

### **Sociodemographic and Clinical Status of Neurocritical Patients: A Study in A Tertiary Care Hospital of Bangladesh**

#### **Abstract**

**Background:** Usually, neuro-critical patients demand more attention from physicians and need intensive care. Generally, those patients are admitted to the hospitals or to the emergency unit of the hospitals with severe neurological and neurosurgical conditions. So, in order to achieve prompt but proper steps for such patients, the assessment of patient's demographic and clinical status is a very important issue for respective healthcare professionals. **Aim of the study:** The aim of the present study was to assess the sociodemographic and clinical status of neuro-critical patients. **Methods:** This was a prospective observational study which was conducted in the ICU, Department of Anaesthesia, Analgesia, Palliative & Intensive Care Medicine, Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh from March 2018 to April 2020. In total 100 neuro-critical patients who fulfilled the inclusion criteria were taken as a sample population of the study. Written informed consent had been taken from all participants. Data were collected by a predesigned questioner. All data were processed, analyzed by using MS office and SPSS version 22.0. **Results:** The mean ( $\pm$ SD) age of the participants was found  $54.51 \pm 17.77$  years. The male participants were 57% and females were 43%. So, male participants were dominating in number. In total 67% of participants were from urban areas whereas 33% were from rural areas. Most of the patients were from middle-classed families which were 59%. In this study, in analyzing the causes of hospital admission of the participants we observed that 27%, 28%, 21%, and 15% were admitted to the hospitals with a head injury, intracerebral hemorrhage, subarachnoid hemorrhage, and tumor as the major causes respectively. Besides these, 9% of participants were admitted with other causes. **Conclusion:** The proper assessment of the sociodemographic and clinical status of neuro-critical patients is a very important task for the physicians for determining the exact treatment steps for such critical patients.

**Keywords:** Sociodemographic, Clinical status, Causes, Neuro-critical patients.

#### **1. INTRODUCTION**

Neuro-critical patients are admitted to hospitals or to the Emergency Unit of the hospitals with severe neurological and neurosurgical conditions. So, to take prompt but proper steps for such patients the assessment of patient's demographic and clinical status is a very important task for respective healthcare professionals. Neurologically injured patients who have severe brain injury are at increased risk for acute lung injury/acute respiratory distress syndrome and may develop ventilator-induced lung injury. Timely decision to extubate, to prevent both complications associated with extubation failure and undue ventilatory support, remains challenging, in the field of critical care medicine. Finding reliable clinical predictors of extubation success [in brain-injured patients] still appears as a holy grail.<sup>1</sup> The neuro-critical patient presents a unique set of challenges to airway management, mechanical ventilation, and defining extubation readiness. With respiration or airway control, neurological injury and disease can directly or indirectly involve the process. Approximately 200,000 patients per year will require mechanical ventilation secondary to neurological injury or disease.<sup>2</sup> Extubation of the neurological patient also demands particular consideration of airway patency as well as respiratory mechanics. The mechanical ventilation discontinuing is a complex process that has been considered to occur in several stages. Firstly, to consider commencing the process of weaning the patient must recover sufficiently from the acute derangements in physiology that complicated their episode of critical illness. Secondly, until a point is reached where he/she is capable of spontaneous breathing the patient must undergo progressive reductions in ventilator support. Thirdly, the patient must be disconnected from the ventilator, extubated, and breathe spontaneously.<sup>3</sup> Spontaneous breathing trial (SBT) assesses the patient's ability to breathe while receiving minimal or no ventilator support. The process of SBT and weaning should start by assessing whether the underlying cause of respiratory failure has been resolved or not the collective task force

