

**Original Article****Frequency and Treatment Outcomes of Isolated Ventricular Hemorrhage Cases Among Traumatic Intracranial Hemorrhage Patients\**

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**Abstract**

**Background:** Bleeding into the ventricular system of brain is called intraventricular hemorrhage (IVH). It may be associated with brain parenchyma. Cases of isolated ventricular hemorrhages are found less. Ventricular hemorrhage due to trauma is more commonly seen in premature babies and infants than adults. Uncertainty in recovery is a important issue for such cases. Aim of the study: The aim of this study was to evaluate the frequency and the treatment outcomes of isolated ventricular hemorrhage cases among patients with traumatic intracranial hemorrhage.

**Methods:** This prospective observational study was directed in the neurosurgery department of Sylhet MAG Osmani Medical College, Sylhet, Bangladesh from January 2015 to December 2020. In total 890 Admitted diagnosed cases of traumatic intracranial hemorrhage were chosen for this study as study population. Ultrasonography CT scan, MRI of the brain, MRA, MRV, and CSF were performed according to the patient's status. Those were collected, processed, analyzed, and disseminated by using MS office and SPSS version 23 as per need.

**Results:** According to this study, in total participants, the highest number was with parenchymal hemorrhage which was 34% (n=302). Besides these, cases with extradural hemorrhage were 33% (n=298), cases with subdural hemorrhage were 17% (n=149%), cases with subarachnoid hemorrhage were 14% (n=124) and cases with isolated ventricular hemorrhage (IVH) were 2% (n=17). So, in this study, the frequency of IVH was found only 2% among all types of traumatic intracranial hemorrhage cases. Among a total of 17 IVH patients, most of the cases were infants or baby which was 59%. And 41% of the IVH patients were adults. In analyzing the outcomes among the IVH patients we observed, early recovery was found in 1 child (5.88%) and in 2 adults (11.76%). Besides these, death was occurred in 6 children (35.29%) and in 3 adults (17.65%).

**Conclusion:** Traumatic isolated ventricular hemorrhage (IVH) causes the worst prognosis in most cases. The survival rate with no residual effect is very minimum. In this study in 2 patients' history of long coma, for more than 12 weeks was found. Besides these, moderate to severe morbidity was found in some cases.

**Keywords:** Frequency, Treatment outcome, Isolated ventricular hemorrhage, IVH Traumatic intracranial hemorrhage.

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**Introduction**

Bleeding into the ventricular system of brain is called intraventricular hemorrhage (IVH).

Although in the last 20 to 30 years, mortality and functional consequences of intracerebral

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haemorrhage were unchanging,<sup>1-3</sup>the outcome of recent animal<sup>4</sup> and human investigations<sup>5,6</sup> completely turn the possibility of changing the little outcomes in this disease. Now a days, it is credible that this changing into achievement in human function after bleeding occurrence and turn over the pathway of blood clot-mediated injury of brain tissues. Improvement of intensive care unit that is organized and multi component including controlling blood pressure and support for impaired cardiorespiratory functions,

has become widely available.<sup>7-9</sup> Over the decades, prospectively different main treatment protocols have been experimented in various clinical trials. Particularly, intracranial pressure (ICP) control, routine application of neurocritical care,<sup>7</sup> taste with thrombolysis,<sup>10</sup> knowing of intracranial drug delivery,<sup>11</sup> and image-based prediction<sup>11-13</sup> is now far-reaching. In fact, hemorrhage in brain has the highest rate of morbidity and mortality than other types of strokes. Respectively, in the United States, about 15% subarachnoid haemorrhage and 5% intracerebral hemorrhage (ICH) of the 750000 strokes happening that indicate more than 45,000 patients per year.<sup>14</sup> About 45% ICHs (spontaneous) and 25% SAHs (aneurysmal) that spread into the ventricles.<sup>15,16</sup> The expected mortality of both ICH and intraventricular hemorrhage (IVH) is 50% to 80%.<sup>17,18</sup> Outcome is poor in case of ICH occurring twice (a modified Rankin scale [MRS] score of 4–6 at hospital discharge) and in case of three times that is most probably to die than their cohorts without IVH.<sup>19</sup>

## Objectives

### General Objective:

- To assess the frequency and the treatment outcomes of IVH cases among patients with traumatic intracranial hemorrhage.

