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To Evaluate Frequency of Intracranial Hemorrhage in Patients of Head Trauma with GCS 10-15

Abdullah Asghar[1*], Ehsan Ahmad[2], Hammad Naeem[3], Sanan Rasheed[4], Hafsa Waseem[5], Shahrukh Ahmad Khan[6]

[1]MBBS, House officer Holy Family Hospital, Rawalpindi, Pakistan
[2]MBBS, Rawalpindi Medical University, Rawalpindi, Pakistan
[3]MBBS, House officer DHQ, Rawalpindi, Pakistan
[4]MBBS, Rawalpindi Medical University, Rawalpindi, Pakistan
[5]Assistant Professor, Al Nafees Medical College and Hospital, Islamabad, Pakistan
[6]MBBS, Rawalpindi Medical University, Rawalpindi, Pakistan

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***Corresponding Author:** Abdullah Asghar
MBBS, House officer Holy Family Hospital, Rawalpindi, Pakistan

Abstract

Background: A common cause of mortality is traumatic brain injury (TBI). One of the deadliest complications is cerebral bleeding. Unanimously, CT scans are considered as gold-standard diagnostic tools for traumatic brain damage. In-patient assessment is aided by the patient's general condition score (GCS). Patients with a high GCS are often overlooked, yet it is possible that they may have major difficulties in the future. However, it is debatable whether or not a CT scan should be performed in individuals with GCS between 13 and 15 or not. ***Objective:*** It is our goal to examine individuals who have suffered head trauma and have a high GCS 10-15 on a CT scan who may have been overlooked but are now experiencing symptoms. We discovered the prevalence of ICH in 70 individuals with GCS ranging from 10-15. ***Methods:*** The computed tomography scans of 70 individuals with head trauma were performed. All patients underwent a non-contrast computed brain CT scan of 5mm axial images and slice thicknesses from the foramen magnum up to the vertex from which the findings were obtained. The patient's name, age, gender, and GCS score were all entered into a Performa. ***Results:*** The results showed that 32 patients (45.71 percent) experienced cerebral bleeding out of 70 individuals. ***Conclusion:*** Patients with RTA are at greater risk of developing ICH, and this risk is greater in men than in women.

Keywords: Computed Tomography, Intracranial Hemorrhage, Head Trauma, GCS Score.

INTRODUCTION

It is more common for intracranial bleeding to occur inside the meningeal spaces or in the brain parenchyma than elsewhere. However, even if the brain is protected by a strong outer shell and coated with CSF, a quick blow may strike it. Any major physical trauma to the inflexible skull will push the brain and inflict irreversible harm. Contusions, hemorrhagic lesions, herniations, infarction, and other complications are caused by craniocerebral trauma. When there is a traumatic brain injury or a cerebral vascular lesion, intracranial hemorrhage (internal bleeding) develops. The risk of severe impairment or death is higher when compared to other types of stroke, such as subarachnoid hemorrhage and ischemic stroke. In addition to being a significant public health issue, head injuries may result in neurological impairment. Traumatic brain injuries can cause permanent disruption of blood flow via intracranial hemorrhage or disruption of nervous function, leading to the presentation of several patients to EDs annually [1]. Some of the major causes for TBI and intracranial hemorrhage are falls accidents, which also doubles as a major cause of death in children. Nearly 15% of these injuries are severe and may lead to death or physical impairment [2]. Contusion index is also a means through which detection of the severity of an intracranial hemorrhage can be done. It is estimated that nearly 2 million traumatic brain injuries occur each year [3]. Cranial Computed Tomography is an accurate neuro-radiological diagnostic tool that provides the non-invasive diagnosis of head injuries such as cerebral edema, intracranial hemorrhage, and fractures. It thus provides objective assessments of structural damage to the brain. Axial non-contrast Computed Tomography is the gold standard technique in trauma patients [4]. 4.2% of traumatic brain injuries featured intracranial hemorrhage [5].

