Title: comparison of conventional and Intermittent therapy in children with hemiplegic cerebral palsy-a pilot study

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Abstract:

Background: In the world it ranges from 1.5 to more than 4 per 1000 live births of a defined age range.In India>1 million/year are affected. About 1/323 children have cerebral palsy according to centers for disease control and prevention(CDC),which tracks through (ADDM) autism and developmental disabilities monitoring cerebral palsy network.

Cerebral palsy more in boys than girls,black than whites,77.4% had spastic,58.2%walk independently.**The aims and objectives of the study were**:(1) to determine the feasibility of a rehabilitation program combining the Intensive therapy periods with periods without therapy over a 6-month period in severely impaired children cerebral palsy(CP);and (2). To measure changes in gross motor function after intensive therapy periods (immediate effects) and rest periods (retention).A convenience sample included ten children (four females,six males;mean age months [SD 9.9]) with severe forms of Cp with impairment of four limbs and trunk (GMFCS level IV and V).**Method**: A multiple – baseline design was used.Changes in motor performance were assessed by a blind evaluator using the Gross Motor Function Measure.Visual and statistical analyses followed.Level of compliance during intensive therapy was 93.1%.Children received a mean of 60 treatments over the 20 weeks of the experimental phase compared with the 48 treatments they would have received routinely. Increases in GMFM scores (mean 9.2%;range 3 to 15%) were significant in seven children ($p<0.05$) and all participants maintained their motor performance during the two rest periods.

Results showed that four treatments per week over a 6-week period were well tolerated when separated by rest periods.The intermittent program led to improvements in motor function that were maintained over the rest periods.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.

Conclusion: In conclusion this pilot study showed that children with moderate impairments who had hemiparesis improved their motor performance when short periods of high frequency alternated with longer periods of rest.

INTRODUCTION:

Cerebral palsy is the commonly used name for a group of conditions characterized by motor dysfunction due to non progressive brain damage early in life.

Babies(0-2 yr),Toddlers(3-5 yr)-common

- Children(6-13 yr)-common
- Teenagers(14-18 yr)-common
- Adults(41-60)-Rare
- Seniors(60+)-Rare
- Cerebral Palsy is more in boys than girls ,Black than whites ,77.4% had spastic ,58.2% walk independently.

DATA COLLECTION:

HOSPITALS	NO. OF CEREBRAL PALSY CASES
CARE	DOES NOT EXIST
KRISHNA CHILDREN'S CLINIC	03
RANI CHANDRAMATHI DEVI HOSPITAL	08
SUNFLOWER	20
RAINBOW	06
PREMA HOSPITAL	03
OMNI RK	00
SRI LAKSHMI CHILDREN'S CLINIC	01
QUEENS NRI	00
RAMA KRISHNA MISSION	50
ARUNODAYA	10

A PILOT STUDY:

STUDY SETUP: At SAVEETHA HOSPITAL ,THANDLAM.

INCLUSIVE CRITERIA: Mean Average Age and Previous Treatment Period Taken

The study is designed to determine the feasibility of a rehabilitation program combining intensive therapy periods (4 times /week for 12 weeks)with periods without therapy(8 weeks)over a 5-month period in children with cerebral palsy.

SCALES: GMFCS(Blind Evaluator)

CONVENIENT SAMPLE: Ten Children(six males. four females ;Mean age 18.75 months)

METHOD:

STUDY DESIGN:

Multiple Baseline Design was used to provide a clear demonstration that performance changes when the intervention is introduced.The design, thus, provided a between-patient control(staggered duration of the baseline phase A) and within-patient control(experimental phase B).During phase A the children underwent conventional physical therapy (4/week,low frequency).The duration of this therapy was 4 weeks(staggered baseline).In phase B(experimental),intensive physical therapy(4x / week,high frequency)was provided over a 6-week period(phase Bt)followed by an 4-week rest without any treatment(phase Br).This first sequence of 10 weeks duration (Bt^1:6 weeks;Br^1:4 weeks) was repeated (Bt^2:6 weeks;Br^2:4 weeks) for a total experimental phase duration of 20 weeks.

<table>
<tr><td colspan="2">Phase A</td><td colspan="4">Phase B</td></tr>
<tr><td colspan="2">Treatments
2x/wk</td><td colspan="4">Treatments
Bt^1 Br^1 Bt^2 Br^2
4x/wk 0x/wk 4x/wk 0x/wk</td></tr>
<tr><td colspan="2">1wk
1wk
1wk</td><td>6wks</td><td>4wks</td><td>6wks</td><td>4wks</td></tr>
<tr><td colspan="2">1wk</td><td colspan="4">10 wks 10wks</td></tr>
<tr><td colspan="2">4 Weeks
Baseline</td><td colspan="4">20 Weeks
Experimental</td></tr>
</table>

PARTICIPANTS:

To include in the study children had to:(1) be enrolled in Saveetha hospital (2) have a diagnosis of CP either spastic, athetoid,ataxic,spatic-athetoid form confirmed by a neurologist(3)have a moderate form of CP with impairment of either two limbs or one limb and trunk.We excluded children who were candidates for surgery or with any other conditions that could potentially modify the rehabilitation program.These criteria were chosen to produce a homogeneous sample of children with moderate impairment.Parents of the participants signed an informed consent forms.

