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A Postmortem Study of Pattern and Distribution of Intracranial Haemorrhages in Fatal Head Injuries Following Road Traffic Accidents in Basaveshwara Teaching and General Hospital, Gulbarga

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ABSTRACT

Background: The present study was conducted to know, pattern and distribution of intracranial haemorrhage in fatal head injuries in RTAs along with victim's age and sex and survival period. In addition, an attempt was also made to know the cause of death.

Methodology: The present study was both retrospective and prospective study. The study material comprised of 75 victims of RTA cases, who were admitted and died in Basaveshwara teaching and general Hospital, MRMC, Gulbarga and subsequently autopsied, during the 3 year period from May 2011 to April 2014.

Results: In this study, males outnumbered females in the ratio 2.9:1. Age group most commonly involved was 21 – 30 years (24%). Most of the victims died < 24 hours following accident (58.66%). Most common victims involved were motor cycle occupants (37.33%). Intracranial haemorrhage was present in maximum number of victims (58.67%), followed by lung injuries (33.33%). Subdural haemorrhage was seen in majority of cases (38.67%). Intracranial injuries alone were responsible for death in 57.33% followed by hemorrhagic shock in 36%.).

Conclusion: RTA's are the penalty paid by us for rapid transportation and have become the commonest cause of unnatural deaths. The rise in the number of fast moving vehicles, semi-skilled drivers, drunken drivers, congested and ill-maintained roads has led to the increase in the number of RTA's. Intracranial injury was the most common finding in the study. It was observed that in majority of cases, intracranial injury contributed either directly or indirectly to death especially with skull fracture. Hence stricter implementation of traffic rules and promotion of road safety measures by the concerned authority viz. the use of helmets and seatbelts, avoidance of over speeding, using footpaths, etc. is the need of the hour. It also highlights the need of emergency trauma services at site of the occurrence for reducing morbidity and mortality in such cases.

Keywords: Road traffic accidents, fatal head injuries, Intracranial Haemorrhage.

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INTRODUCTION

Road traffic accident is any vehicle accident occurring on the roadway (i.e. originating on, terminating on, or involving a vehicle partially on the roadway)[1]. Amongst all traffic accidents, road traffic accidents have largest claim on human life and most serious health related problems. This occur when a road vehicle collides with another vehicle, pedestrian, animal, geographical or architectural obstacle causing injuries or death of involved individuals.

Intracranial hemorrhages/ Hematoma are classified by anatomical location as Extradural, Subarachnoid, Subdural, Intracerebral hemorrhage. Its a common complication of head injury and is the most common cause of death in patients who experienced a lucid interval, 'talk and die', or 'talk and deteriorate after injury'. In several cases of death due to blunt force head trauma, the only intracranial injuries that are evident at autopsy include subdural and subarachnoid hemorrhage [2].

Extradural/Epidural Hematoma (EDH) is the bleeding occurring between the inner table of the skull and meninges (dura). It is seen in falls and road traffic accidents (upto 10% of severe head injury cases). Its common in adults between 20-40 years as the dura is able to strip more readily off the underlying bone. Mostly traumatic in origin be due to impact over lateral convexity of head, resulting in linear fracture of squamous temporal bone with rupture of underlying middle meningeal artery which is a direct branch of internal maxillary artery [2].

Subdural Hematoma (SDH) occurs between the under surface of dura and outer surface of arachnoid mater. It is essentially venous or capillary involving rupture of bridging or communicating veins traversing the subdural space to drain into parasagittal sinus and tears in the dural venous sinuses and not arterial bleeding. It is usually traumatic, following an assault or fall (70-75%), accidents account for another 20-25% of cases [2].

Subarachnoid Hematoma (SAH) is the hemorrhage in the subarachnoid space between the arachnoid and pia mater, mixed with CSF. It is common in TBI and even in minor head trauma, small amount of localized SAH over the cerebral convexities is almost invariably seen. It is mostly venous in origin and has traumatic and non-traumatic causes [2].

Intracerebral Hematoma (ICH) are hemorrhage found within the cerebral parenchyma that is not in contact with the surface of the brain. Traumatic ICH is seen in 15% of all patients who sustain fatal head injuries. Most likely result from a direct rupture of intrinsic cerebral blood vessel in relation to contusions at the time of injury. Hypertension, trauma and cerebral amyloid angiopathy cause the majority of these hemorrhages[2].

