

Sensory Integration Therapy Verses Conventional Physical Therapy Among Children With Cerebral Palsy On Gross Motor Function – A Comparative Randomized Controlled Trial

Dr.Pooja Kumari Mahaseth¹ Aparna Choudhary²

1.Assistant Professor, Mgm School Of Physiotherapy, Aurangabad.
Constituent Unit Of Mgm Institute Of Health Sciences (Mgmih) Deemed To Be University, Navi Mumbai.

Poojamahaseth1993@Gmail.Com

0000-0002-1354-9487

2.Assistant Professor, Physiotherapy Department Carrer College, Bhopal.

Abstract

Background: Cerebral Palsy Is A Group Of Conditions Characterized By Motor Dysfunction Due To Non-Progressive Brain Damage In Early Life. Worldwide The Incidence Being 2 To 2.5 Per 1000 Live Births. Deficits In Sensory System Are Believed To Affect The Way Child Behaves, Including His Or Her Ability To Attend, Learn, Organize As Well As Affects Children's Ability To Perform Motor And Functional Task. With Sensory Integration Therapy The Aim Is To Provide The Child With Graded Sensory Experiences. **Purpose Of The Study:** The Purpose Of The Study Is To Determine The Sensory Integration Therapy Verses Conventional Physical Therapy Among Children With Cerebral On Gross Motor Function. **Study Design:** Experimental Study **Methodology:** In This Study 30 Children With Cerebral Palsy Were Included For The Study And Divided Into Two Groups Of Group A (Conventional Physical Therapy) And Group B(Sensory Integration Therapy With Conventional Physical Therapy Exercises). Pre And Post Intervention Assessment Was Done For Gross Motor Function Using Outcome Measure Gmfm And By Using Short Sensory Profile. All The Participants Of The Both Groups Were Given Exercises According To The Group For 5 Days A Week For 6 Months. **Conclusion:** The Result Indicates That Sensory Integration Therapy And Conventional Physical Therapy Exercise When Given Together Appears To Be More Effective And Powerful In Improvement Of Gross Motor Function Among Children With Cerebral Palsy, Instead Of Just Giving Conventional Physical Therapy Exercises.

Keywords: Cerebral Palsy; Gross Motor Function; Sensory Integration Therapy; Conventional Therapy; Physiotherapy.

Introduction

Cerebral Palsy (Cp), A Common, Non-Progressive, Non-Changing Neurological Disorder Of Childhood. The Range Of Severity Of Condition May Be From Total Dependency And Immobility To Abilities Of Talking, Independent Self-Care And Walking, Running And Other Skills. Premature Babies Are Also At A Higher Risk Of Developing Neurological Problems. It's Critical To Understand That Cerebral Palsy Develops During The Prenatal, Perinatal, And Postnatal Periods. It Can Be Described As A Static Encephalopathy In Which, Despite The Fact That The Original Lesion, Anomaly, Or Injury Is Stable, The Clinical Pattern Of Presentation Changes With Time Due To The Central Nervous System's Growth And Developmental Plasticity And Maturation. ^(1,2)

The Worldwide Incidence Of Cp Is 2 To 2.5 Per 1000 Live Births. ⁽³⁾. The Prevalence Of Cp Is Higher For Children Born Preterm Or At Low Birth Weight. Some Parts Of The World, There Is Evidence That The Prevalence Of Cp Has Declined, Particularly For Children Born At Moderately Or Very Low Birth Weight. ^(4,5,6)

Jane Ayers In 1972 Defined Sensory Integration As “The Neurological Process That Organizes Sensation From One’s Own Body And From The Environment And Make It Possible To Use The Body Effectively Within The Environment”. Ayers Focused Her Theory On The Vestibular, Proprioceptive And Tactile Systems.⁽⁷⁾

Sensory Integration Signify To The Process By Which The Brain Organizes And Interprets External Stimuli Such As Touch, Movement, Body Awareness, Sight, Sound, And Gravity.⁽⁸⁾ It Takes Place In The Brain And Necessitates A Delicate Balance Between The Central And Peripheral Neural Systems, As Well As The Excitatory And Inhibitory Neural Systems.⁽⁹⁾

Sensory Processing In Cerebral Palsy Has Been A Subject Of Study In Recent Years. Blanche States That The Traditional Classification Of Cerebral Palsy Is Based On Motor Dysfunction. Current Theories Of Motor Behaviour Support The Notion That Movement And Sensation Are Related To Each Other.⁽¹⁰⁾

White Matter Lesions, Which Are Found In 45 Percent Of Children With Cp, Are One Of The Most Important Drivers Of Sensory Abnormalities. The Loss Of White Matter Can Have A Negative Impact On The Development Of Cortical And Thalamic Areas, Which Are Involved In Sensory Processing.^(11,12)

Children With Adequate Sensory Integration Of Afferent Impulses Display Adaptive Behaviour In Daily Tasks And Meet The Demands Set By The Environment. As A Result, Sensory Integration That Is Appropriate Increases Functional Performance.^(13,14,15)

Thus, The Systematic Evaluation Of Sensory Processing Allows Therapists To Adapt Their Intervention Improving Sensory Integration Of The Inputs Constantly Received From The Environment In Order To Improve Motor Performance And Adaptive Success Of Children With Cp.⁽¹⁶⁾

Problem In Sensory Integration Leads To Sensory Integration Dysfunction (Sid) Which Is Defined As “ The Inefficient Neurological Processing Of Information Received Through Senses Causing Problems With Learning, Developmental And Behaviour.” One Approach To Help Children With Cp Achieve Their Optimal Level Of Functioning Is Sensory Integration Therapy (Sit).^(17,18)

It Appears That Cerebral Palsy Children Share An Abnormal Degree Of Sensory Processing, Whether Decreased Or Increased. Its Aim Is To Provide The Child With Graded Sensory Experiences. It Enables The Child To Make Sense Of Their World By Receiving, Registering, Modulating, Organizing And Interpreting The Information That Comes To Their Brains From Their Senses.^(19,20)

