Effect of Goal Oriented Exercises Versus Combined Physiotherapy Intervention on Functional Independence in Subject With Traumatic Brain Injury

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Abstract

Background- Traumatic brain injury is a devastating neurological disorder and a leading cause of death and acquired disability in India. Traumatic brain injury leads the damage to the brain that result in impairment in physical, cognitive, speech/language, daily activities and quality of life and behavioural functioning. These impairments have direct impact on the individuals functional outcome after traumatic brain injury. In rural areas the health care delivery system is still an upcoming area. There is scarcity in rehabilitation units to provide health care. Many researches has been done on motor and balance impairment but there is lack of researches done on goal oriented exercises and combined physiotherapy intervention on functional independence. In this study we are given goal oriented exercises mainly concentrate on problem list of patients and combined physiotherapy intervention given combining all the exercises and give it to the patients. Indeed this made us to study the effect of Goal Oriented Exercises Versus Combined Physiotherapy Intervention on Functional Independence in Subject with Traumatic Brain Injury. **Objectives-**1. To find out effect of Goal oriented exercises On functional independence In subjects with traumatic brain injury.2.To find out effect of Combined Physiotherapy Intervention On functional independence In subject with traumatic brain injury. **Method-** 44 subjects diagnosed with Traumatic Brain Injury were included in this study. Subjects were divided into two different groups. Group A was Given Goal Oriented Exercises and group B was given combined Physiotherapy intervention. These subjects were allocated by convenient sampling method. During Pre and post treatment assessment functional mobility were assessed by outcome measures Functional Independence Measure and Barthel Index. These outcome measures were analysed. **Result-** Pre and Post functional independence and mobility was analysed by using paired and unpaired t test. Data analysis showed significance for FIM and Barthel Index (p value less than 0.001) for both the groups but comparative to group A (Goal oriented Exercises), group B (Combined Physiotherapy Intervention) is more effective. **Conclusion-** Goal oriented Exercises and Combined Physiotherapy Intervention is effective in improving the functional independence and mobility in the post Traumatic Brain Injury individuals but comparative to Goal oriented Exercises, Combined Physiotherapy Intervention is more effective.

Keywords- *Traumatic brain injury, Functional Independence Measure, Physiotherapy Intervention.*

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Introduction

Traumatic brain injury is defined as an alteration in brain function caused by an external force. Brain tissue damage can be of two type: primary injury and secondary injury. Primary injury occurs due to direct trauma to the parenchyma. Secondary injury results from cascade of biochemical, cellular, and molecular events that occur due to an initial injury and injury related hypoxia, elevated intracranial pressure and oedema. (1) There is

open head injury and close head injury, open head injury is associated with skull fracture and close head injury occurs in isolation without skull fracture. Blood supply of brain may also get indirectly affected due to the injury of face and neck. Most TBI occurs due to road traffic accident (RTA). The severity of brain injury may be categorised as mild, moderate and severe head injury. (2)

In Mild traumatic brain injury there is minimal damage to the neuroanatomical structures with slight or no permanent impairment. Glasgow coma scale score of more than 13 is defined as mild TBI. In moderate TBI GCS between 8 -13 and the post traumatic amnesia lasting between 1 to 24 hours. Severe TBI is GCS score less than 8. (2)

After TBI – state of consciousness, sensorimotor changes, cognitive, emotional and behavioural changes, attention, balance, dizziness and visual dysfunction, spasticity and post traumatic headache. (2)

Functional Independence is a common consequence of traumatic brain injury. To maintain a mobility, it is important that central nervous system receives and integrates a somatosensory information, which includes both the tactile and proprioceptive system. The receptors which carry tactile sensations are Merkels cells, Pacinian corpuscles, Meissners corpuscles and Ruffini endings. And they are found in feet and might play an important role in maintaining body stability and balance in upright stance. The proprioceptive receptors are muscle spindle and Golgi tendon organs which carry the sense of joint position and joint motion. The proprioceptive receptors in feet are sensitive to ankle rotation and can give information about balance. (3, 4) Stimulation of these receptors may improve balance control in individual with post TBI. The rhythmic auditory stimulation (RAS) also improves the balance and gait of post TBI patients by stimulating brain functions involved in movement, cognition, emotions and sensory perception also RAS helps in execution of movements and normalizing gait parameters. (5, 6, 7) Balance incorporates two vestibular reflexes- the vestibuloocular reflex (VOR) and the vestibulospinal reflex (VSR). To improve balance after TBI the vestibular balance rehabilitation therapy and visual treatments are commonly used. (8)

Postural impairment and Functional Independence are common consequences of TBI which may result in instability while performing day today activities like standing, walking, grasping, difficulty while coordinating eye-head movement and problem while focusing on target. The postural and coordination defect result from damage to cerebellum. (9)

The motor disability following TBI is a common, motor performance can be affected by damage to various loci in the nervous system which can cause reduction in muscle power and tonus disorder which can result in impaired balance. (6, 7) Focal or diffuse spasticity may appear following TBI. Time post injury is an important consideration as spontaneous neurological recovery may continue for 9- 15 months post injury. Motor impairment can also result from prolong immobilization and bed rest during acute period, prolonged immobility can cause effect on multiple body system that impact the motor function the most. Motor rehabilitation is essential in helping the patient re-establishing independence post TBI. (7, 8)

Examination of Functional Independence in TBI patients is done by using Functional Independence Measure Scale and Barthal Index(10, 11, 12) Initially many therapist concentrate on the motor component of patient to improve his independence in this study we are going to give Combined physiotherapy intervention for Functional Independence in TBI Individuals.