In African countries such as Senegal, mortality rates are as high as 34.8% among child victims due to intracranial hemorrhage in severe TBI [6]. Identifying patients with brain lesions has grown easier and more convenient with recent technological advances in Magnetic Resonance Imaging and Computed Tomography. Current studies by Hanley *et al*., on the identification of show that the review of whole images should be conducted carefully excluding present pathological findings [7]. Incidental findings can range from major pathologic lesions to trivial lesions. The widespread use of CT scans has also been used in the evaluation of patients with trauma. Most of these findings necessitate referral to specialists or early management. Incidentalomas may thus pose significant challenges to trauma centers and require organized approaches to be managed successfully. Brain tumors had a prevalence rate of about 0.2% after evaluating incidental findings from 1000 asymptomatic volunteers [8].

One lesion that is extremely prevalent in males is arachnoid cysts that have a prevalence of around 4% in the USA and their detection often occurs as an incidental finding. In neurological patients, the frequency of these cysts is higher based on studies on the subject. 28 focal intracranial lesions were discovered in a study of 3000 cases with normal neurologic exams and non-specific symptoms. 22 of these had lesions associated with vascular-related problems while 6 of these had intracranial neoplasm [9]. In most of the studies, the most commonly found tumor lesions were pituitary adenomas. This detection may be related to the high frequency of adenomas in comparison to other brain tumors. The diagnosis of meningiomas is commonly done in people between sixty and eighty years even though symptomatic meningiomas are seen in one's fifties. A rare congenital abnormality whose diagnosis occurs within the first two years is agenesis. Common symptoms such as headaches, repetitive speech, or seizures are not witnessed in mild cases. In between 0.3% to 0.7% of all brain images, there is an occurrence of a large cisterna magna and is often associated with infection, inflammation, and infarction [10]. Therefore, the purpose of this study is to critically evaluate the occurrence of intracranial hemorrhage in TBI patients.

METHODS

It was an observational study being conducted from February 2021 to May 2021. 70 patients of head trauma visited or admitted during in main radiology, emergency department of DHQ Hospital, Gujrat, and Radiology department of DHQ Hospital, Mandi Bahauddin and Al-Ghani hospital Mandi Bahauddin for CT-scan were recruited in the study. The Convenient sampling technique was used. The patients who fulfilled the following criteria included in this study:

- All age groups
- All genders
- Head trauma
- Patients with GCS 10-15

Patient on anti-coagulant therapy and patients with bleeding disorder were excluded in the study. GE Healthcare helical CT-scanner 16-slice, Aquilion CT-scanner 16-slice and Siemens CT-scanner 64-slice machines were used.

RESULTS

70 patients were divided into three age groups into which 1st age group ranged 1-25 were 20 (28.6%), 2nd age group ranged 26-50 were 43 (61.4%), 3rd group ranged 51-75 (10%) in number (Table 1).

Table 1: Age Distribution

Age	Frequency	Percentage
1 to 25 years	20	28.6%
26 to 50 years	43	61.4%
Above 50 years	7	10%
Total	70	100%

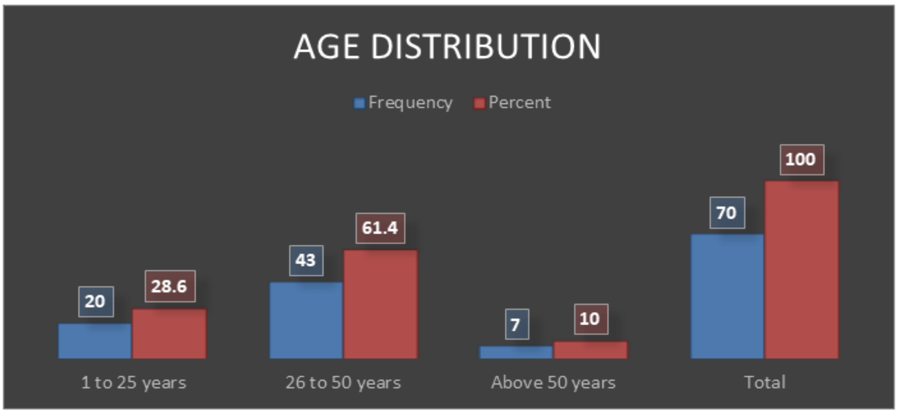

Figure 1: Age Groups

Out of these 70 patients 45 (64.3%) were male and 25 (35.7%) were female presented with head injuries (Table 2).

