Prevalence of Spinal Injuries among Autopsied Cases of Traumatic Deaths

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ABSTRACT

Background: Traumatic deaths, resulting from spinal injuries are significant issue in Nepal. The study aims to assess the prevalence of spinal injuries amongst the traumatic death cases brought in for autopsy in Jumla and to provide their socio-demographic profile.

Methods: This is a descriptive cross-sectional study done in Karnali Academy of Health Sciences (KAHS) from 16th July 2021 to 16th July 2023 incorporating all the traumatic deaths brought for autopsy. The data was collected using a proforma which included the modality of trauma, spinal involvement, seasons associated with trauma and demographic variables of the deceased. The data was analyzed using both Microsoft excel and SPSS 23.0.

Results: A total of 55 cases were brought for autopsy following traumatic death with road traffic accident (45.45%) and fall injuries (29.1%) being the most common mode of trauma. Among all traumatic deaths, 29.1% cases presented with spinal injuries. The cervical spine (68.8%) was the most commonly affected spine followed by thoracic (12%), lumbar spine (6.3%) and two cases with multiple spinal involvement. Of all the spinal injury cases in traumatic deaths, the highest and the lowest number of cases occurred during spring and summer season respectively.

Conclusions: Traumatic deaths caused by spinal injuries after fall and road traffic accidents is a common phenomenon in Jumla. Thus, timely preventive measures associated with these deaths needs to be addressed to reduce them.

Keywords: Autopsy; deaths; Jumla; spinal injuries; trauma.

INTRODUCTION

Death following traumatic injuries inflicted by fall, road traffic accidents (RTAs), fire arm, blunt or sharp force injuries, irrespective of the manner, are referred to as traumatic deaths.[1] In South East Asia, traumatic injuries bear the largest burden of death and disability.[2] In Nepal, a large proportion of traumatic injuries are associated with RTAs and fall, which are also the most common mode of spinal injuries.[3,4] The terrain of Karnali province is as such that both RTAs and fall injuries are the most common modalities of traumatic injuries.[5,6]

Despite this, there is a lack of study on the prevalence of spinal injury in traumatic death cases in Nepal. The study aims to assess the prevalence of spinal injuries among the traumatic death cases in Jumla. The study also intends to provide demographic data and seasonal variation of these deaths which can enhance safety measures in impacted regions.

METHODS

The present study is a descriptive cross-sectional study. The study was conducted in Karnali Academy of Health Sciences (KAHS), the only centre in Karnali province which provides post-mortem services by a Forensic expert. Being

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the referral centre for surrounding districts from within and neighbouring provinces, the institution receive cases for treatment as well as for conduction of post-mortem.

The ethical clearance for this study was obtained from the Institutional Review Committee of KAHS. The study period was from 16th July 2021 to 16th July 2023, corresponding with two Nepalese fiscal years. All the traumatic mortality cases brought to the Department of Forensic Medicine and Toxicology (DoFMT), KAHS for conduction of autopsy during the study period were included. Also, the cases belonging to the neighbouring districts who had suffered traumatic injuries and were brought to KAHS for medical management and died during the course of treatment were included. However, the cases belonging to Jumla districts who were referred for further management were excluded from the study. The modality of injury, whether traumatic or non-traumatic, were differentiated based on the police requisition letter which is always required for the conduction of autopsy and is provided to the DoFMT, KAHS.

The secondary data were collected using the autopsy register and from the official copy of the dispatched autopsy report, both maintained within the DoFMT for each case. The variables included the age and sex, place of occurrence of incidence (local municipals), mode of trauma, season of occurrence of trauma and spinal involvement associated with these trauma. The place of occurrence of incidence were recorded as eight local municipals of Jumla (Chandannath, Guthichaur, Tatopani, Patarasi, Tila, Hima, Sinja and Kanakasundari) and others for neighbouring districts. Further, the season of the year when trauma occurred were recorded as summer (June – August), autumn (September – November), winter (December – February) and spring (March – May).[7] The mode of trauma were divided into road traffic accidents; fall injuries; landslides; alleged homicide; and, animal attacks, based on the information provided in the police requisition letter. The injuries on spine were recorded based on the spinal involvement as cervical spine, thoracic spine, lumbar spine, sacrococcygeal spine and multiple spinal involvement.

