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Original Article

EFFECTS OF WRIST WEIGHING IN REDUCING UPPER LIMB TREMORS IN PATIENTS WITH CEREBELLAR LESIONS

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ABSTRACT

Background: An intentional tremor is one of the most untreated causes in patients with cerebellar ataxia. Upper limb tremors decreases the performance of many activities of daily life Thus treatment of patients with tremor probably implies better functional ability. It is one of the major areas of concern to improve functional independence hence, this study proposed to know the effects of wrist weighing in reducing upper limb tremors in cerebellar injury patients.

Materials and Methods: A total number of 21 patients with various abnormalities of cerebellum were selected depending on selection criteria. These patients were randomly divided into two groups. One group was treated with wrist weighing by using Velcro weight cuffs for 15 minutes along with conventional physiotherapy for 5 days a week for 2 months & other group is treated with conventional physiotherapy for 5 days in a week for 2 months. The objectives were tested by using tremor rating scale and nine hole peg test. The values are collected before and after the treatment

Results: In the group treated with wrist weighing the improvement in the tremor rating scale is very significant (p: 0.0001) and in nine hole peg test is extremely significant (p: 0.0001). In conventional therapy group the improvement in the tremor rating scale is not significant (p: 0.0051) and in nine hole peg test is very significant (p: 0.0002).

Conclusion: Incorporation of wrist weighing along with conventional therapy reduced the intensity of upper limb tremors in patients with cerebellar injuries but both the treatments are effective in improving upper limb functions.

KEY WORDS: Intentional tremor, Rehabilitation, Wrist weighing

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INTRODUCTION

The cerebellum plays a key role in postural control, equilibrium, balance & coordination through the connections to various parts of brain. The cerebellum will detect & correct the errors, encountered during motor task execution. A connection with vestibular system & reticular system enables the cerebellum to detect any changes in body position in relation to environment & recruit appropriate motor patterns to maintain balance & equilibrium. Cerebellar dysfunctions lead to balance impairments & it affects function leading to disability. Although cerebellum doesn't have its direct impact influence over the production of motor activity, its role in precision of task & task execution and motor learning is invaluable [1].

Cerebellar tremor is caused by lesions or

damage to the cerebellum resulting from stroke, tumor, or disease such as multiple sclerosis or some inherited degenerative disorder. It can also result from chronic alcoholism, overuse of certain medicines. In classic cerebellar tremor, a lesion on one side of the brain produces a tremor in that same side of the body that worsens with directed movement. Cerebellar damage can also produce a "wing-beating" type of tremor called *rubral* or *Holmes'* tremor. It is a combination of rest, action, and postural tremors. Cerebellar tremor may also be accompanied by certain signs such as dysarthria, nystagmus, gait problems, and postural tremor of the trunk and neck [2-4].

S H Alusi et al evaluated three different ways of assessing tremors. The results obtained from 9 hole peg test may provide useful objective method for assessing arm dexterity in tremulous Patients [5]. This provides valid and reliable measures for tremors in these patients. Morgan et al studied effects of weights to reduce intentional tremors and he used various amounts of weights. He concluded that an optimum weight load to reduce intention tremor usually is between 600-840gms which helped to overcome the problems of variability. Especially the bias in results due to practice of fatigue has proved negligible [6-9].

Effective treatment has not been evolved for Cerebellar tremor so far and very limited analysis has been done to improve effectiveness of treatment. Treating cerebellar tremors of upper limb has much impact and it gains more importance as they are functional active. And in this setup this treatment was not introduced before therefore it is very much essential to study effectiveness of weight bearing exercises on reducing intentional tremors and to improve functional activities of upper limb.

MATERIALS AND METHODS

Comparative study was performed in SIMS College of physiotherapy in which 21 subjects were randomly selected and were assigned into two groups - group A and group B according to the selection criteria. Both Males and females were included between the age of 40 to 60 years with cerebellar tremors with the tremor rating score 1 – 4 and upper limb muscle power less than 3. Subjects were excluded if they were Disoriented, Spasticity, Rigidity, and Multiple Sclerosis.

Group A consists of 11 subjects and Group B with 10 subjects. Group A was treated with conventional physiotherapy and wrist weighing technique compared with Group B which was treated with conventional physiotherapy. Nine peg hole test and tremor rating scale were used to test outcomes as a pretest and post test. Both the groups were treated for 5 days a week for a period of 2 months.

Group A was treated with Rhythmic stabilization: It is useful to improve stability of trunk and limbs by simultaneously applying resistance in opposite direction to anterior and posterior surfaces of upper limb emphasizing isometric contractions of trunk rotators. It is typically performed in weight bearing positions to incorporate joint approximation hence facilitating co contraction thus multiple muscle groups around the joint must contract most importantly the rotators to hold the position with wrist weighing technique. Group B is treated with conventional physiotherapy techniques alone.

Conventional physiotherapy techniques such as flexibility exercises to upper limb followed by active exercises are given. Treatment is given for 30 minutes per session; Rest is given after 10 minutes of treatment session to avoid fatigue. At the end of 2 months the intensity of intentional tremor is tested with Tremor rating sale, Nine peg hole test and statistical analysis was done.