Material and Method

This was a study to find the "Effect of goal oriented exercises versus combined physiotherapy intervention on functional independence in subject with traumatic brain injury. The study was carried out in hospitals from Karad. An approval for the study was obtained from the protocol committee and ethical committee of KIMSDU. Individual were approach and those fulfilling the inclusive criteria were selected. The purpose was explained and written inform consent was taken prepared in accordance with the Helsinki Declaration from those who are willingly to participate. Total 44 individuals were taken. The inclusion criteria was TBI patients, Patients with mild and moderate TBI, Both male and females, Age- above 18 years, Patients with functionally Dependent. The exclusion criteria was individual who are unable to follow simple commands, unconscious patients, unstable vitals and candidates with any fracture of spine, lower and upper limb. Their Functional Independence was assessed by FIMS and Barthal Index. Then the candidates were divided in to two groups for group A goal oriented exercises and for group B Combined Physiotherapy Intervention are

given. This was given for 4 days per week for 6 weeks up to 45-60 minutes per session including rest time. The time of session increased as the week progresses, initially it took 30- 35 minutes per session and later progressed to 45- 60 minutes per session on 6th week.[13]. Later evaluation and interpretation was done using statistical analysis.

Finding

The data was analyzed using INSTAT software. Descriptive statistics were used to analyze for demographic data: Pre and post treatment protocol was analyzed by using paired and unpaired t test and p value <0.0001 was considered to be statistically significant.

Within Group Comparison-

Within group comparison was done by applying 'Paired t-test' to pre and post training values of Functional independence measure.

Table 1: Comparison of Pre and Post-treatment average with Functional Independence Measure:-

Group	Pre training Mean	Post training Mean	t value	p value
Group A	54.364	69.909	11.984	< 0.0001
Group B	55.955	59.545	10.021	<0.0001

Table 2: Comparison of Pre and post-treatment average with Barthel Index

Group	Pre training Mean	Post training Mean	t value	p value
Group A	30.227	60	18.678	< 0.0001
Group B	31.364	36.818	17.390	< 0.0001

Between Group Comparison-

Between groups comparison was done by applying 'unpaired t test

Table 3: Comparison of Pre and post-treatment average with Functional Independence Measure:-

Group	Group A	Group B	t value	p value
Pre training Mean	54.364	56.500	0.7822	0.4385
Post training Mean	69.909	59.545	3.517	0.0011

Table 4: Comparison of Pre and Post-treatment average with Barthel Index

Group	Group A	Group B	t value	p value
Pre training Mean	30.227	37.045	2.817	0.0074
Post training Mean	60	36.818	6.795	< 0.0001

Discussion

The purpose of this study was to find out the effect of goal oriented exercises versus combined physiotherapy intervention on functional independence in subject with traumatic brain injury. About 40% of patients report Functional Dependence after TBI. (14) In many research's done before treatment was given mainly on motor component to improve balance in TBI patients. Many currently practicing physiotherapist mainly concentrate only on motor components of patients. (7) In this study we have given Goal oriented exercises and Combined Physiotherapy Interventions.

Our study included total 44 post TBI candidates with Functional Dependence. Motor impairment is a common problem in post-TBI patients. This problem may persist for life time after TBI which can affect the Patients daily activities and his mobility. For this early management of patients in its acute stage plays an important role.(17) Motor management alone with combined physiotherapy have a more effect in improving Functional Independence in post TBI patients. Vestibular apparatus has also been identified as sensory organ that controls sensations of balance and equilibrium in individual. In this study we found that candidates also had impairment in eye-head coordination movements which was improved by vestibular exercises which help in stabilizing gaze and eventually to improve the balance.

Motor disturbances following TBI includes reduction of power, tonus disorder (spasticity) and motor control disorganisation. Reduction of spasticity helps in improving ROM and functional activities. The static balance is improved by decreasing muscle tone of neck and upper trunk. Thus improving Functional Independence of an individuals. (21, 22)

Limitation of this study was that the study is done with small sample size and in limited geographical area.

Conclusion

Through this study, it is concluded that, Goal Oriented Exercises and combined physiotherapy intervention is effective in improving the functional independence and mobility in the post TBI individual but comparative to Goal oriented exercises, combined physiotherapy intervention is more effective.

Conflicts of Interest: There is no conflict of interest in this study.

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Ethical Clearance: This study has undergone ethical clearance through the university level ethical committee.

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