

Pattern of Intracranial Haemorrhages' In Cases of Two Wheelers without Wearing Helmet in Fatal Road Traffic Accidents in Mangalore

Dr. Azia Manzoor Bhat¹, Dr. Wasim Manzoor Bhat²

Available online at: www.xournals.com

Received 16th October 2021 | Revised 03rd February 2022 | Accepted 19th September 2022

Abstract:

Deaths due to road traffic accidents are one of the common forms of unnatural death and its history is as old as the invention of the wheel. To study the pattern of Intracranial hemorrhages in cases of two wheelers without wearing helmet in fatal road traffic accidents in Mangalore. All cases of road traffic accidents involving fatal head injuries among two wheelers which underwent autopsy at the Wenlock District Hospital and Justice K.S Hegde charitable Hospital, Mangalore from January 2009 to December 2013 were included in the study. A proforma was prepared accordingly to collect the details about the pattern of skull fractures and also about intracranial haemorrhages were obtained and entered in the proforma. Out of total 101 cases of RTA with two wheelers 91.09% had not used helmet while only 8.91% were wearing helmet. Majority of the cases (36.96%) not using helmet were 20-29 years of age. Among helmet non users 94.57% cases were male. Diffuse Extravasation of Blood from Scalp (41.3%) was observed most commonly followed by combined Extravasation from Frontal, Parietal and Temporal region (14.13%) among the non-helmet users. No brain injury was diagnosed in 26.09% cases. Among the non-helmet user victims diffuse brain injury was seen in 30.43% cases while frontal lobe was involved in 26.09% cases. Thus we conclude that Sub arachnoid haemorrhage and Sub Dural haemorrhage was the most common intracranial haemorrhages in cases of two wheelers without wearing helmet in fatal road traffic accidents in Mangalore.

Keywords: Intracranial haemorrhages, fatal road traffic accidents, two wheelers without wearing helmet

Authors:

1. Assistant Professor and Head, Department of Forensic Medicine and Toxicology, Government Medical College Anantnag, Jammu and Kashmir 192101, India.
2. Senior Resident, Department of Dentistry, SKIMS Soura, Srinagar, Jammu and Kashmir, INDIA

Introduction

Death is the ultimate truth among the two extremes of the life. But unnatural death is always a surprise and is known for its immense striking power. Road traffic accident deaths are one of the common forms of unnatural death and its history is as old as the invention of the wheel (Johnson *et al.*, 1995). Extensive and irrational vehicle uses for different purposes have increased the nature of assaults and accidental fatalities (Mestri, 2020). The shearing, strains and biophysical motion (mechanical forces) that occur during accidents to the head are responsible for patterns of injuries. Road traffic accident is the third major preventable cause of death (Ravikumar, 2013). In many countries less attention was given to the need of two wheelers and pedestrians when roads are planned and built to allow motor vehicles to travel faster. Injury to the head following two wheeler accidents is the commonest cause of mortality and morbidity.

In traffic accidents Motor cyclists are about 25 times more likely to die than passenger car occupants (Traffic Safety Facts, 2009). About 20% of deaths in RTA are in motor cycle accidents (National Crime Records Bureau, 2008; Gupta *et al.*, 1979). Majority of the people were young males who are in the productive period of life. This places heavy burden on the family social and medical resources. Two wheeler riders are more vulnerable to RTA and for sustaining injuries because they do not have protective shell around them as compared to those inside vehicles. They are at more risk when their needs have not been taken into consideration during the construction of roads. The present study was undertaken to compare the injury pattern in drivers and pillion riders in two wheeler accidents.

Aims and objectives

Study the pattern of intracranial haemorrhages in cases of two wheelers without wearing helmet in fatal road RTA in Mangalore.

Materials and method

The present record based retrospective study was conducted at the Wenlock District Hospital and KSHEMA, Mangalore. All cases of RTA involving fatal head injuries which underwent autopsy at the Wenlock District Hospital and KSHEMA, Mangalore from January 2009 to December 2013 were included in the study. Out of these cases patients involved in two wheeler accidents were further evaluated. Both of the hospitals being major tertiary care hospitals, situated in Mangalore. While all other fatal head injury other than road traffic accidents was excluded.