AIMS AND OBJECTIVES

1. To study the various pattern and distribution of intracranial hemorrhages in Road Traffic Accidents.
2. To find out the duration of survival and cause of death.
3. To determine the age and sex incidence in victims of fatal Road Traffic Accidents.
4. To suggest measures to reduce the incidence and number of deaths due to Road Traffic Accident.

METHODS & MATERIALS

The present study was both retrospective and prospective study. The study material comprised of 75 victims of RTA cases, who were admitted and died in Basaveshwara teaching and General Hospital, MRMC, Gulbarga and subsequently autopsied at the same centre during the 3 year period from May 2011 to April 2014.

In the present study information regarding the bio-data of the deceased and various characters regarding the circumstances of the accident and time of accident were gathered from all possible sources like police records and hospital records. In addition to these X-ray report of each case was reviewed and the radiograph was examined for the presence of

fracture. In retrospective study, postmortem findings from the reports were noted, whereas in each case of prospective study, a thorough external and internal examination was done for the injuries and opinion as to the cause of death was made after the examination. The data thus obtained was recorded in the proforma, which comprised relevant data that is concerned with the objectives of the study and analyzed.

SAMPLE SIZE:

The sample size was calculated to be 75 for 3 years, by taking 25% of the average of similar cases, in Basaveshwara teaching and general Hospital, MRMC, Gulbarga over a period of 1 and half years of retrospective cases (May 2011 to October 2012) which comprised of 37 cases and this was covered during the above said period.

INCLUSION CRITERIA:

All the victims of RTA cases admitted and died in the Basaveshwara Teaching and General Hospital, MRMC, Gulbarga and subsequently autopsied at the same centre, were included in the present study.

EXCLUSION CRITERIA:

Cases other than RTAs were excluded from the study.

RESULTS

The findings obtained in the present study were tabulated as in Table 1.

Out of 75 cases (Table 1), 56 (74.67%) were males and 19 (26.33%) were females indicating that a large majority of victims were male. Male to female ratio was 2.9:1. Maximum numbers of victims were in the age group 21 - 30 years comprising of 18 cases (24%), followed by 12 cases each (16%) in age group 31-40 yrs and 41-50 yrs. Minimum victims were found in the age group less than 10 years comprising of 5 cases (6.67%). Youngest victim was 3 years old male child and eldest was 70 years old male.

In the present study (Table 2), 44 victims (58.66%) died within 24 hours after the accident, 13 victims (17.33%) died after 24 hours but within 3 days. The number of cases decreased with increase in survival period. Only 2 victims (2.67%) survived for more than 4 weeks.

Majority of the victims (Table 3) who died due to road traffic injuries were a motor cycle (two-wheeler) occupants comprising of 28 cases (37.33%) followed by occupants of light motor vehicle in 25 cases (33.33%) and pedestrians in 16 cases (21.34%) and least cases were of pedal cyclist and heavy motor

Table 1: Age and sex wise distribution of cases of fatal RTA

Age group (in years)	Male	Female	Total	
			No	Percentage (%)
≤10	2	3	5	6.67
11-20	5	4	9	12
21-30	15	3	18	24
31-40	9	3	12	16
41-50	9	3	12	16
51-60	10	1	11	14.67
61-70	6	2	8	10.66
Total	56	19	75	100

Table 2: Period of survival following accident

Survival period	No. of cases	Percentage (%)
<24 hours	44	58.66
24 hours to 3days	13	17.33
3 days to 1 week	6	8
1 week to 2 weeks	5	6.67
2 to 4 weeks	5	6.67
> 4 weeks	2	2.67
Total	75	100

Table 3: Distribution of types of the victim

Status	No. of cases	Percentage (%)
Pedestrians	16	21.34
Pedal cyclist	3	4
Motor cyclist	28	37.33
Light motor vehicle	25	33.33
Heavy motor vehicle	3	4
Total	75	100

vehicle occupants seen in 3 cases each (4%). Most of the two-wheeler occupants were riding the motor cycle.