Sit Helps To Overcome Problems Experienced By Many Young Children In Absorbing And Processing Sensory Information. Encouraging These Abilities Ultimately Improves Balance And Steady Movement. So, Sensory Integration Therapy (Sit) Is Designed To Restore Effective Neurological Processing And Increase The Individual Ability To Integrate Sensory Information By Enhancing Each Of These Sensory Systems. .^(21,22)

Aim Of The Study

The Study Is Aim To Determine The Sensory Integration Therapy Verses Conventional Physical Therapy Among Children With Cerebral On Gross Motor Function

Methodology

Research Approach: Approach Used Probability Sampling Techniques

Reaerach Design: Experimental Design Which Involves Comparison Between Experimental And Control Groups

Study Setting: Career College, Opd, Bhopal. Mgm Physiotherapy Rehabilitation And Fitness Center, Aurangabad, Mh.

Study Duration: The Study Was Carried Out For A Period Of 6 Months

Protocol Duration: The Protocol Duration Was 5 Days A Week For 6 Months, The Treatment Duration Was For 1 Hour.

Sample Size: 30 Children Diagnosed With Cerebral Palsy, Following The Inclusion Criteria Were Included In The Study.

Inclision Criteria

Children With Spastic Diplegic Cerebral Palsy, Monoplegic Cerebral Palsy, Hemiplegic Cerebral Palsy. Children With Cerebral Palsy Had Aged From 3 To 7 Years. Both Males And Females.

Exclusion Criteria

Children Having Quadriplegic Cerebral Palsy. Child Underwent Any Orthopaedic Surgery Like That Of Foot, Leg Or Ankle. Child Underwent Medical Procedures Like Botulinum Toxin Injections, Baclofenac Pump Or Other Treatment Effecting Neuromuscular Transmission At Any Point. Mental Retardation And Seizures.

Outcome Tools

Gmfm Scale

Short Sensory Profile

Procedure

Cerebral Palsy Children Aged From 3 To 7 Years Of Both The Sexes And The Diagnosis Of Cerebral Palsy Was Confirmed By An Expert Pediatrician Or Neurologist Who Visited At Study Center During Specified Schedule That Further Met The Inclusion Criteria Were Participated In The Study.

A Total Of 43 Children Suffering From Cerebral Palsy Who Approached For Treatment To Career College Opd, Bhopal Were Screened For The Present

Experimental Study And Out Of Them 38 Children Suffering From Cerebral Palsy Were Fulfilled The Inclusion Criteria That Deemed Fit As A Sample.

Thirty Children Diagnosed From Cerebral Palsy Were Randomly Selected As Subjects Using Simple Random Sampling Technique (Lottery Method) From A Total Of Thirty Eight Eligible Children Diagnosed From Cerebral Palsy That Fulfilled The Inclusion Criteria.

Thirty Children With Cerebral Palsy Were Available For The Study And Later Divided Into Two Equal Halves Of Size 15 That Constituted Two Study Groups And Further Designated As “Group A” (Control Group) And “Group B” (Experimental Group). An Ethical Clearance Was Obtained From The Ethical Committee Of Career College, Bhopal.

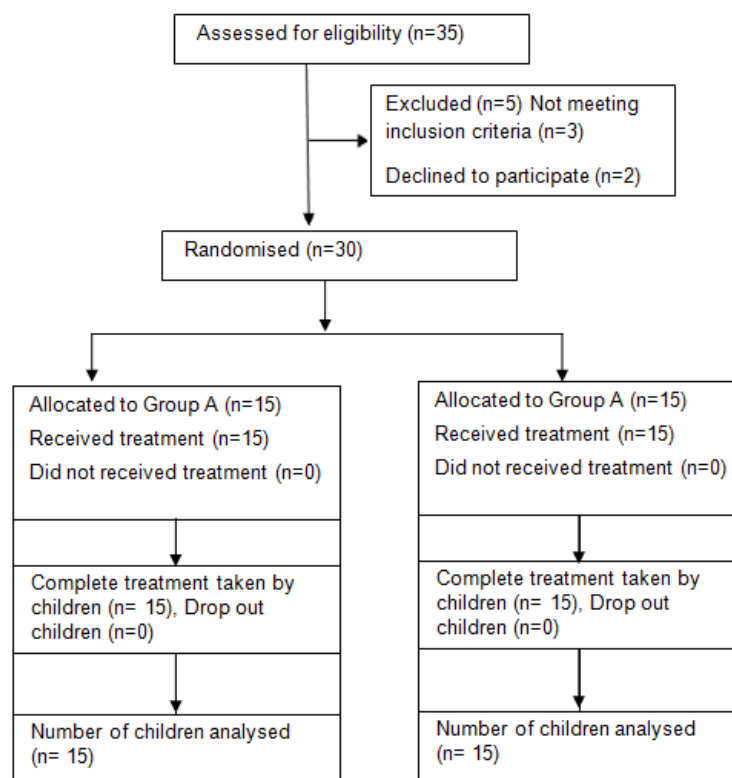


Fig 6: Flow Chart Of Treatment Procedure

Group- A: Control Group (Conventional Physical Therapy Exercises)

Group A Received Conventional Balance Training Which Includes Routine Passive Range Of Motion Exercises, Stretching Exercises, Strengthening Exercises For Lower Limb, Trunk And Upper Limb. Transitional Exercises In Supine, Rolling, Sitting, Crawling, Kneeling, Lying, Standing And Walking Performed By Physiotherapist On Children.

Group- B: Experimental Group (Sensory Integration Therapy Along With Conventional Physical Therapy Exercise)

Group B Received Sensory Integration Therapy Which Includes Several Visual Perception, Body Awareness, Tactile Perception, Visual Motor Coordination Training,

Vestibular And Proprioceptive Exercises Which Improve Child's Ability To Process And Integrate Sensory Information (Visual, Perceptual, Proprioception And Auditory) Along With Conventional Exercises Mentioned Above.