PARTICIPANTS	SEX	AGE(mo)	DIAGNOSIS	GMFCS LEVEL	BASELINE TOTAL GMFM SCORE%
1	M	15	Rt HEMIPARESIS	III	45.2
2	M	36	Rt HEMIPARESIS	III	57.1
3	M	32	Rt HEMIPARESIS	III	53.2
4	M	20	Rt HEMIPARESIS	III	43.2
5	M	26	Rt HEMIPARESIS	III	51.4
6	M	34	Lt HEMIPARESIS	III	54
7	M	36	Lt HEMIPARESIS	III	58.7
8	F	12	DELAYED MILESTONES	IV	47.5
9	F	12	DELAYED MILESTONES	IV	40.2
10	F	16	DELAYED MILESTONES	IV	45.2

six males and four females participated in the study.seven were diagnosed with hemiparesis and three with delayed milestones.Initial GMFM total scores ranged from 40.2 to 57.1 indicating moderate motor impairment.Child 1 to7 were able to roll from prone to supine and child 8 to 10 were unable to roll from prone to supine.All children, however were able to

hold the sitting position on the floor either supported or not supported by the therapist. Only seven children (1-7) could crawl.None was able to stand without support.

TYPE OF THERAPY:

Physical therapy in Phase A for 30 minutes and in Bt^1 and Bt^2 consisted of an individual session of 60 minutes. Individually each child is given different protocols based on their GMFC Score. Which includes developmental therapy, Conductive Education, Biofeedback , Pelvic positionings, Stretchings, Strengthenings ,Sensory integration are the techniques that are used in the protocol.

The rehabilitation program of all children also included occupational therapy,which focused on the upper-extremity function(manipulation,prehension), hand-eye coordination tasks, and perceptual training.Occupational Treatments followed a schedule similar to that set for the Physical Therapy Treatments.During the therapy periods,treatments were carried out at the rehabilitation center .During phase Br,the children did not come to the center and parents well tolerated by the children.The parents of child 8-10 were irregular to the treatment periods due to the ill health and personal issues.By these there is an impact on the compliance which showed minimal progression.These observations,however,suggest that intensive therapy should probably not discontinued for periods longer than 1-week at the time of treatment period.

OUTCOME MEASURE

The main outcome measure was the GMFM: a test designed to measure the gross motor function of children under 5 years of age.This test includes 88 items grouped in five dimensions:(A) Lying and Rolling (B)Sitting;(C)Crawling and Kneeling; (D)Standing; (E)Walking, Running and Jumping.Each item of the test is scored on a 4-point likert scale and a percentage score is calculated for each dimension.The total score is obtained by calculating the mean of the five dimension scores.The total GMFM score and dimension scores collected at each evaluation were used in the analysis.The children’s motor functional status was also classified according to the gross motor function classification system for cerebral palsy.

The children are assessed at the initial stage of treatment period i.e,phase A initial period and also at the end of the phase A treatment,assessed by different physical therapists in order to unaware the previous assessment scores.Assesssment took place at the saveetha hospital in the usual treatment room.And same procedure for phase B were the assessment are taken before and after completion of the treatment periods.Testing conditions were standardized according to the protocol.Variables such as age ,sex,before treatment period were collected at baseline.

RESULTS:

Baseline Phase:

The total number of treatments received during the multiple baseline in phase A are shown in below table

According to the no. of treatments received by the children in Phase A there the motor performances of children 1-7 were considered stable but there is only slight improvement can be observed in the below graphs.whereas child 8-10 were also stable But there is no improvement.