In the present study (Table 4), soft tissue/ organ injuries were classified as head & neck, thorax, abdomen & pelvis. In head & neck, brain injuries were seen in 21 cases (28%) and brain haemorrhages was seen in 44 cases (58.67%). In thorax, lung injuries were seen in 25 cases (33.33%), heart injuries in 2 cases (2.67%) and major large vessels were injured in 9 cases (12%). In abdomen, spleenic injuries were seen in most cases (10) comprising 13.33%, followed by injury to liver 8 cases (10.66%) and then kidneys, stomach and intestine. In pelvis, bladder is injured in 2 cases (2.67%) and genitalia in 1 case (1.33%).

In our present study (Table 5), brain haemorrhages were classified as extradural haemorrhage, subdural haemorrhage, subarachnoid haemorrhage and intra cerebral/ cerebellar haemorrhage. Subdural haemorrhage was most commonly seen (29 cases), followed by subarachnoid haemorrhage (26),

Table 4: Pattern and Distribution of Soft tissue/organ injuries involvement

Type	No. of cases	Percentage (%)	Total cases
Head & neck			75 (100%)
Brain	21	28	
Intracranial haemorrhage	44	58.67	
Thorax			
Lungs	25	33.33	
Heart	2	2.67	
Diaphragm	1	1.33	
Large vessels	9	12	
Abdomen			
Stomach and intestine	5	6.67	
Liver	8	10.66	
Spleen	10	13.33	
Kidneys	6	8	
Pelvis			
Bladder	2	2.67	
Organs of generation	1	1.33	

Table 5: Distribution of Intracranial haemorrhage and their relation to each other:

	Extradural haemorrhage	**Subdural haemorrhage**	**Subarachnoid haemorrhage**	**Intra-cerebral / cerebellar haemorrhage**	**Skull fracture**
Extradural haemorrhage	6	3	4	2	5
Subdural haemorrhage	3	29	14	4	20
Subarachnoid haemorrhage	4	14	26	11	20
Intra-cerebral / cerebellar haemorrhage	2	4	11	14	7

intra cerebral/cerebellar haemorrhage (14) and least seen was extradural haemorrhage (6). Subarachnoid haemorrhage was associated with subdural haemorrhage in 14 cases, with intra cerebral haemorrhage in 11 cases, with extradural haemorrhage in 4 cases respectively. Extradural haemorrhage was seen in only 6 cases as it was sweaped out due to fracture of skull and hence it was not appreciated at autopsy. Among 6 cases of extradural haemorrhage, fracture of the skull was seen in 5. Among the 29 cases of subdural haemorrhage, 20 had fracture of skull. Among the 26 cases of subarachnoid haemorrhage, fracture of the skull was seen in 20. Among the 14 cases intra cerebral/cerebellar haemorrhage, 7 had fracture of th skull.

In this research study, maximum cause of death was intracranial injuries (57.33%) followed by hemorrhagic shock (36%), respiratory insufficiency (5.34%) and thrombo-embolism (1.33%). Most of the deaths due to hemorrhagic shock are due to blunt thoraco-abdominal injuries.

DISCUSSION

Out of 75 cases, 56 (74.67%) were males and 19 (26.33%) were females indicating that a large majority of victims were male. Male to female ratio was 2.9:1. Maximum numbers of victims were in the age group 21 - 30 years comprising of 18 cases (24%) as they lead an active life & the findings are consistent with the studies done by Khajuria B et al [3], R.M.Tandle et al [4], Chaitanya R et al [5] & Jakkam Surender [6].

In the present study, 44 victims (58.66%) died within 24 hours after the accident, 13 victims (17.33%) died after 24 hours but within 3 days. The number of cases decreased with increase in survival period similar to the study done by Jakkam Surender [6], J.R. Shinde et al (2012)[7] & Hetal C. Kyada et al (2012)[8].

Majority of the victims who died due to road traffic injuries were a motor cycle (two-wheeler) occupants comprising of 28 cases (37.33%) and most common offending vehicle involved in road traffic accidents was heavy motor vehicle seen in 34 cases (45.33%) in accordance with studies done by R.M.Tandle et al (2012)[4] and Dr. Dhaval J. Patel (2009)[9].

