Medical Science Journal for Advance Research

Vol. 3 , No. 4 , December 2022
e-ISSN: 2774-4892

Computed Tomography Imaging Of Traumatic Brain Injuries In Patients Presented With A History Of Fall

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ABSTRACT

Aim and objective: *The goal of our research was to find traumatic brain injuries in patients who had a history of falling and had a CT scan.* ***Material and methodology:*** *The Radiology Department of DHQ Hospital, Jhelum, conducted this prospective cross-sectional study for 3 months. It includes a total of 79 patients who presented with a history of fall. The patients included 35 males & 26 women, ages ranging from one to ninety-five yrs. The frequency of findings was assessed by using SPSS version 20.* ***Results:*** *Out of 79 patients, 36 cases were found to have brain fractures, 23 participants showed scalp thickness while 17 patients had a hematoma and 12 patients had opacification.*

Conclusion: *Children made up most of the fall injury patients that visited emergency rooms. Frequent Emergency department visits in youngsters due to fall-related traumatic brain injury indicate a significant public health load, as evidenced by a rise in emergency room visits for TBI caused by a fall in an age category with a significantly greater risk of falling and a larger chance of long-term effects from the injury.*

Keywords: Traumatic Brain Injury, Fall, Computed Tomography

Article Information
Received: October 06, 2022; Revised: November 10, 2022; Online: December, 2022

INTRODUCTION

Imaging is crucial in the treatment of people who have suffered a traumatic brain injury (TBI). In the case of acute head trauma, computed tomography is the preferred imaging technology for extra- and intra-axial bleeding, hydrocephalus, mass effect, as well as damage to blood vessels because it offers reliable diagnosis and therapy. CT is also suitable for analyzing secondary injuries, necessitating follow-up. Emergent imaging is often used to detect manageable lesions while they inflict more neurological damage.[1] Prompt neurosurgical treatment for TBI has been shown to improve results significantly, especially when decompression is undertaken within 48 hours of symptom onset.[2-4] For the examination of a patient with a severe head injury, CT is the imaging modality of choice. It's simple, non-invasive, and widely available, with little side effects. The sensitivity of CT for detecting transient intra-axial and extra-axial hemorrhaging, mass effects, ventricular hypertrophy, and bone cracks make it an excellent tool for assessing TBI. One of the disadvantages is the least sensitive in measuring little non-hemorrhagic abnormalities like cerebral contusions and diffused axons damage, including in identifying a brain disorder with not enough oxygen & blood flow earlier.[5] Adults suffer from head traumas, is

https://doi.org/10.46966/msjar.v3i4.91

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amongst the most likely reason for dysfunction and mortality. The damage could be as minor as a jolt, bruise or head cut or as serious as a shock, laceration, skull bone(s) cracked, or bleeding internally and brain impairment. In the last years, the incidence of mortalities has increased by twenty-four % worldwide, having roughly 540,000 casualties attributed to falls in 2010. Falls was the 31st most common cause of death in 1990 but had climbed becoming the 28th leading cause of mortality by 2013.[6] The Eastern Mediterranean Region has the greatest rate of mortality owing to falls, with 2.9 deaths per 100,000 people.[7] When the rate of disease related to injuries is considered, falls contribute 12.2% of related to injury defect-adjusted life years, resulting in significant cost and productivity losses.[8] Despite the fact that injuries owing to fall are most typically documented in the old age category, geographical surveys have revealed that younger populations (15 to 49 yrs.) are the most vulnerable to damage related to fall, men are two times more likely as women to be afflicted.[9-13] Falling from a great height is also by far the most usual reason for damage in low-income countries.[14-17] Domestic surveys in countries of Asia revealed a high proportion of morbidity and impairment in kids as a result of falls, putting financial and social strains on patients' families.[18] In a recent study from Malaysia, older patients who came to the emergency after going through a fall had lower functionality and had a higher mortality one year later.[19] Because available information on unintended injuries frequently focuses on automobile mishaps or lacks information on injuries related to fall, mortality-related damage and morbidity have not received adequate attention.[20]

According to Pakistan's National Injury Survey, the yearly incidence of injuries related to fall is 8.85 per thousand people. Nearly 87 percent of these falls were found to harm the juvenile population, particularly youngsters under the age of 15, indicating significant public health and economic concern.[21]

The frequency of damage related to fall, emergency department handling

and their consequences among patients who visited emergency departments in low-income nations, however, are little understood.[22,23] TBI is a dynamic process that involves biochemical changes in the injured brain that can lead to the advancement of initial lesions or secondary injury. As a result, the appearance of intra or extra-axial injury on the commencing computed tomography imaging necessitates careful monitoring and scanning investigation.[24] On subsequent CT, about 25 to 45 percent of brain parenchymal tissue injuries grow in extent, and 16 percent of dispersed injuries show considerable progression with indications of new mass lesions.[25,26] Primary lesions usually progress within the first 24 hours after the baseline CT.[27] TBIs can be detected early and treated appropriately to prevent long-term disabilities.[28] This research focuses solely on traumatic brain injuries in patients who have had a fall and describes the injury characteristics in this patient group. Patients who refused to participate and injuries for which a fall was not recorded as the cause were excluded from the study.

