



# International Journal of Advance Research in Medical Surgical Nursing

E-ISSN: 2663-2268  
P-ISSN: 2663-225X  
IJARMSN 2020; 2(2): 22-26  
Received: 17-05-2020  
Accepted: 21-06-2020

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## Assess the nutritional outcome of traumatic brain injury (TBI) patients admitted in critical care unit in PESIMSR Hospital, Kuppam, Andhra Pradesh

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### Abstract

**Background:** Traumatic Brain Injury (TBI) is considered a major public health problem. Each year, the resulting brain injury contributes to a large number of cases of permanent disability and death and can be categorized in terms of entry and closure head injuries. The brain is known as a functional regulator of all metabolic activities in the body and many complex metabolic changes occur in TBI patients, including abundant cellular metabolism, abnormal metabolic processes, changes in hormonal function, and inflammatory cascades. Since the medical condition of the patients affects the nutritional component, the TBI patient's condition should be assessed clinically and nutritionally.

**Methods:** The research methodology adopted in this study was a quantitative method with a descriptive study to assess the nutritional outcome of TBI patients. The sample selection was made with a convenience sampling technique and the sample consisted of 60 TBI patients admitted in critical care unit at PESIMSR Hospital in Kuppam, Andhra Pradesh. Anthropometric measurements (weight, height, body mass index) were estimated using standard protocols. Nutritional outcome of all subjects was assessed by using Malnutrition Universal Screening Tool. Data collected was analyzed using descriptive and inferential statistics in terms of frequency, percentage distribution and chi-square tests.

**Results:** The study results revealed that the risk of malnutrition was high among majority of the TBI patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh. About 27(45%) of TBI patients had high risk of malnutrition, 24(40%) had moderate risk of malnutrition and about 9(15%) of them had low risk of malnutrition.

**Conclusion:** TBI patients are at a high risk of developing malnutrition. Therefore, nutritional assessment and support is vital to improve patient's outcomes amongst the TBI patients.

**Keywords:** assess, nutritional outcome, malnutrition, traumatic brain injury, critical care unit

### Introduction

"One of the most powerful interventions that a therapist can have on a client is diet"

Traumatic Brain Injury (TBI) is considered a major public health problem. Traumatic brain injury (TBI) has developed into a "silent epidemic" of developed nations. The WHO says TBI will be the third largest killer in developing countries by 2020. Road traffic Accidents in India accounts for 45-60% of TBI.

Each year, the resulting brain injury contributes to a large number of cases of permanent disability and death and can be categorized in terms of entry and closure head injuries. The brain is known as a functional regulator of all metabolic activities in the body. Patients with traumatic brain injury have significantly higher resting metabolic expenditure than patients without TBI.

Providing adequate nutritional support to patients with moderate and severe TBI has been a clinical challenge for present decades. Severe brain damage often results in malnutrition due to caloric and protein deficiency. If left untreated, it will have a negative impact on rehabilitation. As the medical condition of the patients could affect part of the nutrition, Hence, the present study was aimed to assess the TBI patient's condition required a medical and nutritional outcome, as the medical condition of the patients could affect part of the nutrition.

Over the years, many studies have attempted to confirm a nutritional evaluation tool (NST) for patients with TBI. In 2003, the Malnutrition Universal Screening Tool (MUST) which includes a BMI test, weight loss percentage 3-6 months ago, and the effect of acute illness on dietary intake was investigated for use in any patient, and was approved for use in patients with a TBI.

## Review of Literature

### Literature related to prevalence of malnutrition in TBI patients:

Sivashanmugam Dhandapani, *et al* (2017) <sup>[8]</sup> conducted a study to evaluate the Clinical malnutrition in severe traumatic brain injury: Factors associated and outcome at 6 months at department of neurosurgery, AIIMS, New Delhi. Eighty-eight adult patients within 24 hours of TBI approved with GCS 4 to 8 without serious systemic disease enrolled in the study. They were randomly assigned to various clinical aspects of malnutrition for up to 3 weeks with the result tested at 6 months. Weekly there was a significant increase in the number of patients with various clinical features of malnutrition. Pedal edema was the most common symptom in 70% of patients at 3 weeks, followed by skeletal prominence (19%) and cheilosis (12%). Clinical malnutrition shows a significant association with poor GCS and hypoproteinemia. An adverse effect at 6 months was noted in 30 of the 37 patients with malnutrition in clinics compared with 3 out of 15 patients who did not have clinical features of malnutrition.