A proforma was prepared accordingly to collect the data based on the deceased’s particulars, with complete external and internal examination in retrospective studies of those involved in fatal head injury cases due to road traffic accidents. Recorded details include name, age, sex, address, information furnished by the police in the inquest papers, postmortem reports, investigation reports if any and cause of death. All the data obtained was kept anonymous to protect the identity of the deceased and also for confidential medico legal information.

The details about the pattern of skull fractures and also about intracranial haemorrhages were obtained and entered in the proforma. The data from all the proformas were compiled in a master chart, analyzed by calculating sum, range, distribution and percentage. The data was also tabulated and appropriate inferences were drawn. These inferences were compared with other similar studies.

Table no.1: Distribution of cases according to use of helmet at the time of accident

		Helmet Used		Helmet not used		Grand Total	
		No. of victims	%	No. of victims	%	No. of victims	%
Age in Years	1-9 years	0	0.00	0	0.00	0	0.00
	10-19 years	2	22.22	5	5.43	7	6.93
	20-29 years	2	22.22	34	36.96	36	35.64
	30-39 years	3	33.33	20	21.74	23	22.77
	40-49 years	1	11.11	14	15.22	15	14.85
	50-59 years	1	11.11	13	14.13	14	13.86
	60-69 years	0	0.00	2	2.17	2	1.98
≥70 years	0	0.00	4	4.35	4	3.96	
Sex	Male	9	100.00	87	94.57	96	95.05
	Female	0	0.00	5	5.43	5	4.95
Total		9	100.00	92	100.00	101	100.00

Result

It was observed that out of total 101 cases of RTA with two wheelers 91.09% had not used helmet while only 8.91% were wearing helmet.

It was observed that majority of the cases (36.96%) not using helmet were 20-29 years of age. Among helmet non users 94.57% cases were male.

Table no.2: Distribution of cases according to details of injuries

Parameter		Helmet Used		Helmet not used		Grand Total	
		No. of victims	%	No. of victims	%	No. of victims	%
Scalp Extravasation of Blood	Absent	1	11.11	10	10.87	11	10.89
	Diffuse	3	33.33	38	41.30	41	40.59
	Frontal	0	0.00	6	6.52	6	5.94
	Frontal+Parietal +Temporal	3	33.33	13	14.13	16	15.84
	Frontal+Temporal+Occipital	0	0.00	2	2.17	2	1.98
	Parietal	0	0.00	3	3.26	3	2.97
	Parietal+Temporal+Occipital	2	22.22	6	6.52	8	7.92
	Temporal	0	0.00	5	5.43	5	4.95
	Occipital	0	0.00	9	9.78	9	8.91
Injuries to face and head	Absent	1	11.11	3	3.26	4	3.96
	Abrasion	0	0.00	8	8.70	8	7.92
	Abrasion+Laceration	3	33.33	23	25.00	26	25.74
	Abrasion+Laceration+Contusion	2	22.22	21	22.83	23	22.77
	Abrasion+Laceration+Contusion	0	0.00	2	2.17	2	1.98
	Abrasion+Contusion	0	0.00	4	4.35	4	3.96
	Abrasion+Surgical Scar	0	0.00	8	8.70	8	7.92
	Laceration	0	0.00	7	7.61	7	6.93
	Contusion	0	0.00	1	1.09	1	0.99
	Crush	0	0.00	3	3.26	3	2.97
	Surgical Scar	3	33.33	12	13.04	15	14.85
Grand Total		9	100.00	92	100.00	101	100.00

Diffuse Extravasation of Blood from Scalp (41.3%) was observed most commonly followed by combined Extravasation from Frontal, Parietal and Temporal

region (14.13%) among the non-helmet users. Abrasions (71.75%) and Lacerations (70.66%) were the most common injuries to face and head.

Table no.3: Distribution of cases according to Type of Intracranial Haemorrhage

Type of Intracranial Hemorrhage	Helmet Used		Helmet not used		Grand Total	
	No. of victims	%	No. of victims	%	No. of victims	%
Absent	3	33.33	10	10.87	13	12.87
EDH+SDH	1	11.11	3	3.26	4	3.96
SDH	0	0.00	2	2.17	2	1.98
SDH+SAH	5	55.56	44	47.83	49	48.51

SDH+SAH+IVH	0	0.00	16	17.39	16	15.84
SAH	0	0.00	10	10.87	10	9.90
SAH+IVH	0	0.00	7	7.61	7	6.93
Grand Total	9	100.00	92	100.00	101	100.00

In the present study Sub arachnoid haemorrhage (83.7%) was the most common type of intracranial haemorrhage followed by Sub Dural haemorrhage (70.65%) was observed.

