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Effectiveness of Rebound Therapy along with Conventional Physiotherapy for Muscle Tone Management in Children with Cerebral Palsy

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ABSTRACT

Background: *According to world health organization globally 15% of populations are disabled and in Bangladesh 10% are disabled and among them, 42% child has a disability related to CP. The study purpose was to explore the effectiveness of rebound therapy along with conventional physiotherapy for muscle tone management in children with Cerebral palsy (CP).* ***Methodology:*** *Study used Randomized control trial (RCT) at CRP pediatric department at Dhaka Bangladesh.* ***Results:*** *Statistical analysis was done by using Mann Whitney "U" test. Where in experimental group, mean difference of muscle tone at the following of quadriceps femoris (Right), quadriceps femoris (Left), Hamstrings (Right), Hamstrings (Left), Gastrocnemius (Right), Gastrocnemius (Left), Biceps brachi (Right), Biceps brachi (Left), Wrist flexors (Right) and Wrist flexors (Left) was 1, 1, 1.5, 1.4, 1.9, 1.9, 0.5, 0.7, 0.3 and 0.5 more than control group. Pre-test and post-test score ensure rebound therapy more significant for the management of lower limbs muscle tone than upper limbs. Significant improvement wasn't found ($p>0.05$). So improvement was not statistically significant. According to mean difference study has found greater improvement in the experimental group by applying rebound therapy to CP child.* ***Conclusion:*** *This true experimental study concludes that rebound therapy with conventional physiotherapy is more effective than only conventional physiotherapy.*

Keywords: Rebound therapy, Physiotherapy, Conventional physiotherapy, Cerebral palsy (CP), Physiotherapy in CP

INTRODUCTION

In Bangladesh disability is a major social and economic phenomenon in the country. In this country disability is the most challenging issue [1]. CP is the common condition which leads to child disability [2]. According to the world health organization, 10% of Bangladeshi people are disabled. Bangladesh has recently seen an increasing number of children diagnosed with CP. Most of the population are illiterate and not be aware of health [1,3]. CP is known to maximum health and social service professionals, as well as many members of the general public, like a physical disability condition. In fact, CP only affects between 2 and 3/1000 live births; it is the most general cause of serious disability especially physical disability in childhood [4]. Bangladesh has recently raised the count of children diagnosed with CP. According to disability profile the client assess in the Shishu Bikash clinic (Rural center) during January 1998 to December 1998 showed a report of child disability where 42% of total disability was cerebral palsy, among these spastic cerebral palsy 19%, Athetoid cerebral palsy is 2%, Ataxic cerebral palsy is 3% and rest of them is other. Service for disabled children is meager in relation to their needs [3]. A huge amount of children with CP need proper physiotherapy management for improving quality life in the community [5]. Cerebral palsy cannot be cured but treatment can improve child capability. The earlier treatment can be made more improvement of a child who is suffering from CP. In realizing this truth some NGO's such as CRP, Bangladesh Protibondhi Foundation (BPF), BRAC Inclusive Education Programme, ABC (Assistant for Blind Children), IFB (Impact Foundation

Bangladesh), Shishu Bikash, Shishu pally, Shishu hospital. ICMH (Institute of child and mother health) and also some other organization have taken a step to provide physiotherapy service [6]. Among these NGO's only CRP have an individual pediatric department for the children with CP which provide physiotherapy, occupation therapy, and speech therapy service. CP is the universal condition excepted by pediatric physiotherapists [7]. Within the world, physiotherapy management and rehabilitation with the child with CP is their self-approach of treatment [3]. In CRP pediatric department physiotherapist uses various physiotherapy management tools for children suffering from CP. A large amount of child with CP needs proper physiotherapy management for their living in society. In CRP Pediatric department, physiotherapist applied various treatments for the management of spastic tone of a child with CP. But there is no valuable research to evaluate the effectiveness of rebound therapy on muscle tone of cerebral palsy children in Bangladesh. The study was conducted to explore the usefulness of rebound therapy along with conventional physiotherapy on muscle tone management which is widely used by physiotherapist's new profession and is vitally important to apply evidence-based treatment techniques to the patient for better treatment. It will help physiotherapist to adjust, mold and carry on the service of children with CP. There is limited evidence on rebound therapy and there is no article about this within Bangladesh. So researcher would like to conduct this study to explore the utility/effectiveness of rebound therapy along with conventional physiotherapy to manage muscle tone in a child with CP. Probably it will help for economic reduction of patients and is time-saving for a physiotherapist with most evidence-based rehabilitation management.