Assessment Fields	Activities
Visual Perception	Block Design, Finding Shapes In Pictures, Puzzles, Matching Geometric Shapes, Letters, Numbers
Body Awareness	Pointing To The Body Parts, Life Size Drawing, Awareness Of Body Parts Through Touch
Tactile Perception	Feeling Various Textures, Touching Boards And Feeling, Shapes, Writing On Sand, Clay/ Slime Activity
Co-Ordination	Ocular Pursuit Training, Moving Ball And Peg Board Activity
Vestibular	Swinging On The Swings, Turning Left And Right Side And Jumping On Trampoline
Proprioception	Joint Compression, Ball Squeezing, Ball Catch And Throw And Wall Pushups

Fig 2: Peg Board Activity



Fig 3: Swinging On The Swings



Fig 4: Ball Squeezing And Catch & Throw

These Exercises Are Progressed Gradually; The Progression Is Made When The Patient Performs The Task Without Any Discomfort And At Ease. The Interventions Were Given For 1 Hour A Day For 5 Days A Week And For 6 Months With Adequate Rest Period. Assessment Was Done Using Gmfm Scale And Short Sensory Profile Before Giving The Intervention And Post Intervention By The Physiotherapist.

Statistical Analysis

The Spss Version 17.0 Trial Was Used For Analysis. The Descriptive Statistics Had Used To Identify The Features And The Characteristic Of The Children With Cerebral Palsy. The Inferential Statistics Used To Test The Hypotheses In Order To Make A Comparison Between Pre And Post Intervention Score (%) Of Gross Motor Function Measure (Gmfm) And Score Of Short Sensory Profile Among Children With Cerebral Palsy From The Collected Data

The Paired T-Test Used To Identify The Significance Of Mean Differences Of Score (%) Of Gross Motor Function Measure And Score Of Short Sensory Profile Between Pre (Baseline) And Post Intervention Stages Among Children With Cerebral Palsy Of Group A And Group B.

Independent Sample T-Test Was Used To Identify The Significance Of Mean Difference Of Score (%) Of Gross Motor Function Measure And Score Of Short Sensory Profile Between Children With Cerebral Palsy Of Group A And Group B At Pre-Intervention (Baseline) And Post-Intervention Sampling Stages. Independent Sample T-Test Is Also Used To Know The Significance Of Mean Differences In Ages Of Subjects Between Group A And Group B In Order To Confirm The Non-Biasedness With Respect To Ages Of Subjects In The Present Study. The P Value Was Less Than 0.05.

Result

4.1 Patient Characteristics: The Mean Age (Mean $\pm$ Standard Deviation) Of All Children With Cerebral Palsy Found To Be 4.93 ± 1.31 Years.

Table 4.1:-

The Frequency And Percentage Distribution Of Age Of Subjects

Age (Year)	Group A		Group B	
	Frequency (N ₁)	Percentage (%)	Frequency (N ₂)	Percentage (%)
3 Year	3	20.0	2	13.3
4 Year	2	13.3	4	26.7
5 Year	5	33.3	5	33.3
6 Year	2	13.3	2	13.3
7 Year	3	20.0	2	13.3
Total	15	100.0	15	100.0

Table 4.1 Reveals The Distribution Of Ages Of Studied Children With Cerebral Palsy Of Two Groups. The Ages Of Children Of Group A Found With Little Variations When Compared To Children Of Group B.

Results Showed That Each Exactly One-Third (33.6%) Of The Children With Cerebral Palsy Of Group A And Group B Were More Frequently Belonged To The Age Group Of 5 Years.

Further, This Was Also Noted That The Two (13.3%) Children Of Group A And Group B Had Belonged To Second Higher Age Group Of 6 Years.

Lastly, The Present Enquiry Showed That 3 (20.0%) Children With Cerebral Palsy Of Group A As Compared To 2 (13.3%) Of Group B Had Belonged To Higher Age Group Of 7 Years.

Table 4.2

The Distribution Of Children According To Gender

Gender	Group A		Group B	
	Frequency (N ₁)	Percentage (%)	Frequency (N ₂)	Percentage (%)
Male	8	53.3	10	66.7
Female	7	46.7	5	33.3
Total	15	100.0	15	100.0

Table 4.2 Projects The Gender Wise Distribution Of Studied Children With Cerebral Palsy Of Both The Groups (A And B). The Distribution Of Genders Was Noted With Little Variations Between The Two Studied Sex-Groups.

This Was Easily Sees In Table That More Than Half (8, 53.3%) Of The Children Of Group A Were Most Commonly Male Had Selected From The Population Of Cerebral Palsy Children As Compared To Two-Third (10, 66.7%) Of The Children Of Group B. Present Enquiry Showed That (7, 46.7%) Of The Children With Cerebral Palsy Of Group A While Exactly One-Third (5, 33.3%) Of The Children Of Group B Were Female Had Also Participated In The Present Study.

4.2 Non-Biasedness Of Samples With Respect To Age Of Children Of Two Groups

Study Investigated Discrimination In Acquirement Of Knowledge Due To Impaction Of Age Between The Children With Cerebral Palsy Of Two Groups (Group A And Group B). Finally, The Status Of Biasness Regarding The Distribution Of Ages Of The Selected Children Of Two Groups With Cerebral Palsy Was Ruled Out.