RESULTS

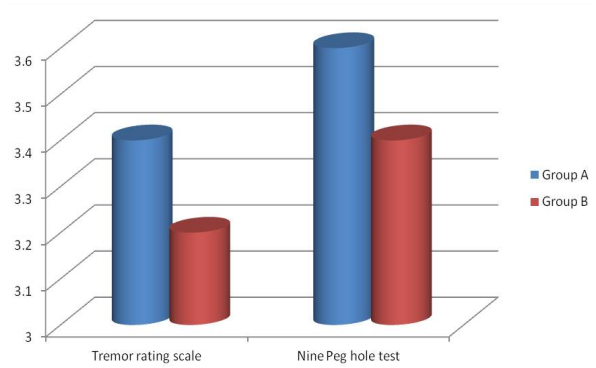
Table 1: Comparison of pretest and posttest results in Group A & Group B – Nine Peg Hole Test.

Group	Test	Mean	S.D.	Std. Error Mean	Paired t-value	P value
Group A	Pre test	3.64	0.92	0.28	11.353	0.0001
	Post test	7.18	1.25	0.38		
Group B	Pre test	3.4	0.97	0.31	6.042	0.0002
	Post test	5.3	1.42	0.45		

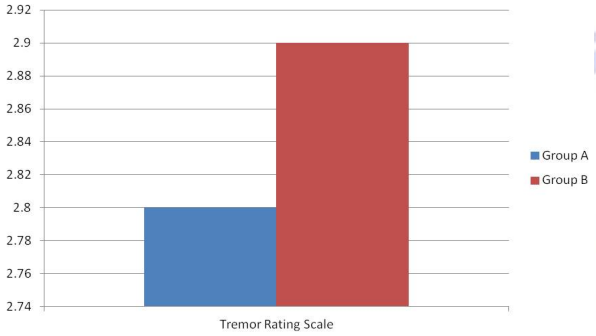
Table 2: Comparison of pretest and posttest results in Group A & Group B – Tremor Rating Scale.

Group	Test	Mean	S.D.	Std. Error Mean	Paired t-value	P value
Group A	Pre test	3.409	0.302	0.091	6.5	0.0001
	Post test	2.818	0.405	0.122		
Group B	Pre test	3.2	0.483	0.153	3.6742	0.0051
	Post test	2.9	0.516	0.163		

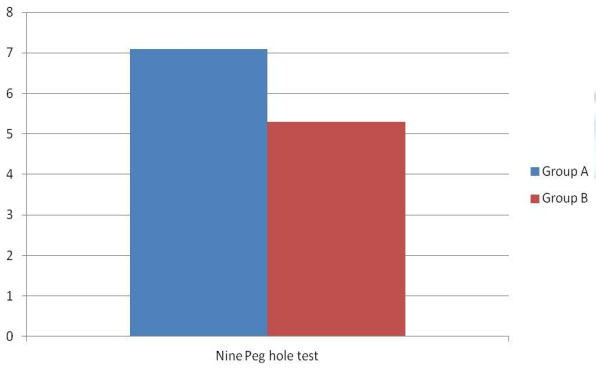
Graph 1: Comparison of Pretest results of Tremor rating scale and Nine peg hole test between GroupA and GroupB



Graph 2: Comparison of Post test results of Tremor Rating scale between Group A and Group B.



Graph 3: Comparison of Posttest results of Nine peg hole test between Group A and Group B.



DISCUSSION

Pathologically, Tremor is an unintentional, rhythmic muscle movement involving oscillating movements of one or more parts of the body. It is the most common of all involuntary movements and can affect the hands, arms, head, face, voice, trunk, and legs [2]. This affects an estimated one million. Tremors impede activities of daily living and social function. For tremor disabled individuals independent function is difficult although it is not life threatening [2].

S H Alusi et al evaluated three different ways of assessing tremors. The results obtained from 9 hole peg test may provide useful objective method for assessing arm dexterity in tremulous Patients. This provides valid and reliable measures for individuals with cerebellar tremors [5].

The application of weights to wrist joint reduces intentional tremors with some improvement in functional activities[10]. An optimum weight load to reduce intentional tremor usually 600-840g is used to achieve additional mechanical loading [9].

Tremors can be assessed in several ways including basic examination such as handwriting assessment, drawing tests, nine peg hole tests, Finger to Nose tests. In the present study, we examined using Nine Peg hole test following the treatment with wrist weighing with weight cuffs to improve upper extremity muscular coordination on cerebellar intentional tremors subjects. The effects of mechanical loading on intentional tremor in our present study are similar from the results of proprioceptive loading in earlier studies, a functional improvement was found using mechanical loading [12].

Both the groups showed improvement in post test results. But group A wrist weighing shows better improvement compared to the conventional physiotherapy. Thereby this study can be considered for further management of tremors. We come across certain limitations about follow up protocol after post test analysis, Probably long term treatment can further provide better results and use of different others scales as outcomes can be performed in future studies.

CONCLUSION

Incorporation of wrist weighing along with conventional physiotherapy was more influential and effectively reduced the intensity of upper limb tremors in patients with Cerebellar injuries and effectively improved upper limb functions.

Conflicts of interest: None

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