A COMPARITIVE STUDY BETWEEN INTENSIVE PHYSIOTHERAPY VERSUS CONVENTIONAL PHYSIOTHERAPY IN CHILDREN WITH CEREBRAL PALSY

A Dissertation Submitted to

THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY

CHENNAI

in partial fulfillment of the requirements

for the award of the

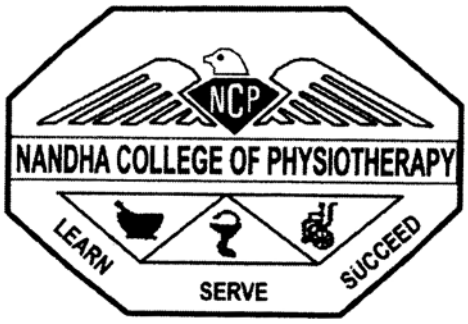
MASTER OF PHYSIOTHERAPY

(ADVANCED PHYSIOTHERAPY IN NEUROLOGY)

DEGREE

Submitted by

Reg. No.27102005



NANDHA COLLEGE OF PHYSIOTHERAPY

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Under the Guidance of

DR. V. VIJAYARAJ, M.P.T. (Neuro)

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Dissertation evaluated on ----------

Internal Examiner External Examiner

CERTIFICATE BY THE HEAD OF THE INSTITUTION

This iscertify that the dissertation entitled "A**COMPARTIVE STUDY BETWEEN INTENSIVE PHYSIOTHERAPY VERSUS CONVENTIONAL PHYSIOTHERAPY IN CHILDREN WITH CEREBRAL PALSY"** is abonafide compiled work, carried out by **Register No. 27102005**, Nandha College of Physiotherapy Erode – 638 052, in partial fulfillment for the award of Degree in Master of Physiotherapy as per the doctrines of requirements for the degree of the TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY CHENNAI – 32. This work was guided and supervised by **DR. V. VIJAYARAJ, M.P.T.(Neuro)**

PRINCIPAL

NANDHA COLLEGE OF PHYSIOTHERAPY

ERODE - 52

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation entitled "**ACOMPARTIVE STUDY BETWEEN INTENSIVE PHYSIOTHERAPY VERSUS CONVENTIONAL PHYSIOTHERAPY IN CHILDREN WITH CEREBRAL PALSY"** submitted by **(Reg No.27102005)** is a record of original and independent work done by the candidate during the period of study under my supervision and guidance. The dissertation represents entirely an independent work on the part of the candidate but for the general guidance by me.

Guide

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ACKNOWLEDGEMENT

"AT THE VERY OUSET, I THANK THE ALMIGHTY FOR HIS BLESSINGS TO ENABLE ME TO COMPLETE THIS PROJECT AND I OFFER THIS PROJECT AT HIS FEET AS MY HUMBLE PRAYER"

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CONTENTS

INTRODUCTION

Physiotherapy for children with cerebral palsy is often provided as a more or less continuous process from the time of identification or diagnosis until school leaving age. it is possible that short but intensive bursts of physiotherapy directed to help a child change from ‘could do’ a motor skill to ‘does do’ a motor skill, at a time when the child displays the wish to do so, may be a more appropriate use of therapy time in relation at motor skill acquisition with the understanding that physiotherapy cannot change a child from ‘can’t do’ to ‘does do’. But that a physiotherapist may be able to help a child from ‘could do’ to ‘does do’ when the child demonstrates the appropriate behavior.

Physiotherapists, parents and teachers of children with cerebral palsy often feel that motor-skill acquisition in children could be speeded up if they had more physiotherapy, targeting particular motor skills. A commonly used treatment for cerebral palsy in children is so called conventional therapy which includes physiotherapy. Although more intensive rehabilitative treatment is thought to be more effective than less intensive interventions, this assumption has not been proven. In this study we compared the efficacy of intensive versus conventional therapy in children with cerebral palsy.

CEREBRAL PALSY

Cerebral palsy is a whole spectrum of disorders of movement and posture caused by a non-progressive injury to a developing brain.

In 1861, William john little was the first to report a link between prematurity and adverse events with perinatal asphyxia (breathing problem at birth) leading to poor outcome. He described this condition as cerebral palsy in a lecture to the obstetrics society of London, but his audience did not agree with his conclusions.

Sir William osler published a monograph in 1889 entitled “the cerebral palsies of children” in which he described this non-progressive neuromuscular disease of children.