stated in 2001. Weaning predictors are the parameters that help clinicians to predict whether their attempts will be successful or not. Researchers did not stop working in this area, although the international consensus conference in 2005 did not recommend their routine use for clinical decision-making.<sup>4</sup> Some subjective and objective combination criteria are usually used to determine disease reversal. Usually, the criteria used are improvement of mental status, neuromuscular functional assessment, radiographic signs and gas exchange.<sup>5</sup> However, it should be kept in mind that some patients who don't meet these criteria are eventually successfully weaned.<sup>6</sup> As with medical ICU (MICU) and general surgical ICU (SICU) patients, neurosurgical (NSY) ICU patients are predisposed to a number of complications related to mechanical ventilation. Retrospective and prospective investigations have documented increased rates of reintubation, pneumonia, tracheostomy, and prolonged mechanical ventilation among patients with acute brain injury.<sup>7</sup> The need for airway protection and/or manipulation of intracranial pressure, as well as pulmonary physiologic abnormalities, clinical indications for intubation, and mechanical ventilation in this setting generally include impaired neurologic function. Considerable variability among clinicians regarding strategies for liberation from mechanical ventilation and extubation in NSY patients has been documented, and the optimum approaches to these measures have not been clearly defined. According to a recent study, selected mechanically ventilated, brain-injured patients did not support delaying extubation when impaired neurologic status was the sole reason for prolonged intubation.<sup>8</sup> Suggested by several studies that, physician prompt clinical decision criteria improves the extubation outcome and increases the chance for successful weaning, During the weaning process, the usefulness of the integrative weaning index (IWI) being effective in predicting both successful and failed weaning outcomes was confirmed by the previous study.<sup>9</sup> Therefore, our aim was to evaluate the effectiveness of “Physician prompt clinical decision criteria” for successful weaning in neuro-critical patients in our setting. An international consensus conference was held in April 2005 to answer certain questions about the process of weaning. They provided few recommendations regarding categorization of patients based on difficulty and duration of weaning, when and how the weaning process should be performed, which mode of ventilation is better in weaning for critically ill patients.<sup>10</sup> Search for effective weaning readiness predictors for neuro-critical patients are continuing throughout the world. Physician prompt clinical decision criteria refer to extubation based on neurological status. Different studies around the world are suggesting the effectiveness of physicians’ prompt criteria to assess weaning readiness in such patients.<sup>11</sup>

## 2. OBJECTIVE

### General Objective:

- To assess the sociodemographic and clinical status of neuro-critical patients.

### Specific Objective:

- To determine the sociodemographic status of the participants.
- To determine the clinical status of the participants.

## 3. METHODOLOGY

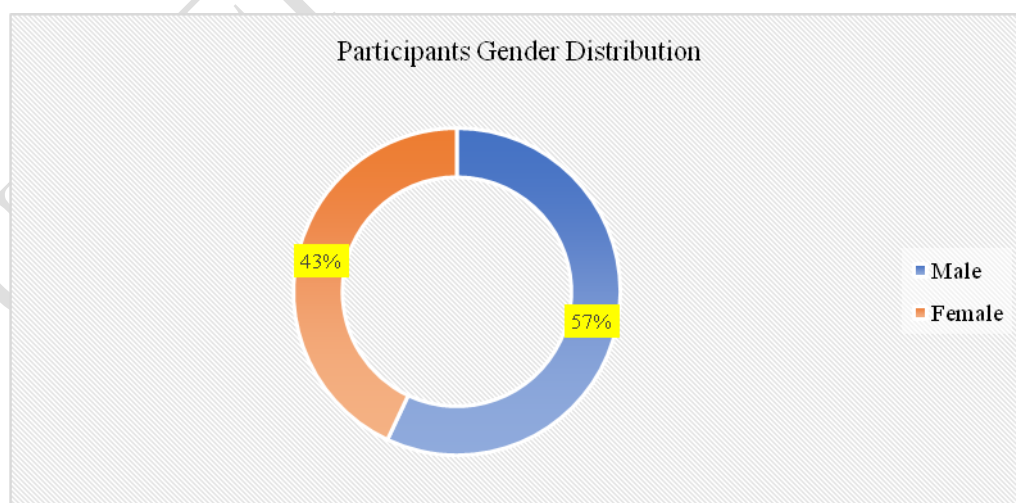
This was a prospective observational study which was conducted in the ICU, Department of Anaesthesia, Analgesia, Palliative & Intensive Care Medicine, Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh during the period from March 2018 to April 2020. In total 100 neuro-critical patients who fulfilled the inclusion criteria were taken as samples by informed written consent. Data were collected by a predesigned questioner. Through purposive sampling technic, only neuro-critical patients who fulfilled the inclusion criteria were taken as samples by informed written consent. According to the exclusion criteria of the study patients of age  $\leq 18$  years, pregnant women, and neuro-critical patients who were assessed for weaning readiness by methods other than SEC were excluded. The study population was the neuro-critical patients admitted in the ICU who required

mechanical ventilation for  $\geq 24$  hours (within 3-5 days after ICU admission) and considered ready (receiving minimal ventilatory support, no or minimal vasopressor/inotropic support of  $\leq 5$   $\mu\text{g}/\text{kg}/\text{min}$  of Dopamine or Dobutamine, improved respiratory parameters, adequate cough and gag reflex, minimal to moderate tracheal secretion) for weaning according to SEC criteria. ICU physicians recorded the patient's clinical and laboratory data according to "Standard Extubation Criteria" to predict the weaning readiness for those patients. Both male and female patients fulfilling the inclusion and exclusion criteria were included in the study. Higher psychic function, visual pursuit, pupillary light reflex, cough reflex, required tracheal toilet, GCS, hypotension, Brady/tachycardia, standard extubation criteria, objective measurements, and adequacy of oxygenation, duration of ICU stays, and causes of ICU admission were the clinical variables in this study. Demographic variables were age, sex, residence status, and socioeconomic status. All data were processed, analyzed, and disseminated by using MS Office and SPSS version 22.0.

