

Original Research Article

Epidemiological study of thoracolumbar spine fracture patients reported to tertiary care center of central India

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ABSTRACT

Background: Thoracic and lumbar spine fractures account for 90% of all spine fractures recorded. In low- and middle-income countries, spinal injuries are associated with significant disability and decreased life expectancy. Non-operatively, these injuries can be managed with a thoracolumbar orthosis or hyperextension cast. The operative management with a posterior, anterior or combined approach will offer immediate mobilization and earlier rehabilitation, providing a better environment for restoration of neurological function. Aim of the study was to find out epidemiology of patients with thoracolumbar spine fracture patients.

Methods: A cross sectional observational study was conducted in department of orthopaedics at tertiary care, teaching hospital among patients with traumatic thoracolumbar spine fractures. Epidemiological data variables were collected. In statistical analysis data from 60 patient reported was recorded and analysed.

Results: Fall from height is the leading mechanism of injury among middle aged people (30-60years) with male predominance, accounting for 58.33 percent of all spinal cord injury cases. The majority (45%) of fractures were of the burst kind, followed by compression (28.3%), and then translation/rotation (21.6%). And the most-rare of all was the distracted type (just 5%). An only 15% of patients had had a complete spinal injury, whereas the remaining 85% had sustained incomplete/ no spinal cord injury.

Conclusions: Knowledge about the burden brought on by spinal cord injury makes it clear that preventing such injuries is the backbone of care. preventive measures for high-risk individuals and early definitive response by paramedics can help reducing the load caused by these injuries.

Keywords: Epidemiology, Thoracolumbar spine, Central Indian region, Spinal cord injury

INTRODUCTION

Thoracic and lumbar region can involve injuries ranging from simple, undisplaced fractures to complicated fracture dislocations.¹

Anatomically and functionally thoracolumbar spine is divided into rigid thoracic spine (T1-10), transitional thoracolumbar junction (T10-L2), and Flexible lumbar spine (L3-L5).² Thoracic spine being rigid needs greater amount of force to produce fracture or dislocations, also

narrow spinal canal at this region leads to high incidence of spinal cord involvement.¹ Lumbar spine being flexible with greater diameter of canal predisposing it to lesser incidence of neurological injuries.¹ Thoracolumbar region (T10-L2) is a transition zone from rigid thoracic to flexible lumbar spine, making it more vulnerable biomechanical stress, leading to maximum injuries in this region.^{3,4}

In low-and middle income countries, spinal injuries are associated with significant disability and decreased life expectancy, due to their significant effect on quality of life with neurological deficit, pain, and deformity.^{5,6}

Thoracolumbar spine fractures account for 90% of all spine fractures recorded.² Such injuries are very common among young people, between 20 and 40 years old, and the most common causes of such spine trauma are motor vehicle accidents, falls, and gunshot injuries.⁷ The probability of developing a neurological deficit will depend on the type of fracture.² Based on x-ray, CT, and MRI investigations, these injuries can have any of the following morphologies: Compression, burst, translation or rotation, and distraction.⁸

For these patients, after resuscitation in the emergency room and subsequent care, all efforts must be made to immobilize spinal injury patients safely and intermittently log roll to prevent pressure sore formation. Stabilization of unstable injured motion segments with orthoses plays an important role in preventing further injury.¹ Despite the fact that NASCIS studies revealed significant positive results when using methyl-prednisolon, Hurlbert concluded that the drug's efficacy and impact are limited.⁹

Non-operatively, these injuries can be managed with a thoracolumbar orthosis or hyperextension cast with bed rest. operative management.¹⁰ The operative management with a posterior, anterior, or combined approach will offer immediate mobilization and earlier rehabilitation with better restoration of sagittal alignment, providing a better environment for restoration of neurological function.¹ Although all these advantages are offered with operative treatment, there is no significant difference between the two modalities regarding neurological recovery and long term functional outcome.¹¹ Posterior pedicle screw fixation has been shown to be simple, familiar, efficient, reliable, and safe for the reduction and stabilisation of most fractures and remains the most popular technique to date, even with advent of new minimally invasive techniques.¹

Aim

To describe the epidemiology of thoracolumbar fractures and their associated injuries in patient presented to emergency department of tertiary care center.