Sigmund freud was also an early major contributor to cerebral palsy investigation, publishing many articles on spastic diplegia in the late 1890’s. freud was also the first to discuss the classification cerebral palsy.

It is interesting that 150 years after these first discriptions, there is still discussion about the possible causes of cerebral palsy and many questions remain unanswered.

Cerebral palsy is a group of disorders. It is quite associated conditions.it is the most common motor problem in the children. Even with about 2.5 per 1000 live births and 5 per 1000 children, this is relatively uncommon in overall population. Because of this it is frequently frightening for the family to hear the diagnosis of cerebral palsy.

AIM OF THE STUDY

To compare the effectiveness of the intensive therapy versus conventional therapy in children with cerebral palsy

OBJECTIVES

- To determine the effect of conventional therapy in children with cerebral palsy by using GROSS MOTOR FUNTCTION MEASURE in GROUP A subjects.
- To determine the effect of intensive therapy in children with cerebral palsy by using GROSS MOTOR FUNTCTION MEASURE in GROUP B subjects.
- To determine difference between conventional therapy and intensive therapy in children with cerebral palsy by using GROSS MOTOR FUNTCTION MEASURE.

HYPOTHESIS

- **Null Hypothesis**

  The null hypothesis states that there is no significant difference between intensive physiotherapy versus conventional physiotherapy in children with cerebral palsy.

- **Alternate Hypothesis**

  The alternate hypothesis states that there is significant difference between intensive physiotherapy versus conventional physiotherapy in children with cerebral palsy.

REVIEW OF LITERATURE

1 Trahan J, Malouin F.

Conducted study to determine the feasibility of a rehabilitation program combining intensive therapy periods (4 times/week for 4 weeks) with periods without therapy (8 weeks) over a 6-month period in severely impaired children with cerebral palsy (CP); and to measure changes in gross motor function after intensive therapy periods (immediate effects) and rest periods (retention). Results underline the need to reconsider the organization of physical rehabilitation programs. A regime that is intensive enough without being tiring and one that provides practice conditions for consolidating motor skills learned during the intensive therapy period may best optimize motor training.

2.Sorsdahl AB, Moe-Nilssen R, Kaale HK, Rieber J, Strand LI.

The effects of intensive training for children with cerebral palsy (CP) remain uncertain. The aim of the study was to investigate the impact on motor function, quality of movements and everyday activities of three hours of goal-directed activity-focused physiotherapy in a group setting, five days a week for a period of three weeks. Change scores in the Pediatric Evaluation of Disability Inventory (PEDI) ranged 2.0-6.7, $p < 0.01$.

3. Polovina S, Polovina TS, Polovina A, Polovina-Proloscić T.

The aim of the study was to evaluate long-term impact of intensive and continuously performed rehabilitation on the motor autonomy level children

with CR Motor autonomy levels, defined according to the Gross Motor Function Classification System (GMFCS) and Gross Motor Function Measure (GMFM), were analyzed in 24 children with CP at the beginning of the study and at the last visit. During rehabilitation, GMFM scores increased above the expected value of initial GMFCS level in the majority of patients. Intensive rehabilitation had significant influence on motor improvement in children with CP.

4. Bower E, McLellan DL,.

Rehabilitation Research Unit, University of Southampton,

Four children aged two to three years with four limb cerebral palsy and apparently 'normal' intellect received randomized periods of conventional amounts of physiotherapy and a period of intensive physiotherapy directed at goals with both functional and pattern motor skill objectives. Intensive physiotherapy directed at goals that could not be achieved was associated with an increase in unco-operative behaviour in some children.

5. Trahan J et. Malouin F. (2002).

Johanne Trahan and her colleague conducted a pilot study to test this possibility[1]. Children received intensive physical therapy 4 times a week for 4 weeks, followed by an 8 week rest period. The author states: ‘a regime that is intensive enough without being tiring and one that provides practice conditions for consolidating motor skills learned during the intensive therapy period may best optimize motor training’.

6. Mary Rahlin, PT, DHS, PCS

The purpose of this case report was to describe the use of an individualized intermittent intensive PT schedule for a child with CP who was otherwise seen following a traditional, two times per week, schedule. The greatest mean change score obtained when the intermittent intensive therapy schedule was used.

7. Elizabeth C S Datorre, PT, DPT, MSPT, ATC

Purpose of this report is to describe how the Thera Suit combined with an Intensive Therapy Program, was used in a twelve-year-old boy diagnosed with cerebral palsy (CP).