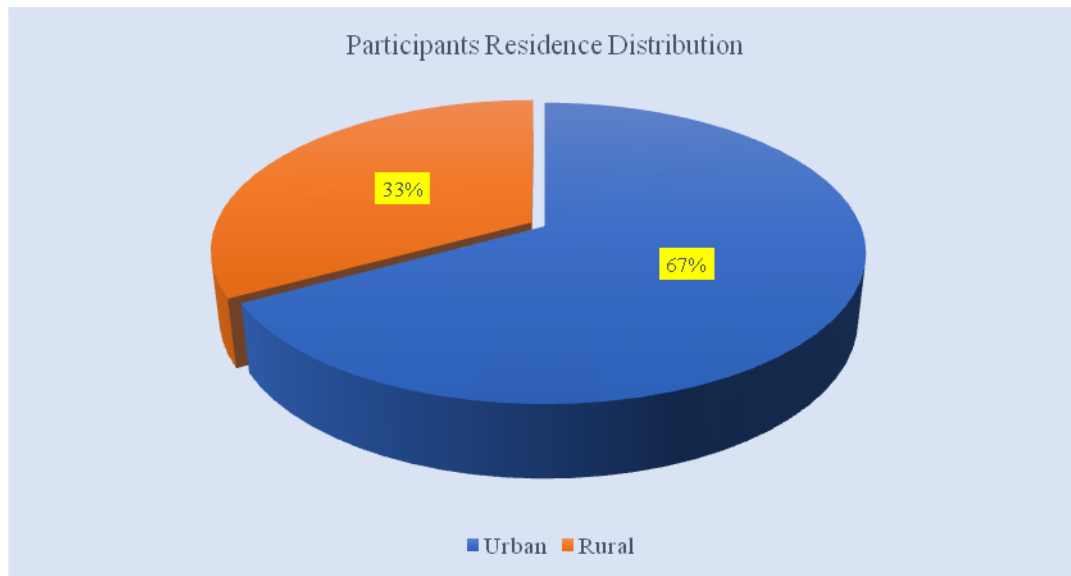
**3.1 Ethical Issue:** Ethical approval, IRB was taken from the appropriate authority of Dhaka Medical College, Dhaka, Bangladesh. Patients consent also taken from study group.

#### 4. RESULT

This was a prospective observational study in nature that was conducted in the ICU, Department of Anaesthesia, Analgesia, Palliative & Intensive Care Medicine, of DMCH, Dhaka, Bangladesh during the period from March 2018 to April 2020. In total 100 neuro-critical patients who fulfilled the inclusion criteria were taken as samples by informed written consent. In this study, the mean ( $\pm$ SD) age of the participants was found  $54.51 \pm 17.77$  years. The male participants were 57% and females were 43%. So, male participants were dominating in number and the male-female ratio was 1.33:1. In total 67% of participants were from urban areas whereas 33% were from rural areas. Most of the patients were from middle-classed families in this study which was 59%. Besides this, 27% and 14% of participants were from lower and upper-class families respectively. In this study, in analyzing the causes of hospital admission of the participants we observed that 27%, 28%, 21%, and 15% were admitted to the hospitals with a head injury, intracerebral hemorrhage, subarachnoid hemorrhage, and tumor as the major causes respectively. Besides these, among only 9% of participants, some other causes were associated as the major causes.



*Figure 1: Distribution of gender among the participants (N=100)*



**Figure II:** Distribution of residents among the participants (N=100)

**Table 1:** Family status of participants (N=100)

Status	n	%
Lower	27	27.0
Middle	59	59.0
Upper	14	14.0

**Table 2:** Distribution of patients according to the causes of admission (N=100)

Causes of Admission	n	%
Head injury	27	27.0
Intra cerebral hemorrhage	28	28.0
Subarachnoid hemorrhage	21	21.0
Tumor	15	15.0
Others	9	9.0

Table 3 shows that the lower 27(42.9%) followed by middle 22( 34%) and upper 14(22.2%) class people of Urban area get admitted to hospital. In rural area all the patients were from 37(100%) middle class family. The study shows statistically significant (P value=.000).

