who were between 2 years and 5 years of age. Interclass correlation(ICC) ranged from 0.90 to0.97 for the subskills of grasping, hand use, eye-hand coordination, and manual dexterity. The results concluded that the PDMS fine motor scale is used to evaluate fine motor delays in the young children.

- **Andrew m Gordon, Jennifer A Schneider, Ashley chinnan, Jeanne Charles.** Hand arm bimanual intensive therapy (HABIT) was performed to examine the efficacy in children with hemiplegic CP with mild to moderate hand involvement. Twenty children (age range 3 years 6 months–15 years 6 months) were randomizes to either early intervention or delayed treatment control group. Children were engaged in play and functional activities that provided structural bimanual pract6 hours per day for ten days (60 hours).Children with CP, HABIT appears to be efficacious in improving bimanual hand use.

- **Charles j eat al.** Constraint- induced movement therapy is a physical intervention that has been receiving increasing attention in pediatric rehabilitation. So far, the evidence suggests that practice is associated with constraint induced (CI) therapy may improve uni-manual hand function in some children with hemiplegic cerebral palsy. Children with hemiplegia have impairment in bimanual coordination beyond their unilateral impairments. Thus, an intervention approach to increase functional independence during activities of daily living by using both hands in cooperation is needed. Hand arm bimanual intensive training improves bimanual coordination.

Gordon AM and Charles J. proposed hand arm bimanual intensive therapy (HABIT) for improving bimanual co-ordination in children with sapaspic cerebral palsy, HABIT retains the two major elements of pediatric constraint induced therapy (intensive structured practice and children friendliness) they proposed that extensive targeted practice can be provided in a child-friendly manner without using a physical restraint, although till that time efficacy of such an approach was not determined.

•**Hanna etal.** The development of hand and upper extremity function in young children who have cerebral palsy with upper extremity involvement. Assessments of hand function and the quality of upper extremity movement were conducted on 29 males and 22 females (mean age 36.2 months, SD 10.6; age range 16 to 60 months at baseline) and on four other occasions over 10 developmental curves. The results indicate that the hand function develops differently from overall upper extremity skills with declines in function in upper extremity skills being more common and pronounced among older children.

•**Hung yc et al.** Impaired hand function in children with hemiplegic cerebral palsy have focused on either the involved or the non -involve extremity in isolation. Bimanual coordination using a drawer-opening task under speed and hand constraints in 10 children with CP(5 males and 5 females, mean age13 years 5 months, range 8 years to 16 years).Children were asked to reach forward and open a drawer with one hand and then activate a light switch inside the drawer with the contralateral hand. The role of the two hands(open drawer and activate switch) and speed (self-paced vs fast as possible) were varied. Movement constraints on task performance suggest that movement, speed, might facilitate better bimanual coordination.

METHODOLOGY:

STUDYDESIGN:

- 30 patients with spastic cerebral palsy were taken in the study and given treatment.
- Non-randomized study before and after comparison without control.

INCLUSIONCRITERIA:

- Patients clinically diagnosed with spastic bilateral hand dysfunction.
- 1 to 5 years of age. Both male and female gender.
- Child is able to maintain independent sitting position if made to sit or
- comes to sitting on his own.
- Spasticity in the upper extremity,with muscle grade1 to 2 on modified ashworth scale.

EXCLUSIONCRITERIA:

- Subjects with history of upper limb contractures.
- Subjects with any infections or tumors.
- Subjects with uncontrolled epilepsy
- Subjects with visual problems,mental retardation,co-ordination disturbances.
- Subjects with pathological conditions such as chickenpox ,jaundice, influenza, spinal bifida etc.

SAMPLING:

- Patients are selected by random sampling method.

STUDY SETTING:

- Patients are taken from Department of Pediatrics, Narayana Medical College & hospital.

DURATION OF STUDY:

- Treatment duration for one session is 40 minutes, five days per week for 6 weeks.

MATERIALS:

- Coloured chart.
- Sketch pen.
- Data collection sheet.
- Ball.
- Peabody developmental motor scale 2nd edition (PDMS-2)kit is used with all items contained in it as per instruction for fine motor assessment.
- Toys that facilitate bimanual activities like clay, card games, videogames, arts and craft materials.

Fig: Peabody developmental motor scale(PDMS) kit.

PROCEDURE:

•Before implementing the study, initial assessment and informed consent will be taken. Subjects who ful fill the inclusion criteria will be assigned based on convenient random sampling. Pre treatment evaluation will be done before starting the treatment. Post treatment evaluation will be done immediately after the treatment.

