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A Cross-sectional Observational Study on the Demography of the Neurosurgical Emergency Admissions in a Year 2014 at Gurayat General Hospital, Saudi Arabia

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ABSTRACT

Gurayat General Hospital is a 350 bed secondary referral hospital of Kingdom of Saudi Arabia. This is one of the busiest hospitals in Al-Jouf region. Trauma is very common in this city and the ER department is mostly overwhelmed by Neurosurgical emergency patients. The aim the study was to evaluate the age sex, types of injuries and causes of injuries of the neurosurgical emergency patients. This was a cross-sectional descriptive observational study. Ethical approval was achieved from proper authority. Good Clinical Practice (GCP) ICH E6 protocol was followed in order to ensure safety and efficacy. Data was collected from the log book of the ER department. Data were transferred to a spreadsheet to make a master sheet. Valuables of individual columns were analyzed and tabulated. Comparison was performed between the result of this study and other international studies. About 7.3% of all ER admissions were for the Neurosurgical cases. Among the Neurosurgical cases (n=3588) there was clear predominance of male gender (81%). Majority (45%) of the Neurosurgical patients were from children and teen age group. Nearly 50% of the patients reported to ER with the history of Road Traffic Accident (RTA). Head injury was the commonest (61%) type of injury. Approximately 45% patients were admitted in to general ward whereas 42% patients were discharged from ER after providing primary treatment. When the results of this study were compared to the results of the other international studies fair similarities were observed.

Keywords: demography, Neurosurgical, emergency admission.

INTRODUCTION

The city Gurayat is located in Al-Jouf province, in northern Saudi Arabia. The population of the city is nearly 1, 50,000 according to latest census[1]. Gurayat General Hospital is a 350-bed secondary referral centre with a catchment area of almost 450 kilometer area with referral from seven district hospitals, each comprises of 50 beds and many primary health centre.

The Emergency Room (ER) remains very busy all over the year which comprises of specialist and residents. The ER has fully equipped resuscitation room, with 5 beds, triage areas, observation rooms, cubicles, plaster and minor surgery procedure room. The total number of rooms in ER is 27. The hospital receives emergency referral for most the disciplines.

In the neuroscience emergency the 3 most common neurologic diseases are cerebrovascular disease (31%), neurotrauma (28%), and altered mental status (12%)[2]. Neurosurgical pathologies represent 19% of all the neurologic admissions with a combined emergency-based disease prevalence of 3%. Mortality rate is 9%. The most common neurosurgical diseases are neurotrauma (87%), caused by motor vehicle accidents (59%), falls (20%), and assault (17%).

This observational analytic study was conducted in Gurayat General Hospital on the demography of the neurosurgical emergency admissions in one year. The aim of this study was to evaluate the demographic data of the neurosurgical emergency patients of this hospital and to compare the result of this study with that of other international studies.

MATERIALS AND METHODS

This is a cross-sectional descriptive observational study on Neurosurgical patient's admission in Emergency department from 01/01/2014 to 31/12/2014. The study was performed according to the guideline of Good Clinical Practice (GCP) ICH6. A pre-study meeting was held with all the co-researchers. Related previous studies were reviewed. Ethical review was done and permission was achieved (GGH/DD/1437/5/6) from the local authority for the study. All the data were collected from the Emergency log book of the year of 2014. The variables were age, sex, date of admission, cause of admission, types of injury and outcome after admission. No identifying point or any other medical information was collected. There was no disclosure of any personal or medical information, so informed consent was not obtained in this study. In present study there was no safety and confidentiality concern. No patient was reimbursed for the study. There was no conflict of interest with any of the author or co-authors of this study. At first data were collected from the log book of ER of the year of 2014. Then data were transferred to Excel spreadsheet. From the spreadsheet

different variables were extracted from the master copy and tabulated into two by two tables. Percentage was calculated to finalize the result. Then the result of this study was compared the same of the other international studies.