Table 4.3:

Significance Of Age Differences At The Time Of Admission Between Group “A” And Group “B”

Cerebral Palsy Children	Scatter For Age (Year)	95% Ci Of The Mean (Year)		T-Statistic	Los
	Mean $\pm$ Sd	Lb	Ub		
Group A	5.00 $\pm$ 1.41	4.22	5.78	0.27	P>0.05 [®]
Group B	4.87 $\pm$ 1.25	4.18	5.56		
Mean Difference Between Groups		0.13 Year [®]			

[®] The Mean Difference Is Not Significant (Insignificant) At The 0.05 Level Of Significance. [Degrees Of Freedom Is 28; Ub-Upper Bound; Lb-Lower Bound; Los-Level Of Significance]

Table 4.3 Highlights The Distribution Of Ages Of Children With Cerebral Palsy Included In Group A And Group B For Present Study Were Examined And Compared To Rule Out The Biasedness Between The Ages Of Children With Cerebral Palsy Of Two Groups. Results Showed That The Difference Between The Average Ages Of Samples Of Two Groups Was Not Statistically Significant. Moreover, The Statistical Agreement Indicated That The Distribution Of Ages Of Children With Cerebral Palsy Of Group A And Group B Were Noted Approximately Similar For The Present Study And Was Recorded At The Time Of Admission Of Subjects.

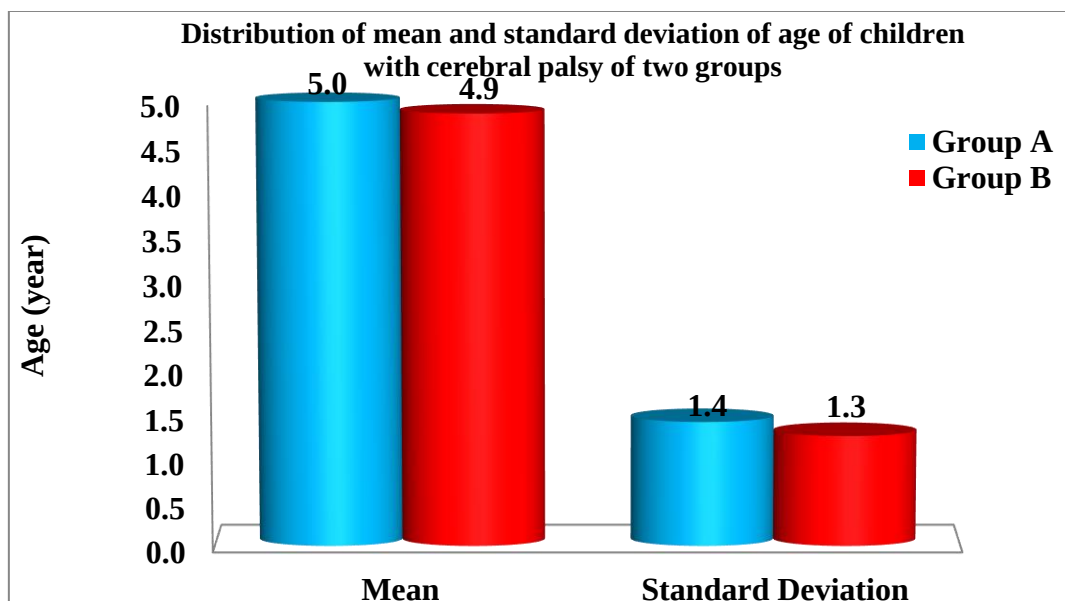


Figure 4.3-Bar Diagram Depicting The Distribution Of The Mean And Standard Deviation Of Age Of Children With Cerebral Palsy Of Group A And Group B.

5.3 Comparison Of Scores Of Gross Motor Function Measure And Short Sensory Profile Between Children Of Two Groups

The Assessments Of Scores (%) Of Gross Motor Function Measure And Score Of Short Sensory Profile Were Done Before And After Interventions In Both Groups. Nevertheless, The Children With Cerebral Palsy Of Group A Had Received Conventional Therapy Alone While Rest Other Children With Cerebral Palsy Of Group B Received Sensory Integration Therapy With Conventional Therapy. Significance Of Mean Differences Of Score (%) Of Gross Motor Function Measure And Score Of Short Sensory Profile Was Carried Out Between Pre And Post Intervention Among Children With Cerebral Palsy Of Group A And B.

Intra Group Comparison Was Carried Out Within The Groups Between Two Sampling Stages. Within The Groups, The Assessment Of The Scores (%) Of Gross Motor Function Measure And Score Of Short Sensory Profile Was Carried Out In Children Of Group A And B To Detect The Improvement On Gross Motor Function. The Significance Of Differences In Scores (%) Of Gross Motor Function Measure And Score Of Short Sensory Profile Among All Studied Children Of Cerebral Palsy Within The Groups Are Summarized In Tables From 4.4 To 4.5.

Table 4.4:-

Measurement Of Changes In Scores Of Gross Motor Function Measure From Baseline (Pre) To Post Intervention In Group A And Group B

Group	Sampling Stage	Score Of Gmfm (%)	Mean Diff	T-Value	Los
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Mean ± Sd					
Group A	Pre- Intervention	71.66±3.89	0.57 Percent	4.58	P<0.00 1 [#]
	Post- Intervention	72.23±3.98			
Group B	Pre- Intervention	73.62±3.08	4.35 Percent	8.76	P<0.00 1 [#]
	Post- Intervention	77.97±3.56			

[#] The Mean Differences Are Highly Significant At The 0.000 Level Of Significance. The Degrees Of Freedom Are 14. [Mean Diff-Mean Difference; Los-Level Of Significance]

Applied Test Of Significance Demonstrated That Both Found To Be Effective Protocols In Improving Gross Motor Functions Among Children With Cerebral Palsy Of Group A And B. When Comparison Was Done Of Gross Motor Function Measured In Children In Group A Had Better Scoring. Gmf Significantly Improved After Administration Of Conventional Therapy Along At Post Interventional Stage. This Clearly Reflected Little Effectiveness Of Conventional Therapy Alone In Cases Of Cerebral Palsy Of Group A.

Further, Investigation Showed Improvement In Scoring Of Gross Motor Function Measured At Large After Sensory Integration Therapy With Conventional Therapy Reflected Little Effectiveness Of Sensory Integration Therapy When Used As An Adjunct To Conventional Therapy In Cases Of Cerebral Palsy Of Group B.