- Step1:Children diagnosed with spastic bilateral hand dysfunction.
- Step2:Children fulfilling the inclusion criteria were included in the study and randomly allocated.
- Step3:Protocol was explained and written informed consent taken.
- Step4:Children were made to sit on a chair of comfortable height and table was given in front to place the objects.
- Step5:Object manipulation with different size,shape,and weight were given.
- Step6:The rapist assist the child in doing activities. Progression was done on repetition with previous object size, shape.
- Step7: Each exercise is given 10 repetition per set. Intervention was given for 5 days a week for 6 weeks. Treatment duration of one session is 40 min.

- Step8: Task difficulty was graded and improved by requiring speed or accuracy or by providing task that require more skilled use of involved hands.
- Step9: Conventional physiotherapy treatment based on activities of daily living (ADL)includes weight shifting exercises, passive, active assistive and active range of motion exercises.
- Step10: At end of each day, parents should be taught to engage the child in home practice of bimanual activities for 1 hour.

Activities improving the fine motor function include:

a)Dough activities–Roll large ball between two palms or roll two equal sizes of dough by both hands at the same time on the table

b)Ball activities–Throwing or catching different sized balls.(start with large ones).

c)Cube activities–Transferring cube from non-affected to affected hand and towering cubes. Started with 3 cubes till 6 cubes (first tower with the uninvolved limb and then with the involved one).

d)Bottle and marble activities – Put marbles into bottle. First the affected hand stabilized the bottle and the child performed the task with the unaffected hand.

e)Stacking rings – child held the rings with large one and stack with the non-affected hand and put rings on with the affected hand.

Fig:Drawing a picture (is a part of HABIT)

Fig :Clay activities (is a part of HABIT)

Fig:Removing pegs:activity of visuo motor integration(is a part of HABIT)

Fig:Peg board activities (is a part of HABIT)

Fig:Removing and keeping rings : activity of grasping (is apart of HABIT)

Fig:Ball activity (isa part of HABIT)

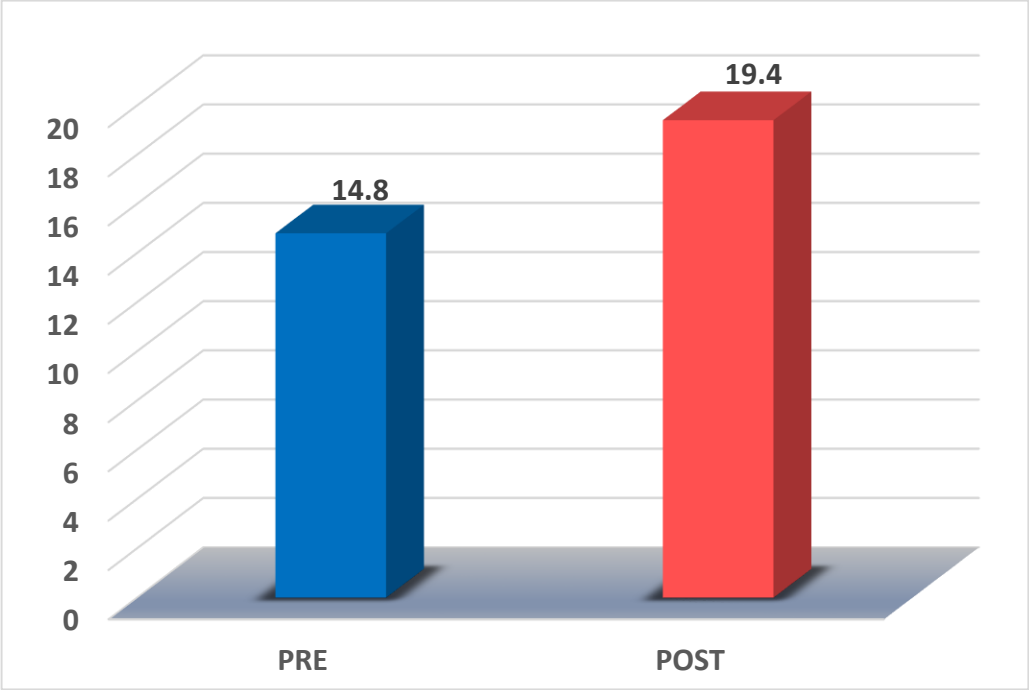
Fig:Grasping a cube(is a part of HABIT)

Fig :Bottle and Marble Activity (is a part of HABIT)

DATA ANALYSIS:

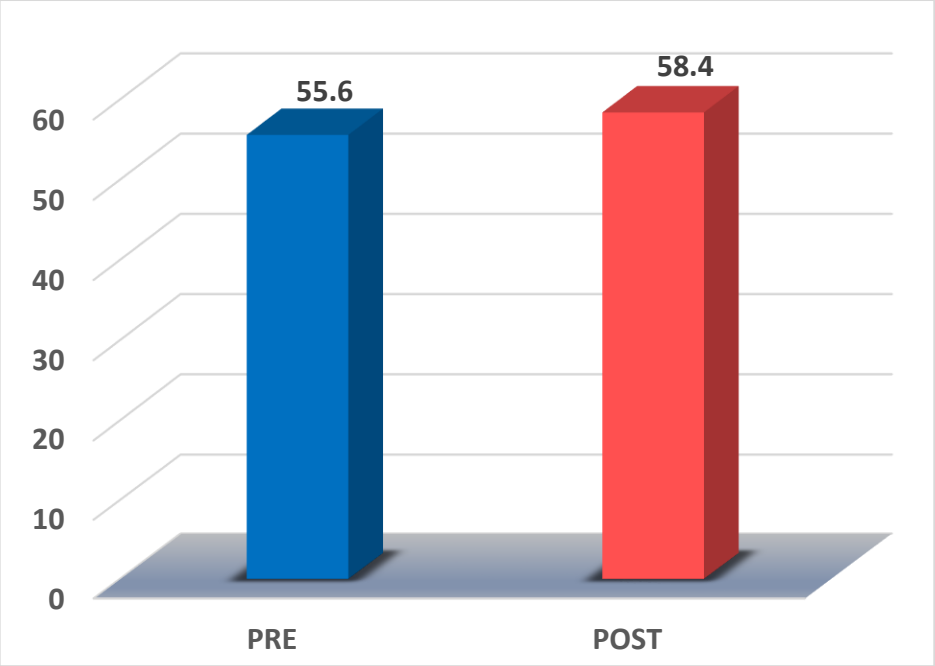
Analysis of MEAN of PRE and POST values of Grasping in PDMS scale
Group Statistics:

	Mean	STD	P-Value	Inference
PRE	14.8	.617	0.0001	Significant
POST	19.4	.676		



Analysis of MEAN of PRE and POST values of visuomotor integration in PDMS scale
Group Statistics:

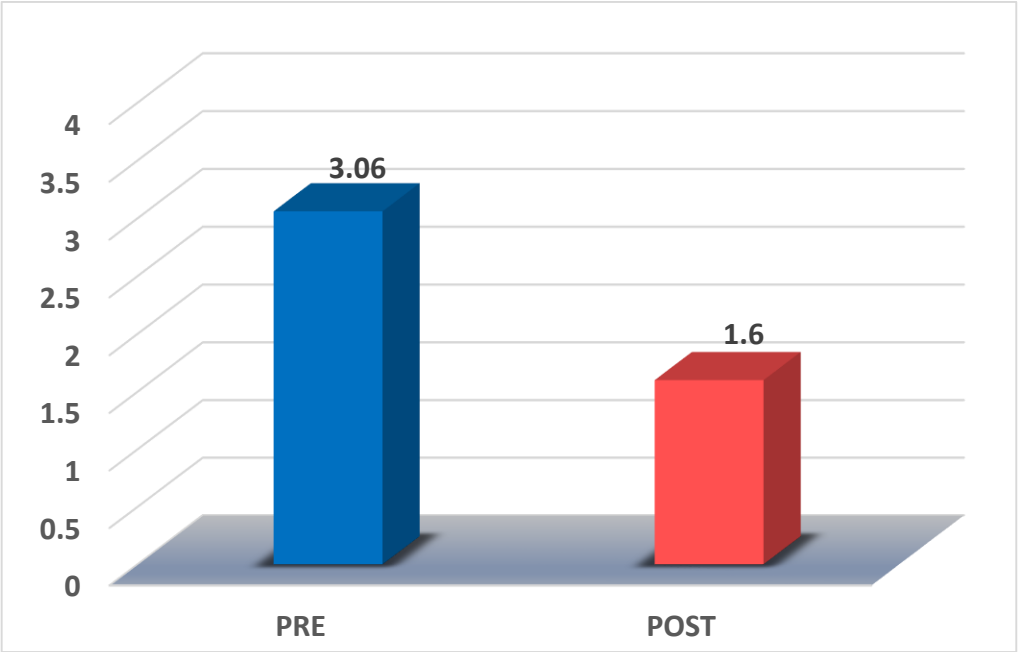
	Mean	STD	P-Value	Inference
PRE	55.6	4.33	0.0001	Significant
POST	58.4	4.94		



Analysis of MEAN of PRE and POST values of spasticity in modified Ashworth scale

Group Statistics

	Mean	STD	P-Value	Inference
PRE	3.06	2.46	0.0001	Significant
POST	1.6	2.83		



RESULTS:

The Result of this study shows that Hand arm bimanual intensive therapy (HABIT) is effective in improving fine motor function in children with spastic cerebral palsy which was measured by PDMS scale.This Study also shows that reduce in Spasticity which was measured by modified by Ashworth scale (Bohannon & Smith).