This case report suggests that the TheraSuit with the Intensive Therapy Program helps improve a patient's functional abilities. Also this case report supports the literature suggesting changing current physical rehabilitation programs for children diagnosed with CP to include bouts of intensive suit therapy programs.

8. Tsorlakis, et al in 2004.

This study examined the effect of neurodevelopmental treatment (NDT) and the differences in its intensity on gross motor function of children with CP. 34 children with mild to moderate spasticity and hemiplegia, diplegia, or tetraplegia were randomly assigned to two groups: group A underwent NDT twice a week and group B five times a week, each for 16 weeks. Using the GMFM before and after intervention, the study found that there was a significant improvement of both groups after

intervention. The study also found that the children in group B performed better and showed significantly greater improvement than those in group A. Overall, the results of the study support the effectiveness of NDT and underline the need for intensive application of the treatment

9. Bower and McLellan, 2001.

Their 2001 study was a randomized control trial where children with CP received therapy 5 days per week for 6 months in a row followed by a 6-month rest period. This study was unable to meet statistical significance which may have been due to the long duration of both therapy and rest time.

10. Koscheyev and Leon

Koscheyev and Leon have completed an unpublished pilot study at the University of Minnesota. This study consisted of 6 adults with CP or stroke who underwent 3 weeks of intense therapy using suit therapy. Therapy was 5 days per week for 2 hours per day.

Motion analysis revealed less variability in walking, improved movement of paralyzed arm, and improved upright posture during gait activities in corresponding patients.

11.Tordis,PT,Msc; Sorsdahl,Anne B.PT,Msc; Ljunggren,

This study was designed to examine effects of blocks of daily physiotherapy in 5 infants with cerebral palsy .Intervention consisted of 4-weeks of daily physiotherapy, interrupted 8 weeks of physiotherapy as usual. All infants showed gross motor progress compared with baseline, but separation of daily physiotherapy from as usual was inconclusive. Parents preferred the intensive treatment alternative.

MATERIALS AND METHODOLOGY

MATERIALS USED IN THIS STUDY

- Couch
- pillows
- chair
- knee hammer
- toys
- hot packs
- therasuit
- universal exercise unit
- mat

METHODOLOGY

STUDY DESIGN

The design is used for this study is experimental study design.

STUDY SETTING

The study was conducted at

- Outpatient department of Nandha college of physiotherapy, Erode.
- Arputha oli rehabilitation center, Kangayam.
- Immanuel physiotherapy clinic, Erode.

STUDY SAMPLING

A total number of 30 subjects with cerebral palsy were selected by random sampling method with consideration of inclusion criteria and exclusion criteria and they were divided into GROUP A and GROUP B with 15 subjects in each group.

STUDY DURATION

The study was carried out for a six month period.

CONVENTIONAL THERAPY

In group A each children was trained 1 hour a day, 5 days a week for a 3 week period.

INTENSIVE THERAPY

In group B each children was trained 2 to 3 hours a day, 5 days a week for a 3 week period.

INCLUSION CRITERIA

- Age group: 3 to 11 yrs.
- Established diagnosis of quadriplegic cerebral palsy
- Both genders
- All type of cerebral palsy

EXCLUSION CRITERIA

- Cerebral palsy with severe MR

- Cervical myelopathy
- Brachial plexus injury
- Upper limb birth fracture

PARAMETER

GROSS MOTOR FUNCTION MEASURE (GMFM)

The GMFM is standardized observational instrument designed and validated to measure change in gross motor function over the time in children with cerebral palsy. This measure has a selection of 88 items arranged in five dimensions:

- (1) lie and roll,
- (2) sit,
- (3) crawl and kneel,
- (4) stand and
- (5) Walk, run and jump.

INTERVENTION

- The purpose of the treatment and aim of the study were explained to the parents of those children who are selected for the treatment.
- Prior to the treatment pre test were conducted for group A and group B and the results were recorded.
- Patients in group A was treated with conventional therapy.
- Patients in group B was treated with intensive therapy.
- The treatment was given for both groups for a period of 6 months.

PROCEDURE

INTENSIVE THERAPY

The intensive physical therapy is a specialized program open to children with cerebral palsy and an appropriate goal-oriented therapy program. The child participates in the program for 2 to 3 hours a day, 5 days a week for three week period of therapy.

PREPARATION PHASE:

Generally, the first part of treatment is a preparation period. This can consist of warming up the muscles through hot packs and massage followed by stretching and strengthening the muscles so that they are ready for the second part of the therapy.