Finally, The Outcomes Of Two Treatment Strategies Utilized In Present Study Indicated The Effectiveness Of Both, Conventional Therapy Alone And Sensory Integration Therapy. Investigation Projected That The Children With Cerebral Palsy Of Group B Had Experienced A Large Improvement At Post Treatment Stage Than Children With Cerebral Palsy Of Group A. The Differences In Mean Score On Gross Motor Function Measure Among Children With Cerebral Palsy Of Group B (4.35 Percent) Found To Be Large As Compared To Children Of Group A (0.57 Percent).

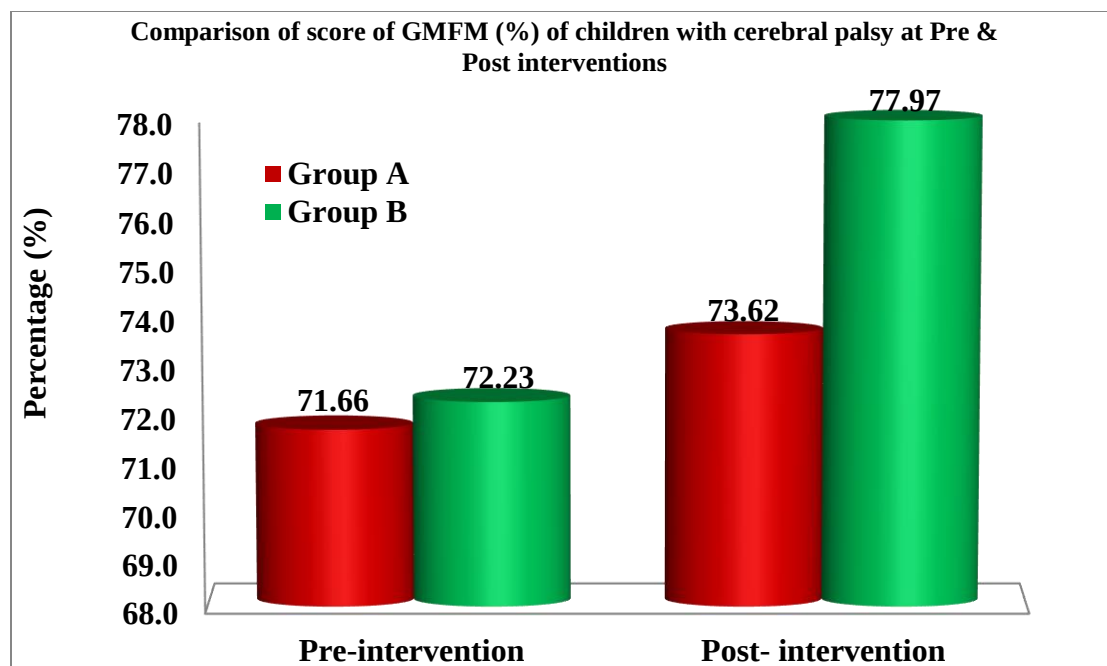


Figure 4.4–Bar Diagram Is Showing The Distribution And Comparison Of Pre-And Post-Interventions Scoring Of Gross Motor Function Measure Of Children With Cerebral Palsy Of Group A And Group B.

Table 4.5:-

Measurement Of Changes In Scores Of Short Sensory Profile From Baseline (Pre) To Post Intervention In Group A And Group B

Group	Sampling Stage	Score Of Ssp Mean $\pm$ Sd	Mean Diff	T-Value	Los
Group A	Pre-Intervention	125.40 $\pm$ 6.80	1.20 Point	4.58	P<0.001 [#]
	Post-Intervention	126.60 $\pm$ 6.89			
Group B	Pre-Intervention	126.87 $\pm$ 5.00	8.20 Point	15.82	P<0.001 [#]
	Post-Intervention	135.07 $\pm$ 5.23			

[#] The Mean Differences Are Highly Significant At The 0.001 Level Of Significance. The Degrees Of Freedom Are 14. [Mean Diff-Mean Difference; Los-Level Of Significance]

Statuses Of Short Sensory Profile Of Children With Cerebral Palsy Of The Groups, A And B Can Be Easily Observes In Table 4.5. However, The Children With Cerebral

Palsy Of Group B Found With More Improved Short Sensory Profile Scores Than Children With Cerebral Palsy Of Group A. Children In Group A Showed Improvement After Administration Of Conventional Therapy, Also In Group B Depicted Statistically Significant Improvement In Short Sensory Profile.

Finally Results Of Present Study Concluded That The Sensory Integration Therapy Considered Significantly Effective On Improving Gross Motor Function Among Children With Cerebral Palsy When Used As An Adjunct To Conventional Therapy.