Zoltan Denes (2014) <sup>[9]</sup> performed study was to evaluate the consequences of severe malnutrition in patients with severe head injury during rehabilitation. Data were collected from the medical records of patients admitted to the neuro rehabilitation unit in the last 5 years. Out of 1850, 200 patients had severe malnutrition, with body mass index (BMI) of these patients being less than 15 kg / m<sup>2</sup>. Most patients suffered traumatic brain damage (17/20). The study result shows that TBI patients suffering from severe malnutrition exhibit severe complications at the time of admission as well as during rehabilitation treatment. It was very difficult to mobilize patients. Length of stay in the rehabilitation unit was 28 days longer when complicated by malnutrition compared to head injuries showing normal nutritional status. These findings underscore the importance of adequate nutrition in patients with head injury in both the acute ward and the rehabilitation unit.

### Literature related to assessment of nutritional status in TBI patients:

Ghazi Daradkeh, *et al* (2020) <sup>[6]</sup> conducted a study to assess the nutritional status and nutritional adequacy of among TBI attendees seeking consultation at the National Trauma Center, Oman, for the sequel of traumatic brain injury (TBI). Seventy seven TBI patients aged 18–65 years, males and females were included in the study. Anthropometric measurements (weight, height, body mass index, skinfold thickness) were estimated using standard protocol. Dietary intake was assessed by using “24 – Hour recall method”. Nutritional status and nutritional adequacy were analyzed electronically using a computer program (super tracker) to assess the adequacy/inadequacy of micronutrients. The study result shows that about 46% of attendees were classified as ‘mild TBI’ and 12.7% and 40.8% were classified as moderate and critical TBI respectively. Depending on the parameters of a healthy diet, half of the group were at high risk of malnutrition (50.7%) 12.7% and 36.6% were moderate and not at risk of malnutrition respectively. According to the anthropometric form, 28.1% of the participants were underweight, while 16.9% and 7.1%

were overweight and obese respectively. About 30.2%, 43.0%, 24.8% and 54.1% were noted to have energy deficient in energy, carbohydrate, protein, and fiber respectively. This study result concluded that TBI patients are at a high risk of developing malnutrition. Therefore, nutritional assessment and support is vital to improve patient’s outcomes amongst the TBI patients.

A Peetz *et al* (2015) <sup>[7]</sup> conducted a study on Traumatic brain injury, nutritional status and their outcomes: a registry based cohort study in medical and surgical intensive care units in Boston, Massachusetts. The study included 1,685 patients age more than 18 years, who received critical care following TBI between 1997 and 2015. The level of malnutrition was determined by Registered Dietitian formal assessment within 48 hours of ICU admission by data related to anthropometric measurements, clinical signs of malnutrition, malnutrition risk factors, and metabolic stress. The study findings concluded that the patients with TBI who require critical care, nutritional status is predictive of adverse outcomes. Compared to well-nourished patients, those with evidence of malnutrition have increased short term mortality.

## Statement of the Problem

**A study to assess the nutritional outcome of traumatic brain injury patients admitted in critical care unit at Pesimsr, Kuppam, Andhra Pradesh**

### Objectives

1. To assess the nutritional outcome of traumatic brain injury patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh.
2. To find out the association between nutritional outcome of traumatic brain injury patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh with their selected demographic variables.

## Materials and Methods

**Research Approach:** Quantitative research approach was adopted.

**Research Design:** A descriptive design was adopted for this study.

**Setting of the Study:** The study was conducted in admitted in critical care unit at PESIMSR Hospital, Kuppam, Andhra Pradesh.

**Sample:** TBI patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh.

**Sample Size:** The total sample size was 60 TBI patients.

**Sampling Technique:** Non-probability convenient sampling technique was adopted.

## Tools of Data Collection

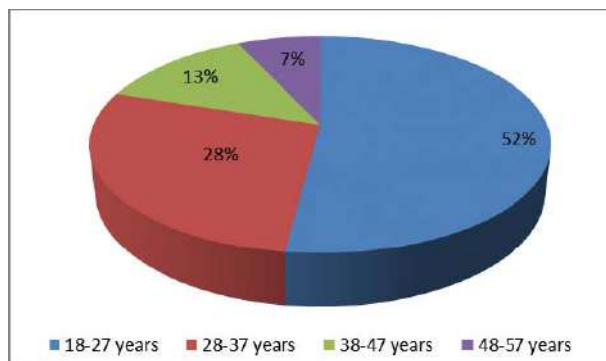
Data was collected from 60 TBI patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh using Malnutrition Universal Screening Tool. The overall risk of malnutrition was assessed by calculating BMI score, weight loss score and acute disease effect score of the subjects.

