

Epidemiology of Spinal Trauma and Related Complication

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ABSTRACT

Background: Traumatic spinal injury is leading cause of mortality and morbidity among the people of productive age group. This study aim to find the cause of spinal injury, site ,and mode of injury, treatment option given so that a preventive measures and create awareness among people of this region.

Methods: This is a prospective observation study done in Karnali Academy of Health Sciences from December 2021 to January 2023. Performa was filled to collect data. Data were entered in excel sheet and transported to SPSS 16.0 and statistical analysis was done .

Results: Out of 117 patients male population had higher incidence of spinal trauma (69.2%) with average age 43.9 years . Fall injury was the commonest mode of injury. 65.8% had injury at the thoracolumbar junction followed by lumbar, thoracic and cervical respectively. Cervical injury patients had higher incidence of neurological deficit. The average duration of trauma to hospital presentation was 10.9 ± 11.2 hours. 19.7 % were operated and 6.8 % of patients were referred to other center.

Conclusions: Fall injury being the commonest mode of injury in this art of world, prevention and awareness should be raised about the spinal trauma and its consequences. Adequate equipment with health facilities to the distant hospital may reduce the referral rate and duration of presentation to the hospital which ultimately prevent the further damage to the cord.

Keywords : Fall Injury; spinal trauma; western Nepal.

INTRODUCTION

Traumatic Spinal injury is one of the common trauma leading to disability and mortality in patients of younger age.^{1,2} Prevalence of spinal injury of all trauma patients is 6 % with 90 % involvement around the junctional area i.e T10 - L2. ^{3,4} These spinal trauma with spinal cord injury leads to serious disability including pressure sore deep venous thrombosis , pneumonia, paraplegia sometimes even quadriplegia.⁵ These trauma leads to huge economic burden to the patients family and to the country.⁶ The estimated lifetime economic burden associated with SCI in Canada ranges from CAD\$1.47 million for a person with incomplete paraplegia to \$3.03 million for one with complete tetraplegia.^{7,8} Due to ecological and geographical distribution of Karnali region spinal trauma and its related complications may be one

of the common cause of mortality and morbidity of the people of this region. The aim of this study is to find the location, cause of spinal trauma, its complication so that to create awareness regarding spinal trauma among the people of this region.

METHODS

This is a descriptive cross-sectional study performed in Karnali Academy of Health Sciences(KAHS), a referral center located in mid-western region of Nepal. Before commencing the study an ethical clearance was taken from IRB of KAHS. The study included all patients that were presented to KAHS with spinal trauma from December 2021 to January 2023. Patients with pathological spine fracture were excluded from

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the study. Data were recorded filling the preformed performa.

Demographic data like age, sex, mode of injury, site and level of spinal injury, spinal cord injury using American Spinal Injury Association(ASIA) Grading, types of interventions, complications and Time of presentation to emergency after trauma were recorded. Mode of injury divided into 1)fall from roof with fall from height of not more than 12 feet height, 2) fall from hill with fall from tree, rollover injury in hill and 3) Road traffic injury. Spinal cord injury were classified as ASIA Grade A, B, C, D and intact neurology. Spinal injury were classified as compression, stable burst, unstable burst ,translation or subluxation and Spina cord injury with obvious radiological abnormality (SCIORA). All the data were entered in preformed performa. Data were collected entered in SPSS 16.0. and analysed.

RESULTS

Total of 117 patients with spinal trauma were included in this study with mean age of patients being 43.9 years with age ranging from 16 to 82 year. The table below shows the age distribution of patients. 69.2 % were male and 30.8% were female who presented to this hospital.

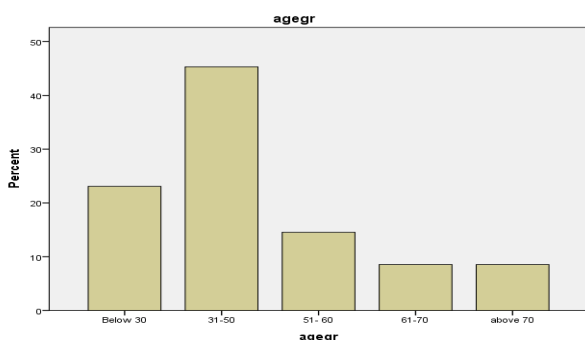


Figure 1. Age Distribution of Patients.

The commonest mode of injury spinal trauma presenting to our institute was fall from roof (41%) followed be fall from hill (39%) and RTA(37%) .

Most of the patients presented with injury at the thoracolumbar junction with frequency of 65.8%. Equal percentage of cases in lumbar and thoracic. About 1 % of cases presented multiple level of spinal injury. According to ASIA grading of Patients with spinal injury 101 patients had intact neurology where as nine of the patients had complete neurological deficit with ASIA A grade. Most of the patients with neurological deficit

of various ASIA grade has cervical spine injury. Table 1 shows the correlation of ASIA grading with location of injury.