- Moist hot packs – 10 to 15 minutes of application to areas of tight musculature.
- Therapeutic massage – 15 to 20 minutes to prepare muscles for stretching and strengthening.
- Stretching and range of motion – 30 to 60 minute of stretching , passive range of motion, active assisted range of motion, active range of motion and or resisted range of motion to prepare for strengthening and functional activities.
- Strengthening exercises – focus on weak muscle groups Often utilizes the universal exercise unit (UEU).

SECONDARY PHASE

In the second phase of the therapy, a number of activities are practiced which include balance, coordination and functional activities such as head control, rolling, sitting, crawling, and walking.

- Balance and coordination - These skills are essential in order to maintain different positions as well as to be able to move through different positions independently.
- Functional activities training – includes activities such as rolling, crawling, kneeling, standing, stair climbing etc.
- Gait training – walking with and without assistive devices.
- Therasuit therapy – suit therapy for strengthening, balance and functional activities. Suit therapy increases proprioceptive awareness and positions the child in amore ideal alignment during these activities .suit therapy is typically done for 1 to 2 hours per day.
- Universal exercise unit (UEU) – Is a system of pulleys,straps,weights and splints utilized to perform variety of exercises for improving strength, active range of motion, and muscle flexibility.

CONVENTIONAL THERAPY

It includes exercises, massage, balance training and strengthening exercises.

STATISTICAL TOOLS

The following statistical tools were used to find effectiveness of the intensive therapy versus conventional therapy in different goal setting procedure in children with cerebral palsy

PAIRED 'T' TESTS

.

$$s = \sqrt{\frac{\sum d^2 - \left(\frac{\sum d}{n}\right)^2}{n-1}}$$

$$t = \frac{d\sqrt{n}}{s}$$

d = difference between the pre test Vs post test

$\bar{d}$ = mean difference

n = total number of subjects

S = standard deviation

UNPAIRED 'T' TEST

$$t = \left[t = \frac{\overline{X_1} - \overline{X_2}}{s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \right]$$

$$S = \sqrt{(n_1 - 1)\,S^1 (n_2 - 1) S^2{}_2} \;/\; n_1 + n_2 - 2$$

$\overline{X}_1$ - M.D of Group A

$\overline{X}_2$ - M.D of Group B

s_1 - SD of group A

s_2 - SD of group B

n_1 - Number of observations in group A

n_2 - Number of observation in group

DATA PRESENTATION

GROUP A GMFM- TOTAL SCORE FOR EACH PATIENT

s.no	Pre test	Post test
1	51.8	52.2
2	33.8	34
3	36.7	37.1
4	42.5	43
5	34.1	34.3
6	45.5	46.2
7	40	41
8	50.2	50.5
9	41.5	41
10	32	32.5
11	29	30
12	29.5	30.5
13	40.3	41.3
14	42.4	42.8
15	36.2	36.2

GROUP B GMFM-TOTAL SCORE FOR EACH PATIENT

s.no	**Pre test**	**Post test**
1	35.5	37.7
2	41.2	43
3	28.5	31.3
4	31.7	32.5
5	35.8	38
6	52	53.5
7	32.8	35.2
8	45.2	48.3
9	41	43
10	36	37.2
11	55.2	58.2
12	28.8	31.5
13	36.7	39
14	35.2	37.2
15	44.3	47.5