RESULTS

Total 48912 patients were admitted into emergency department in the one year period of which 7.3% (N= 3588) patients were for neurosurgery department (Table 1).

Table 1: Percentage of Neurosurgical patients in emergency department

Total patients in ER	Neurosurgical patients in ER	Percentage of Neurosurgical patients
48912	3588	7.3 %

About 81% (2912 patients) were male, proving the male predominance in the study. Approximately 21% (676 patients) patients were female (Table 2).

Table 2: Frequency according to sex (n=3588)

Sex	Number of patients	Percentage
Male	2912	81%
Female	676	19%

Nearly half of the patients were children or teen ager. About one quarter of the patients was in 20 to 39 years age group. There were 517 patients (14.5%) in 40 to 59 years age group and 471 patients' (13%) age was 60 years or above (Table 3).

Table 3: Frequency according to age group (n=3588)

Age frequency (years)	Number of patients	Percentage
19 and below	1612	45.0%
20 – 39	988	27.5%

40 – 59	517	14.5%
60 and above	471	13.0%

Nearly half of the patients (1768 patients) were admitted because of Road Traffic Accident (RTA). Fall was the cause for one third (1196 patients) of the patients. About 13% patients (468) were admitted because of assault. Only less than 5% patients (156 patients) were admitted due to other causes like neuro-vascular emergency or CSF pathway obstruction (Table 4).

Table 4: Frequency according to cause of admission (n=3588)

Cause of admission	Number of patients	Percentage
Road Traffic Accident (RTA)	1768	49.5 %
Fall	1196	33.0 %
Assault	468	13.0 %
Others	156	04.5 %

Nearly 61% of patients (2161 patients) were admitted due to head trauma. Poly trauma was the cause of admission for nearly one quarter patients (992 patients). Spinal injury patients were much less (10.5%) in number (364 patients) in contrast to head injury patients. Only one percent patients (39 patients) were admitted for other causes like nerve injury or scalp injury (Table 5).

Table 5: Frequency according to the types of trauma (n=3588)

Types of trauma	Number of patients	Percentage
Head injury	2191	61.0 %
Poly trauma	992	27.5 %
Spine injury	364	10.5 %
Others	39	1.0 %

Total 1507 (42%) patients were discharged either with medical advice or against medical advice. Nearly half of the patients (1613 patients) were admitted into general ward. Number of the patients admitted in Intensive Care Unit (ICU) was 311 (9%). Death was fate for 157 (4%) patients (Table 6).

Table 6: Frequency according to outcome from emergency (n=3588)

Outcome from emergency	Number of patients	Percentage
Discharged	1507	42.0 %
Admission to ward	1613	45.0 %
Admission to ICU	311	9.0 %
Death	157	4.0 %

Table 7 illustrates the relationship between the age frequency and the cause of admission in all 3588 patients. It shows fall was the predominant cause of admission in children and teen ager (19 years and below) group. Nearly half of the fall patients lie in this group. On the other hand assault was prominent in young adult (20 to 39 years) age group. About 44% of assault patients were from this group. The cause RTA is more or less equally distributed in all age groups with a slight predominance in 20 to 39 year age group.

Table 7: Distribution of age frequencies in relation to their causes of admission (n=3588)

Age / cause	RTA No. / percentage (in column)	Fall No. / percentage (in column)	Assault No. / percentage (in column)	Others No./ percentage (in column)	Total
19 and below	469 / 26.5%	537 / 45.0%	89 / 19%	13 / 33%	1612
20 – 39	514 / 29.0%	221 / 18.5%	207 / 44%	9 / 23%	988
40 – 59	431 / 24.5%	167 / 14.0%	117 / 25%	5 / 13%	517
60 and above	354 / 20%	271 / 22.5%	55 / 12%	12 / 31%	471
	1768	1196	468	39	

DISCUSSION

This study was performed in Gurayat General Hospital. The aim of this observational analytic study was to evaluate the demographic data (age, sex, incidence, etiology) of the neurosurgical emergency admissions and to compare them with the same of other national / international studies. The study period was on year (2014). During this period total 48,912 patients were admitted into emergency room (ER), of them 3,588 were admitted under Neurosurgery department. After collecting all data those were compared with the other studies.