DISCUSSION:

- Cerebral palsy results in the limitation of activity, accompanied by impairment of sensory function, cognition, communication and perception. However, early treatment helps in reconstructing the damaged brain and is likely to improve the activities. It is proven that rapid growth and development of brain occurs during pregnancy.
- This study has used task-oriented activities which consists of grasping, holding, removing pegs with bimanual use of hand arm in spastic cerebral palsy children.
- Pre-task practice involve targeting movement exclusively of other movements. For example, making different shapes with clay targeting precision grasp.
- Manipulative gross motor activities like throwing and catching a ball were also included in HABIT Whole task practice involved targeted movements spatial and temporal coordination within the context of completing task. For example during drawing the objective was to complete the picture using a Coloured sketch.
- Task difficulty was graded as the child's performance improved by increasing the speed. For example, making different shapes using clay as fast as possible.
- In this study we followed PDMS (FINE MOTOR) score after intensive treatment and found that the improvement of fine motor function was maintained during 6weeks.
- PDMS scores significantly improved fine motor activities like grasping, drawing, throwing a ball in CP children with age group of 1-5 years.
- There are other studies where only fine motor functions were improved with less duration. In the present study, improvement is seen in fine motor function and reduced spasticity with short time.

CONCLUSION:

In this study patients with spastic cerebral palsy showed improvement in fine motor function after using the hand arm bimanual intensive therapy (HABIT)intervention. As patients are advised to perform task-oriented activities like grasping, holding, removing pegs, fine motor skills were improved.

The study was for 6 weeks spasticity showed to be reduced with improved grip. Using modified ashworth scale spasticity was checked and PDMS is used to check fine motor function.

LIMITATIONS:

1) The current study was limited with small sample size.
2) No control group.
3) Children between 0-1years and> 5years of age were not included as it is beyond PDMS Scale.
4) Maximum children were in the age group of 1-3 years. Hence, effects of HABIT during >4 years were not evaluated.
5) The study focused only on fine motor function and reducing disabilities and no other associated problems related with cerebral palsy.

RECOMMENDATIONS:

1) Large sample size can be used to find more Effectiveness effect with

   HABIT Protocol.

2) Long - term follow -up study can be conducted to understand the sustained effects of HABIT.

REFERENCES:

1. EFFICACY OF HAND ARM BIMANUAL INTESIVE THERAPY (HABIT) IN CHILDREN WITH CEREBRAL PALSY (Andrew m Gordon, Jennifer A Schneider, Ashley chinnan, Jeanne Charles). 2007; 49:832-838.

2. DEVELOPMENTAL HAND ARM BIMANUAL INTESIVE THERAPY (HABIT) FOR IMPROVING BIMANUAL COORDINATION IN CHILDREN WITH CEREBRAL PALSY (Charles j eat al).Nov.2006;48:931-936.

3.BIMANUAL COORDINATION DURING A GOAL ORIENTED TASK IN CHILDREN WITH HEMIPLEGIC CEREBRAL PALSY (Hang yc et al).Nov.2004;46:746-753.

4.DEVELOPMENTAL HAND FUNCTION IN CHILDREN WITH CEREBRAL PALSY: GROWTH CURVE ANALYSIS FOR AGES 16 TO 70 MONTHS (Hanna et al).July.2003;45:448-455.

5.INTERRATER RELIABILITY OF THE PEABODY DEVELOPMENTAL MOTOR SCALE: FINE MOTOR SCALE (A.R Gebhard, Kenneth Ottenbacher, s.j lane).1994;48(11):976-981.

ANNEXURE:

- **PEA BODY DEVELOPMENTAL MOTOR SCALE:**

Following are the components and subcomponent of PDMS:

A.**Gross motor scale**:

a) Reflexes:8 Items reflex subtest, measures aspects of a child's ability to automatically react to environmental events. Reflexes get integrated at 12 months of child's age, so this subtest is given only to children from birth to 11 months of age
b) Stationary:30 Items stationary subtest,measures the child's ability to sustain control of his/her body within its Centre of gravity and retain equilibrium.
c) Locomotion:89 Items locomotion subtest,measures the child's ability to move from one place to another. The activities analyzed are crawling, walking, running, hopping, jumping.
d) Object manipulation: 24 Items object manipulation subtest,measures a child ability to manipulate balls. The activities analyzed are throwing, kicking and catching a ball. This subtest is given only to the children ages from 12 months and older.