Material and methodology: For three months, this cross-sectional study was conducted. A convenient sampling technique was used for the collection of data. A total of 79 patients who came to the Radiology Department of Jhelum with a history of fall were suspected to have head injuries were included while patients with a history of intentional fall and who were not willing to give data were excluded from the study. CT was performed by an experienced technologist using Hitachi SUPRIA 16 Slice CT Scanner machine. After taking demographic details from the patient, a CT scan was conducted, and all the issues related to the head injury were recorded. The Statistical Package for Social Sciences version 20 was used to gather and analyze the data. The mean and standard deviation were used to convey quantitative data, whereas frequency and percentage were used to explain qualitative data.

RESULTS

A total of 79 cases of all age groups were enrolled in this study. The mean value of age was found to be 28.30±26.621 with a minimum age of 1 year and 95 years as the maximum age range. (Table 1).

Descriptive Statistics

	N	Minimum	Maximum
Age	79 79	1	95

There are 32 patients in the age group of less than 10 years old, 9 patients in the age group of 11 to 20 and 9 patients in age group of 21 to 30 years, 3 patients in the age group of 31 to 40, and 7 patients in age group of 41 to 50 years old, 6 patients in the age category of 51 to 60 years old, 7 patients in age category of 61 to 70 years old, 3 patients in age group of 71 to 80 years old, 2 victims of the age range of 81 to 90 and only 1 patient in age category of greater than 90 years old. (Table 2)

Age Group

		Frequency	Percent
	<10	32	40.5
	11-20	9	11.4
	21-30	9	11.4
	31-40	3	3.8
	41-50	7	8.9
	51-60	6	7.6
	61-70	7	8.9
	71-80	3	3.8
	81-90	2	2.5
	>90	1	1.3
	Total	79	100.0

Out of 79 patients, there are 45 males and 34 females. (Table 3)

Sex

		Frequency	Percent
	Male	45	57.0
	Female	34	43.0
	Total	79	100.0

Out of 79 patients, 36 patients had fractures which mean that fracture was present in 45.6% of patients and was absent in 54.4% of patients. (Table 4)

Fracture

		Frequency	Percent
	No	43	54.4
	Yes	36	45.6
	Total	79	100.0

Out of 79 patients, 4 patients had dilated ventricles which means that ventricles were dilated in 5.1% of patients and were normal in 94.8% of patients. (Table 5)

Ventricles

		Frequency	Percent
	Normal	75	94.9
	Dilated	4	5.1
	Total	79	100.0

Out of 79 patients, 5 patients presented with contusions, and 74 patients presented with no contusions, which means that out of 100 %, 6.3% patients had contusions. (Table 6)

Contusion

		Frequency	Percent
	No	74	93.7
	Yes	5	6.3
	Total	79	100.0

Out of 100%, opacification was presented in 15.2% of patients and was absent in 84.8% of patients in other words this means that out of 79 patients 12 presented with opacification. (Table 7)

Opacification

		Frequency	Percent
	No	67	84.8
	Yes	12	15.2
	Total	79	100.0

Out of 79 patients, 29.1 % of patients which means 23 patients had scalp thickness, and 70.9% of patients means 56 patients did not have scalp thickness, hence out of 100 %, a higher number of patients had no scalp thickness. (Table 8).

Scalp thickness			
		Frequency	Percent
	No	56	70.9
	Yes	23	29.1
	Total	79	100.0

Out of 79 patients, pneumocephalus was present in 9 patients and was absent in 70 patients which mean that out of 100%, 11.4% of patients presented with pneumocephalus. (Table 9)

Pneumocephalus			
		Frequency	Percent
	No	70	88.6
	Yes	9	11.4
	Total	79	100.0

Out of 79 patients, 10.1% means only 8 patients had infarcts while 89.9% of patients who are 71 in number, had no infarcts. (Table 10)