## Results

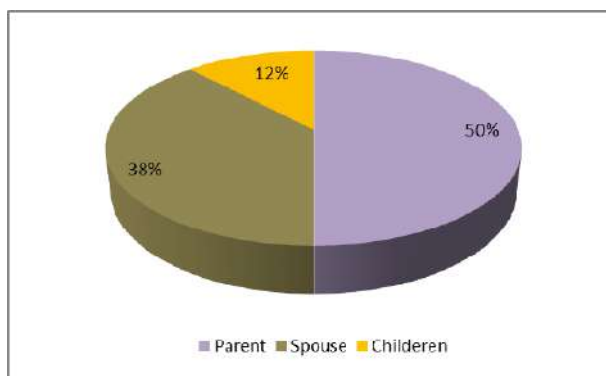
**Table 1:** Frequency & Percentage distribution of TBI patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh

S. No	Demographic variables	Frequency	%
1	<b>Age (years)</b>		
	18-27 years	31	52
	28-37 years	17	28
	38-47 years	8	13
	48-57 years	4	7
2	<b>Gender</b>		
	Male	48	80
	Female	12	20
3	<b>Religion</b>		
	Hindu	28	47
	Christian	14	23
	Muslim	18	30
	Others	0	0
4	<b>Education</b>		
	Illiterate	7	12
	Primary	8	13
	Secondary	18	30
	Collegiate	27	45
5	<b>Marital status</b>		
	Married	26	44
	Unmarried	32	53
	Widowed	2	3
	Divorced	0	0
	Separated	0	0
6	<b>Level of TBI</b>		
	Mild	17	28
	Moderate	29	48
	Severe	14	24
7	<b>Diet preference</b>		
	Vegetarian	27	45
	Non-Vegetarian	33	55
8	<b>Caregiver to the patient</b>		
	Parent	30	50
	Spouse	23	38
	Children	7	12
	Others	0	0

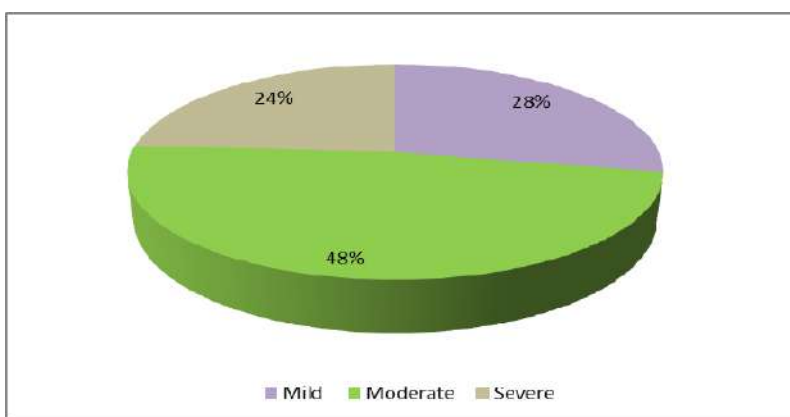
The table 1 depicted that majority 31 (52%) of the TBI patients admitted in critical care unit were 18-27 years old, about 48 (80%) were males, 28 (47%) were belonging to Hindu religion, about 27 (45%) had collegiate education, 32 (53%) were unmarried, about 29 (48%) had moderate level of TBI, 33 (55%) had non-vegetarian diet preference and about 30 (50%) of them had their parents as their caregivers.