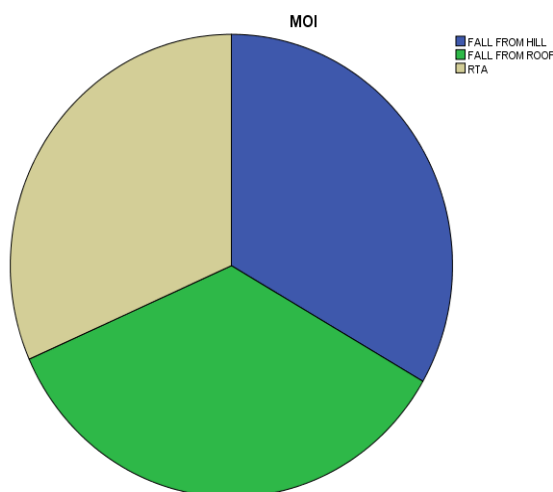


Figure 2. Percentage Distribution of Mode of injury.

Table 1. Correlation of ASIA grading with location of spinal injury.

AO grading	site	Total					
		cervical	Thoracic	Thoracolumbar	lumbar	Multiple level	
Asia A	Asia A	4	1	3	1	0	9
	Asia B	3	0	0	0	0	3
	Asia C	1	0	0	0	0	1
	Asia D	1	0	2	0	0	3
	Intact neurology	1	14	72	13	1	101
Total		10	15	77	14	1	117

Out of 117 patients compression type of fracture compromises of 65 % followed by stable burst and unstable type of fracture 15% and 16 % respectively. Subluxation compromises of 8%. Two of the patients had spinal cord injury with no bony abnormality.

The average duration of trauma to hospital arrival was 10.97± 11.2 hours ranging minimum from 1 hour to maximum 56 hours. 73.5 % of patients were managed conservatively where as eight patients were referred to higher center.

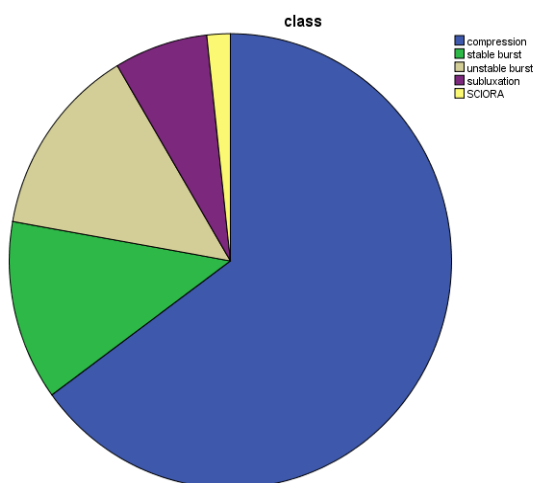


Figure 3. Percentage Distribution Of Classification Spinal Injury.

DISCUSSION

Traumatic spinal injury is leading cause of mortality and morbidity among patients of younger age leading to huge economic burden to the society and the families. The socioeconomic condition of the people of Karnali province is lowest in Nepal. The average age of patients presenting with spinal injury was 43.9 years with maximum patients in age group 30-50 years. Similar finding were found in study done by chabok SR⁶ et al were mean age of the patients was 38.9 years. The mean age of the patients was 42.27±16.83 years in study done by Andalib et al⁹ which correlates with this study. Study done by Dhakal et al the mean age of the patients was 33.07 years which correlates with our study.¹⁰ The maximum number of patients were in the age group > 50 years as per the study done by Bajracharya et al.³ Maximum number patients were in the age group 30-50 in study by Boren et al¹ which correlates with this study.

The frequency of male patients was 69.2 % and female was 30.8% which was 2.5: 1. Similar finding was found in other study done by Bajracharya et al³, Boran et al¹, Grivna M and team⁵, S. Chabok et al⁶ and parajuli et al.¹¹

The commonest mode of injury was fall from roof 41% , fall from hill 39% and RTA 37%. The finding of this study correlates with study done by other author Bajracharya et al³, Devkota et al⁴ and Parajuli et al.¹¹ However the study done by Grivna M et al⁵, Chabok et al⁶, Boran et al¹ and Ning et al¹² found the common cause of spinal trauma was road traffic accidents (RTA). The difference in finding is because the later two studies

was done in united Arab Emirates and Iran however the studies done in Nepal correlates with this study. The ecological distribution of Nepal and the socioeconomics condition of Nepal is the Major factors for fall injury as the commonest cause of spinal trauma .

65% of the patients had thoracolumbar junction fractures followed by lumbar , thoracic and cervical spine which correlates with study done by Devkota et al⁴, Grivna et al.⁵ However study done by Boran et al¹ cervical spine was the common site of traumatic spine injury.