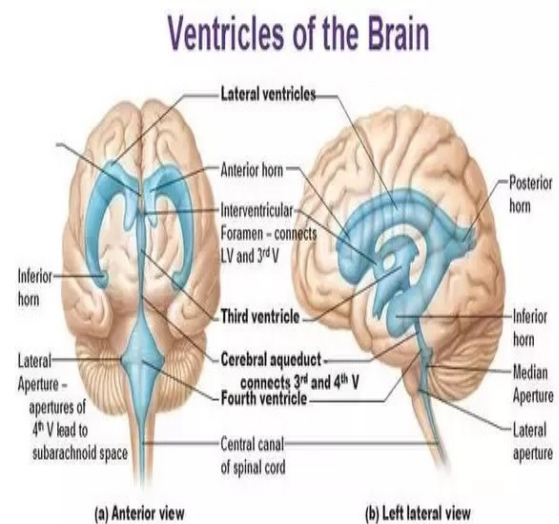
### Specific Objective:

- To assess the demographic status of participants.
- To assess the types of hemorrhages among participants.
- To assess the outcomes among patients with IVH.

## Methodology & Materials

This prospective observational study was directed in the neurosurgery department of Sylhet MAG Osmani Medical College, Sylhet, Bangladesh from January 2015 to December 2020. In total 890 Admitted diagnosed cases of traumatic intracranial hemorrhage were chosen for this study as study population. For the cases

with the possibilities of HCP ultrasonography was performed. CT Scan reports were taken for a good number of patients. Besides these, for getting clear concepts about the hemorrhage situation MRI of the brain, MRA, MRV, and CSF studies were performed as per individual patient's status. As per the diagnosis report cases of extradural, subdural, subarachnoid, intracerebral, and isolated ventricular hemorrhage were defined and assessed.



Before data collection, properly written consents were taken in favor of every participant. A pre-designed questionnaire was used for collecting patient data. Those were collected, processed, analyzed, and disseminated by using MS office and SPSS version 23 as per need.

## Result

According to this study, in a total of 890 patients, 502 were male which was 56% and 388 were female which was 43% of the participants. So, male patients were dominating in number and the male-female ratio was 1.29:1. In analyzing the ages of the participants, we observed, the highest number of participants were from the 20–40 years age group which was 67.75%. Then 19.10% were from, <20 years' age group and the rest 13.15% were from >40 years' age group. In this study, among total participants, the highest number was with parenchymal hemorrhage which was 34% (n=302). Besides these, cases with extradural

hemorrhage were 33% (n=298), cases with subdural hemorrhage were 17% (n=149%), cases with subarachnoid hemorrhage were 14% (n=124) and cases with isolated ventricular hemorrhage (IVH) were 2% (n=17). So, in this study, the frequency of IVH was found only 2% among all types of traumatic intracranial hemorrhage cases. Among total 17 IVH patients,

most of the cases were infants or baby which was 59%. Where 41% of the IVH patients were adults. In this study, in analyzing the outcomes among all the IVH patients, we observed, early recovery was found in 1 child (5.88%) and in 2 adults (11.76%). Besides these, death was occurred in 6 children (35.29%) and in 3 adults (17.65%).

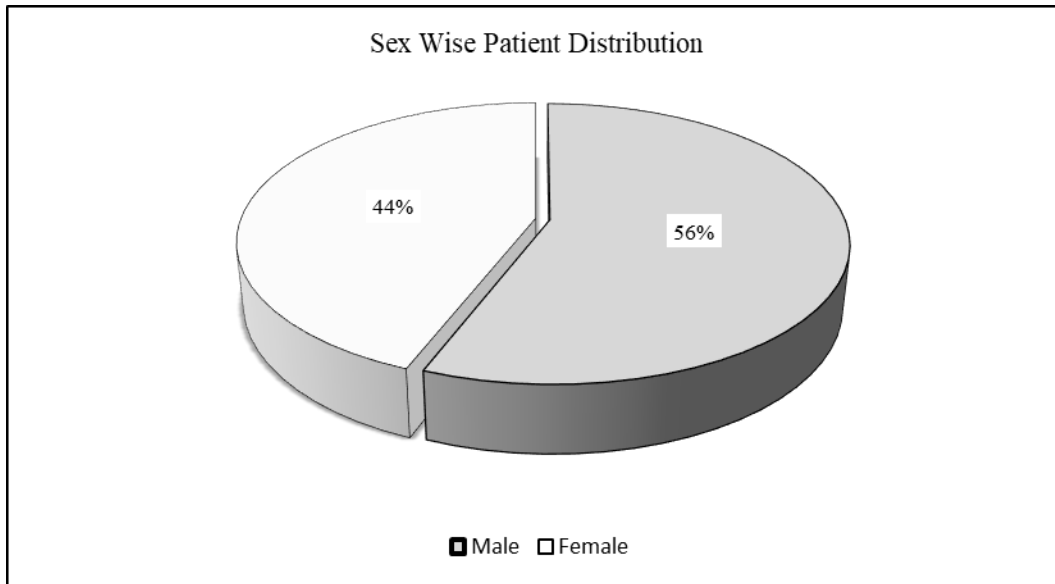


Figure II: Sex Wise distribution of participants (N=890)