**Fig. 1:** Percentage distribution of age of the TBI patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh



**Fig. 2:** Percentage distribution of caregiver to the TBI patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh



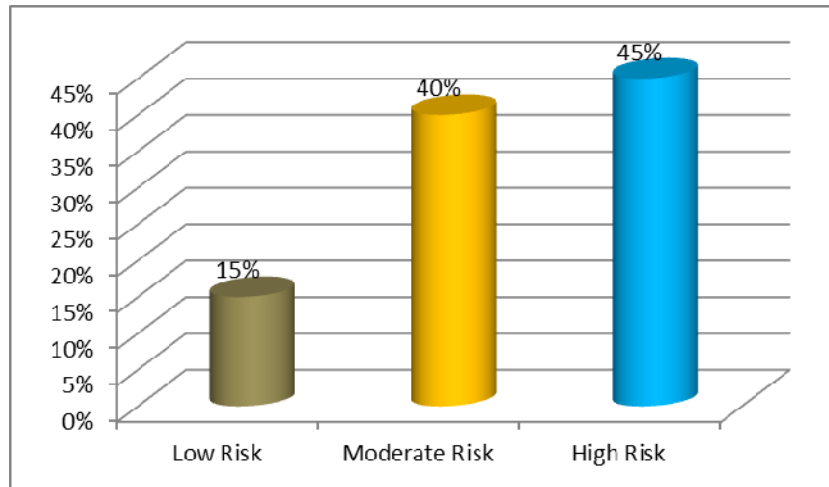
**Fig. 3:** Percentage distribution of Level of TBI of patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh

**Table 2:** Frequency & Percentage distribution of nutritional outcome of TBI patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh

Risk of Malnutrition	Frequency	%
Low	9	15
Moderate	24	40
High	27	45

Table 2 showed that the risk of malnutrition was high among majority of the TBI patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh. About 27

(45%) of TBI patients had high risk of malnutrition, 24 (40%) had moderate risk of malnutrition and about 9 (15%) of them had low risk of malnutrition.



**Fig. 3:** Percentage distribution of nutritional outcome of TBI patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh

**Table 3:** Association between nutritional outcome of TBI patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh with their selected demographic variables

S. No	Demographic variables	Frequency	%	Chi-square value
1	<b>Age (years)</b>			10.29 S**
	18-27 years	31	52	
	28-37 years	17	28	
	38-47 years	8	13	
	48-57 years	4	7	
2	<b>Gender</b>			1.18 NS
	Male	48	80	
	Female	12	20	
3	<b>Religion</b>			1.01 NS
	Hindu	28	47	
	Christian	14	23	
	Muslim	18	30	
	Others	0	0	
4	<b>Education</b>			2.57 NS
	Illiterate	7	12	
	Primary	8	13	
	Secondary	18	30	
	Collegiate	27	45	
5	<b>Marital status</b>			1.34 NS
	Married	26	44	
	Unmarried	32	53	
	Widowed	2	3	
	Divorced	0	0	
	Separated	0	0	
6	<b>Level of TBI</b>			14.26 S**
	Mild	17	28	
	Moderate	29	48	
	Severe	14	24	
7	<b>Diet preference</b>			1.65 NS
	Vegetarian	27	45	
	Non-Vegetarian	33	55	
8	<b>Caregiver to the patient</b>			0.87 NS
	Parent	30	50	
	Spouse	23	38	
	Childeren	7	12	
	Others	0	0	

The above table 3 represented that age and the level of TBI of patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh had significant association with nutritional outcome.

### Discussion

This study was aimed to assess the nutritional outcome of TBI patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh. The collected data was analyzed using descriptive and inferential statistics. majority 31 (52%) of the TBI patients admitted in critical care unit were 18-27 years old, about 48 (80%) were males, 28 (47%) were belonging to Hindu religion, about 27 (45%) had collegiate education, 32 (53%) were unmarried, about 29 (48%) had moderate level of TBI, 33 (55%) had non-vegetarian diet preference and about 30 (50%) of them had their parents as their caregivers. About 27 (45%) of traumatic brain injury patients had high risk of malnutrition, 24 (40%) had moderate risk of malnutrition and about 9 (15%) of them had low risk of malnutrition. Age and the level of TBI of patients admitted in critical care unit at PESIMSR, Kuppam, Andhra Pradesh had significant association with nutritional outcome.

### Conclusion

Patients with TBI have significantly higher resting metabolic expenditure than patients without TBI. Results of this study brought evidence that TBI patients are at a high risk of developing malnutrition. Therefore, nutritional assessment and support is vital to improve patient's outcomes amongst the TBI patients.

### Implications

- Nutritional assessment on the admission of TBI patients is an important factor in identifying patients, prevention with malnutrition, and nutritional problems.
- Initiation of nutrition support should begin as soon as the patient has been stabilized and resuscitated.

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