METHODS

A cross sectional observational study was conducted in department of orthopaedics at tertiary care, teaching hospital among patients with traumatic thoracolumbar spine fractures reporting to emergency department of tertiary care center of central India. All the patients reported to emergency department in the year 2021 was included. A detailed history was obtained for evaluating the mode of trauma, ASIA grading, sensory level and to check for any spinal deformity. They were clinically and radiologically evaluated for ensuring the thoracolumbar fracture. Plain X-rays in antero-posterior and lateral views were obtained and the instability of spine was confirmed using thoracolumbar injury classification and severity score (TILCS). The 60 thoracolumbar spine patient injuries were recorded and investigation for the same was

carried out. In statistical analysis data was recorded in a predesigned case record form and compiled in Microsoft excel version 2018 and analysed.

Study place

Study conducted at Dr. Shankarrao Chavan government medical college, Nanded, Maharashtra.

Study period

Study conducted from Jan 2022 to Dec 2022.

Sample size

Sample size was calculated with complete enumeration method, with all the cases included in the study.

Inclusion criteria

Patient of thoracolumbar spine fracture were included in the study.

Exclusion criteria

A0 type of fractures (insignificant fracture) and patient not willing to participate in study/ give written informed consent were excluded from the study.

Ethical approval

Ethical approval before starting study was taken from institutional ethical committee.

RESULTS

The average age of patients presenting with thoracolumbar fractures to casualty in 2021-2022, with a standard deviation of 16.46 years, was 41.25. As many as 46% of patients fell into the 30-to-60-year-old bracket. There was a male preponderance among patients. It was found that men made up 73.33 percent of the patient population. Five-eighths of all trauma was caused by falls from a height, with road traffic accidents coming in second at thirty percent. The patient who had sustained fractures to the thoracolumbar spine showed single as well as multiple levels. The second lumbar vertebra was the most often affected vertebra in thoracolumbar injuries, followed by the first and third lumbar vertebrae. In the thoracic region, vertebrae D11 and D12 were most common, accounted for about similar numbers of cases. In 42% of all cases, the TLICS score of the resulting injury was 4. Which was an ambiguous region where the surgeon had more leeway in deciding whether to operate or conserve. The majority (45%) of fractures were of the burst kind, followed by compression (28.3%), and then translation/rotation (21.6%). And the most-rare of all was the distracted type (just 5%). An only 15% of patients had had a Complete spinal injury, whereas the remaining 85% had sustained incomplete spinal cord injury. Seventy-six

percent of those incomplete with AIS were classified as having grade E symptoms, which indicate normal sensory and motor function. Roughly 15% of the population had AIS grade A, with no motor or sensory abilities at all. In addition to their primary injury, 41.66% of patients also suffered from secondary injuries. An independent thoracolumbar spine injury accounted for 58.33%. With 41.67 having associated other injuries as well.

It was determined that 28.12% of the injuries were to the chest (hydro, hemo, pneumothorax). Fractures of the upper extremities accounted for 18.75% and head injuries accounted for 15.62% of all injuries. Lower extremity injuries accounted for 25%, with calcaneal fractures among lower limb injuries accounting for 18.75% of them. And 3.22% abdominal, cervical and pelvicitabular injuries and associated with COVID-19 each.

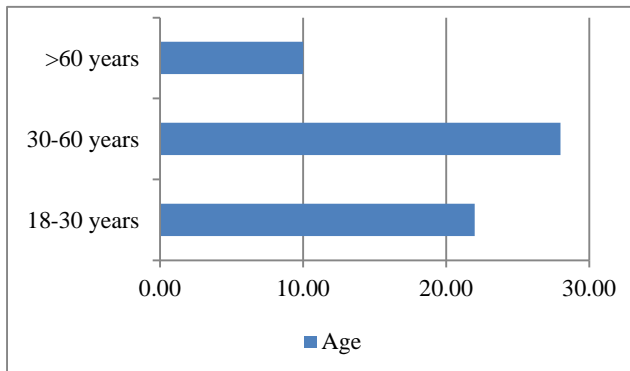


Figure 1: Age distribution of patient.

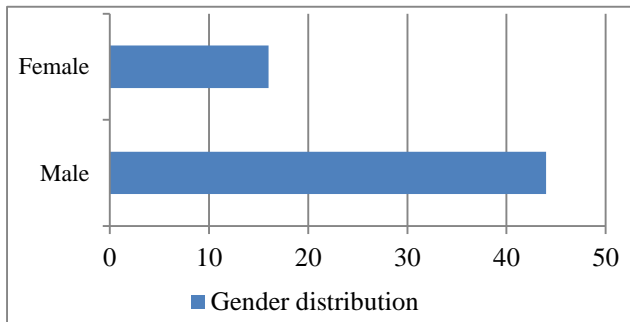


Figure 2: Gender distribution of patient.