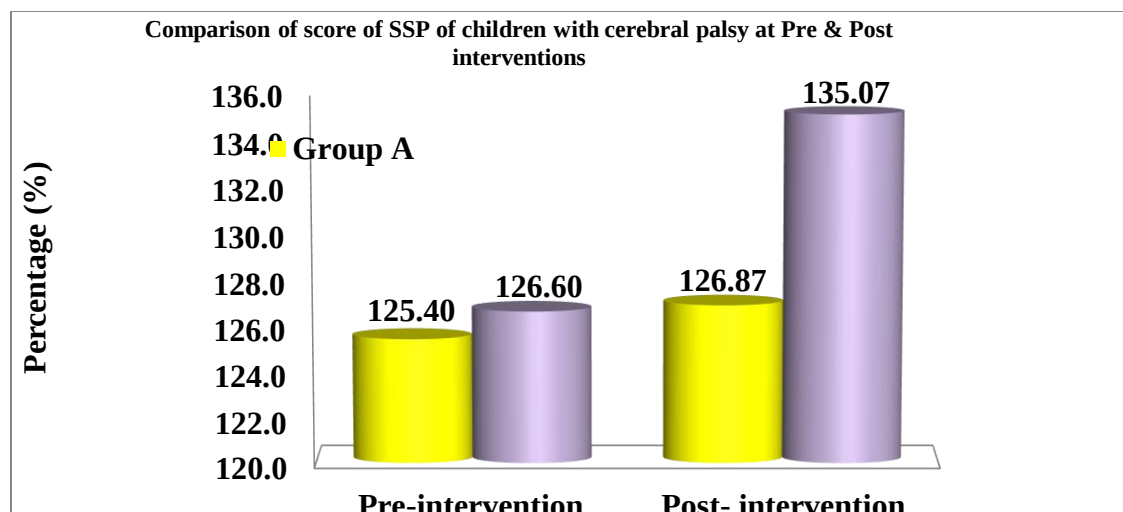


Figure 4.5–Bar Diagram Is Showing The Distribution And Comparison Of Pre-And Post-Interventions Scoring Of Gross Motor Function Measure Of Children With Cerebral Palsy Of Group A And Group B.

5.4 Comparison Of Scores Of Gross Motor Function Measure And Short Sensory Profile Between Children Of Group A And Group B

The Assessment And Comparison Of Scores (%) Of Gross Motor Function Measure And Score Of Short Sensory Profile Was Carried Out At Two Sampling Stages.

Inter Group Comparison Was Carried Out At Baseline And After Administration Of Conventional Therapy Alone And Sensory Integration Therapy With Conventional Therapy To Report The Changes Between Children With Cerebral Palsy Of Group A And Group B In Order To Verify The Usefulness Of Conventional Therapy For Improving The Gross Motor Function. The Significance Of Differences In Scores (%) Of Gross Motor Function Measure And Score Of Short Sensory Profile Among Studied Children Of Cerebral Palsy Between The Two Groups Which Is Summarized In Tables From 4.6 To 4.7.

Table 4.6:-

Comparison Of Scores (%) Of Gross Motor Function Measure Between Groups A And B At Pre (Baseline) And Post Intervention Stages

Assessmen	Group	Score (%) Of	Mean	T-	Los
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t Stage		Gmfm	Diff	Value	
		Mean $\pm$ Sd			
Baseline	Group A	71.66 $\pm$ 3.89	1.96	1.53	P>0.05 [⊗]
	Group B	73.62 $\pm$ 3.08	Percent		
Post Intervention	Group A	72.23 $\pm$ 3.98	5.74	4.16	P<0.001 [#]
	Group B	77.97 $\pm$ 3.56	Percent		

⊗ The Mean Difference Is Not Significant (Insignificant) At The 0.05 Level Of Significance. # The Mean Differences Are Highly Significant At The 0.001 Level Of Significance. [Mean Diff-Mean Difference; Los-Level Of Significance]

Table 4.6 Highlights The Performances Between Children With Cerebral Palsy Of Group A And Group B At Pre (Baseline) And Post-Intervention Stages With Respect To Gross Motor Function.

Prior To Intervention, The Score (%) Of Gross Motor Function Measure Among Children In Group B Were Not Significantly Differed And Found To Be Approximately Similar As Compared In Group A At Baseline Stage. But, The Score (%) Of Measure Among Children In Group B Were Significantly Higher Post Intervention Stage As Compared Cerebral Palsy Of Group A.

Investigation Showed That The Children With Cerebral Palsy Of Group B Had Experienced Significantly Differed And Improved Score (%) Of Gross Motor Function.

Finally, Results Of Research Indicated That The Sensory Integration Therapy Found To Be An Effective Conservative Treatment Among Children With Cerebral Palsy When Used As An Adjunct To Conventional Therapy To Cope With Compromised Gross Motor Function.

The Below Depicted Figure 4.6 Shows The Comparison In Score (%) Of Gmfm At Pre And Post Interventions Among Children With Cerebral Palsy Of Group A And Group B. The Differences In Children Between Groups (Group A And Group B) Found Approximately Same At Baseline Stage But Noted Statistically Significant At Post Intervention Stage.

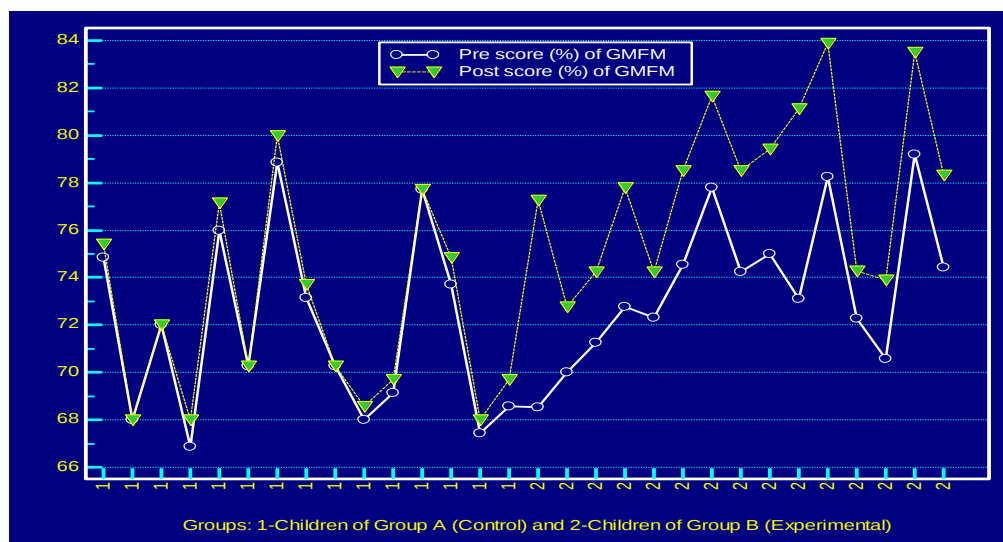


Figure 4.6–Line Diagram Is Showing The Distribution And Comparison Of Pre-And Post-Intervention Score (%) Of Gross Motor Function Measure Of Patient With Cerebral Palsy Of Group A And Group B.

