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ORIGINAL ARTICLE

Patterns, Frequency and Gender Dominance in Paediatric Neuro-trauma in a Tertiary Care Hospital in Peshawar

ZAHID KHAN, FAROOQ AZAM, SEEMA SHARAFAT
SHUMAILA GUL, FAHAD SHAHZAD
Department of Neurosurgery, Lady Reading Hospital, MTI, Peshawar – Pakistan
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ABSTRACT

Objective: *To determine the patterns, frequency and gender dominance in pediatric trauma presenting to Neurosurgery Department in a tertiary care hospital.*

Material and Methods: *This retrospective study was conducted in Department of Neurosurgery, Lady Reading Hospital, Peshawar. The medical records of all patients (0 – 15 years) with trauma admitted in our unit were analyzed retrospectively.Demographic details of the included subjects were noted down.*

Results: *A total of 448 patients were included in our study; 308 males and 140 females. Patients with 0 – 5 years were 40%, 6 – 10 years were 38% and 11 – 15 years were 22%. Extradural hematoma (28.12%) preceded depressed skull fracture (20.08%), followed by linear fractures (17.85), subdural hematoma (7.58%), contusions (5.80%) and subarachnoid hemorrhage (5.35%). Patients with diffuse axonal injury accounted for about 4.91%. Only 2 cases of cervical injury were noted.*

Conclusion: *The number of boys was comparatively greater than girls. Most of the patients were in the age group of 0 – 5 years. Ratio of extradural hematoma was the highest among all the injuries.*

Keywords: *Paediatric trauma, gender dominance, frequency, patterns.*

INTRODUCTION

Trauma is the type of penetrating or non-penetrating injury, caused intentionally or unintentionally by external factors, like falling, road traffic accidents, fire arm injuries, bomb blasts, physical assaults, drowning or poisoning etc.[1] Traumatic brain injury is among the leading causes of mortality and morbidity in children,[2] which results in a range of injuries to brain, skull and scalp that differ both in management and pathophysiology from adults. The major differences are due to difficulty in the neurological assessment in pediatric patients, mechanism of trauma based on child's physical ability and structural changes related to age.[3] TBI's related to falls in children aged 0-14 years, showed increase by 62% till 2006. Now the rate of TBI in pediatric age group is the highest among the general population.[4-6] The factors responsible for the upward trend in pediatric trauma are the impaired assessment of risk and the inability to recognize and react against the danger in time by children.[7] Younger children are more prone to TBIs from falls as compared to the adults who most commonly get injured from motor vehicle accidents and sports related trauma.[8] It is estimated that moderate to severe traumatic brain injuries leads to disability in 61% of chidren.[9] Even those children without any apparent neurological deficits from TBIs have also shown declension in academic performance, concentration and mindfulness, cognition and memory, which becomes obvious after months or years of the initial injury.[10-12] All of these factors lead to a major burden on economics of health, as a consequence of which it is under studied in the developing countries.[13,14]

As there are a few studies conducted in such overly populous areas of middle income countries, in which the ratio of pediatric trauma is increasing day by

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day. This study will signify the patterns, etiology, gender dominance and the growing proportion of trauma in pediatric age group, upto 15 years, admitted in Neurosurgery Department, Lady Reading Hospital, Peshawar; on the basis of which precautionary measures can be formulated and the health situation in the country can be improved. Secondly, due to lack of equipment and facilities, the upward trend in post-traumatic disabilities can also be addressed.

MATERIAL AND METHODS

Study Design and Patients

This is an observational retrospective hospital based study, conducted in Neurosurgery Department, Lady Reading Hospital, Peshawar. The medical records of all the trauma patients in the mentioned age group, admitted in the unit from July 1, 2019 to December 31, 2019, were retrospectively analyzed.

Inclusion Criteria

All the pediatric patients up to 15 years, admitted in Neurosurgery Unit or Intensive Care Unit via emergency with history of trauma, were included in the study.

Exclusion Criteria

Those patients received expired before getting admitted and those who had polytrauma with minor head injuries admitted in other units were excluded from the study.