Table I: Age distribution of participants (N=890)

Age (Years)	n	%
<20	170	19.10
20-40	603	67.75
>40	117	13.15
Total	890	100.0

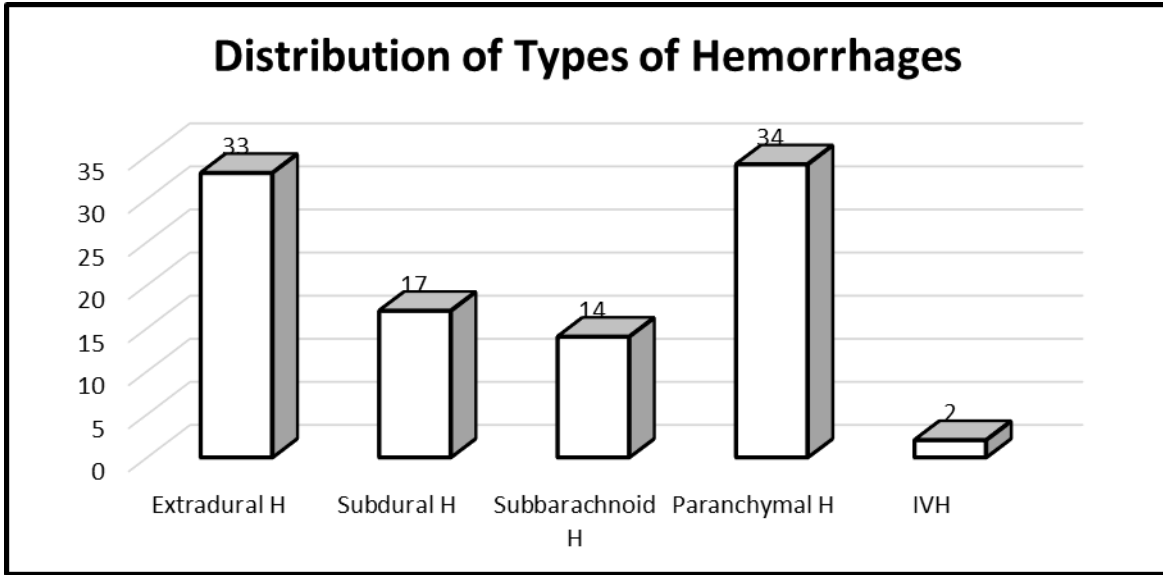


Figure III: Distribution of types of hemorrhages among participants (N=890)