MATERIALS AND METHODS

Design of Study

The study used Randomized control trial (RCT). The sample was collected from the indoor pediatric unit, children with CP, 12 CP children were randomly chosen and after that 6 children with CP was randomly employ to rebound therapy along with conventional therapy unit and 6 children with CP to unique conventional therapy unit for this RCT study. Study follow single-blinded method at the pediatric unit of CRP Bangladesh. A pre-test and post-test were done with each subject of both unit/groups for comparing muscle tone effects pre and post of the management (Figure 1).

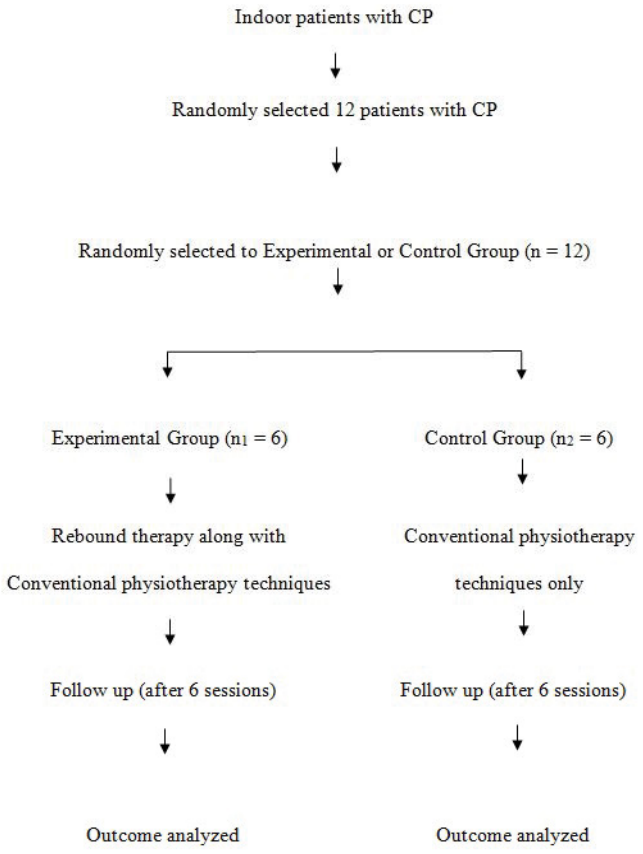

Figure 1 Flow-chart of the phases of a randomized controlled trial

Study Site

The study was conducted at the indoor Pediatric Physiotherapy Department of Centre for the rehabilitation of the paralyzed (CRP), Dhaka Bangladesh.

Study Population

The population was children with cerebral palsy who was taking physiotherapy treatment at CRP pediatric physiotherapy department.

Study Sample

The subject who met all the inclusion criteria and were clearly diagnosed as a CP patient. CP children who were admitted at CRP indoor pediatric unit for at least 2-week among them randomly assigned 6 CP child to the experimental group and 6 to control group. The sample was given a numeric number like C1, C2, C3 for the control group and E1, E2, E3 for the experimental group.

Inclusion Criteria

- Clearly mentioned a diagnosis of CP child in CRP indoor unit
- 2-12 years of children (more effective in this age)
- Those whose parents voluntarily agreed to participate in this research study

Exclusion Criteria

- Children with undiagnosed and another type of disability. Because if undiagnosed children will be present in this study then other conditions children may mix up and influence the study
- Children with cognitive and learning difficulties, as they might not be able to follow instructions
- Children with severe complication

Data Collection Method

Data collection tools: A questionnaire and the Ashworth scale were used to collect data.

