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Influence of limb physiotherapy and maintenance of bronchial hygiene on level of consciousness in head injury

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Abstract

Background- The present rate of hospitalization for head injury is high now a days. Many patients die in coma state, some patients become severe disabled or remain in vegetative state. There are many nosocomial infections are seen in prolonged hospital stay conditions. Till now a strong correlation of limb physiotherapy along with bronchial hygiene as coma arousal is yet to be established.

Methods– Total 87 head injury subjects with Glasgow coma scale score below 8 were included by using convenient sampling method. Pre intervention assessment were done with GCS and CPIS. The subjects were given limb physiotherapy and bronchial hygiene techniquefor 7days. Statistical analysis were done with appropriate tool.

Result – Post value of GCS is 7.759 ± 2.023 and CPIS is 5.402 ± 1.728which showed significant effect of limb physiotherapy along with maintained bronchial hygiene on level of consciousness in head injury.

Conclusion – This study concluded that limb physiotherapy and maintained bronchial hygiene has significant effect on improving consciousness level of head injury individuals.

Keywords – *Head injury, bronchial hygiene, limb PT, coma, GCS, CPIS.*

I. INTRODUCTION

Head injury is an insult to brain resulting in temporary or permanent damage to the internal structures and presenting as motor disturbance, sensory disturbance and cranial nerve impairment. Head injury has 2 types that are TBI and NTBI. TBI is further divided into two open brain injury and closed brain injury[1]. Head injury causes a wide range of severe complications. Some patients die before admission to hospital[2]. The problem caused by head injury is vast and varied. Lesion causes focal and diffuse patterns of damage after head injury.Head injury causes many other complications to brain and its system[3].

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Intracranial complications - hematoma, swelling, raised intracranial pressure, vasospasm, infection, epilepsy and hydrocephalus. Systemic complications – hypoxia, hypercarbia, hypocarbia, hypotension, fever, anemia and hypernatremia. Traumatic brain injury is a biggest cause of mortality, morbidity and socioeconomic burden in India[4]. Coma is a sleep like state in which patient makes no purposeful response to the environment and from which he/she cannot be aroused[6]. Coma stimulation is one of the best approach where we can found good outcome. There are various coma stimulation techniques are used[7]. Approximately 1 in 10 patients remain in coma after severe head injury. Treatment has some or other modification in therapy. Coma stimulation is program which involves vigorous sensory stimulus made to accelerate coma recovery. Many other complications may occurs after head injury irrespective of mild, moderate or severe head injury[8]. Physiotherapy is profession which has well established in various specialties. For example oncology. Even has important role in improving functional condition after various diseases and their post-surgical complications. Still profession is lacking because of awareness among other medical professionals. As approach like biofeedback has shown good impact on many conditions. Biofeedback approach has significant role not only in improving functional outcome but also in speeding up recovery time[9]. Cardiorespiratory function is badly hamper after head injury. There are many nosocomial infections are seen in prolonged hospital stay conditions. These bronchial hygiene related conditions may hampers the O_2 saturation and its delivery to brain. Cardiovascular function is an important aspect in comatose patients. Patient is considered medically unfit if there is alteration in cardiac and lung function. And there is additional chances of infection and it is a barrier for patients' prognosis which may further lead to morbidity. Ventilator associated pneumonia, reduced cardiac output, low O_2 saturation, fever etc. like complications are seen in such patients[5].

These complication may worsen the patient's outcome. Techniques which available for pulmonary care are postural drainage, manual techniques such as percussion, vibration, shaking, respiratory PNF, breathing exercises, cough stimulation are airway suctioning techniques etc. For such complication chest physiotherapy found effective which may minimize pulmonary secretions and maximize oxygenation[11].

Thus as patient is in acute coma stage combination of limb PT along with bronchial hygiene technique may improves better functional outcome[10]. There is lack of literature on whether limb physiotherapy and maintenance of bronchial hygiene can help us to achieve proper consciousness and optimal cognitive function which indicates good prognosis.

So, this novel thought of combining both concepts is necessary to be evaluated in comatose individuals.

II. METHODS

Inclusion criteria were-

- Severe head injury GCS level below 8
- both pre and post-operative
- both male and female
- Age group 20 between 50 etc.

Exclusion criteria-

- Subjects with any other systemic illness related to brain
- Upper limb, lower limb and spine Fractures
- History of head injury etc.

Procedure -The study was approved by the Institutional ethical committee. Subjects were referred by neurosurgeons. Procedure was explained before including for study to respective doctor. By using convenient sampling method subjects were taken for this experimental study. Pre and post outcome were assessed by using GCS and CPIS. Statistical analysis were using appropriate tool.