DATA ANALYSIS

Mean and standard deviation for Group A and Group B

s.no	**GROUP A**	**GROUP B**
Standard deviation	0.3	0.72
Mean	0.6	2.2

Table value and calculated values for Group A and Group B

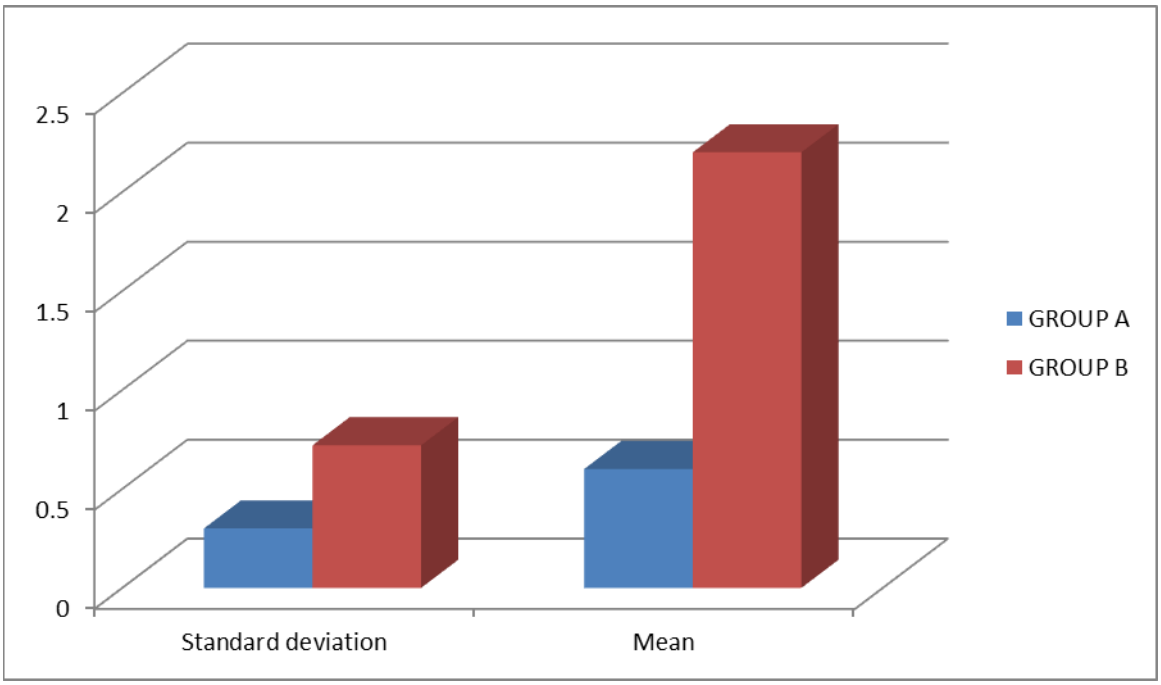
S.no	**GROUP A**	**GROUP B**
Table value	2.15	2.15
Calculated value	7.72	12.13

Unpaired ‘t’ test values

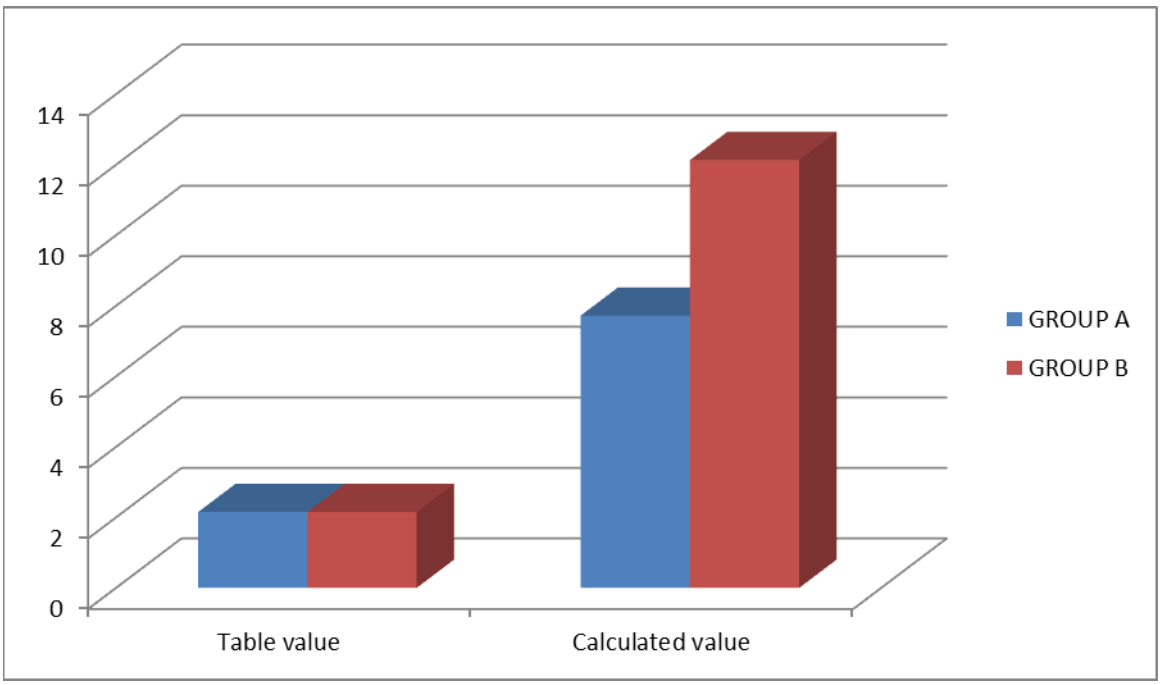
GROUPS	**TABLE VALUE**	**CALCULATED VALUE**
Comparision of group A and Group B	2.05	8.08