Questionnaire: Self-developed questionnaire was advised and guided by the supervisor. There was close-ended inquiry with Ashworth scale with some purposive inquiry that was deliberate by the researcher and every inquiry has framed to find the level of muscle tone.

Measurement Tool

In the case of materials, the researcher used the "Ashworth scale".

The Ashworth scale: An easy measurement tool are very much useful in clinical practice. A standardized testing protocol is required in research to follow the definition of the condition as closely as possible. The Ashworth scale is useful besides the clinical measurement of tone. Ashworth and modified Ashworth scales are the most widely used tests to assess the muscle tone [8]. The assessment of tone with the Ashworth scale is only moderately reliable and repeatable even between serial examinations by the same individual. Nevertheless, in older infants and children, such scales are more useful than cumbersome attempts at more precise assessments. In the newborn, tone measurement is even more subjective and dependent on the experience and attitude of the examiner [9] (Table 1).

Table 1 The Ashworth scale

Score	Ashworth Scale (1964)	Modified Ashworth Scale Bohannon and Smith (1987)
0 (0)	No increase in tone	No increase in muscle tone
1 (1)	A slight increase in tone giving a catch when the limb was moved in flexion or extension	A slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the range of motion when the affected part(s) is moved in flexion or extension
1+ (2)	Slight hypertonus noticeable catch when the limb is moved	A slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the reminder (less than half) of the ROM (range of movement)

2 (3)	A more marked increase in tone but limb easily flexed	The more marked increase in muscle tone through most of the ROM, but affected part(s) easily moved
3 (4)	Considerable increase in tone-passive movement difficult	Considerable increase in muscle tone passive, movement difficult
4 (5)	Limb rigid in flexion or extension	Affected part(s) rigid in flexion or extension

Data Collection Procedure

From indoor pediatric unit randomly 12 children with CP were selected. About 6 sessions of treatment were provided for every subject, 12 subjects were chosen for data collection according to the inclusion criteria. The researcher divides all participants into 2 groups and coded C1 (6) for the control group and E1 (6) for the experimental group. The experimental group received conventional physiotherapy with rebound therapy and the control group received only conventional physiotherapy. Data was gathered through a pre-test, intervention, and post-test and the data was collected by using a written questionnaire. A pre-test was performed before beginning the treatment and measure of the muscle tone according to the Ashworth scale on the questionnaire form. The same procedure was performed to take post-test at the end of the 6 sessions of the treatment. At the end of the study, the specific test was performed for statistical analysis.

Intervention

After randomization subjects were assigned into 2 groups that were the control group and experimental group. The entire subjects were given intervention according to their groups. Both the groups received 50 min of physiotherapy per day, 6 sessions for each patient within 2 weeks indoor pediatric unit.

Control group: There were 6 subjects in the control group, 6 sessions of treatment were performed, the control group received a conventional physiotherapy program (Table 2).

Table 2 Conventional physiotherapy

Category	Components	Setting
Conventional physiotherapy	Stretching both upper limbs and lower limbs	1 set/10 rep
	Sitting to standing	1 set/10 rep
	Long sitting practice	5min
	Cross sitting practice	5 min
	Toilet sitting practice	5 min
	Weight-bearing	5 min
	Horse riding	5 min
	Staring practice	5 min
	Standing in a standing frame	10 min
	Walking by walker	5 min

Experimental group: There were 6 subjects in the experimental group, 6 sessions they were received rebound therapy in addition to conventional physiotherapy (Table 3).