Table 2: Gender Distribution in Head Injury

Gender	Frequency	Percentage
Male	45	64.3%
Female	25	35.7%
Total	70	100%

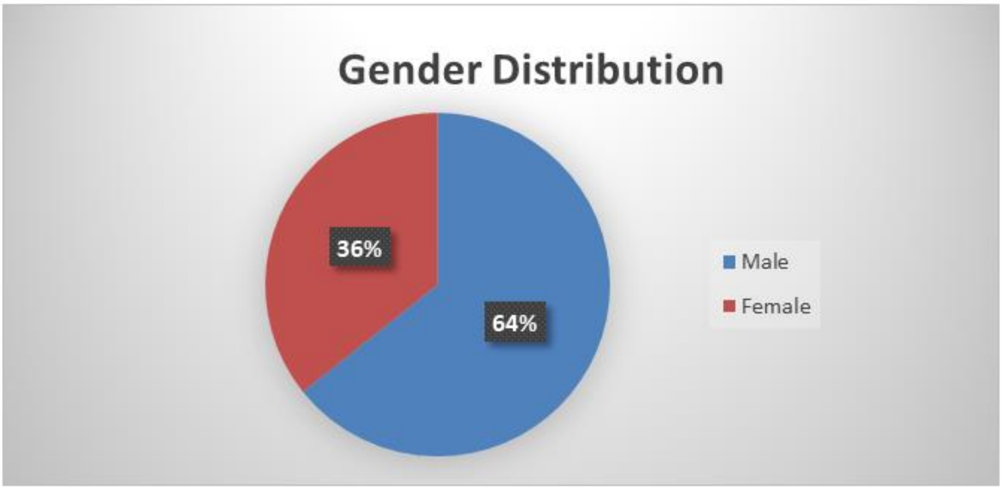

Figure 2: Graph showing Gender Distribution for Head Injury

From these 70 patients the patients which had history of road traffic accident (RTA) were 37 (52.9%) and H/O fall were 33 (47.1%) (Table 3).

Table 3: Mode of Head Injury

Mode of Head Injury	Frequency	Percentage
RTA	37	52.9%
H/O Fall	33	47.1%
Total	70	100%