All the data were recorded in a preformed proforma, entered in excel and analysed using both SPSS version 23 and Microsoft excel. The data were presented with number and percentage for categorical variables. The median and range were computed for continuous variables. Seasonal variations were presented using trendlines.

RESULTS

The DoFMT, KAHS received a total of 123 autopsy cases during the study period. A total of 44.7% (n = 55) cases out of the total cases were of traumatic deaths. Out of the 55 traumatic death cases, 69.1% (n = 38) were male and 30.9% (n = 17) were female. Of the total traumatic deaths, 29.1% (n = 16) presented with spinal injuries. The mode of trauma across different local levels leading to traumatic deaths is shown in table 1. The number of traumatic deaths across these local levels varied from 2 to 10. Also, the seasonal trend associated with different forms of trauma have been shown in figure 1 with maximum cases occurring during the spring season 45.45 % (n = 25) followed by autumn season 27.3 % (n = 15).

Among the total cases of spinal injuries, 75% (n = 12) were males and 25% (n = 4) were females with an overall median age of 42.5 (range: 23–66) years. The median age of the male and female was 41.5 (range: 23–66) years and 57 (range: 34–65) years respectively. Out of the total cases of spinal injuries, 31.3% (n = 5) cases were entirely isolated spinal injuries and were not associated with any other internal injuries. The most commonly affected spine was cervical with 68.8% (n = 11) followed by thoracic spine 12% (n = 2) and lumbar 6.3% (n = 1). Also, two cases were associated with multiple spinal involvement, with one case involving cervical and thoracic spine and another case involving cervical and sacral spine. The spinal involvement associated with different mode of injury is shown in figure 2.

Of the total number of cases with spinal injuries, highest number of cases were during spring season which was 43.8% (n = 7), followed by autumn season which was 37.5% (n = 6), then winter season which was 12.5% (n = 2) and then summer season 6.3% (n = 1). The seasonal variation for different mode of trauma associated with spinal injuries has been shown below in figure 3.

Based on the location of the mode of trauma, 93.8% (15/16) cases occurred within eight different local levels of Jumla district and one case occurred outside of the district and died on its way to our institution. Across all the local levels where traumatic incidence leading to spinal injuries took place, 18.8% (3/16) cases occurred in Tatopani, Guthichaur and Tila each. Next, 12.5% (2/16) cases occurred in Chandannath and Hima each. Of the remaining three cases, one each occurred at Patarasi, Kanakasundari and local level outside Jumla district. Also, none of the traumatic deaths were from Sinja during the study period. The details of different mode of trauma which took place across all the levels is shown in table 2.

Table 1. Mode of trauma across all the municipalities in traumatic deaths.

		Mode of Trauma					Total
		RTA	Fall Injuries	Landslides	Alleged Homicide	Animal Attack	
Municipal Level of Occurrence of Trauma	Chandannath	1	2	1	2	0	6
	Tatopani	1	4	1	0	1	7
	Guthichaur	3	1	1	1	1	7
	Patarasi	5	1	0	0	0	6
	Tila	3	4	2	1	0	10
	Hima	2	1	3	0	0	6
	Sinja	2	0	0	0	0	2
	Kanakasundari	3	1	0	0	0	4
	Others	5	2	0	0	0	7
Total		25	16	8	4	2	55

Table 2. Mode of trauma leading to spinal injuries across different local levels.

		Mode of Trauma				Total
		RTA	Fall Injuries	Landslides	Animal Attack	
Municipal Level of Occurrence of Trauma	Chandannath	0	2	0	0	2
	Tatopani	0	2	1	0	3
	Guthichaur	1	0	1	1	3
	Patarasi	1	0	0	0	1
	Tila	0	3	0	0	3
	Hima	2	0	0	0	2
	Kanakasundari	1	0	0	0	1
	Others	1	0	0	0	1
Total		6	7	2	1	16

