



## EFFECTIVENESS OF COMA AROUSAL THERAPY ON LEVEL OF CONSCIOUSNESS AMONG PATIENTS WITH TRUAMATIC BRAIN INJURY PATIENTS

**Mrs. Deena.S.V**

Msc. Nursing student, 12th Batch, Govt.College of Nursing Kottayam

**Sr. Rose Abraham\***

M. Sc (N), Assistant professor, Govt.College of Nursing Kottayam \*Corresponding Author

**Mrs. Rakhi Manjooran**

M. Sc (N), Assistant professor, Govt.College of Nursing Kottayam

### ABSTRACT

Traumatic Brain Injuries(TBI) are a leading cause of morbidity, disability and socio-economic losses in India and other developing countries [1]. It is estimated that nearly 1.5 to 2 million persons are injured and 1 million succumb to death every year in India. The aim of the study was to evaluate the effectiveness of coma arousal therapy on level of consciousness among patients with TBI at Govt. Medical college Hospital, Kottayam. A quantitative approach was used for the study and design adopted was Sr. Callista Roy's Adaptation Model theoretically supported by the study. A total of sixty patients with TBI, thirty each in the control and experimental group, were selected for the study by purposive sampling technique. The data were collected using socio personal-clinical data sheet and Coma Recovery Scale-Revised. Pretest was conducted by assessing the level of consciousness using Coma Recovery scale –Revised on the first day of therapy. Coma Arousal therapy was implemented on a scheduled manner in the experimental group for six consecutive days which was directed to five sensory stimulations including auditory, visual, olfactory, gustatory and tactile. Each stimulus is implemented for 4 minutes and each session lasted for 20 minutes with 4 sessions per day with a resting period of 2 hours in between and is administered for six consecutive days. Post test was conducted by using the same scale on the seventh day of therapy in the control and experimental group. The results of the study revealed that coma arousal therapy had a statistically significant effect on level of consciousness ( $p < 0.05$ ) and there were a statistically significant association between the level of consciousness and pupillary reaction at the time of first assessment ( $p < 0.05$ ).

**KEYWORDS** : Level Of Consciousness, Traumatic Brain Injury, Coma Arousal Therapy

### 1. INTRODUCTION

At global level, it is estimated that the annual incidence and mortality from Traumatic Brain Injuries is 200 and 20 per 100,000 respectively. The exact statistics from India and world is unavailable. But all of the studies quote a high incidence of the same problem with increasing age of the patients [2].

Traumatic brain injury typically affects the Indian family system disrupting relationship, communication and sharing of responsibilities. Initial brain injury and associated pathological changes leads to alterations in the patient's level of consciousness [3]. Patients in unconsciousness experience sensory deprivation because of their altered response to internal and external stimuli [4]. Because of this alteration, the threshold of activation of the reticular activating system may increase. The practical implication of sensory deprivation is that controlled stimulation consisting auditory, olfactory, tactile, gustatory and visual models may meet the higher threshold of the reticular neurons and increase cortical activity or that undamaged axon may actually send out collateral connections called collateral spouting, which assist in recognizing the brain's activity [5].

Coma arousal therapy is a treatment which applies stimulation to one or more of the patient's five senses, it will facilitate both dendritic growth and improve synaptic connectivity in those with damaged nervous systems [6]. Unconscious patients after brain injury may survive for days or months and often experience decreased quality of life. The sensory stimulation programme beginning in the early stages of recovery can be beneficial to facilitate the recovery process and to prevent sensory deprivation after brain injury [7].

### 2. Objectives

- 1) To assess the level of consciousness of patients with traumatic brain injury.
- 2) To determine the effectiveness of coma arousal therapy on level of consciousness of patients with traumatic brain injury.
- 3) To find out the association between the level of consciousness of patients with traumatic brain injury and selected variables.