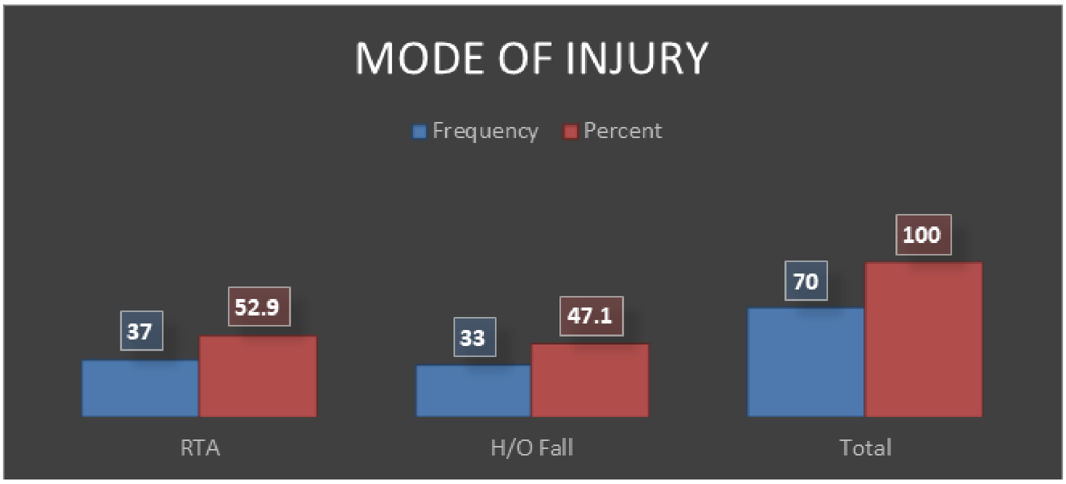

Figure 3: Graph showing Mode of Injury

Thirty-two (45.7 percent) of seventy-one patients had cerebral bleeding as determined by CT scan (Table 04). According to age groupings, the 26-50 age groups had the greatest incidence of cerebral bleeding, with 22 individuals out of a total of 32 patients suffering from the condition. Patients who had a history of RTA had a greater incidence of ICH (75.00 percent) than patients who had other types of head injuries, according to the study.

Table 4: Frequency of Intracranial Hemorrhage

ICH	Frequency	Percentage
Yes	32	45.7%
No	38	54.3%
Total	70	100%

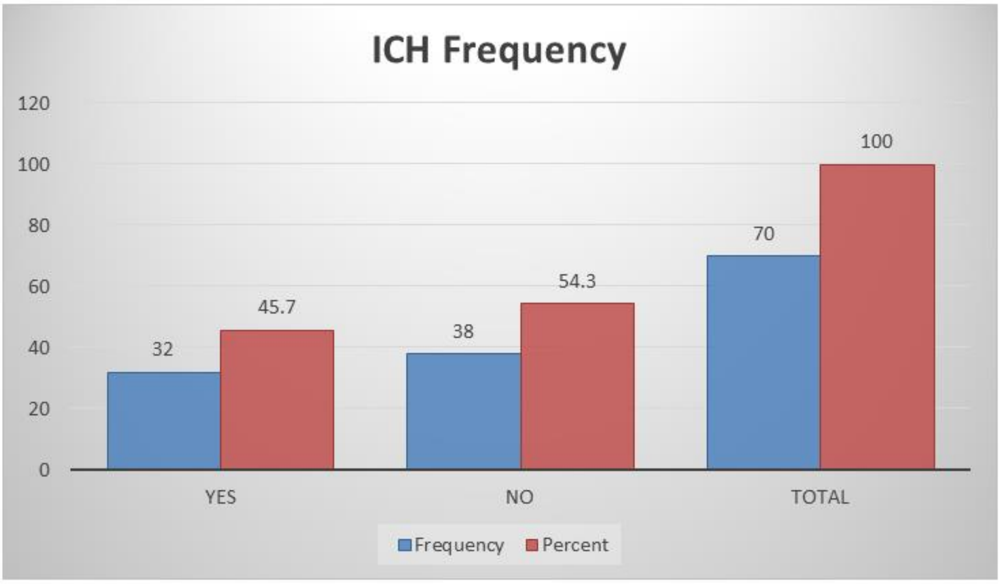

Figure 4: Graph representation of Frequency distribution of ICH

Table 5: Cross tabulation of Age and ICH

			ICH Hemorrhage		Total
			Yes	No	
Age	1 to 25 years	Count	9	11	20
		% Within Age	45.0%	55.0%	100.0%
	26 to 50 years	Count	22	21	43
		% Within Age	51.2%	48.8%	100.0%
	Above 50 years	Count	1	6	7
		% Within Age	14.3%	85.7%	100.0%
Total		Count	32	38	70
		% Within Age	45.7%	54.3%	100.0%

According to the statistics, men were more likely to suffer head injuries (64.3 percent) than females (35.7 percent), and males were more likely to suffer ICH (68.75 percent) than females (31.25).