Table 3 Rebound therapy

Category	Components	Setting
Rebound therapy	Lying down on tempo ling bouncing created by the therapist	1 sets/10 rep
	Learning seat drops, front drops, and other functional movements	5 min
	High-kneeling bouncing with physio-balls	5 min
	Standing bouncing with physio-ball	5 min
	Jumping on the tempo ling	5 min

Ethical Consideration

It should be ensured that it would maintain the ethical consideration in all aspects of the study. It is the crucial part of the all form of research. The study was approved by the ethical committee of the research project before conducting the research project. Ethical issues have followed based on the World Health Organization (WHO) and Bangladesh

Medical and Research Council (BMRC) format. At first, to conduct this study, the research project was submitted to the Institutional Review Board (IRB) and obtained approval. For conducting this research ethics committee have checked the proposal and allowed to carry out the research project. The formal permission was taken from the head of the Physiotherapy Department and in charge of the pediatric unit to collect the data. Data collection was started and complete within the allocated time frame. All the data was reviewed in strict secure and maintained confidentiality. The assessment files were strictly secured and it was not open in front of others without researcher. Written consent was given to all participants prior to completion of the questionnaire. The researcher explained to the participants about his or her role in this study. The researcher received written consent from every participants or participants guardian including signature. So, the participant assured that they could understand the consent form and their participation was on a voluntary basis. The participants were informed clearly that their information would be kept confidential. The researcher assured the participants that the study would not be harmful to them. The participants had the rights to withdraw consent and discontinue participation at any time without prejudice to present or future treatment at the pediatric unit of CRP.

Data Analysis

Data were analyzed by the statistical "Mann-Whitney U test". Data analysis was done with statistical analysis. To maintain confidentiality participants were code according to the group. Subjects from both group, measure of muscle tone by the Ashworth scale as pre and post treatment approaches were used. Improvement of the muscle tone differences between pre-test and the post-test score was used and it was analyzed with U-test. The Mann-Whitney U test was done for the analysis of the improvement of muscle tone after 6 sessions of treatment of both control and experimental groups.

According to experimental study, various methods of designs where two groups are used and everyone tested in two dissimilar conditions and data is either ordinal and interval/ratio should be analyzed with Mann-Whitney U test [10]. This test is used when the experimental design compares 2 separate or different unmatched groups of subjects participating in different conditions. When calculating the Mann-Whitney U test, we find the value called U which we then look up in the probability tables associated with the Mann-Whitney U test to find out whether the U value represents a significant difference between the results from 2 groups.

The study was experimental and participants were randomly employed to rebound therapy along with conventional physiotherapy and only conventional physiotherapy unit/group. Outcome measures through considering ordinal, interval or ratio data.

The "U test" formula:

$$U = n_1 n_2 \quad \frac{n_x\left(n_x+1\right)}{2} \quad T_x$$

n_1=The number of subjects in the trail group

n_2=The number of the subject in the control group

n_x=The number of the subjects in group with larger rank total

T_x=The larger rank total

Level of Significance

The p-value was calculated to explore the level of significance. It is called the significance level for an experiment and p-value of 0.05 was accepted as a significant result for health service research. When the p-value is smaller/equal to the mentioned value 0.05 thus it can be stated that the result is significant.

RESULTS

Mean Age

Total of 12 cerebral palsy children was a sample of this research (Table 4).

Table 4 Mean age of the participants

Experimental Group		Control Group	
Subjects	**Age in years**	**Subjects**	**Age in years**
E1	4	C1	7
E2	11	C2	3
E3	4	C3	3
E4	5	C4	4
E5	5	C5	4
E6	7	C6	7
Mean Age=6		Mean Age=5	

Socio-demographic Characteristics

Table 5 explains the socio-demographic characteristics of children.

Table 5 Sociodemographic information

Age (mean): 5.33 years		**Sex**	
≤ 6 Years	8 (66.7%)	Boy	7 (58.3%)
≥ 7 Years	4 (33.3%)	Girl	5 (42.7%)
Religion		**Family type**	
Muslim	11 (91.7%)	Nuclear Family	9 (75.0%)
Hindu	1 (8.3%)	Extended Family	3 (25.0%)
Living area		Family Income: mean ± 8333	
Rural	7 (58.3%)	5000-10000	6 (50.0%)
Urban	5 (41.7%)	10000	6 (50.0%)

Table 6 shows the total score of the participants on the Ashworth scale (Pre-test).