Table 4.6:-
Comparison Of Scores Of Short Sensory Profile Between Group A And Group B At Pre And Post Interv,Ention Stages

Assessme nt Stage	Group	Score Of Ssp Mean $\pm$ Sd	Mean Diff	T- Valu e	Los
Baseline	Group A	125.40 $\pm$ 6.80	1.47 Point	0.67	P>0.05 [⊗]
	Group B	126.87 $\pm$ 5.00			
Post Interventi on	Group A	126.60 $\pm$ 6.89	8.47 Point	3.79	P<0.001 [#]
	Group B	135.07 $\pm$ 5.23			

[⊗] The Mean Difference Is Not Significant (Insignificant) At The 0.05 Level Of Significance. [#] The Mean Differences Are Highly Significant At The 0.001 Level Of Significance. [Mean Diff-Mean Difference; Los-Level Of Significance]

Table 4.6 Highlights The Significance Of Differences Of Score Of Short Sensory Profile Between Children With Cerebral Palsy Of Group A And Group B At Pre (Baseline) And Post-Intervention Stages.

Comparison In Outcomes Of The Treatment Therapies Showed That The Sensory Integration Therapy Found To Be An Effective Therapeutic Regime In Improving Gross Motor Function Disorders When Used As An Adjunct To Conventional Therapy

In Cases Of Cerebral Palsy As Compared To Conventional Therapy Alone. Nevertheless, Results Indicated That Sensory Integration Therapy Is Better Effective Therapeutic Regime In Improving Gross Motor Function. Enquiry Showed That The Differences In Score Of Short Sensory Profile (1.47 Point) Between The Children Of Group A And Group B Was Very Little At Pre-Intervention Stage And Thereafter The Difference In Means Could Not Reach At Statistically Significant ($P > 0.05$) Level Of Significance. This Reflected That At Baseline Stage That The Children Of Both The Groups Had Approximately Similar Gross Motor Function Disorders With Small Variations.

The Below Depicted Figure 4.7 Shows The Comparison In Score Of Short Sensory Profile At Pre And Post Interventions Among Children With Cerebral Palsy Of Group A And Group B. The Differences In Children Between Groups (Group A And Group B) Found Approximately Same At Baseline Stage But Noted Statistically Significant At Post Intervention Stage.

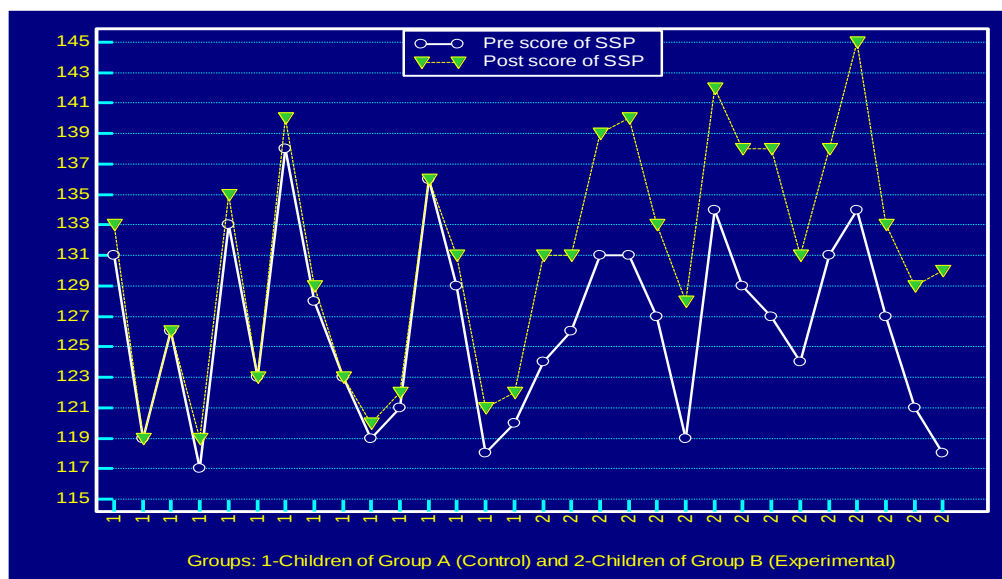


Figure 4.7–Line Diagram Is Showing The Distribution And Comparison Of Pre-And Post-Intervention Short Sensory Profile Scores Of Patient With Cerebral Palsy Of Group A And Group B.

Moreover, This Is Inference Statistically That The Therapeutic Regime Such As Sensory Integration Therapy Is More Effective Intervention Protocol When Used An Adjunct To Conventional Therapy In Improving The Gross Motor Function Among Children With Cerebral Palsy Than Conventional Therapy Alone.

Finally, Sensory Integration Therapy Among Children With Cerebral Palsy May Be More Preferred Treatment Protocol In Improving The Gross Motor Function Among Cerebral Palsy Children. Overall, The Above All Statements And Inferences From All The Tables Indicated The Rejection Of Null Hypothesis.

Discussion

This Study Was Designed To Compare Sensory Integration Therapy Verses Conventional Physical Therapy Among Children With Cerebral Palsy On Gross Motor Function The Impact Of Sensory Integration Therapy And Conventional Physical Therapy In Improving Gross Motor Function In Cerebral Palsy Children.

The Worldwide Incidence Of Cerebral Palsy Is Being 2 To 2.5 Per 1000 Live Births With Motor Disorders Are Often Accompanied By Disturbances Of Sensation, Perception, Cognition, Communication And Behaviour. The Destruction Of White Matter Can Have Secondary Effects On The Development Of Cortical And Thalamic Regions, Which Are Responsible For Sensory Processing. Problem In Sensory Integration Leads To Sensory Integration Dysfunction (Sid) Which Is The Inefficient Neurological Processing Of Information Received Through Senses Causing Problems With Learning, Developmental And Behaviour.