Table 6: Gender Distribution in ICH

Gender	Frequency	Percentage
Male	**22**	**68.75%**
Female	**10**	**31.25%**
Total	**32**	**100**

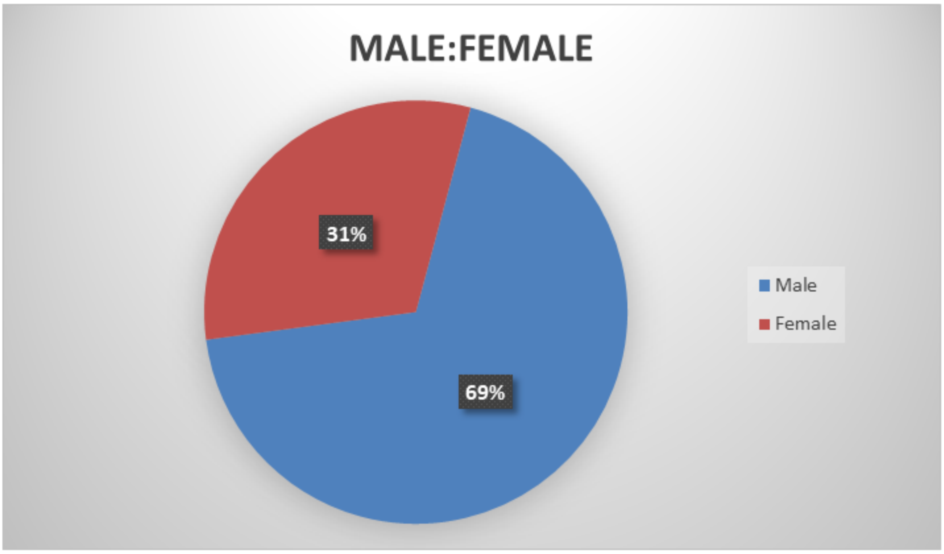

Figure 5: Pie chart Descripting gender distribution in ICH

Table 7: Mode of Injury in Patients with Intracranial Hemorrhage

Mode of injury	Hemorrhage	Percentage
RTA	24	75.00%
H/O fall	8	25.00%
Total	32	100.00%

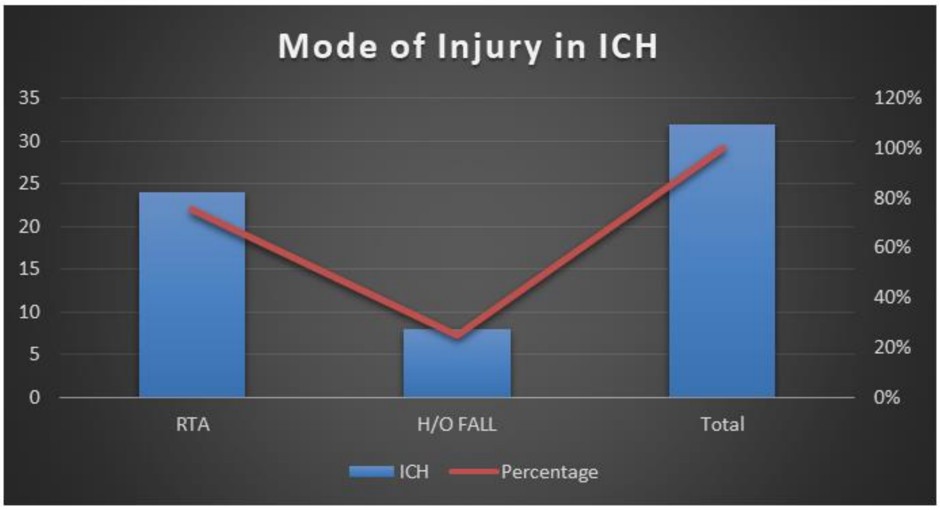

Figure 6: Mode of Injury in ICH

The most important criteria of this study on which the whole study is mainly based is CGS scoring. Out of 70 patients 8(11.4%) patients had 10 GCS, 9 (12.9%) had 11, 10 (14.3%) had 12, 12(17.1%) had 13, 13 (18.6%) had 14 and 18 (25.7%) had 15 GCS (Table 8).