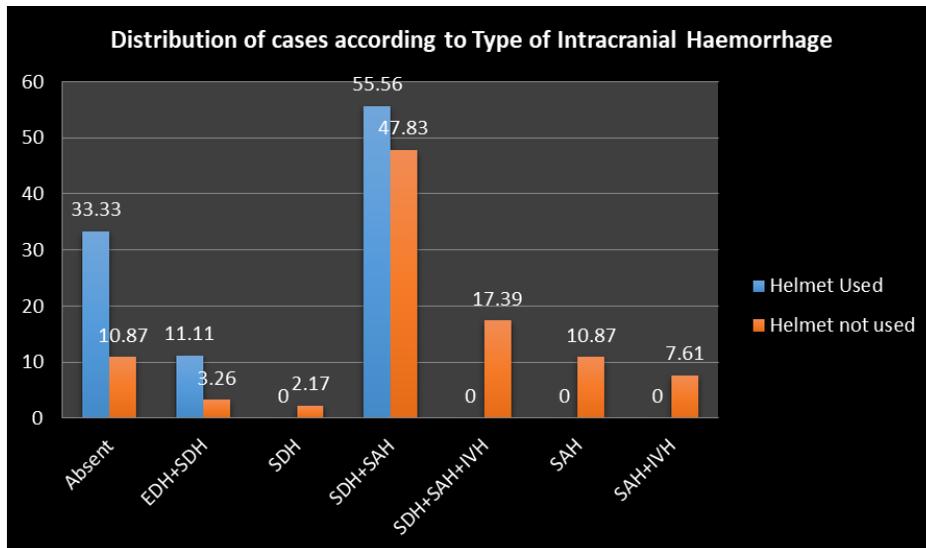


Table no.4: Distribution of cases according to details of Brain Injuries

Parameter		Helmet Used		Helmet not used		Grand Total	
		No. of victims	%	No. of victims	%	No. of victims	%
Type of Brain Injury	Absent	1	11.11	24	26.09	25	24.75
	Contusion	1	11.11	14	15.22	15	14.85
	Contusion+Laceration	2	22.22	16	17.39	18	17.82
	Laceration	0	0.00	4	4.35	4	3.96
	Oedema	3	33.33	25	27.17	28	27.72
	Expelled out	2	22.22	9	9.78	11	10.89
Site of Brain Injured	Absent	1	11.11	24	26.09	25	24.75
	Frontal	1	11.11	9	9.78	10	9.90
	Frontal+Temporal	2	22.22	14	15.22	16	15.84
	Frontal+Parietal	0	0.00	1	1.09	1	0.99
	Temporal	1	11.11	9	9.78	10	9.90
	Parietal	0	0.00	3	3.26	3	2.97
	Occipital	0	0.00	2	2.17	2	1.98
	Base of Brain	0	0.00	2	2.17	2	1.98
Grand Total	9	100.00	92	100.00	101	100.00	

Contusion (32.61%) was most common type of Brain Injury observed among non-helmet users followed by Oedema (27.17%) was observed. No brain injury was diagnosed in 26.09% cases. Among the non-helmet user victims diffuse brain injury was seen in 30.43% cases while frontal lobe was involved in 26.09% cases.

Discussion:

A helmet aims at reducing the risk of serious head injury by minimizing the impact of force, by reducing the deceleration of the skull, spreading the forces over a greater surface area and preventing direct contact between skull and the impacting object (**Pruthi et al., 2010; Mohan, 2004**). When motorcyclists crash at lower speeds, helmets significantly decrease the risk of death but at speeds greater than 50 km/h, there is no added benefit from a helmet (**Shibata and Fukuda, 1994**). This finding is plausible given that motorcycles crashing at higher speeds may result in overall body injuries not compatible with life regardless of how well the head is protected, or that the energy transfer on crashing above a certain speed overcomes any protective effect of a helmet.