### 3. MATERIALS AND METHODS

A quantitative approach was used for the study. The study design selected was quasi experimental pretest post test control group design. Non probability purposive sampling technique was employed to select 60 patients with Traumatic Brain Injury who were admitted in Govt. Medical College Hospital, Kottayam. All participants in the study were between the age group of 18 to 55 years and after 72 hours of admission under neurosurgery department and the initiation of the routine treatment. Those excluded from the study were patients with TBI who were on sedation and oxygen saturation below 90%. Pretest was conducted with Coma Recovery Scale-Revised before starting the therapy on both control and experimental group. Coma Arousal Therapy was implemented to patients in the experimental group for six consecutive days. Post test was conducted with Coma Recovery Scale-Revised on the seventh day of therapy to evaluate the effectiveness of coma arousal therapy on level of consciousness of patients with TBI. The obtained data were tabulated and analysed in terms of objectives of the study using descriptive and inferential statistics.

### 4. RESULTS

#### 4.1 Findings related to sample characteristics

Majority of patients with traumatic brain injury under study in the control (66.6%) and experimental (63.3%) group were males. With regard to age, majority of them belonged to the age group of 49-55 years. With regard to the education, most of the patients in the control group (53.3%) and experimental group (46.7%) possessed primary school education. Most of the patients in both control (66.7%) and experimental group (76.7%) were married. Majority of the patients in the control group (43.4%) and experimental (50%) group had no unhealthy habits like alcoholism and smoking. Half of the patients in the control group and 63.3% of the patients in the experimental group had monthly income upto 5000 Rs.

#### 4.2 Findings related to Clinical data

Road traffic accidents (RTA) are the major cause of trauma in the patients of the control (66.7%) and experimental group (70%). The duration of coma was less than one week in both control group and

experimental group. Most of the patients in the control group(30%) and in the experimental group (26.7%) had subdural hematoma as the diagnosis More than half of the patients in the control group(60%) and experimental group (56.7%) had bilaterally reactive pupillary reaction at the time of first assessment. The total 80% of the patients in the control group and 86.3% of patients in the experimental group had no pre-existing comorbidities like hypertension, diabetes mellitus, CAD renal diseases and seizure disorders. All of the patients under study had no hyponatremia, previous history of neurotrauma and pre existing sensory disabilities.

**4.3 Findings related to the assessment of level of consciousness of patients with traumatic brain injury.**

**Table 1:Mean and standard deviation of domains of level of consciousness among patients with traumatic brain injury in control and experimental group.**

Domains of level of consciousness	Control group		Experimental group	
	Mean	SD	Mean	SD
Auditory (0-4)	2	0.43	3	0.50
Visual (0-5)	3	0.52	3	0.47
Motor (0-6)	3	0.53	3	0.48
Verbal (0-3)	2	0.47	2	0.49
Communication(0-2)	1	0.37	1	0.45
Arousal (0-3)	1	0.50	1	0.40

**4.4 Findings related to Effectiveness of Coma arousal therapy on level of consciousness among patients with traumatic brain injury**

The study result revealed that there was a significant difference in the median scores of level of consciousness which was measured with coma recovery scale among patients with traumatic brain injury at post test after coma arousal therapy between control and experimental group. Mann Whitney U test was used to find the effectiveness of coma arousal therapy among patients with traumatic brain injury. The obtained U value is statistically significant at 0.05 level. The study result depicted that the coma arousal therapy had an influence on level of consciousness among patients with traumatic brain injury. Mann Whitney U test was used to find out the effectiveness of coma arousal therapy on the domains of level of consciousness among patients with traumatic brain injury. The domains assessed were auditory, visual, motor, verbal, communication, and arousal functions of the level of consciousness. The obtained U values were showed that only arousal function of level of consciousness was statistically significant at 0.05 level. The study result depicted that the coma arousal therapy had an influence on arousal function of level of consciousness among patients with traumatic brain injury.