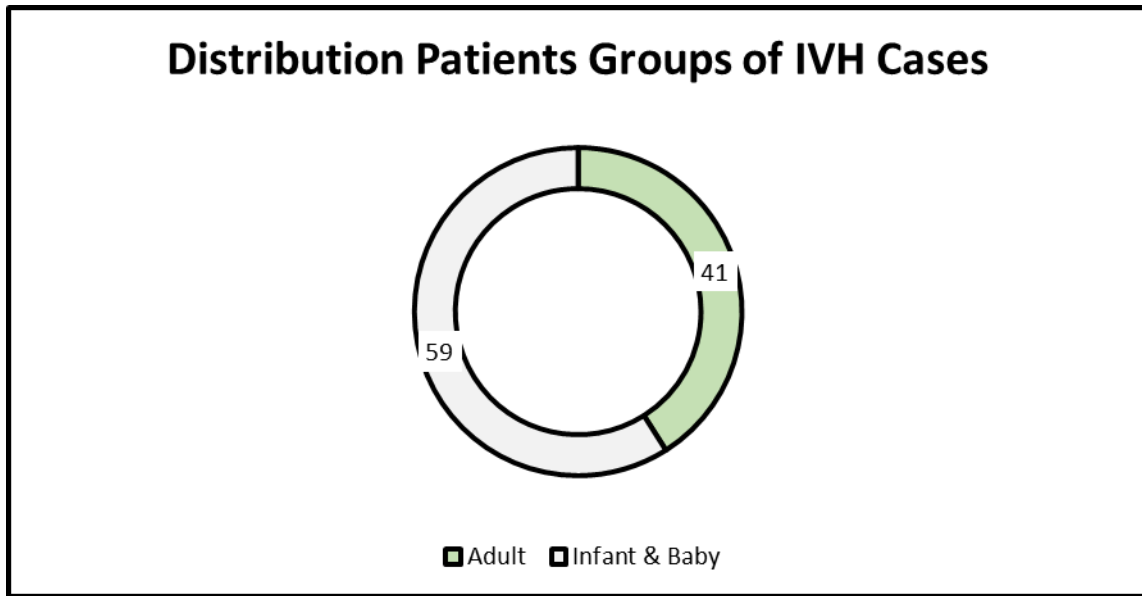


Figure IV: Distribution of patient groups of IVH cases (n=17)

**Table II:** Outcomes among patients with IVH(n=17)

Outcomes	Patient Group	n	%
Early recovery	Child	1	5.88
	Adult	2	11.76
Death	Child	6	35.29
	Adult	3	17.65

## Discussion

The aim of this study was to evaluate the recurrence and the treatment outcomes of isolated ventricular hemorrhage cases among patients with traumatic intracranial hemorrhage. For the movement of cerebrospinal fluid the ventricular system of cerebrum provide low pressure. When blood with its near-systolic pressures crosses through a defected arterial wall that form a spontaneous ICH and it destroys brain tissue.<sup>8</sup> According to the observations of several studies it was found that poor outcomes including coma, mortality, and long-term functional impairment are a very common phenomenon in IVH patients. The patient with intraventricular hematoma presented more commonly loss of consciousness.<sup>14</sup> In this current study, among total participants, the highest number was with parenchymal hemorrhage which was 34% (n=302). Besides these, cases with extradural hemorrhage were 33% (n=298), cases with subdural hemorrhage were 17% (n=149%), cases with subarachnoid hemorrhage were 14% (n=124) and cases with isolated ventricular hemorrhage (IVH) were 2% (n=17). So, in this study, the frequency of IVH was found only 2% among all types of traumatic intracranial hemorrhage cases. Among a total of 17 IVH patients, most of the cases were infants or baby which was 59%. And 41% of the IVH patients were adults. In this study, in analyzing the outcomes among all the IVH patients, we observed, early recovery was found in 1 child (5.88%) and in 2 adults (11.76%). Besides these, death was occurred in 6 children (35.29%) and in 3 adults (17.65%). Tuhim<sup>20</sup> was the first case that proves a strong relationship between IVH in a brain hemorrhage patient and the probability of death. And it was exhibited in different subsequent studies.<sup>21</sup> There was gradually increases in the volume of intraventricular blood.

<sup>22</sup>Observed multivariate regression analysis on different competent samples nearly demark the presence of IVH as a risk factor for mortality and that functional outcome is poor.<sup>23</sup> If hydrocephalus occurs then the frequency of recovery decreases to 11.5%.<sup>24</sup> In the Novo Seven, same finding is repeated in ICH trial.<sup>25</sup> In which, 141 of 374 cases had IVH at the time of presentation and 169 subjects had IVH at 24 hours. Only 20% of those cases of IVH at the time of presentation had good outcomes (modified Rankin score, 0–3) versus 43% of those cases with no IVH at the time of presentation. If IVH expanded within first 24 hours then only 7% of cases were marked to have good outcomes about 90 day, by these same modified Rankin score criteria.<sup>25</sup> Thus, in a recent multivariate analysis of the Novo Seven trial, the result of IVH and IVH expansion (>2 cm<sup>3</sup>) on functional outcome that extent from an OR of 2.53 to 4.21 and is providing strong support that is removal of ICH is an best therapeutic aim.<sup>25</sup> Moreover there was no organized attempt to remove IVH in either trial. All the findings of this study may be favorable in similar further studies and in the treatment of isolated ventricular hemorrhage.

## Conclusion and Recommendations

Traumatic isolated ventricular hemorrhage (IVH) causes the worst prognosis in most cases. The survival rate with no residual effect is very minimum. In this study in 2 patients' history of long coma, for more than 12 weeks was found. Besides these, moderate to severe morbidity was found in some cases. All the findings of this study may be favorable in similar further studies and in the treatment of isolated ventricular hemorrhage. For getting more reliable information regarding this issue we would like to recommend for conducting similar more studies in several places.

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