It was observed that out of total 101 cases of RTA with two wheelers 91.09% had not used helmet while only 8.91% were wearing helmet. Similarly, **Tripathi et al., 2014** observed only 13.4% of all two wheeler passengers were wearing helmet at the time of accident. Thus despite legislation and many public awareness programs, the use of helmet is very less. **Ravikumar, 2013** in their study observed that 35.82% riders, among 187 riders have not been wearing a helmet at the time of accident while none of the pillion riders have been wearing Helmet. Failure to wear a helmet resulted in a significantly higher incidence of head injury and death among both riders and pillion rider motorcycle crashes as found in **Pruthi et al., 2010** and **Sharma et al., 1994**. Study in **Mumtaz et al., 2007** where frequency of helmet use is 56.6% and that of non-users in 43.3%.

It was observed that majority of the cases (36.96%) not using helmet were 20-29 years of age followed by 30-39 years of age (21.74%). **Ravikumar, 2013** study showed that the two wheeler RTAs were more in the third and fourth decades constituting 47.75% and 22.44% of total 245 victims. Findings found in the studies by **Kumar et al., 2008** results show that the younger economical active groups 21-30 years followed by 31-40 years, highest number of fatalities (54.24%) was in the 21-40 years were predominantly involved as these age groups are found using the roads

frequently and are generally rash drivers. In **Kakeri et al., 2014** study maximum victims (29.5%) were seen in the age group of 21-30 years, followed by 25.5% in the age group of 31-40 years. Individuals in the age group of 71-80 years is the least affected 4 cases (2.2%), maximum number of males 45 is seen in the age group of 21-30 years and 2 cases of male 54 cases of females is seen.

Among helmet non users 94.57% cases were male while among helmet users all were male. Similarly **Tripathi et al., 2014** also observed male predominance. **Ravikumar, 2013** observed the cases are seen more in the male victims (87.75% as compared to females (12.25%). Similar to the findings of studies of **Kumar et al., 2008** were males belonging to 88.22% and females 11.77% and in the study of **Singh et al., 2005** males belong to 86.96% and females belong to 13.04%. In the study by **Kakeri et al., 2014** male comprised a majority and constituted 83.3% of 150 cases compared to females 16.7% (30) cases. The male preponderance may be due to the effect that males are more exposed to outdoor activities travelling between the home and place of work to earn bread for the family. While woman remains mainly indoor involved in house hold work.

Abrasions (71.75%) and Lacerations (70.66%) were the most common injuries to face and head. Diffuse Extravasation of Blood from Scalp (41.3%) was observed most commonly followed by combined Extravasation from Frontal, Parietal and Temporal region (14.13%) among the non-helmet users. In **Singh et al., 2005** study 62% of victims showed facial injuries like abrasion, contusion and laceration, in 55.3% victims no injuries were seen at all. Commonest injury was abrasion (28.6%) seen along face region as seen in (16.3) was alone of 97 cases of facial injuries (40.6%) cases had facial bone fracture.

In the present study Sub arachnoid haemorrhage (83.7%) was the most common type of intracranial haemorrhage followed by Sub Dural haemorrhage (70.65%) was observed. **Ravikumar, 2013** also in their study found subdural haemorrhage (90.83%) as the commonest variety of Intra Cranial Hemorrhage, followed by sub arachnoid haemorrhage 70.53%, Intra cerebral hemorrhage 20.64% and least is extra dural hemorrhage found in 4.75% of cases. In the study by **Kakeri et al., 2014** among intracranial hemorrhage, subdural and sudrachnoid hemorrhage were the commonest present in 95(63.3%) cases followed by combination of subdural + sudrachnoid intracerebral haemorrhages 25(16%). Similar findings were also

observed by **Pathak et al., 2008** and **Sirathranont and Kasantikul, 2003**. Contusion (32.61%) was most common type of Brain Injury observed among non-helmet users followed by Oedema (27.17%) was observed. No brain injury was diagnosed in 26.09% cases. Among the non-helmet user victims diffuse brain injury was seen in 30.43% cases while frontal lobe was involved in 26.09% cases. Similar results were observed in a study done in Bangalore, where they showed diffuse involvement of brain in 39 cases (34%) followed by frontal lobe in 24 cases.

Conclusion:

Thus we conclude that Sub arachnoid haemorrhage and Sub Dural haemorrhage was the most common intracranial haemorrhages in cases of two wheelers without wearing helmet in fatal road traffic accidents in Mangalore. Brain Contusion and oedema was observed in majority of cases. No brain injury was diagnosed in 26.09% cases while diffuse brain injury and frontal lobe injury were common

References:

Death and suicides in India. National Crime Records Bureau. 2008

Gupta S., et al. "Demographic study of fatal Craniocerebral Road Traffic injuries in North Bengal region" *Medicine Science and Law*, 1979; 19 (3):186-194.