Residence	Family status			P value
	Lower	Middle	Upper	
Urban	27(42.9%)	22(34.9%)	14(22.2%)	.000
Rural	0(0.0%)	37(100.0%)	0(0.0%)	
Total(100)	27(27.0%)	59(59.0%)	14(14.0%)	

Table 3 shows that the Male patients are prone to prone gets admitted to the hospital due to head injury 27(47.4%), Intra cerebral hemorrhage 28(29.1%), Subarachnoid hemorrhage 2(3.5%) . where the female are more prone to prone gets admitted to the hospital due to Subarachnoid hemorrhage 19(44.2%), Tumor 15(34.9%), Others 9(20.9%). The study shows statistically significant (P value=.000).

UNDER PEER REVIEW

Table 4 : Relation between gender and the cause of hospital admission

Gender	Cause of Hospital Admission					P value
	Head Injury	Intra cerebral hemorrhage	Subarachnoid hemorrhage	Tumor	Others	
Male(57)	27(47.4%)	28(29.1%)	2(3.5%)	0(0%)	0(0%)	.000
Female (43)	0(0%)	0(0%)	19(44.2%)	15(34.9%)	9(20.9%)	
Total(100)	27(27%)	28(28%)	21(21%)	15(15%)	9(9%)	

Table 5 Shows that the people of urban area are more prone gets admitted to the hospital due to Head Injury 27(47.4%), Intra cerebral hemorrhage 28(29.1%), Subarachnoid hemorrhage 8(3.5%). In rural area the people gets admitted to the hospital due to Subarachnoid hemorrhage 13(44.2%), Tumor 15(34.9%), others 9(20.9%). The study shows statistically significant (P value=.000).

**Table 5 : Relationship Between Residence status and causes of hospital admission**

Residence	Cause of Hospital Admission					P value
	Head Injury	Intra cerebral hemorrhage	Subarachnoid hemorrhage	Tumor	Others	
Urban(63)	27(47.4%)	28(29.1%)	8(3.5%)	0(0%)	0(0%)	.000
Rural (37)	0(0%)	0(0%)	13(44.2%)	15(34.9%)	9(20.9%)	
Total(100)	27(27%)	28(28%)	21(21%)	15(15%)	9(9%)	

## 5. DISCUSSION

The aim of the present study was to assess the sociodemographic and clinical status of neuro-critical patients. For this study, a total number of 100 neuro-critical patients who required mechanical ventilation for  $\geq 24$  hrs. and were considered ready for weaning by SEC criteria were selected. According to the study, the mean ( $\pm$ SD) age of the study subjects was 54.51 ( $\pm 17.77$ ) years with both genders. This finding was consistent with the finding of some previous studies.<sup>12-14</sup> Few similar studies<sup>9,15</sup> had found lower mean age than our study which may be due to geographical variations, racial, ethnic differences, and genetic causes. In this study, the male participants were 57% and females were 43%. So, male participants were dominating in number and the male-female ratio was 1.33:1. In total 67% of participants were from urban areas whereas 33% were from rural areas. Most of the patients of this study were from middle-classed families in this study which was 59%. Besides this, 27% and 14% of participants were from lower and upper-class families respectively. In our study, in analyzing the causes of hospital admission of the participants we observed that 27%, 28%, 21%, and 15% were admitted to the hospitals with a head injury, intracerebral hemorrhage, subarachnoid hemorrhage, and tumor as the major causes respectively. Besides these, among only 9% of participants, some other causes were associated as the major causes. In this study, the majority of the patients were admitted into ICU due to head injury, intracerebral hemorrhage, subarachnoid hemorrhage, brain tumor, global ischaemia following cardiac arrest, or status epilepticus. This finding was consistent with some other studies.<sup>12,15</sup>

## 6. LIMITATION OF THE STUDY

This was a single-centered study with a small sample size. Due to the limited sample size, the findings of this study might not reflect the exact scenario of the whole country.

## 7. CONCLUSION & RECOMMENDATION

The proper assessment of the sociodemographic and clinical status of neuro-critical patients is a very important task for the physicians for determining the exact treatment steps for such critical patients. All the findings may be helpful in similar further studies and in the treatment arena of neuro-critical patients. For getting more specific information regarding this issue we would like to recommend conducting more studies in several places with large sample size.

## COMPETING INTERESTS DISCLAIMER:

No competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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