PATTERNS OF FATAL HEAD INJURIES DUE TO ROAD TRAFFIC ACCIDENTS – AUTOPSY FINDINGS AT AFIP RAWALPINDI, PAKISTAN

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ABSTRACT

Objective: To analyze the antopsy findings in cases of fatal head injuries due to road traffic accidents.

Study Design: Descriptive Study.

Place and Duration of Study; Armed Forces Institute of Pathology Rawalpindi from 2004 to 2008.

Material and Methods: The present study was conducted to ascertain the patterns of fatal head injuries due to road traffic accidents as documented during autopsies performed at AFIP, Rawalpindi during the five years period (2004-2008). Data were analyzed using SPSS version 14. Mean, median and mode were calculated for quantitative variables like age and hospital stay. Frequencies and percentages were calculated for qualitative variables like time of accident, pattern of head injury, skull bones fractured, and other associated injuries, passenger status of deceased and duration of hospital stay.

Results: Out of 550 postmortem cases received during the study period, 57(10.4%) deaths were due to head injuries. The age ranged from 19 to 51 years with mean age of 35.6+ 7.9 years. Most (50%) of the deaths occurred in 4th decade and during daytime 34 (59.6%). Majority of subjects died on spot 40 (70.1%). Most of the deceased suffered from more than one compartment hemorrhage 30 (52.6%) and multiple skull bone fractures 24 (42.1%). November was the month in which most of the deaths occurred 13 (23.1%) followed by September 7 (17.5%). Majority 36 (63.1%) of subjects were travelling as passengers.

Conclusion: Head injury is one of the most frequent causes of death in road traffic accidents. Most of the deaths occur on spot before any life support can be give to these subjects. The pattern of skull fractures observed, was quite comparable to other studies. It indicates that road traffic accidents lead to similar kinds of fatal head injuries throughout the world. The frequencies of such injuries are more frequent in developing world due to the lack of traffic safety regulations.

Keywords: Head injuries, Road traffic accidents, skull fractures

INTRODUCTION

Road traffic accidents are one of the major causes of death in developed as well as developing countries[1]. Although this problem has been controlled very much in developed countries but in developing countries like Pakistan, condition is still worsening. Road traffic accidents still remain one of the leading causes of death in youth. The major reason is that it is one of the neglected health problems in Pakistan. About 1.2 million people are killed and 50 million people are injured due to road traffic accidents each year worldwide[2]. In 2002, road traffic accident ranked 9th amongst the leading causes of disease burden accounting for 2.6% of overall global disabilities. If increased motorization continues to follow the same trends, it is estimated that by 2020, road traffic accidents will rank as third leading cause of disease burden globally[3]. According to a report released by World Health Organization on April 7th, 2004, road traffic accidents kill at least 5000 and injure 12,000 persons in Pakistan every year[4].

Although there are many causes of fatalities in road traffic accidents, head injury is one of the major cause. Head injury may lead to skull fractures, various extents of brain parenchymal injuries and traumatic vascular injuries[5]. The latter includes formation of epidural and subdural hematomas and intracerebral hemorrhages[6]. Death due to head injury depends upon various factors including intensity of impact on head, degree of deceleration, pattern of skull bones fractured,

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Received: 25 Sep 2009; Accepted: 29 March 2010

degree and sites of parenchymal and vascular injuries, time spent from the time of injury to the specialized health care at hospital and how efficiently life support measures were given[7]. Unless some safety and preventive measures are strictly implemented death toll will continue to increase and will cause significant loss of precious lives.

The present study was conducted to ascertain the patterns of fatal head injuries due to road traffic accidents in northern areas of Pakistan as documented during autopsies performed at AFIP, Rawalpindi.

MATERIAL AND METHODS

This descriptive study was carried out at AFIP Rawalpindi, Data of all postmortem examinations carried out during the years 2004-2008 were retrieved from the record. Out of 550 autopsies carried out during these 5 years, a total of 57 comprised deaths secondary to head injuries resulting from road traffic accidents. All cases received due to death secondary to causes other than head injuries were excluded. Since we perform autopsies on serving soldiers and male employees of defense forces only, all cases were male.