Data Collection

The documented data included the demographic details like age, gender, pattern and mechanism of injury. Age was stratified into three groups; 0 – 5, 6 – 10 and 11 – 15 and the ratio of males to females was also analyzed. The comparison of different mechanisms of injuries and patterns was also taken into consideration. In addition, the frequency was measured as compared to adults.

Data Analysis

The data was arranged in graphical order via Microsoft Excel.

RESULTS

Gender Incidence

Medical records of 448 patients were reviewed. Majority of our patients were males, which accounted for about 69%. The remaining 31% were female patients.

Age Incidence

179 (40%) patients were reported in 0 – 5 years of age, followed by 170 (38%) patients in 6 – 10 years. In the age group of 11 – 15 years, there were 99 (22%) patients (see figure 1).

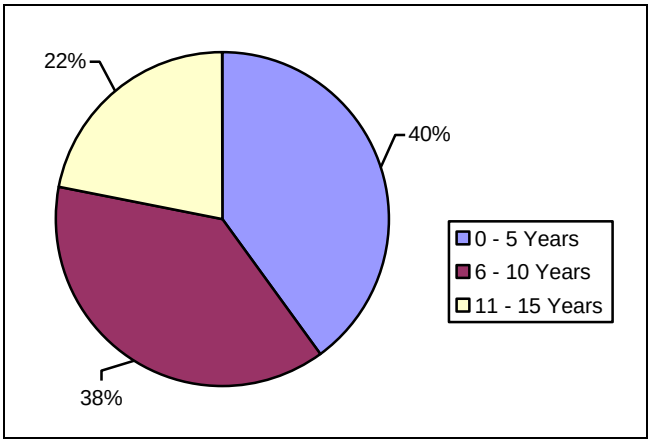

Fig. 1: *Stratified Age Groups.*

Clinical Findings

Extradural hematoma was the most frequent CT scan finding followed by depressed skull fracture. Further detail about the percentages of radiological diagnosis is given in figure 2. Out of 126 patients having extradural hematoma, there were 96 males and 30 females.Among 90 patients with depressed skull fracture, males and females were 59 and 31 respectively. As far as linear fracture is concerned, there were 61 males and 19 females. There were 25 males and 19 female patients having cerebral edema. Taking subdural hematomas into consideration, we found 28 males and 6 females. Out of 26 patients having contusions, number of males and females were 13 each followed by 24 patients, who had subarachnoid hemorrhage, there were 9 and 15 males and females respectively. Among 22 patients with diffuse axonal injury, there were 16 males and 6 females. Last but not the least, there were 2 male patients, who had cervical injury.

Patients ranging from 0 – 5 age group, the leading radiological diagnosis was linear fracture with 44 patients followed by 40 patients having depressed skull fractures. The extradural hematoma was noticed in 37 patients, whereas 14 were diagnosed with cerebral edema and 15 with contusions. Patients with a subdural hematoma, subarachnoid hemorrhage and diffuse axonal injury were 9, 7 and 13 in number respectively. Among patients with age group 6 – 10 years, extradural hematoma showed the greatest trend in 45 patients while depressed skull fractures and linear fractures were found in 38 and 27 patients respectively. 24 patients had cerebral edema followed by 14 patients with subdural hematoma. Subarachnoid hemorrhage was on top among this age group having 11 patients. Out of 99 patients with age group of 11-15 years, there were 44 patients who had extradural hematoma, 12 with depressed skull fractures, 9 and 6 with linear fractures and cerebral oedema respectively. In addition, 2 patients with cervical injury were found in this age group. Contusions and subarachnoid hemorrhage were noticed in 6 patients each.

The different mechanisms of injuries are shown in table 1. Frequency of pediatric patients admitted in Neurotrauma and Neurosurgery Department was 38.5% (448 patients) as compared to adults' 61.5% (715 patients).