GRAPHICAL PRESENTATION

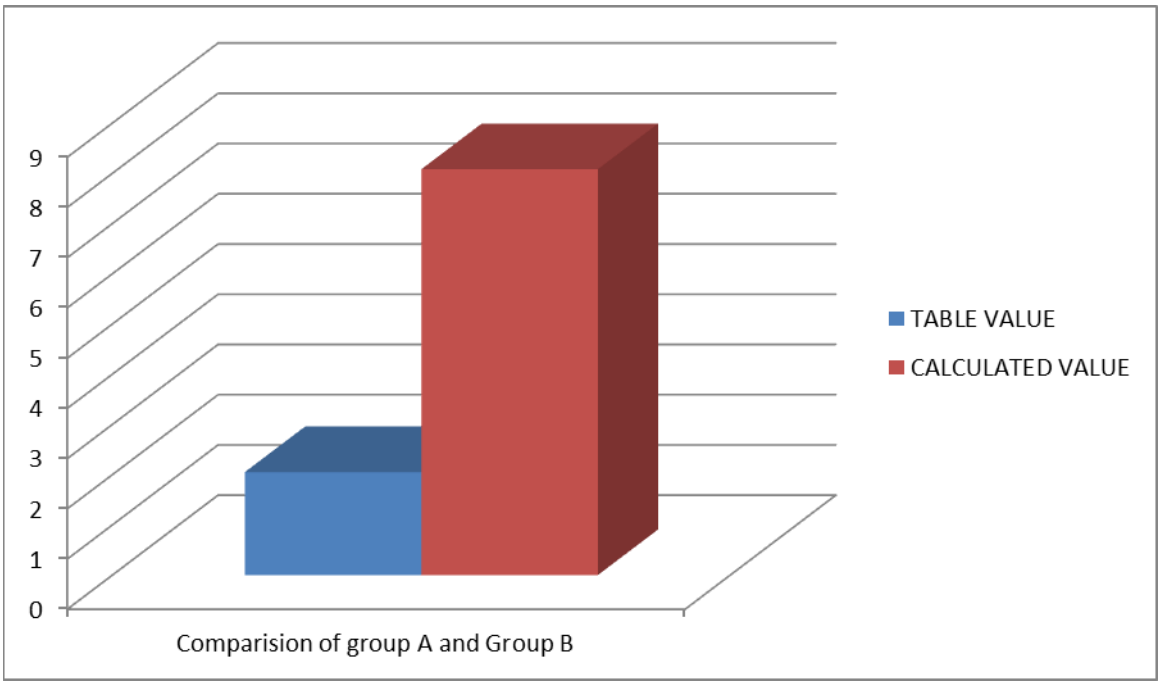
GRAPHICAL PRESENTATION OF MEAN AND STANDARD DEVIATION FOR GROUP A AND GROUP B.



GRAPHICAL PRESENTATION OF TABLE VALUE AND CALCULATED VALUES FOR GROUP A AND GROUP B



GRAPHICAL PRESENTATION OF COMPARING UNPAIRED 'T' TEST VALUES FOR GROUP A AND GROUP B



RESULTS

The pre and post test values were assessed in Group A. The standard deviation was 0.3. the ‘t’ values were calculated by paired’t’ test was 7.72 and it was more than table value 2.15 for 5% level of significance at 14 degrees of freedom.

The pre and post test values were assessed in group B. the standard deviation was 0.72. the ‘t’ values were calculated by paired ‘t’ test was 12.13 and they were more than table value 2.15 for 5% level of significance at 14 degrees of freedom.

The calculated ‘t’ value by unpaired ‘t’ test was 8.08. the calculated ‘t’ value more than the table value 2.05 for 5% level of significance at 28 degrees of freedom.

The paired ‘t’ values have shown that intensive therapy are more effective for the childrens with CP. The unpaired ‘t’ values have shown that there is significant difference in showing important of intensive therapy in CP patients.

This study has proved that the intensive therapy proved to showing improvement in CP patients.

SUMMARY AND CONCLUSION

SUMMARY

Thirty children aged 3 to 11 years with quadriplegic cerebral palsy were prospectively stratified and randomized into two treatment groups,. The acquisition of motor skills was assessed in an experimental study design using the gross motor function measure. The two factors were conventional amounts of physiotherapy vs. intensive amounts of physiotherapy and the use of broad, generalized aims vs the use of specific, 82 % of the children improved. Over the three – week period, intensive physiotherapy produced a slightly greater effect than conventional physiotherapy.