Kalsbeek et al found mild head injury requiring hospital admission is 100 patients per 100,000 populations per year[2]. The incidence of all injuries to head and face is estimated to be 600 per 100,000 populations. Rimel and associate found 55% of their patients sustained mild head injury, whereas Kraus and Nourjah found prevalence of more than 72%. This study shows that 7.3% of total emergency admission was for neurosurgery.

The sex difference present in groups of patients with severe head injury also applies to the groups with mild and moderate head injury. Males appear to be twice as prone as females to mild head injury. A University of Virginia study showed that males accounted for approximately 65% of patients admitted with mild or moderate head injuries[3]. This study shows similarity with other studies too having 81% male admission for neurosurgery. Head injury patients were 61% of all neurosurgical admission.

The etiology of mild head injuries is similar to that of severe head injury. In the University of Virginia reported by Rimel and colleagues, vehicle injuries accounted for 46% of minor head injuries and falls for 23%. Sports related injuries and assaults were much less frequent[4]. This study also demonstrates that 49.5% patients were admitted with the history of Road Traffic Accident (RTA) which is fairly similar of other studies.

In a study of head-injured patients admitted to the Edinburgh Royal Infirmary, Mendelow and associates revealed that of 865 patients who were initially alert and oriented, 1.3% patient showed intracranial hematomas[5]. In this study 57.9% of patients were involved in motor vehicle accidents and 20% in falls. Fall was the cause of admission in 33% of all patients in this study. Nearly half of the patients were for RTA according the present study.

Study of Kraus, J. F et al shows that trauma is the major cause of the death in children between ages of 1 and 14 years, with head injury accounting for 40% of fatal childhood injuries[6]. Head injury accounts for 100,000 pediatric hospitalization per year in the United States. The incidence of pediatric head injury is

approximately 200 per 100,000, with an ensuing mortality rate of 10%[7]. For comparison, the next leading cause of death in the pediatric age group is leukemia, with a rate of approximately 2 deaths per 100,000. Boys are twice as likely as girls to suffer head injury, and their injuries are more likely to be severe or fatal. There are numerous mechanisms of injury in the pediatric age group that is distinct from those seen in the adult injury. The highest incidence occur in motor vehicle, pedestrian and bicycle injuries and in falls[8]. Child abuse is the most common cause of head injury in infants younger than 2 years of age. Falls are the major cause of the pediatric head trauma, particularly in children 4 years of age or younger. As children get older, falls become less common than vehicle related. This study also supports the others studies and confirms that fall was the most likely cause of admission in the children and teen age group.

According to Young, J. S et al spinal cord injury can result from a number of different traumatic insults to the neural tissue of the spinal cord. Nearly 48 percent of all injuries are the result of motor vehicle accidents. Falls accounts for 21 percent, act of violence make up 15 percent of the injury population statistics, and athletic injuries are a little over 14 percent[9]. Approximately 85 percent of the spinal cord injured patients are male, while 15 percent are females. Spinal cord injury is primarily a disease of young adult. Over half (56 percent) of the injured are between 16 and 30 years. The most common levels of spinal cord injury are middle and lower cervical, which are the most mobile and flexible regions of the spine[10]. The second most common level is at the thoracolumbar junction. The result of this study is a bit different from the study of Young, J. S et al. Present study demonstrates only 10% neurosurgical patients were admitted for spinal injury. The trauma to different part of spinal level has not been discussed in the existing study.

CONCLUSION

This cross-sectional descriptive observational study has clearly established fair similarities with few international publications. There are few limitations of this study. Sorting the head injury and spinal cord injury patients according to sub classifications could have given a better picture and statistical clarity. Statistical relationship between etiology and types of trauma could open window for further advanced research.

CONFLICT OF INTERST

The authors declare that they have no competing interests.

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