Table 8: GCS Scoring in Patient with Head Injury

GCS Score	Frequency	Percentage
10	8	11.4%
11	9	12.9%
12	10	14.3%
13	12	17.1%
14	13	18.6%
15	18	25.7%
Total	70	100%

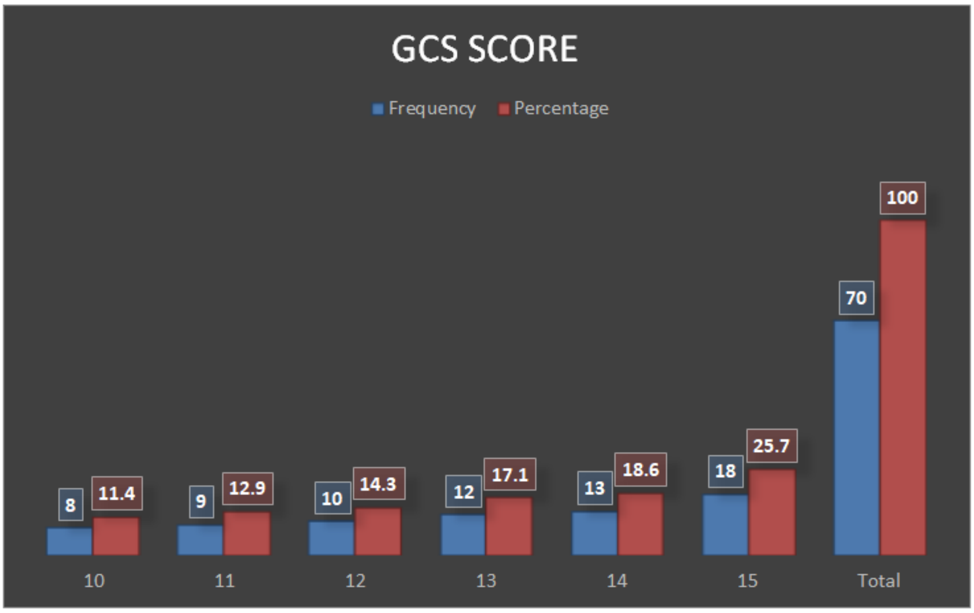

Figure 7: GCS Score Distribution

The percentage of ICH varies among GCS 10-15 were 3 in patients with GCS 10, 4 in GCS 11, 5 in GCS 12, 4 in GCS 13, 8 in GCS 14, 8 in GCS 15 (Table 9).

Table 9: The GCS Distribution in Head Injury and ICH

GCS	No. of Patients	No. of patients with ICH
10	8	3
11	9	4
12	10	5
13	12	4
14	13	8
15	18	8

Table 10: Crosstabulation of Age and Gender

			Gender		Total
			Male	Female	
Age	1 to 25 years	Count	14	6	20
		% Within Age	70.0%	30.0%	100.0%
	26 to 50 years	Count	24	19	43
		% Within Age	55.8%	44.2%	100.0%
	Above 50 years	Count	7	0	7
		% Within Age	100.0%	0.0%	100.0%
Total		Count	45	25	70
		% Within Age	64.3%	35.7%	100.0%

Table 11: Crosstabulation of Age and Mode of Injury

			Mode of Injury		Total
			RTA	H/O Fall	
Age	1 to 25 years	Count	7	13	20
		% Within Age	35.0%	65.0%	100.0%
	26 to 50 years	Count	29	14	43
		% Within Age	67.4%	32.6%	100.0%
	Above 50 years	Count	1	6	7
		% Within Age	14.3%	85.7%	100.0%
Total		Count	37	33	70
		% Within Age	52.9%	47.1%	100.0%

Table 12: Crosstabulation of Gender and Hemorrhage

			Hemorrhage		Total
			Yes	No	
Gender	Male	Count	22	23	45
		% Within Gender	48.9%	51.1%	100.0%
	Female	Count	10	15	25
		% Within Gender	40.0%	60.0%	100.0%
Total		Count	32	38	70
		% Within Gender	45.7%	54.3%	100.0%