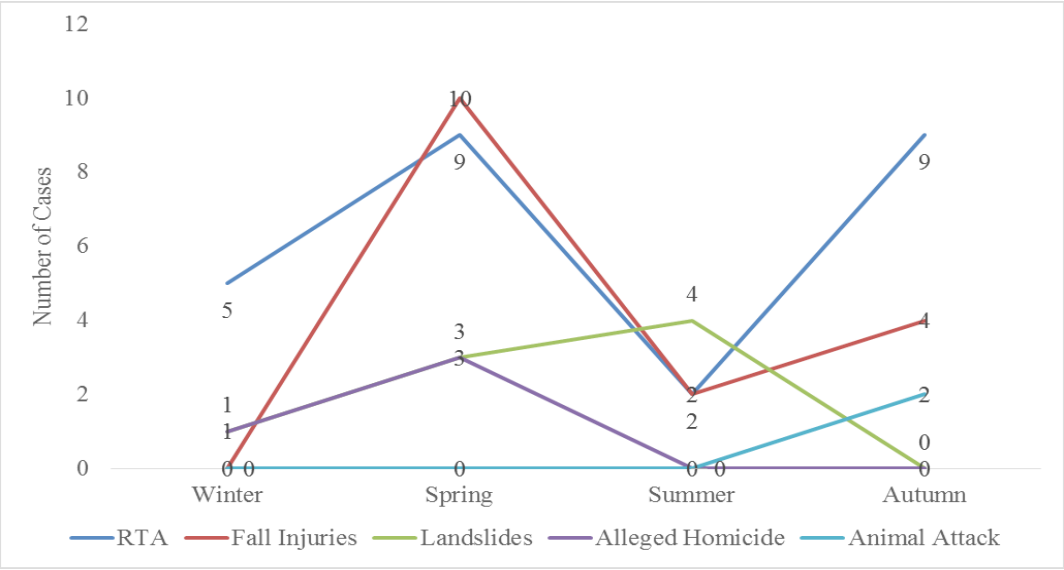

Figure 1. Seasonal variation associated with different mode of trauma leading to traumatic deaths.