The internal injuries were classified like soft tissue/ organ injuries and bone fracture. Soft tissue/ organ injuries were seen in almost all i.e. 75 cases and bone fracture was seen among 66 cases. In soft tissue/organ injuries, in head & neck, brain injuries were seen in 21 cases (28%) and brain haemorrhages was seen in 44 cases (58.67%). In thorax, lung injuries were seen in 25 cases (33.33%), heart injuries in 2 cases (2.67%) and major large vessels were injured in 9 cases (12%). In abdomen, spleenic injuries were seen in most cases (10) comprising 13.33%, followed by injury to liver 8 cases (10.66%) and then kidneys, stomach and intestine. In pelvis, bladder is injured in 2 cases (2.67%) and genitalia in 1 case (1.33%). The findings of the present study were similar to the study done by , Jakkam Surender [6] and Dr. Harman Singh et al (2004)[10].

In our present study, brain haemorrhages were classified as extradural haemorrhage, subdural haemorrhage, subarachnoid haemorrhage and intra cerebral/cerebellar haemorrhage. Subdural haemorrhage was most commonly seen in 29 cases (38.67%), followed by subarachnoid haemorrhage in 26 cases (34.67%), intra cerebral/cerebellar haemorrhage in 14 cases (18.67%) and least seen was extradural haemorrhage in 6 cases (8%). Subarachnoid haemorrhage was associated with subdural haemorrhage in 14 cases, with intra cerebral haemorrhage in 11 cases, with extradural haemorrhage in 4 cases respectively. Extradural haemorrhage was seen in only 6 cases as it was sweaped out due to fracture of skull and hence it was not appreciated at autopsy. Among 6 cases of extradural haemorrhage, fracture of the skull was seen in 5. Among the 29 cases of subdural haemorrhage, 20 had fracture of skull. Among the 26 cases of subarachnoid haemorrhage, 20 had fracture of the skull. Among the 14 cases of intra cerebral/cerebellar haemorrhage, 7 had fracture of the skull. Subdural haemorrhage was the most commonly seen haemorrhage

according to the various studies conducted by Khajuria B et al [3] (79.31%), Chaitanya R et al [5] (39.1%), Dr. Harman Singh et al [10] (44.7%) which are consistent to the findings in the present study. In the first two studies subarachnoid haemorrhage followed subdural haemorrhage with 34.7% and 79.31% of cases respectively. A combination of SDH with SAH was most commonly observed in studies conducted by R.M.Tandle et al [4] (61.95%) which is consistent with the present study.

In maximum cases cause of death was intracranial injuries (57.33%) followed by hemorrhagic shock (36%) consistent with the findings in the study done by Khajuria B et al [3], Jakkam Surender [6], J.R. Shinde et al (2012)[7], Hetal C. Kyada et al (2012)[8] and Dr. Harman Singh et al [10].

CONCLUSION AND RECOMMENDATIONS

Road Traffic Accidents constitute a complex phenomenon. Road traffic accident accounts for major epidemiological, medical and medico legal problem in developing countries like India. Road vehicles have no respect for anatomical boundaries or surgical specialties. Majority of the victims were males and more than 50% of the victims were between the age group 21 to 50 years who are at the most active phase of life both physically and socially. This study shows that most of the deaths in road traffic accidents (58.66%), brought to the hospital took place within 24 hours after sustaining multiple injuries which is very alarming and highlights the need for taking urgent steps for establishing good pre-hospital care and provision of trauma services. Intracranial injuries were seen in (58.67%) of the cases. In majority of victims, intracranial injuries contributed either directly or indirectly to death. Subdural haemorrhage was seen in majority of cases (38.67%). Intracranial injuries cause alone was responsible for death in 57.33% of cases, followed by haemorrhagic shock (36%), respiratory insufficiency (5.34%) and thrombo-embolism (1.33%). This shows that intracranial injuries are most common fatal injuries in road traffic accidents in this region. This could be due to the fact that, the intracranial injuries cannot be treated successfully, even in tertiary level hospitals. Hence, fatalities due to injuries of road traffic accidents can be reduced by preventing the occurrence of such injuries. Encouraging the use of protective measures especially head protective's like use of crash helmets by motorcyclists, use of seat belts by occupants of motor vehicle, inclusion of air bags in cars. Education to the general public regarding traffic rules, safety precautions and risk factors. Proper maintenance of roads, by improving the surface and road signals during both day and night.

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Ethical Clearance: Ethical clearance was obtained before undertaking the research study from Institutional Ethical Committee of Basaveshwara teaching and general Hospital, Mahadevappa Rampure Medical College (MRMC), Gulbarga.

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