Johnson, R Michael et al. "Craniofacial trauma in injured motorcyclists: the impact of helmet usage." *The Journal of Trauma* vol. 38,6 (1995): 876-8. doi:10.1097/00005373-199506000-00008

Kakeri Shamshuddin R. et al. "Pattern of injuries and death sustained by the occupants of the two-wheeler during road traffic accidents. *Al Ameen Journal of Medical Sciences*. 2014; 7(2):118-124.

Kumar, Arvind, et al. "Fatal Road Traffic Accidents and Their Relationship with Head Injuries: An Epidemiological Survey of Five Years." *Indian Journal of Neurotrauma*, vol. 05, no. 02, 2008, pp. 63–67. Crossref, doi:10.1016/s0973-0508(08)80002-0.

Mestri SC. Precautions and Safety Measures to be adopted in Road Traffic Accidents. *JKMLC 2000*; 9(2):28-30.

Mohan D. "Road Traffic Deaths and Injuries in India: Time for Action." *The National Medical Journal of India*, Medknow Publications, 2004. Vol. 17, no. 2, pp. 63–66. pubmed.ncbi.nlm.nih.gov/15141596.

Mumtaz B et al. "Frequency of helmet used among motorcycle riders in Rawalpindi" *The Professional Medical Journal*, 2007; 14(4): p663-668.

Pathak, Akhilesh K. et al. "Profile of road traffic accidents & head injury in Jaipur (Rajasthan)." *Journal of Indian Academy of Forensic Medicine*. 2008. 30: 6-9.

Pruthi, Nupur, et al. "Patterns of Head Injury among Drivers and Pillion Riders of Motorised Two-Wheeled Vehicles in Bangalore." *The Indian Journal of Neurotrauma*, vol. 7, no. 2, 2010, pp. 123–27. Crossref, doi:10.1016/s0973-0508(10)80026-7.

Ravikumar, R. "Patterns of Head Injuries in Road Traffic Accidents Involving Two wheelers: An Autopsy Study." *Journal of Indian Academy of Forensic Medicine*, 35 (2013): 349-352.

 References:

Sharma, B. R., et al. "Pattern of Fatal Motorized Two-Wheeler Crash Injuries in Northern India: Is Safety Helmet Adequate Prevention." *Trends in Medical Research*, vol. 2, no. 1, 2007, pp. 27–36. Crossref, doi:10.3923/tmr.2007.27.36.

Shibata, Akira, and Katsuhiro Fukuda. "Risk Factors of Fatality in Motor Vehicle Traffic Accidents." *Accident Analysis & Prevention*, vol. 26, no. 3, 1994, pp. 391–97. Crossref, doi:10.1016/0001-4575(94)90013-2.

Shobhana S. S, and Jagadeesh N. "Pattern of fatal head injuries autopsied at Vydehi Hospital Bangalore: 5 years study." *Journal of Evidence Based Medicine and Healthcare*, 2014, vol. 1(10), pp. 1310–19. Crossref, doi:10.18410/jebmh/2014/195.

Singh, Y.N. et al. "An Epidemiological Study of Road Traffic Accident Victims in Medicolegal Autopsies." *Journal of Indian Academy of Forensic Medicine*, Diva Enterprises Private Limited, 2005. vol. 27, no. 3, , pp. 166–69.

Sirathranont, Jetn and Vira Kasantikul. "Mortality and Injury From Motorcycle Collisions in Phetchaburi Province." *Journal of the Medical Association of Thailand, Medical Association of Thailand, 2003* vol. 86, no. 2, , pp. 97–102. pubmed.ncbi.nlm.nih.gov/12678145.

Traffic Safety Facts.2009 Data. National Highway Traffic Safety. U.S Department of Transportation. October 2011, Accessed 20 December 2011.
<https://crashstats.nhtsa.dot.gov/Api/Public/Publication/811754>

Tripathi, Manjul et al. "Profile of patients with head injury among Vehicular Accidents: An Experience from a Tertiary Care Centre of India." *Neurology India* vol. 62,6 (2014): 610-617. doi:10.4103/0028-3886.149382