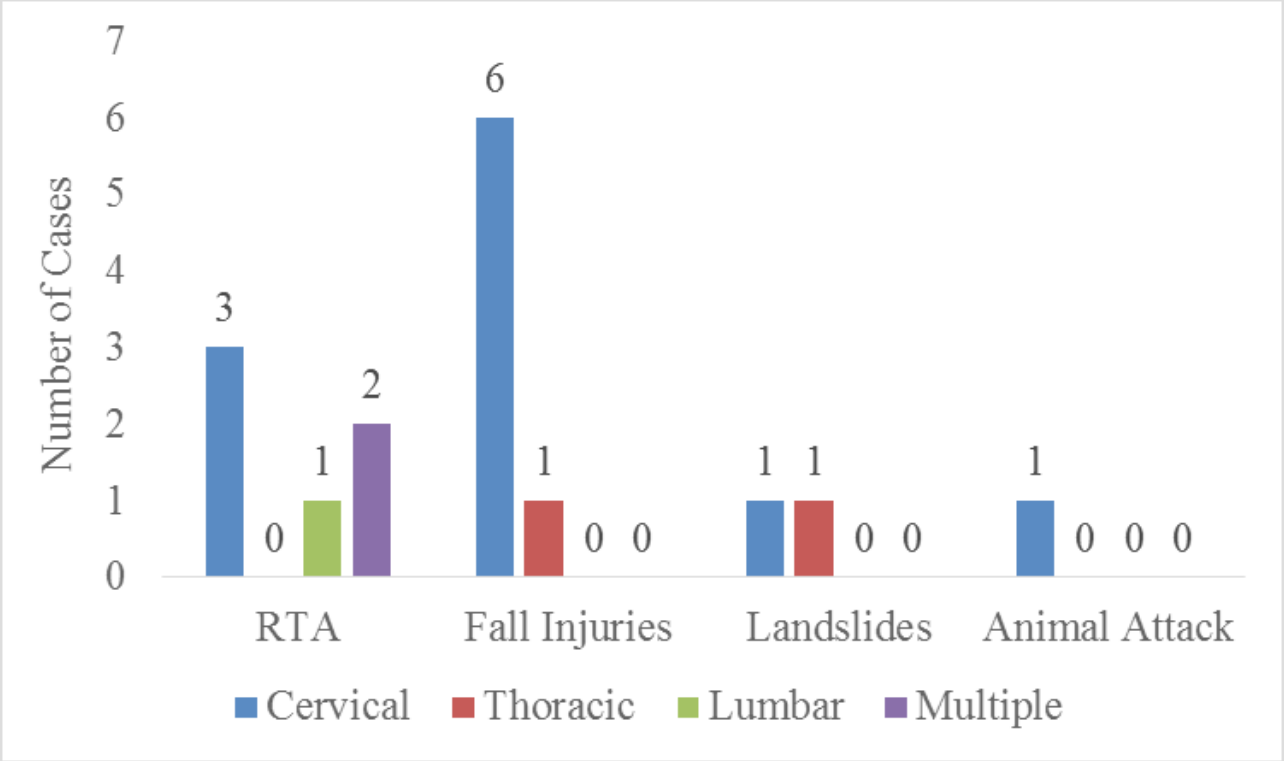

Figure 2. Spinal injuries associated traumatic deaths caused by different mode of trauma

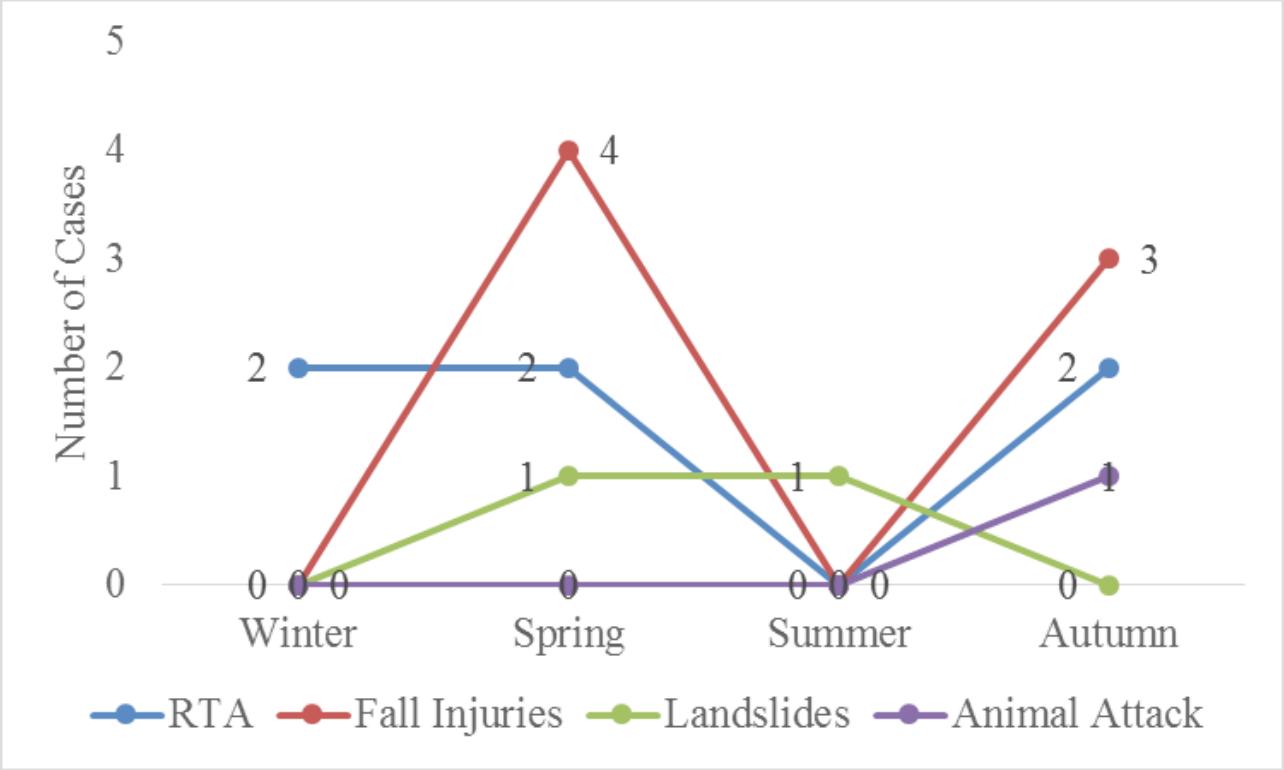

Figure 3. Seasonal variation associated with different mode of trauma in spinal injuries.

DISCUSSION

There have been few studies associated with traumatic deaths in Nepal incorporating the demographic profile of the deceased and seasonal variation. These kind of traumatic deaths are more frequent in lower-middle income country like Nepal.[8] The present study is the first of its kind, discussing on the occurrence of spinal injuries in these traumatic deaths.