Table 6 Score of the participants on the Ashworth scale (Pre-test)

Experimental Group		Control Group	
Subjects	**Scale Ranking**	**Subjects**	**Scale Ranking**
E1	18	C1	24
E2	26	C2	26
E3	22	C3	18
E4	24	C4	24
E5	26	C5	24
E6	20	C6	24
Total Score	136	Total Score	140

Table 7 explains the total score of the participants on the Ashworth scale (Post-test).

Table 7 Score of the participants on the Ashworth scale (Post-test)

Experimental group			Control group		
Subjects	**Scale Ranking**	**Rank**	**Subjects**	**Scale Ranking**	**Rank**
E1	12	3.5	C1	16	9.5
E2	16	9.5	C2	18	11.5
E3	12	3.5	C3	13	7.0
E4	12	3.5	C4	12	3.5
E5	12	3.5	C5	14	8.0
E6	12	3.5	C6	18	11.5
Total	76	27.0	Total	91	51.0
Mean Score	12		Mean Score	15.1	

We know, the formula of Mann-Whitney U test:

$$U = n_1 n_2 + \frac{n_x\left(n_x+1\right)}{2} - T_x$$
$$= 6\times 6 + \frac{6\left(6+1\right)}{2} - 51$$
$$= 36 + 21 + 51$$
$$= 6$$

Where,

n_1=The number of subjects in the trial group

n_2=The number of the subject in the control group

n_x=The number of the subjects of the group with larger rank total

T_x=The larger rank total

Quadriceps Femoris

According to the Ashworth scale, the level of tone quadriceps femoris is different between pre-test and post-test score (Table 8).

Table 8 Tone Score of quadriceps femoris

Experimental Group					Control Group				
Subjects	Pre Test		Post-Test		Subjects	Pre Test		Post-Test	
	Right	Left	Right	Left		Right	Left	Right	Left
E1	2	2	1	2	C1	3	3	2	1
E2	3	3	2	2	C2	2	2	2	2
E3	3	3	1	1	C3	2	2	1	1
E4	3	3	2	2	C4	2	2	1	1
E5	3	3	2	2	C5	2	2	1	1
E6	2	2	2	2	C6	2	2	1	1
Total	16	16	10	10	Total	13	13	8	8
Mean Score	2.6	2.6	1.6	1.6	Mean Score	2.1	2.1	1.3	1.3

Hamstrings

According to the Ashworth scale, the level of tone hamstrings is different between pre-test and post-test score (Table 9).

Table 9 Tone score of hamstrings

Experimental group					Control Group				
Subjects	Pre Test		Post-Test		Subjects	Pre Test		Post-Test	
	Right	Left	Right	Left		Right	Left	Right	Left
E1	2	2	1	2	C1	3	3	2	1
E2	2	2	1	1	C2	3	3	2	2
E3	3	3	1	1	C3	2	2	1	2
E4	3	3	1	1	C4	3	3	2	2
E5	3	3	1	1	C5	3	3	2	2
E6	2	2	1	1	C6	3	3	2	2
Total	15	15	6	7	Total	17	17	11	11
Mean Score	2.5	2.5	1	1.1	Mean Score	2.8	2.8	1.8	1.8

Gastrocnemius

According to the Ashworth scale, the level of tone gastrocnemius is different between pre-test and post-test score (Table 10).

Table 10 Tone score of gastrocnemius

Experimental Group					Control Group				
Subjects	Pre Test		Post-Test		Subjects	Pre Test		Post-Test	
	Right	Left	Right	Left		Right	Left	Right	Left
E1	3	3	1	1	C1	4	4	3	3
E2	3	3	2	2	C2	3	3	3	3
E3	3	3	1	1	C3	3	3	2	2
E4	3	3	1	1	C4	3	3	1	1
E5	3	3	1	1	C5	3	3	2	2
E6	3	3	1	1	C6	3	3	3	3
Total	18	18	7	7	Total	19	19	14	14
Mean Score	3	3	1.1	1.1	Mean Score	3.1	3.1	2.3	2.3

Biceps Brachi

According to the Ashworth scale, the level of tone biceps brachia is different between pre-test and post-test score (Table 11).