DISCUSSION

In the globe, traumatic brain injuries are the leading cause of death, and they are also the most common cause of neurological impairment [11]. Head injuries account for about 65 percent of all traumatic patients [12]. Traumatic brain injury in the United States accounts for approximately 52,000 deaths each year [11]. In Pakistan, brain injury mortality is 15 percent, with 81 fatalities per 100,000 persons a year. The most common and fatal consequence of brain trauma is internal bleeding to the brain [13, 14]. At least one cerebral hemorrhage was seen in 56 percent of participants in the MRC CRASH study, which included patients suffering from moderate to severe traumatic brain injuries [15]. Other factors that affect intracranial bleeding include severity of injury, patient's age, presence or absence of skull fracture, and injury location, which can be classified anatomically as frontal temporal parietal and occipital regions, among others [16].

According to a multicenter study conducted in Japan, CT scans have been extensively utilized for a long time for the neuromonitoring of head trauma [17]. Computed tomography (CT) is the most often used method for ICH post-trauma evaluations and also provides information on structural brain damage [18]. In evaluating serious injuries, axial non-contrast acute CT is considered a gold standard. In the case of ICH, diagnostic criteria include the presence of cerebral hemorrhage, midline shift and the appearance of a mass effect on CT scan. A relationship exists between the global cognitive score, the degree of brain damage, and the results on CT scans [19]. Patients with high GCS >10 were previously thought to be normal and thus unlikely to acquire serious brain abnormalities, but this notion has now been called into question. Individuals with GCS more than 10 are at risk of developing severe brain injury. A variety of variables, such as sedative medicines and narcotics, as well as its dynamic behavior and subjective character on the first day, influence the GCS, making it an ambiguous discriminator on the first day [20-22]. As a result, it is predicted that the categorization of brain lesions on the basis of GCS would have deadly effects. Acute CT brain imaging of the patients must be performed in order to achieve this goal.

About 70 patients from the emergency room, neurosurgical unit and outpatient clinic participated in this research. Non-enhanced acute computed tomography was performed on patients with high GCS (10-15) or normal to moderate GCS to determine the incidence of cerebral bleeding and the kinds of hemorrhage that occur. In 32 of the 70 patients, there was intracranial bleeding i.e., 45.71 percent. Several researches were compared with this one. Non-contrast CT is a reliable study for identifying ICH and early patient treatment.

Racadio *et al*., found that 46 percent of intracranial hemorrhages occur. A cerebral bleeding rate of 0.6% was reported in 2008 at the Shifa International Hospital [23]. My research has a greater incidence of 45.71 percent than the Shifa study, but it is similar to the study of Racadio *et al*.,

70 patients were recruited in this research, of whom 35.7 percent were female and 64.3 percent were male, indicating that the male to female ratio is greater since men are more likely to be involved in a car accident. Dow University Karachi found that men are 90 percent more likely than girls to suffer head injuries [13].

This research is based on the GCS, the GCS patients included in this investigation. It may also be important to treat individuals with the highest GCS (15), which is deemed normal and not considered. Since in this research, individuals with GCS 10-15 had a 45.71% probability of developing a severe cerebral hemorrhage, which may be disregarded. According to the Nayebaghayee *et al*., research, the use of GCS score may not be adequate to determine damage levels, and therefore CT results are regarded gold standard [24].

CONCLUSION

Following my research, it was determined that 45.71 percent of patients who had head trauma had intracranial bleeding, which was the highest rate of all types of brain injuries combined. Males are more likely than females to have an intracranial hemorrhage. Patients with a history of road side accidents have a higher risk of developing intracranial bleeding than patients with any other kind of traumatic injury. However, GCS alone does not provide sufficient diagnostic information since CT is needed for diagnosis and confirmation of the patient's condition.

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Conflict of Interest: Nil

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