In this study spinal cord injury after trauma were classified as ASIA grading among which 86.3 % had intact neurology and 13.6 % had neurological deficit among which 56.25 % has complete and 43.5 % had incomplete neurological deficit. Boran et al found 38 % had neurological deficit among the admitted patients among these 65% incomplete neurological deficit and 35 % had incomplete neurological deficit¹ which correlates with this study. Devkota et al found 42.2% had intact neurology where as 50.6% had incomplete injury and 6.6 % has complete injury⁴ The percentage of complete injuries ranged from 25.2 to 89.96% and incomplete injuries from 10.04 to 74.8% in systemic review done by Guang-Zhi Ning , Qiang Wu, Yu-Lin Li, Shi-Qing Feng.¹²

The average duration of trauma to hospital arrival was 10.97± 11.2 hours ranging from 1 hour to 56 hours in this study. 69.2% patients presented within 2 days of injury, whereas 22.0% within 3-7 days, 7.7% within 8-30 days, and 1.1% after 31 days of injury in study by Dhakal GR et al.¹⁰ Another study done by Dhakal GR et al found 40 % presented to the hospital emergency within 2 days of the injury, 50% between 3 and 7 days, 3% between 8 and 30 days, and 7% was brought to the hospital 31 days after the injury¹³. Bajracharya et al found the duration from injury to hospital presentation in 41.64± 54.24 hours.³

In this study 73.5 %(n =86) of the patients were treated conservatively , 19.7% (n=23) were operated and 6.8 % (n=8) were referred to other center . Study done by Devkota et al⁴ where 42.2 % were managed conservatively , 35.5 % were operated and 11.11% were referred to other center.

CONCLUSIONS

Younger male patients at their productive age group has higher prevalence of spinal injury in this study leading to huge economic burden to the family and society. Fall injury is the common mode of spinal trauma presenting

to KAHs. Preventing measures and awareness regarding the prevalence of spinal trauma and its consequences is necessary. Adequate equipment with health facilities to the distant hospital may reduce the referral rate and duration of presentation to the hospital which ultimately prevent the further damage to the cord.

CONFLICT OF INTEREST

None

REFERENCES

1. Boran S, Street J, Poynton AR, Hospital MP. Demographics of acute admissions to a National Spinal Injuries Unit. 2009;(May 2014):2-7.[Article]
2. Lam C, Lin M roun. An Epidemiological Survey of Acute Spinal Trauma Caused by Traffic Accidents Versus Falls in Northern Taiwan. 2010;(September 2014).doi: <https://doi.org/10.1177/1010539510364669>
3. Bajracharya S, Singh M, Singh G, Shrestha B. Clinico-epidemiological study of spinal injuries in a predominantly rural population of eastern Nepal: A 10 years' analysis. Indian J Orthop. 2007;41(4):286-9.doi: <https://doi.org/10.4103/0019-5413.36988>
4. Devkota P, Manandhar H, Khadka P. Spinal Injuries in a Tertiary Care Referral Center of Western Nepal. Nepal J Med Sci. 2013;2(2):156-9.doi: <https://doi.org/10.3126/njms.v2i2.8967>
5. Grivna M, Eid HO, Abu-zidan FM. Epidemiology of spinal injuries in the United Arab Emirates. ??? [Internet]. 2015;1-7. doi: <https://doi.org/10.1186/s13017-015-0015-8>
6. Chabok SY, Safaee M, Alizadeh A, Dafchahi MA. Epidemiology of Traumatic Spinal Injury : A Descriptive Study Epidemiology of Traumatic Spinal Injury : A Descriptive Study. 2010;(September):4-8. [Article]
7. Krueger H, Noonan VK, Trenaman LM, Joshi P, Rivers CS. The economic burden of traumatic spinal cord injury in Canada. Chronic Dis Inj Can. 2013;33(3):113-22.doi: <https://doi.org/10.24095/hpcdp.33.3.01>
8. Noonan VK, Farry A, Singh A, Fehlings G, Dvorak F. Incidence and Prevalence of Spinal Cord Injury in Canada : A National Perspective. 2012;219-26.doi: <https://doi.org/10.1159/000336014>
9. Andalib S, Mohtasham-amiri Z, Yousefzadeh-chabok S, Saberi A, Behzadnia H. Research Paper : Assessment of Surgery , C omplications , and Clinical Outcomes in P atients With T raumatic Spine. 2021;(July).
10. Dhakal GR, Paudel S, Dhungana S, Gurung G, Kawaguchi Y. Epidemiological characteristics of dorsal and lumbar spine trauma presenting to a trauma hospital in Kathmandu, Nepal: Formulation of a national spine policy. Spine Surg Relat Res. 2018;2(4):249-52.doi: <https://doi.org/10.22603/ssrr.2017-0087>
11. Parajuli B, Acharya K, Shrestha D. Epidemiology of traumatic spinal cord injury in Nepal: A systematic review. Asian J Med Sci. 2020;11(6):121-8.doi: <https://doi.org/10.3126/ajms.v11i6.30151>
12. Ning G zhi, Wu Q, Li Y lin, Feng S qing. Epidemiology of traumatic spinal cord injury in Asia : A systematic review. 2012;35(4).doi: <https://doi.org/10.1179/2045772312Y.0000000021>
13. Dhakal GR, Bhandari R, Dhungana S, Poudel S, Gurung G, Kawaguchi Y, et al. Review of Subaxial Cervical Spine Injuries Presenting to a Tertiary-Level Hospital in Nepal: Challenges in Surgical Management in a Third World Scenario. Glob Spine J. 2019;9(7):713-6.doi: <https://doi.org/10.1177/2192568219833049>