Variables were age of the deceased, time of accident, pattern of vascular injury (extradural, subdural, intracerebral or combination of these), skull bones fractured, single or multiple with description of anatomical sites, other associated injuries, status of the deceased (whether passenger or driver), duration of hospital stay, calendar month of accident. Data were analyzed using SPSS version 14. Mean, median and mode were calculated for quantitative variables like age and hospital stay. Frequencies and percentages were calculated for qualitative variables like time of accident, pattern of head injury, skull bones fractured, other associated injuries, passenger position, status of deceased and duration of hospital stay.

RESULTS

Out of 550 autopsies received during the study period, 57 (10.4%) deaths were due to head injuries. All cases were males. The age ranged from 19 to 51 years with a mean age of 35.6+ 7.9 years. The hospital stay ranged from 1 hour to 14 days with a mean of 2.7 + 3.8 hours.

Out of total of 57 cases, 34 (59.6%) deaths occurred during day time and 23 (40.4%) deaths occurred during evening. Most deaths occurred in 4th decade (50.9%), followed by third (26.3%) and fifth decades (21%) of life (Figure). There was only one (1.8%) person who died at the age of 19 yrs. A total of 40 (70.2%) injured persons died on spot. The remaining 17 (29.8%) were received alive in various nearby hospitals. Seven (12.3%) patients died within 5 hours, 2 (3.5%) between 5-10 hrs, 4 (7%) could stay alive for 21-24 hrs and 1 (1.8%) each for 2 days, 5 days, 10 days and 14 days respectively. According to history all these patients who were received alive were given full life support. Fifteen (26.3%) cases had no skull bone fractures at all, 10 (17.5%) patients sustained more than 2 skull bone fractures and rest 14 (24.6%) had two skull bone fractures (Table 1). Out of the total of 18 (31.6%) subjects which received single skull bone fracture, the most frequent bone fractured was temporal (44.4%), followed by occipital (27.8%), frontal (16.7%) and parietal and sphenoid (5.6%) each.

Out of these 57 cases, more than half 30 (52.6%) subjects presented with hemorrhage in more than one vascular compartment. The most frequent pattern was a combination of extradural and intracerebral hematomas i.e: 18 (60%). This was followed by extradural and subdural 6(20%), extradural and subarachnoid 3 (10%) and subdural and intracerebral 3 (10%). (Table 2). Out of 27 (47.4%) single compartment hemorrhage, the most frequent was extradural 15 (55.6%), followed by subdural 7 (25.9%), subarachnoid 3 (11.1%) and intracerebral 2 (7.4%).

There were no injuries to other body parts in 14 (24.6%) cases. Out of the remaining 43 (75.4%) cases, there were 12 (28%) with rib fractures, 5 (12%) cases with lung lacerations, 4 (9%) with facial bone fractures, 5 (12%) with spinal injuries and 1 (2%) each for pelvic, lower limb, liver and tracheal injuries. A total of 13 (30%) cases received more than two injuries other than head injuries. About 36 (63.2%) subjects were travelling as passengers and 19

(33.3%) as drivers. Two (13.5%) subjects were pedestrians when they encountered accidents. Most deaths occurred in November 13 (23%) and September 7 (12%), followed by October 5 (9%). Other calendar months did not show significance regarding accident frequency.

Out of total of 8 subjects encountering temporal bone fractures, 4 died on spot and 4 were received alive in hospitals. Of the later, 2 stayed alive for 24 hrs, 1 for 5 days and 1 for 14 days. All of the 5 subjects with occipital bone fractures died on spot. Out of 24 subjects receiving multiple skull fractures, 20 died on spot. Of the remaining four, 2 could stay alive for less than 5 hrs and other two for 24 hrs. There were 15 cases which did not encounter any fracture but yet 7 died on spot. Out of the remaining 8 which were received alive, 4 could stay alive for less than 5 hrs, 2 for 1 day, 1 for 2 days and 1 for 10 days. Out of 19 subjects which were drivers, most frequent hemorrhage was extradural followed by multiple hematomata. Of 36 subjects travelling as passengers, most had more than one vascular injury on post-mortem examination.

DISCUSSION

In this study, fatalities due to head injury comprised 10.4% of all deaths. All the deceased were males as we autopsy male soldiers only. In studies based on general population, most of the patients are males because that is the gender exposed more to traffic hazards on urban streets[7,8]. Hence although our study had a strong gender bias our results are still consistent with available data[7,8].