CONCLUSION

In this study based on ‘t’ values it could be seen that there is significant difference between calculated values and table values.the mean deviation and standard deviation shows greater significance with more effects in using intensive therapy.

The result was analyzed using (mean and standard deviation) which proved that the use of intensive therapy to be more effective in children with cerebral palsy than conventional therapy.

Through the result it concluded that there is significant difference in effectiveness of the intensive therapy by using GMFM in children with cerebral palsy.

SO THE NULL HYPOTHESIS IS REJECTED AND ALTERNATE HYPOTHESIS IS ACCEPTED.

LIMITATION AND RECOMMENDATION

LIMITATIONS

In normal practice, physiotherapy for cerebral palsy targets other areas in addition to motor skill acquisition, for example ease of handling a child, compliance with treatment and provision, and use of equipment. These areas were not investigated in this study.

RECOMMENDATIONS

- Further studies may be extended with larger sample
- Further studies may be extended with patients with above the age group of the study
- The patient ability to either improve or retain the regained functional capacity may be assessed at regular intervals over a period of time.
- The efficacy of the treatment may be found by altering the frequency and intensity
- Further study using intensive therapy can be applied to other neurological conditions such as stroke, microcephaly, floppiness, and head injury.

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APPENDIX

CONSENT FORM

1. Name :
2. Age :
3. Sex :
4. Address :

DECLARATION

I have fully understood the nature and purpose of the study. I accept my child to be a subject in this study. I declare that the above information is true to my knowledge.

Signature of the parent

CP ASSESSMENT CHART

Name :

Age/sex :

Present complaints :

Family history :

- Father's age
- Mother's age
- Other siblings
- Consanguinity
- Family history

Development in milestone :

- Recognition of mother
- neck control
- rolling over
- crawling
- sitting
- standing
- walking

PHYSICAL EXAMINATION :

GROSS MOTOR :

Rolling: : Rt: Lt:

Prone to supine :

Crawling :

Coming to sit from :

- side
- supine
- prone
- sitting
- kneeling
- half lying

Coming to stand from:

- low stool
- ground
- squatting
- half lying

standing :

standing on leg : Rt: Lt:

hopping :

jumping :

stair climbing :

co- ordination :

gait :

Fine motor :

Hand function :

- reach
- grasp
- release
- eye hand co-ordination

Assessment of tone :

- upper limb
- lower limb

Assessment of reflexes :

- deep tendon reflexes

Contracture and deformity :

Aids and appliances :

Activities of daily living :

- dressing
- Eating
- Drinking
- Toileting
- Bathing

Goals :

Treatment plan :

Home programme and advices:

GROSS MOTOR FUNCTION MEASURE (GMFM)
SCORE SHEET (GMFM-88 and GMFM-66 scoring)

Version 1.0

Child's Name: _____ ID #: _____

Assessment date: _____
year / month /day

Date of birth: _____
year / month /day

Chronological age: _____
years/months

GMFCS Level [1]

☐ ☐ ☐ ☐ ☐
I II III IV V

Testing Conditions (eg, room, clothing, time, others present)

Evaluator's Name: _____

_____

_____

_____

The GMFM is a standardized observational instrument designed and validated to measure change in gross motor function over time in children with cerebral palsy. The scoring key is meant to be a general guideline. However, most of the items have specific descriptors for each score. It is imperative that the guidelines contained in the manual be used for scoring each item.

SCORING KEY
0 = does not initiate
1 = initiates
2 = partially completes
3 = completes
NT = Not tested [used for the GMAE scoring*]

It is now important to differentiate a true score of "0" (child does not initiate) from an item which is Not Tested (NT) if you are interested in using the GMFM-66 Ability Estimator Software.

*The GMFM-66 Gross Motor Ability Estimator (GMAE) software is available with the GMFM manual (2002). The advantage of the software is the conversion of the ordinal scale into an interval scale. This will allow for a more accurate estimate of the child's ability and provide a measure that is equally responsive to change across the spectrum of ability levels. Items that are used in the calculation of the GMFM-66 score are shaded and identified with an asterisk (*). The GMFM-66 is only valid for use with children who have cerebral palsy.

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Website: www.fhs.mcmaster.ca/canchild

[1] GMFCS level is a rating of severity of motor function. Definitions are found in Appendix I of the GMFM manual (2002).