III. RESULT

Total 87 subjects were included in study. 50 were male and 37 were female. Total traumatic head injury subjects were 45 in that 29 were male and 16 were female. Total non-traumatic subjects were 42 in that 21 were male and 21 were female.[table no.1]

Table -1- GENDER DISTRUBUTION WITH TYPE OF INJURY

TOTAL	MALE		FEMALE	
87	50		37	
	TRAUMATIC	NON TRAUMATIC	TRAUMATIC	NON TRAUMATIC
	29	21	16	21

The GCS score and CPIS score were assessed before and after treatment. Comparison were done by using paired‘t’ test on appropriate statistical tool. The comparison of mean and standard deviation of pre and post values of GCS within group. The mean on pretreatment was 5.000 ± 1.621 and post treatment was 7.759 ± 2.023. The P value was <0.0001 which is statistically significant. [table no.2]

Table -2- GCS

Group	Pre-interventional mean ± SD	Post-interventional mean ± SD	P value	t value	Interference
Single group	5.000 ± 1.621	7.759 ± 2.023	<0.0001	16.628	Extremely significant

The comparison of mean and standard deviation of pre and post values of CPIS within group. The mean on pretreatment was 6.667 ± 1.444 and post treatment was 5.402 ± 1.728. The P value was <0.0001 which is statistically significant. [table no. 3]

Table -3- CPIS

Group	Pre-interventional mean ± SD	Post-interventional mean ± SD	P value	t value	Interference
Single group	6.667 ± 1.444	5.402 ± 1.728	<0.0001	9.632	Extremely significant

IV. DISCUSSION

This experimental study was conducted on influence of limb physiotherapy and maintenance of bronchial hygiene in head injury. After reviewing various studies it was analyzed that various sensory integration and limb physiotherapy are treatment options for coma stimulation after head injury. This study was undertaken considering all the mentioned points and the aim of this study was to evaluate the influence of limb physiotherapy and maintenance of bronchial hygiene on level of consciousness in head injury.

An experimental study was conducted in 87 subjects by using convenient sampling method. All the subjects in this study received limb physiotherapy that included facilitation techniques and bronchial hygiene that includes percussion, vibration and shaking followed by suctioning techniques for 7days.Coma state is critical state found in intensive care unit which has the high rate of morbidity and mortality. The present rate of hospitalization for head injury is high now a days. Many patients die in coma state, some patients become severe disabled or remain in vegetative state. Higher level activity associate with high arousal[1]. When patient is treated in acute stage at that time we have good chance of prognosis and we can also overcome further neurological complications[12]. In this stage main priority is to keep patient medically stable. In this stage patient need to treat as a whole. Prevention of respiratory secretions and enhance oxygenation to brain. Chest care is the important as hypoxia can cause further brain damage and neurological deterioration. Cerebral edema may takes place due to airway obstruction and depressed respiratory drives.

As patient remains in coma for long time because of damage to brain structures many other higher mental functions significantly affect that result in improper social response as well as motor response. Consciousness and arousal important factor to help out patient for good response[1].

Limb physiotherapy that is facilitatory techniques stimulates reticular system as it causes general increase in arousal. In head injury major medical complication is respiratory dysfunction which can leads to systemic inflammation and result in early ventilator associated pneumonia[3]. Stimulation of sympathetic nervous system is an influencing factor of respiration[1].

· When patient is in supine lying due to prolong stage of coma at that time ventilation perfusion ratio is altered as it gravity dependent. As these factors also contribute in coma recovery. These factors keep patient condition healthy as well as psychological factor strong which keeps patient good going[1]. Timely management can prevent complications and helps to reduce risk factors associate with arousal therapy[13]. As patient is beneficial with bronchial hygiene techniques such as percussion, vibration and shaking that maintains mucociliary reaction, good chest wall mobility, and proper lung inflation which helps to maintain proper ventilation it maintaining joint integrity, lung compliance, muscle mobility and prevention of other complications such as hospital acquired diseases which helps in coma arousal. As these play an important role in coma recovery along with limb physiotherapy[3].

So the results of this study showed significant improvement on patients treated with limb physiotherapy along with bronchial hygiene techniques on improving level of consciousness in head injury as it necessary to make patient conscious but it is also important to keep patient medically fit for further prognosis.

This way by using limb physiotherapy and bronchial hygiene techniques can help patient to arouse from vegetative stage and lead towards further prognosis as outcome depends on high quality care and multidisciplinary approach.

V. CONCLUSION

This study concludes that limb physiotherapy and maintained bronchial hygiene has significant effect on level of consciousness in head injury individuals.

ABBREVIATIONS –

- GCS- Glasgow Coma Scale
- CPIS- Clinical Pulmonary Infection Score
- TBI- Traumatic Brain Injury
- NTBI- Non traumatic Brain Injury

ILLUSTRATION- Nil.

CONFLICT OF INTEREST- Nil.

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