Table 1: *Mechanism of Injuries.*

Mechanism of Injury	No. of Patients	Percentage
Fall	276	61.60%
RTA	158	35.26%
FAI	8	1.78%
Physical Assault	5	1.12%
Strangulation	1	0.22%
Grand total	448	100%

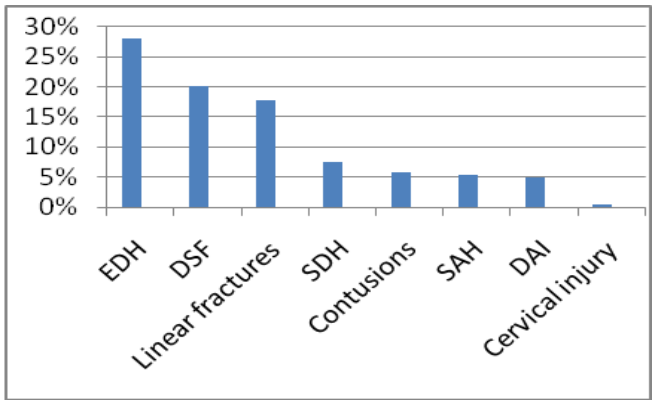

Fig. 2: *Radiological Diagnosis.*

DISCUSSION

In this study, the number of boys sustaining TBI was higher as compared to girls. The same results were shown in studies conducted in KSA and United Arab Emirates.[15,16] This is most likely due to certain reasons as boys are more mischievous, more active and more partaking in hard core games. Chiaretti et al. also reported similar results.[17] Falls related head injuries were most frequent in our study, followed by road traffic accidents; which were found consistent with several other studies.[18,19] In contrast, motor vehicle accident was the leading cause of head injuries in pediatric patients in a study conducted in India.[20] The reasons being discussed as growing rate of underage driving, bi-cycling on overcrowded roads and roll-over accidents.

The most commonly affected age group was found to be 0 – 5 years, which is co-incident with a study conducted at Tokyo.[21] The reason for this upward trend in this age group might be due to the fact that children in this age group are mostly pre-school leading to more unsupervised time and out-door activities.Others reasons might be the increased head circumference compared to the body size, which makes it vulnerable to injuries.

According to a study conducted in India, the frequency of pediatric patients sustaining head injuries was found to be 30% as compared to our study, in which there is 38.50% frequency.[22] Increased plasticity of the skull leads to shear forces between the skull and the adjoining cortical vessels and brain parenchyma. Hence, these forces lead to stretching of the vessels and shear injuries to brain.[23]

In our study, extradural hematoma was the leading radiological diagnosis among all which was about 28.12% as compared to a previous study in which it is 23.80%.[24] In contrast, some other studies stated low incidence of EDH among pediatric patients ranging 2-3%.[25,26] The higher incidence of EDH as compared to subdural hematoma in our series might be due to the higher frequency of associated fractures. We had 2 patients with cervical injuries; the least injuries among all pediatric patients. The same results were shown in some previous studies. It is because of the flexibility of the spinal column in pediatrics, which can be distracted by 5cm without any structural injury.

CONCLUSION

This study highlights the growing proportion of pediatric TBI, which can be helpful for the development of efficient, proper strategies and interventions for the safety of the community in the region. Many prevention measures can be formulated in order to reduce mortality and morbidity resulting from TBI.The increasing prevalence of childhood injuries is mostly due to certain reasons like its low socioeconomic status, overcrowded population, ignorance and poor conditions of roads. Hence, we conclude that majority of pediatric trauma can be prevented. More supervision is needed to children during playing and identification of risk factors to incorporate successful prevention strategies.

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Additional Information

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Address for Correspondence:
Seema Sharafat
Department of Neurosurgery, Lady Reading Hospital, MTI Peshawar, Pakistan
E-mail: seemasharafat@yahoo.com

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr.#	Author's Full Name	Intellectual/Contribution to Paper in Terms of:
1.	Zahid Khan	1. Main investigator/ data collection.
2.	Farooq Azam	2. Data analysis and report writing
3.	Seema Sharafat	3. Data analysis and report writing
4.	Shumaila Gul	4. Co investigator and data collector.
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