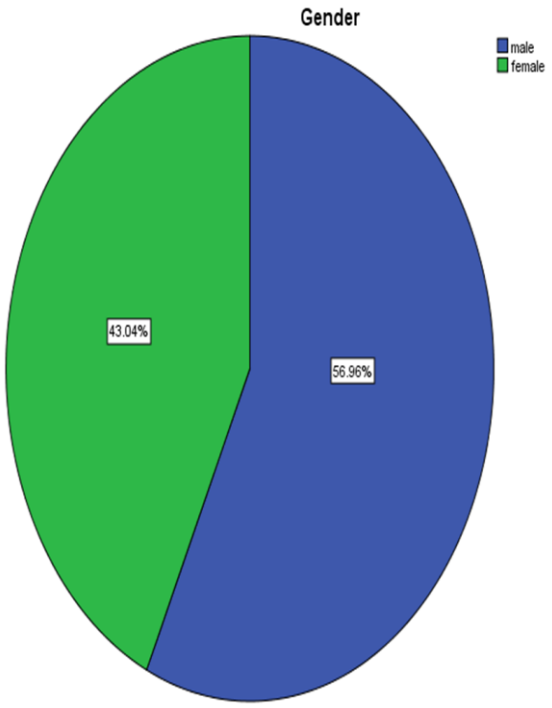
Infarct			
		Frequency	Percent
	No	71	89.9
	Yes	8	10.1
	Total	79	100.0

Out of 79 patients, the hematoma was presented in 25% of patients and was absent in 78.5% of patients which means that out of 100 %, the higher number of patients presented with no hematoma. (Table 11)

Hematoma			
		Frequency	Percent
	No	62	78.5
	Yes	17	21.5
	Total	79	100.0

Out of 100%, hemorrhage was presented in 7.6% of patients and was not presented in 92.4% of patients which means that out of 79 patients 6 patients had a hemorrhage and 73 patients had no hemorrhage. (Table 12).

Hemorrhage			
		Frequency	Percent
	Absent	73	92.4
	Present	6	7.6
	Total	79	100.0



DISCUSSION:

CT scan is the imaging approach option within the early 24 hrs. after a TBI.[29] According to new research, Magnetic resonance imaging is at least as good as Computed tomography in detecting acute hemorrhage.[30] In the acute phase, it has yet to be established as the inquiry of choice. CT scan, on the other hand, is superior in diagnosing bone diseases, is more widely available, and quick,[31] and is associated with the result[32] Children under the age of 15 were shown to be the most common victims of TBI in our research. TBI is frequently resulting from a high-altitude fall, especially in children and women.[33,34] This is mostly related to flaws in the construction of fenceless roofs, which are used for working, sleeping, playing, and flying kites. As a result of parental neglect, children are especially vulnerable to falling from stairwells and balconies. Climbing, falling, jumping, playing, rolling, running, slipping, standing, stepping, or tripping by a child suggested that the youngster caused the fall. Climbing trees and fences might

potentially cause them to fall. In the lack of sufficient safety procedures, a fall from a pole is also an occupational danger. This is made worse by the improper dealing of high-tension cables, and it is commonly linked to electro-cautery.[35] Additional examination of both children's development and parental supervision is vital for creating preventative initiatives to help comprehend falls in young kids.

Traumatic brain damage related to fall in children in the age group 0 to 4 years correlates with the onset of growth and maturation like movability and inquisitive activity, at a period when children's understanding and prevention of risks may be lacking. Children between the ages of one and two are slowly developing range of motion, which may explain why this age group has a greater rate of falls. Further examination of both child development and parental monitoring is vital for creating preventative initiatives to better comprehend falls in youngsters. Fall-related TBI in kids aged 0 to 4 years correlates with the onset of developmental phases like as independent mobility and inquisitive activity, at a period when children's awareness and avoidance of risks may be lacking. Children between the ages of one to two are beginning to develop independent mobility, which may explain why this age group has a greater rate of falls.[36,37,38] Unintended falls in this age category can be prevented by modifying the environment, such as changing the physical space to regulate access to risks like gates and improving parental monitoring in the house.[39] Parent's attention & concern, are important components in preventing falls and have been reported to vary depending on the age of the kid.

Morrongiello et al. found that adolescents (ages 2yrs to 3yrs) are more carefully administered than older (ages 4yrs to 5yrs).[40] To establish the benefit of reducing the rate of fall-related TBI, more research is needed that takes into account both developmental and parental aspects. Professionals who come into touch with caretakers of kids might encourage them to create a safe environment for their children and to be aware of their surroundings when carrying them to avoid falls. Reduced clutter on floors and the use of barriers such as installing security gates on stairways, window protectors above floor level, and baby bed rail guards to keep children safe, are wise safety measures. Fall threats, for example, ladders and playground items, should always be supervised by an adult.

CONCLUSION:

Children under the age of 15 made up the vast majority of individuals who have had a fall injury & visited emergency. In comparison to road traffic accidents, burns, and to die through submersion in and inhalation of water, fall injuries were generally non-fatal among all injury patients who presented to emergency rooms. In developing countries like Pakistan, damage owing to fall places a strain on the health care delivery system, specifically emergency facilities in terms of both resources and costs. To reduce the risk of falling, prevention efforts should focus on environmental changes as well as parental supervision practices**.**

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