The most common age group affected in this study was the fourth decade followed by the third. These results were compatible with studies from other countries[9,10]. This age group comprising breadwinners for their families, travel more. This study was carried out on army soldiers but most of the accidents occurred when they were travelling in public or private vehicles on their way to homes to visit their families or retuning to their units after holidays. As most of the deaths occurred while travelling in public transport, they were exposed to the usual traffic conditions just as applied to the general population.

Table-1: Skull bone fractured (n=57)

Fracture	Number	Percentage
Total number of cases fractured	**42**	**73.6**
Multiple Fractures	**24**	**42.1**
Fronto-occipito-temporal	6	25.1
Fronto-occipito-parietal	4	16.6
Frontal and parietal	4	16.6
Parietal and occipital	4	16.6
Parietal and temporal	4	16.6
Frontal and temporal	2	8.5
Single bone fractured	**18**	**31.5**
Temporal	8	44.4
Occipital	5	27.8
Frontal	3	16.7
Parietal	1	5.6
Sphenoid	1	5.6
No fractures	**15**	**26.4**

Table-2: Pattern of cranial hemorrhage (n=57)

Type of hemorrhage	Number	%
Combination	**30**	**52.6**
Extradural and intracerebral	18	60
Extradural and subdural	6	20
Extradural and subarachnoid	3	10
Subdural and intracerebral	3	10
Single Compartment	**27**	**47.4**
Extradural	15	55.6
Subdural	7	25.9
Subarachnoid	3	11.1
Intracerebral	2	7.4

Most of the deceased suffered from multiple skull bone fractures (n=24, 42.1%). There was no skull bone fracture in 26.4% of cases. Out of the cases which suffered from single bone fractures, the most frequent bone fractured was temporal bone (n=8, 44.4%), followed by occipital bone (n=5, 27.8%). The results were identical to an Indian study[11]. The probable reason of multiple skull bone fractures is very high speed at which vehicles move on highways. So accidents which occur at high speeds cause a great impact on head when it strikes by forcible contact with a broad resisting surface.

In our study, multiple compartment hemorrhages were more frequent as compared to single compartment hemorrhages. Most of the deceased (n=30, 52.6%) suffered from combinations of vascular hemorrhages. The most frequent combination was of extradural

and intracerebral hemorrhage. Out of the remaining cases with single compartment hemorrhages, the most frequent was extradural hemorrhage followed by subdural hemorrhage. In other studies, combination of hemorrhages was less frequent[12]. When frequencies of single compartment hemorrhages were compared, a large number of studies revealed subdural hemorrhage as the frequent group which was not consistent with our study where the frequent single compartment hemorrhage was extradural followed by subdural[13, 14].

Most of the subjects (n=40, 70.1%) died on spot. The remaining 17 (29.9%) cases were received alive in various nearby hospitals and remained alive for a minimum of 1 hour to a maximum of 14 days as mentioned in results. These results were matched with a few international studies[12-13]. In our study, as in other full life support was available at the hospitals in which these subjects were received alive. Majority of these subjects were travelling as passengers. Most (n=34, 59.5%) of the accidents occurred during the day time in our study, in the months of October (9%) and November (23%). These results were comparable with a few studies and were different from other studies published. Maximum number of fatal accidents took place during the month of November in one Indian report[11]. In Nepal, maximum numbers of cases were reported in the month of July followed by January. In other studies conducted in India the results indicated maximum numbers of victims during the month of January with the peak time of road traffic accidents between 3 PM to 6 PM[15,16]. The studies conducted in Mangalore and Kathmandu (Nepal) indicated that most of the accidents happened during the afternoon and evening hours[17,18].

CONCLUSION

Head injury is one of the important causes of death in road traffic accidents. Most of the deaths occur on spot before any life support can be give to these subjects. It is important to improve pre-hospital as well as hospital facilities to deal with fatal head injuries. The pattern of skull fractures observed in our study was quite comparable to other studies. It indicates that road traffic accidents lead to similar kinds of fatal head injuries throughout the world. The frequencies of such injuries are more frequent in developing world due to the lack of traffic safety regulations. Large scale studies are required to make recommendations for improving the vehicle designs, road safety measures and focusing on implementations of traffic legislations covering all the aspects of road traffic accidents. These studies will also provide guidelines for establishing possible emergency first aid providing medical and rescue facilities.

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