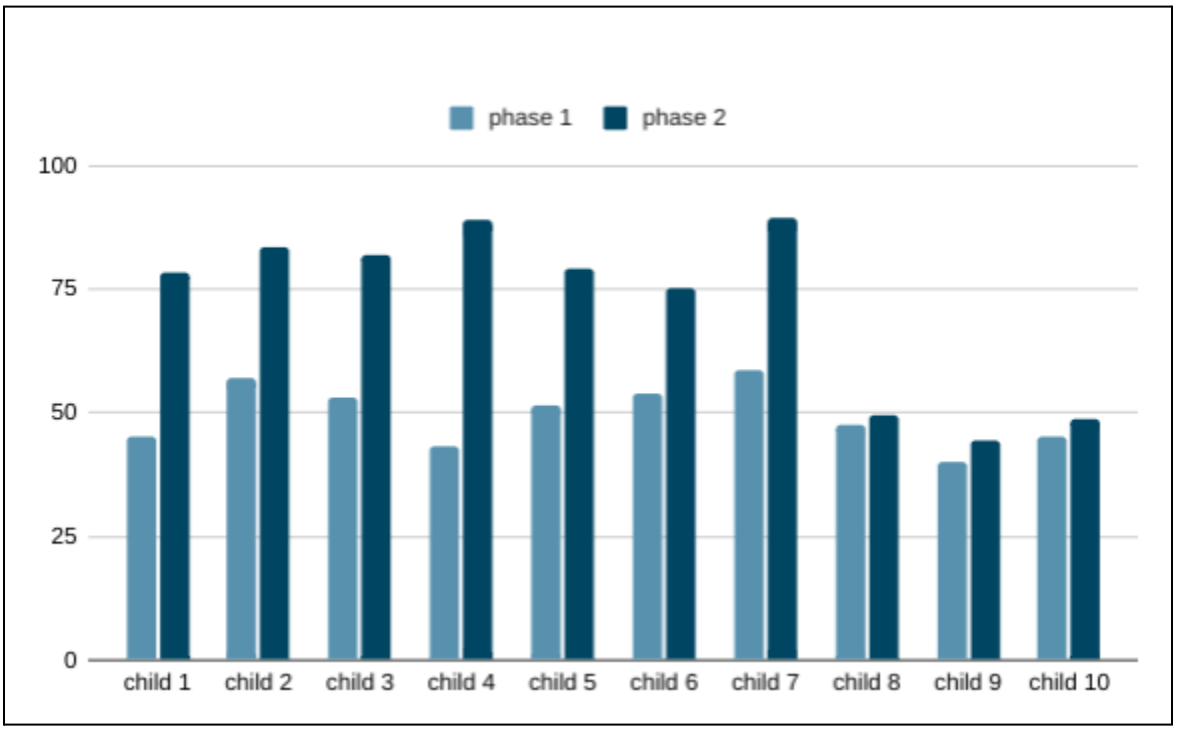
PARTICIPANTS	PHASE A		
	DURATION	TREATMENTS	
	(wk)	RECEIVED(days)	EXPECTED(days)
1	4	25	28
2	4	22	28
3	4	20	28
4	4	26	28
5	4	24	28
6	4	25	28
7	4	27	28
8	4	22	28
9	4	21	28
10	4	25	28

EXPERIMENTAL PHASE: The total number of treatments received during the experimental phase are given in below table

All children showed some increase in their total GMFM scores at the end of the experimental phase but the improvement of performance was significant in only two childen (1-7).The other three showed very little improvement.No child showed the deteriorating trend during the experimental phase.A closer examination of the motor performance after the first intensive therapy period indicates the increase in total GMFM scores in seven children(1-7) with another three(8-10) without any change.Note that after the first rest period(Br^1) there is no decrease in the motor performance of the seven child(1-7) while in the other three (8-10) there is no improvement of motor performance.

PARTICIPANTS	PHASE B				
	DURATION (wk)	Bt^1(Days) RECEIVED	TOTAL	Bt^2 (Days) RECEIVED	TOTAL
1	12	38	42	32	42
2	12	35	42	34	42
3	12	34	42	36	42
4	12	37	42	40	42
5	12	39	42	36	42
6	12	35	42	36	42
7	12	38	42	36	42
8	12	30	42	36	42
9	12	38	42	33	42
10	12	23	42	20	42

RESULTS



Phase 1-Phase A , Phase 2-Phase B

FEASIBILITY:

This pilot study provides evidence that increasing the number of treatments with increase in intensity is well tolerated by young children with Cerebral Palsy who have moderate impairment.In fact, when children received many treatments weekly and reasons for missing treatments were independent of the child (e.g.absence of therapist or festivals ,personal issues) child 10th missed many treatment sessions for health reasons.According to the parents, intensive therapy periods are generally well tolerated by the children.The parents of child 1-7 were very happy by seeing their child improvement.These observations ,however,suggest that intensive therapy can be prolonged for periods longer than 4-weeks at a time in children with moderate impairment.As there is no fatigue and stress by the participants was provided over a 5-month period ,further support the idea that intensive therapy for a very long period is necessarily better than routine therapy.