B.**Fine Motor Scale:**

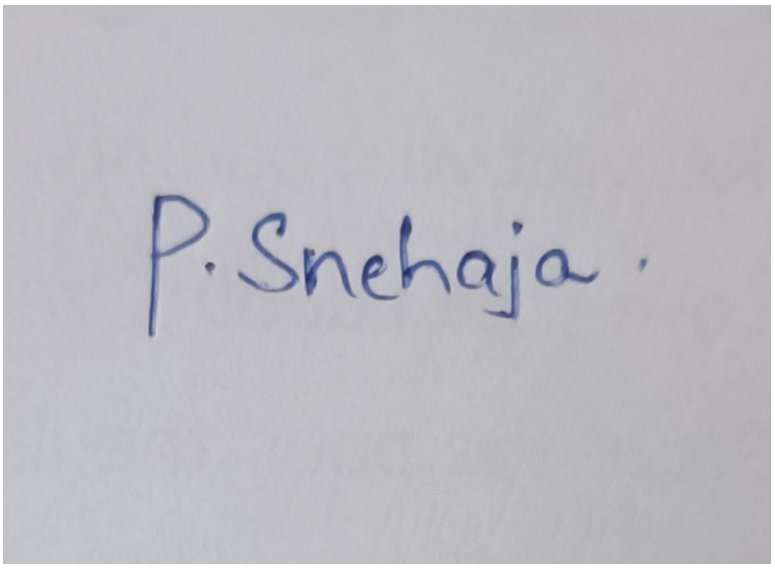
a) Grasping: 26 item Grasping subtest, measures a child's ability to use his/her hands. It with ability to hold an object with one hand and progress to actions involving both hands.
b) Visual-motor integration: 72 Items visual-motor integration subtest, measures a child's ability to use his/her visual perceptual skills to perform complex eye-hand coordination tasks. (i.e. grasping objects, building blocks, copying design.

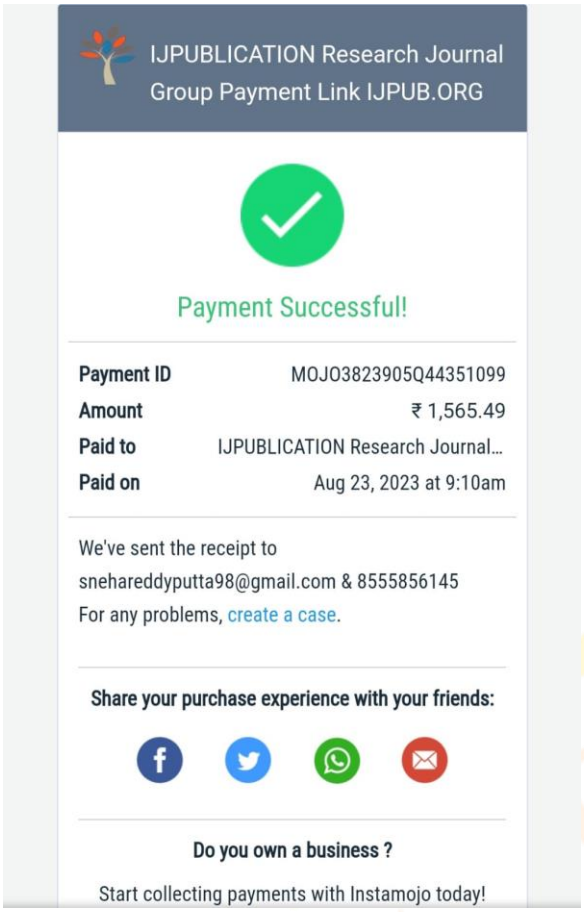
- **MODIFIED ASHWORTH SCALE:**

Modified ashworth scale is used to asses spasticity in muscles.

Modified Ashworth Scale

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





IJPUBLICATION Research Journal
Group Payment Link IJPUB.ORG

Payment Successful!

Payment ID	MOJO3823905Q44351099
Amount	₹ 1,565.49
Paid to	IJPUBLICATION Research Journal...
Paid on	Aug 23, 2023 at 9:10am

We've sent the receipt to
snehareddyputta98@gmail.com & 8555856145
For any problems, create a case.

Share your purchase experience with your friends:

Do you own a business ?

Start collecting payments with Instamojo today!