This Reasons Behinds This Study Was To Find Out Effect Of Sensory Integration Therapy And Conventional Physical Therapy In Children With Cerebral Palsy And To Compare The Efficacy Of Sensory Integration Therapy Along With Conventional Therapy Over Conventional Physical Therapy Program.

A Total Of 43 Children Suffering From Cerebral Palsy Who Approached For Treatment To Career College Opd, Bhopal Were Screened For The Present Experimental Study And Out Of Them 30 Children Suffering From Cerebral Palsy Were Fulfilled The Inclusion Criteria That Deemed Fit As A Sample. Thirty Children With Cerebral Palsy Were Divided Into Two Equal Halves Of Size 15 That Constituted Two Study Groups And Further Designated As “Group A” (Control Group) And “Group B” (Experimental Group). Nevertheless, The Children With Cerebral Palsy Of Group A Had Received Conventional Therapy Alone While Rest Other Children With Cerebral Palsy Of Group B Received Sensory Integration Therapy With Conventional Therapy. The 1 Hour Session Was Given 5 Days A Week For 6 Months. However, Children Of Both The Groups Received Conventional Therapy In Common.

Conventional Physical Therapy Exercises Included Routine Passive Range Of Motion Exercises, Stretching Exercises, Strengthening Exercises For Lower Limb, Trunk And Upper Limb. Transitional Exercises In Supine, Rolling, Sitting, Crawling, Kneeling, Lying, Standing And Walking. While The Sensory Integration Therapy Involved Several Visual Perception, Body Awareness, Tactile Perception, Visual Motor Coordination Training, Vestibular And Proprioceptive Exercises Which Improve Child’s Ability To Process And Integrate Sensory Information.

Jane Ayers In 1972 States Sensory Integration As “The Neurological Process That Organizes Sensation From One’s Own Body And From The Environment And Make It Possible To Use The Body Effectively Within The Environment”.

According To A Study Done By **A.R. Shamsoddini And M.T. Hollisaz** (2009): “Effect Of Sensory Integration Therapy On Gross Motor Function In Children With Cerebral Palsy” Concluded That The This Study Showed The Beneficial Effects Of The Sit Training Program For Children With Cp; The Sit Intervention Had A Significantly Positive Effect On Gross Motor Function In The Children With Diplegic Spastic Cp. Moreover The Results Of The Present Study Showed That Sensory Integration And Vestibular Stimulation Were Effective In Children With Cerebral Palsy.. The Results Obtained By Statistical Analysis For Gross Motor Function In Children Of The Case Group Improved Significantly Better Than In The Control Group, After Intervention In Sitting ($P=0.02$), Crawling ($P=0.001$) And Standing ($P=0.03$) Positions; However No Significant Difference Was Seen In Rolling ($P=0.65$) And Walking ($P=0.69$) Ability Assessment.

Sheffali Gulati, All India Institute Of Medical Sciences, New Delhi November 22, 2019: In This Study They Compared Efficacy Of Sensory Integration Therapy As An Adjunct To Standard Care With Standard Care Alone In Improving Gross Motor Skills In Cerebral Palsy Children With Sensory Processing Abnormalities. Existing Literature Points Towards Presence Of Sensory Processing Abnormalities In Children With Cerebral Palsy. However, There Is Lack Of Robust Evidence For Usefulness Of Sensory Integration Therapy In Cerebral Palsy Children .Standard Therapy Outcome In Improving Functional Motor Skills, Adaptive Responses Are Variable In Children With Cerebral Palsy. Sensory Integration Therapy In Addition To Standard Therapy May Further Improve Adaptive And Functional Motor Skills In Children With Cerebral Palsy

With The Evidence Available, The Current Study And The Statistical Test Shows That Children Intervened With Sensory Integration Therapy With Conventional Therapy Had Significantly Better And Improved Gross Motor Function Disorders Than Children Intervened With Conventional Therapy Alone.

Finally, Results Of Research Indicated That The Sensory Integration Therapy Found To Be An Effective Treatment Strategy Among Children With Cerebral Palsy When Used As An Adjunct To Conventional Therapy To Improve Gross Motor Function.

Conclusion

During The Course Of This Study, It Has Been Concluded That Therapeutic Regime Such As Sensory Integration Therapy Is More Effective Intervention Protocol When Used An Adjunct To Conventional Therapy In Improving The Gross Motor Function Among Children With Cerebral Palsy Than Conventional Therapy Alone. There Is Significant Improvement In Scores Of Gmfm And Short Sensory Profile In Both The Groups With The Treatment.

Therefore, The Alternative Hypothesis Is Accepted Which Stated As “**Conventional Therapy With Sensory Integration Therapy Is More Effective Protocol Than Conventional Therapy Alone In Cerebral Palsy**” That Impacted The Achievement Of The Entire Selected Objectives Followed With Fulfillment Of The Aim Of The

Proposed Research Entitled “Sensory Integration Therapy Verses Conventional Physical Therapy Among Children With Cerebral Palsy On Gross Motor Function – A Comparative Randomized Controlled Trial”.

Limitations

Although The Findings Were Encouraging The Sample Size Was Small.
Children Suffering From Spastic, Hemiplegic And Monoplegic Were Considered.
Long Term Effects Were Not Analyzed.
Study Was Not Done On Other Types Of Cerebral Palsy.

Future Research

Future Studies Should Be Done On Larger Sample Size In Both The Groups.
The Duration Of The Study Should Be Elongated For The Better Effectiveness For The Exercise Interventions.
Further Studies Should Be Done On The Other Cerebral Palsy Children.
Further Studies Can Be Done To Determine The Clinical Applicability Of These Exercise Regimes For Different Age Group With Different Types Of Cerebral Palsy.

Conflict Of Interest

There Is No Conflict Of Interest
There Is No Fund By Any Agencies For The Study.

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