**4.5 Association between level of consciousness among patients with traumatic brain injury and selected variables**

Chi square test was used to determine the association of level of consciousness of patients with traumatic brain injury with selected variables. Study result found that there was significant association between pupillary reaction at the time of first assessment and level of consciousness of patients with traumatic brain injury. Among the selected variables, all except the pupillary reaction at the time of first assessment were not having significant association with the level of consciousness among patients with traumatic brain injury.

**5.DISCUSSION**

**5.1Description of sample characteristics**

In the present study, majority of patients in the control (66.6%) and experimental group (63.3%) were males. A prospective study conducted in San Diego country on epidemiology of head injury showed that head injury rates were higher in males than in females.<sup>57</sup> Another study conducted in Portugal also suggested the incidence rate ratio of TBI was 1.8:1 in hospital admissions and 3.4:1 in mortality, comparing men to women. In the present study, majority of the patients in the control group (66.7%) and

experimental group (70%) had road traffic accidents as the cause of traumatic brain injury. Similar findings can be seen in an epidemiological study, estimated that nearly 1.5 to 2 million persons are injured and 1 million succumb to death every year in India due to road traffic accidents. They also noted the road traffic injuries are the leading cause (60%) of TBIs followed by falls (20% - 25%) and violence (10%). A similar study which is consistent with the findings of the present study that the majority of TBI cases (60%) are a result of road traffic injuries, followed by falls (20-30%), and violence (10%). Most of the patients in the control (30%) and in the experimental group (26.7%) had subdural hematoma as the diagnosis. The study was supported by another study which shows the subdural hematomas are one type of focal brain injury occurring in approximately 30% of patients with TBI.

**5.1 Effectiveness of coma arousal therapy on level of consciousness of patients with traumatic brain injury**

The study result revealed that there was a significant difference in the median scores of level of consciousness among patients with traumatic brain injury after coma arousal therapy between control and experimental group. The result of the study was supported by several studies. A similar study conducted in Punjab, India, to find out the efficacy and benefits of early intervention of coma arousal therapy on patients with low GCS, sustaining Traumatic brain injury. The results of the study showed that coma arousal therapy has significant effect on CRS in patients when compared to the patients who did not receive coma arousal therapy.

A quasi experimental study conducted in Egypt to evaluate the effect of coma arousal technique on clinical outcomes of unconscious patients found that mean length of ICU stay and duration of mechanical ventilation was significantly shorter in the study group than in the control group. The study concluded that application of coma arousal technique had effects on improvement of the level of consciousness and sensory and motor functions associated with a decreased incidence of physiological parameters adverse events. Present study was conducted among 60 patients admitted with traumatic brain injury in Govt. Medical College Hospital, Kottayam to find out the effectiveness of coma arousal therapy on level of consciousness. Quasi experimental pre test post test control group design was used in the study. Thirty patients with TBI each in the control and experimental group were selected through purposive sampling technique. Pre test was done using coma recovery scale for assessing the level of consciousness

among patients with TBI. The sessions of coma arousal therapy was implemented to the experimental group from day 1 to day 6. Post test was done on day 7 using coma recovery scale. Conventional care was given to the control group and pretest and post test were done in the same duration as that of experimental group. The results showed that coma arousal therapy was effective in improving the level of consciousness of patients with TBI and there was significant association between level of consciousness of patients with traumatic brain injury and pupillary reaction at the time of first assessment.

**6. Conclusion**

The study concluded that most of the patients with TBI belonged to the age group of 49-55 years and road traffic accidents being the predominant cause for TBI. The coma arousal therapy was effective to improve the level of consciousness of patients with TBI. The study result depicted that the coma arousal therapy had an influence on arousal function of level of consciousness among patients with traumatic brain injury. There was association between level of consciousness of patients with TBI and pupillary reaction at the time of first assessment and. Level of consciousness had no association with other selected variables in patients with TBI. In the light of present study, it is concluded that coma arousal therapy plays an important role in improving level of consciousness of patients with TBI.

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