MOTOR PERFORMANCE:

Increasing the frequency of treatment improved the level of motor performance as measured with the total GMFM scores.Such findings support the idea that more intensive therapy can accelerate motor skill acquisition of moderate impaired children with CP. Present results show that high intensity treatments with more frequency i.e.,4x/wk can improve motor performance even though there are rest periods which cannot optimize the effects of therapy. The rate and magnitude of gains,however , varied markedly across children,with the best gains in children 1-9 and smallest in the 10th child.Poor collaboration and irregularity with lack of interest towards the child shows the small changes in the 10th child.

CHILD	DIMENSIONS				
	A	B	C	D	E
1	=	v	v	v	=
2	v	v	v	v	v
3	v	v	v	v	v
4	v	v	v	v	v
5	v	v	v	v	=
6	v	v	v	v	=
7	v	v	v	v	v
8	v	v	=	=	=
9	v	v	=	=	=
10	v	=	=	=	=

RETENTION OF GAINS:

All the children increased their total GMFM score and none of the children had a score lower than their mean baseline score during the whole experimental phase.Such findings indicate that the motor performance did not deteriorate despite the two 4-weeks rest periods with a home therapy program. On the contrary,in most children the total GMFM scores continued to increase.Such results raise the possibility that the child's daily activities in their natural environment provided practice conditions that contributed to the

development of motor skills and promoted the consolidation of skills learned during therapy sessions.Such findings are consistent with increasing evidence to the effect that repetition of meaningful tasks and variable practice can promote retention.

ADVANTAGES AND DISADVANTAGES OF INTERMITTENT THERAPY:

Varying the frequency of treatment delivery with blocks of intensive therapy alternating with rest periods provided advantages of a different nature.1.The main advantage reported by me was that, seeing the child almost daily during the intensive therapy phase had a positive effect on the interaction and communication with child and family ,more over the children starts crying whenever they see or hear me which is a big disadvantage but somehow I managed them to stop and this is continued throughout the sessions.2.Another advantage reported by both parents and me was the beneficial effect of the rest periods At the beginning of the study,the parents and the therapists were concerned that 8 weeks without therapy would result in a deterioration of the child's motor performance.Once they realized that such was not the case,they felt more confident and parents were able to take advantage of the periods without therapy to enjoy a less stressful and more normal family lifestyle.3.The third advantage was economic in nature.Present results showed that the motor performance of all the children increased from phase A to phase B even with a lower mean number of weekly treatments in the experimental phase(Bt and Br) indicating the rate of treatments delivery to be more critical than the number of treatments.This is a most crucial finding given that the limited human and financial resources in most health systems.In the present economic context , where in treatment benefits versus costs are questioned and where therapists have to provide optimum therapy with less resources,the proposed regime of care delivery deserves further consideration.

The main disadvantage with this was the proposed treatment regime was organizational.The scheduling of treatments was more difficult when children had appointments in other services.

Discussions:

Other researchers have suggested that the focus should be on research questions pertaining to the conditions under which different interventions are effective rather than on the types of intervention. It was suggested that the intensity of treatment could be a key variable in studies examining the efficacy of early intervention.To date, however, experimental studies in which therapy was provided in variable intensities to groups of children have not provided conclusive evidence.While some studies demonstrated that programs providing a higher frequency of treatments yielded better results(Mayo 1991,Bower and McLellan 1992.Bower et al.1996,Richards et al.1997),others did not provided conclusive evidence .For instance, it was reported that children with delayed motor function who were treated four times a month improved more than children treated once month.Conversely,no significant differences were found in the gross motor function scores of children who were treated five times a week over a 5-month period,instead of twice a week.Reddihough and coworkers were unable to measure any improvement in upper-limb function in a group of 10 children who received four times the amount of therapy normally provided.Most of these studies raised questions about the specificity of the effects observed,either because of lack of information about the therapy provided or methodological concerns relative to the outcome measures,the duration of therapy and the compliance of the treatment .There is, thus, a need to examine further the conditions of service delivery.Results from a recent study suggest that an increase in intensity can have pitfalls and that a higher frequency of therapy is not necessarily better.Children treated four times a week for 5 months showed low compliance and therapy was considered tiring and stressful by many participants. Increasing the frequency of weekly treatments over a long period is very demanding for the children and their families and as such,could jeopardize the efficacy of intensive therapy.Thus,a treatment regime including short periods of enhanced therapy separated by rest periods could represent a good compromise,especially for younger children or those with more severe impairments and low resistance to physical exertion.

CONCLUSION:

In conclusion,this pilot study showed that children with moderate impairments who had hemiparesis improved their motor performance when short periods of high frequency alternated with longer periods of rest.The short periods of intense therapy were well tolerated and the motor performance of the children did not deteriorate during rest periods without therapy. Thus, the best treatment regime may be a program that is intensive enough without being tiring and that can provide the child with practice conditions for consolidating the motor skills learned during intensive therapy.

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