Check (✓) the appropriate score: if an item is not tested (NT), circle the item number in the right column

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

TOTAL DIMENSION A ☐

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

TOTAL DIMENSION B ☐

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

TOTAL DIMENSION C ☐

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

TOTAL DIMENSION D ☐

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

TOTAL DIMENSION E ☐

Was this assessment indicative of this child's "regular" performance? YES ☐ NO ☐

COMMENTS:

GMFM RAW SUMMARY SCORE

DIMENSION	CALCULATION OF DIMENSION % SCORES	GOAL AREA (indicated with ✓ check)
A. Lying & Rolling	$\frac{\text{Total Dimension A}}{51} = \frac{\quad}{51} \times 100 = \quad\%$	A. ☐
B. Sitting	$\frac{\text{Total Dimension B}}{60} = \frac{\quad}{60} \times 100 = \quad\%$	B. ☐
C. Crawling & Kneeling	$\frac{\text{Total Dimension C}}{42} = \frac{\quad}{42} \times 100 = \quad\%$	C. ☐
D. Standing	$\frac{\text{Total Dimension D}}{39} = \frac{\quad}{39} \times 100 = \quad\%$	D. ☐
E. Walking, Running & Jumping	$\frac{\text{Total Dimension E}}{72} = \frac{\quad}{72} \times 100 = \quad\%$	E. ☐

TOTAL SCORE = $\frac{\%A + \%B + \%C + \%D + \%E}{\text{Total \# of Dimensions}}$

$= \frac{\quad + \quad + \quad + \quad + \quad}{5} = \frac{\quad}{5} = \quad\%$

GOAL TOTAL SCORE = $\frac{\text{Sum of \% scores for each dimension identified as a goal area}}{\text{\# of Goal areas}}$

$= \quad = \quad\%$

GMFM-66 Gross Motor Ability Estimator Score [1]

GMFM-66 Score = _____ _____ to _____ 95% Confidence Intervals

previous GMFM-66 Score = _____ _____ to _____ 95% Confidence Intervals

change in GMFM-66 = _____

[1] from the Gross Motor Ability Estimator (GMAE) Software

TESTING WITH AIDS/ORTHOSES

Indicate below with a check (✓) which aid/orthosis was used and what dimension it was first applied. (There may be more than one).

AID		DIMENSION	ORTHOSIS		DIMENSION
Rollator/Pusher	☐	____	Hip Control	☐	____
Walker	☐	____	Knee Control	☐	____
H Frame Crutches	☐	____	Ankle-Foot Control	☐	____
Crutches	☐	____	Foot Control	☐	____
Quad Cane	☐	____	Shoes	☐	____
Cane	☐	____	None	☐	____
None	☐	____	Other	☐	____
Other	☐	____	_____ (please specify)		

_____
(please specify)

RAW SUMMARY SCORE USING AIDS/ORTHOSES

DIMENSION	CALCULATION OF DIMENSION % SCORES	GOAL AREA (indicated with ✓ check)
F. Lying & Rolling	$\frac{\text{Total Dimension A}}{51} = \frac{\quad}{51} \times 100 = \quad\%$	A. ☐
G. Sitting	$\frac{\text{Total Dimension B}}{60} = \frac{\quad}{60} \times 100 = \quad\%$	B. ☐
H. Crawling & Kneeling	$\frac{\text{Total Dimension C}}{42} = \frac{\quad}{42} \times 100 = \quad\%$	C. ☐
I. Standing	$\frac{\text{Total Dimension D}}{39} = \frac{\quad}{39} \times 100 = \quad\%$	D. ☐
J. Walking, Running & Jumping	$\frac{\text{Total Dimension E}}{72} = \frac{\quad}{72} \times 100 = \quad\%$	E. ☐

TOTAL SCORE = $\frac{\%A + \%B + \%C + \%D + \%E}{\text{Total \# of Dimensions}}$

= $\frac{\quad + \quad + \quad + \quad + \quad}{5} = \frac{\quad}{5} = \quad\%$

GOAL TOTAL SCORE = $\frac{\text{Sum of \% scores for each dimension identified as a goal area}}{\text{\# of Goal areas}}$

= _____ = _____ %

GMFM-66 Gross Motor Ability Estimator Score [1]

GMFM-66 Score = _____ _____ to _____ 95% Confidence Intervals

previous GMFM-66 Score = _____ _____ to _____ 95% Confidence Intervals

change in GMFM-66 = _____

[1] from the Gross Motor Ability Estimator (GMAE) Software