Table 11 Tone score of biceps brachi

Experimental group					Control group				
Subjects	Pre Test		Post-Test		Subjects	Pre Test		Post-Test	
	Right	Left	Right	Left		Right	Left	Right	Left
E1	1	1	1	1	C1	1	1	1	1
E2	3	3	2	2	C2	3	3	1	1
E3	1	1	1	1	C3	1	1	1	1
E4	1	2	1	1	C4	2	2	1	1
E5	2	2	1	1	C5	2	2	1	1
E6	2	2	1	1	C6	1	1	1	1
Total	10	11	7	7	Total	10	10	6	6
Mean Score	1.6	1.8	1.1	1.1	Mean Score	1.6	1.6	1	1

Wrist Flexors

According to the Ashworth scale, the level of tone wrist flexors is different between pre-test and post-test score (Table 12).

Table 12 Tone score of wrist flexors

Experimental group					Control group				
Subjects	Pre Test		Post-Test		Subjects	Pre Test		Post-Test	
	Right	Left	Right	Left		Right	Left	Right	Left
E1	1	1	1	1	C1	1	1	1	1
E2	2	2	1	1	C2	2	2	1	1
E3	1	1	1	1	C3	1	1	1	1
E4	1	2	1	1	C4	2	2	1	1
E5	2	2	1	1	C5	2	2	1	1
E6	1	1	1	1	C6	3	3	2	2
Total	8	9	6	6	Total	11	11	7	7
Mean Score	1.3	1.5	1	1	Mean Score	1.8	1.8	1.1	1.1

Upper limbs and lower limbs muscle tone measured through Ashworth scale (Testing U-value) (Table 13).

Table 13 Level of significance of various variables

No	Variables	Observed 'U' value	Critical value of U at $p \leq 0.05$ is	Significance (Value ≤ 5)
1	Quadriceps femoris (Right)	12	7	Not significant
2	Quadriceps femoris (Left)	12	7	Not significant
3	Hamstrings (Right)	3	7	Significant

4	Hamstrings (Left)	3	7	Significant
5	Gastrocnemius (Right)	4.5	7	Significant
6	Gastrocnemius (Left)	4.5	7	Significant
7	Biceps brachi (Right)	15	7	Not significant
8	Biceps brachi (Leftt)	15	7	Not significant
9	Wrist flexors (Right)	18	7	Not significant
10	Wrist flexors (Left)	18	7	Not significant

Mean difference between different variables is shown in Table 14.

Table 14 Mean difference between different variables

No	Variables	Mean difference between Pre -Test, and Post-Test		Improvement between Experimental and Control Group
		Experimental Group	Control Group	
1	Quadriceps femoris (Right)	1	0.8	Experimental group more than the control group
2	Quadriceps femoris (Left)	1	0.8	Experimental group more than control group
3	Hamstrings (Right)	1.5	1	Experimental group more than the control group
4	Hamstrings (Left)	1.4	1	Experimental group more than the control group
5	Gastrocnemius (Right)	1.9	0.8	Experimental group more than the control group
6	Gastrocnemius (Left)	1.9	0.8	Experimental group more than the control group
7	Biceps brachi (Right)	0.5	0.6	Experimental group less than control group
8	Biceps brachi (Left)	0.7	0.6	Experimental group more than control group
9	Wrist flexors (Right)	0.3	0.7	Experimental group less than control group

DISCUSSION

Objectives of this research were to explore the "effectiveness of rebound therapy along with conventional physiotherapy for muscle tone management in children with cerebral palsy". In this study, 12 Cerebral palsy children's were randomly assigned.