The commonest mode of traumatic death in the present study was road traffic accident 45.45 % (25/55) followed by fall injuries 29.1% (16/55). This was similar to the another study conducted on Nepalese population by Sharma et al[2] in which, of all the accidental deaths, 55% belonged to road traffic accidents and 12% belonged to fall injuries.

The percentage of spinal injury in all traumatic deaths in the present study is 44.7% which is higher than a study conducted by Kanna et al[4] with spinal injury associated mortality being 0.7% across all the trauma cases. This variation could be due to the difference in the total number of spinal injury cases which was received in Coimbatore, India over a period of 5 years compared to the total number of cases in Jumla, Nepal over a period of 2 years. This could also be due to the geographical variation across the two regions where these cases were received.

In the present study, isolated spinal injury was found in 31.3% which was lesser than the study conducted by Lalwani et al[9] in which 55.43% presented with isolated spinal injuries. The study by Lalwani et al[9] had injuries over the spine with cervical spine 75.95%, thoracic spine 16.42% and thoraco-lumbar spine 7.62% involvement. This was similar to the present study with injuries to cervical spine 68.8%, thoracic spine 12%, lumbar spine 6.3% and two cases with multiple spinal involvement.

The commonest mode of trauma leading to spinal injury in the present study was fall injuries 43.8% followed by road traffic accidents 37.5%. This finding was similar to other studies conducted by Kathayat et al[6], Kanna et al[4] and Lalwani et al[9]. In the present study, cervical and thoracic spine injury were most commonly found in fall followed by road traffic accidents. However, in a study conducted by Yadollahi et al[10], cervical spine injury was most commonly associated with motorcycle accident and thoracic spine was associated with fall. Also, in the study by Yadollahi et al[10], the highest mortality was associated with lumbar spine injury unlike in the present study in which it was associated with cervical spine injury.

Also, in the present study, all the cases of fall injuries presented during the spring and autumn season. The police requisition letter in these cases of fall injuries have mostly elaborated about the nature of the incidence with most of them being associated with grazing of animals across the high hills or collecting leaves, twigs or branches for feeding of animals as well as preserving these as an energy source for fire. With spring season being followed by extremely challenging winter and autumn preceding it, the preparations for human inhabitation and animal food storage is maximum during these two seasons.

The seasonal variation has significant effect on the traumatic deaths with the altitude of Jumla being as high as 4679 meters from the sea levels and temperatures as low as -14 degree Celsius during the winters.[11] This high altitude and temperature variation along with incessant rain can be a precursor to landslides, road traffic accidents, seasonal animal attacks, floods in specific regions.[12,13]

In the present study, there were two cases of animal attack leading to traumatic death, both, in autumn season and involving bear, at Guthichaur and Tatopani. Of these two cases, one was due to traumatic spinal injury. The findings of the present study was similar to another study conducted by Menyangbo et al[12] in Jumla with most of the cases of animal attack presenting during the autumn season. However, unlike the present study, the study conducted by Menyangbo et al[12] presented no mortality. Similar to the present study, the study conducted by Khadka et al[14] had the highest number of road traffic accidents cases during summer and spring season. This could be due to the incessant rain leading to landslides throughout the highway during summer season and the heavy travelling associated with autumn season because of significant number of festivities at this time of the year.[13,14]

The present study involves only a limited number of traumatic deaths associated with trauma in one of the rural most tertiary care centre of the country. The study also excludes the ethnicity of the deceased and the grading of spinal trauma. With regards to the road traffic accidents, the details of the victims and vehicles were not recorded. Also, the height of fall in fall injuries were not mentioned due to the unavailability of the details in police requisition letter. However, the present study paves way for conduction of large scale studies on spinal injuries associated with traumatic death overcoming these limitations.

CONCLUSIONS

Spinal injuries resulting from falls and road traffic accidents are commonly observed in traumatic deaths brought in for autopsy throughout the year with seasonal variation. The numbers of these fatalities are high with minimal existing research highlighting the need for detailed studies on spinal involvement in these cases in Jumla. Seasonal variation, demographic information and geographical locations are important constituent in analysing spinal injury-related traumatic deaths for the development of region-specific guidelines and protocols in order to prevent such deaths.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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