Age is a factor that provokes the test result. This study was found among the children, the age distribution was 66.7% (n=8) between ≥ 6 years, 33.3% (n=4) between ≤ 7 years. Here the mean age in the experimental group was 6 years and 5 years in the control group. In another study conducted in America, the mean age was 4.5 (± 0.8) years [11]. In the study, we found that there were 58.3% male and 41.7% female. Other study showed that there was 54.9% male and 45.1% female in total population in Australia [12]. In America, another study showed from total population that, there was 60% male and 40% female.

In the study, the average amount of time spent on rebound therapy was 30 minutes (± 5). The average time children spent in conventional physiotherapy was 45 minutes (± 5). In different study showed that the average amount of time spent on the trampoline was 14.23 minutes (± 2.66). The average time children spent in physiotherapy was 44.33 minutes (± 6.27). The rebound therapy expert also supported these claims and support for 28 claims which have provided a firm and reliable foundation in proposing how to rebound therapy improve muscle tone [13].

By using a non-parametric Mann-Whitney U test on the data the results were significant (p=0.05 for a one-tailed hypothesis) and significance value ≤ 7. Here rejection of null hypothesis happens [11]. So rebound therapy along with conventional therapy techniques is better than only conventional physiotherapy techniques for treating muscle tone in CP children [11]. The researcher found rebound therapy significantly effective for the management of lower limbs muscle tone rather than muscle tone of the upper limb in CP children. In experimental group mean difference of muscle tone at quadriceps femoris (Right), quadriceps femoris (Left), Hamstrings (Right), Hamstrings (Left),Gastrocnemius

(Right), Gastrocnemius (Left), Biceps brachi (Right), Biceps brachi (Left), Wrist flexors (Right) and Wrist flexors (Left) was 1, 1, 1.5, 1.4, 1.9, 1.9, 0.5, 0.7, 0.3 and 0.5. In case group of statistical analysis for tone management of Hamstrings (Right), Hamstrings (Left), Gastrocnemius (Right),and Gastrocnemius (left) was statistically significant because U=3 for Hamstrings (Right), U=3 for Hamstrings (Left), U=4.5 for Gastrocnemius (Right) and U=4.5 also for Gastrocnemius (Left) and on the other hand, U=12 for quadriceps femoris (Right), U=12 for quadriceps femoris (Left), U=15 for brachi (Right), U=15 for brachi (Left), U=18 Wrist flexors (Right) and U=18 Wrist flexors (Left) was not statistically significant but in all case the tone was normalized.

Rebound therapy may benefit children with cerebral palsy for many of the same hypothesized reasons as therapeutic horseback riding and hydrotherapy: it combines weightlessness and rhythmic, 3-dimensional movements. It was hypothesized that the rebound therapy is effective in challenging balance and improving postural tone because of the rhythmic, 3-dimensional movement, the constantly changing relationship between the child's center of mass and their base of support, and the instability of the surface demanding righting reflexes [14]. Rebound therapy replicates this: it challenges balance by inducing a rhythmic, 3-dimensional movement by the therapist pushing the bed from underneath the child; it has an unstable surface and the trampoline's movement constantly changes the relationship between the child's center of mass and their base of support [15]. Proposes that high muscle tone is reduced in rebound therapy because of the vibratory effect on the muscle spindles. The vibration of spindles induces their relaxation which decreases the innervations rate of muscle action potentials, muscles lengthen thus reducing tone.

CONCLUSION

In cerebral palsy children, high muscle tone results from excessive contraction; low muscle tone results from insufficient contraction. Muscle tone is essential to maintain posture, head control, efficient movement, and functional activities, and therefore a lack of 'good' and responsive tone is detrimental to physical condition. Rebound therapy can decrease abnormally high muscle tone by vibrating muscle spindles, increase elasticity, and accentuating the amount of laxity within the muscle fibers. Improving muscle tone is of paramount importance for physically disabled children. By doing so, it not only improves balance, movement capacity and functional capabilities, but may contribute to an improved quality of life, especially for a child with cerebral palsy for a child who gains the ability to control his head, he can see more and become more aware of his environment, thus opening up a whole new world.

DECLARATIONS

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Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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