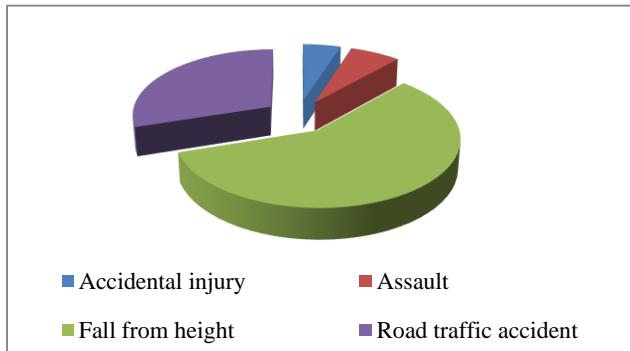


Figure 3: Mechanism of injury.

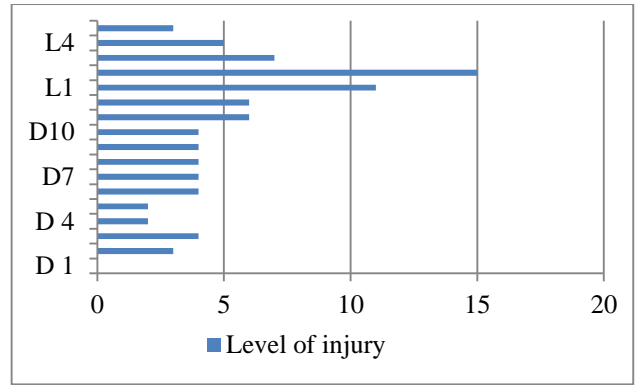


Figure 4: Level of vertebral injury in patients.
*patient presented with multiple vertebral level injuries.

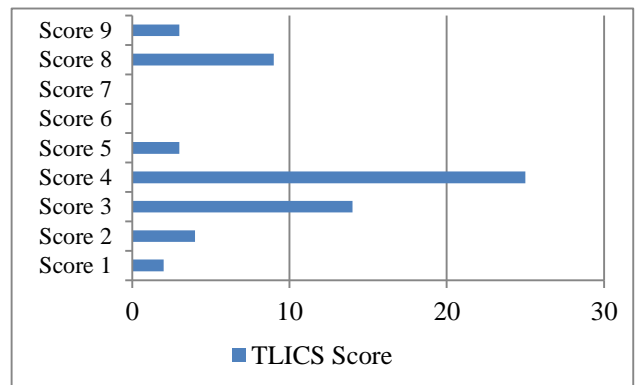


Figure 5: TLICS score.

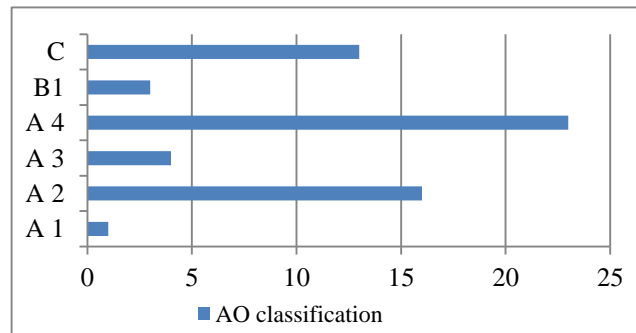


Figure 6: Distribution according to AO fracture classification.

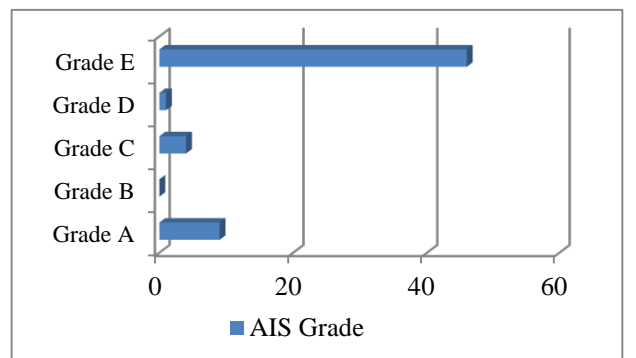


Figure 7: Distribution according to AIS grading.

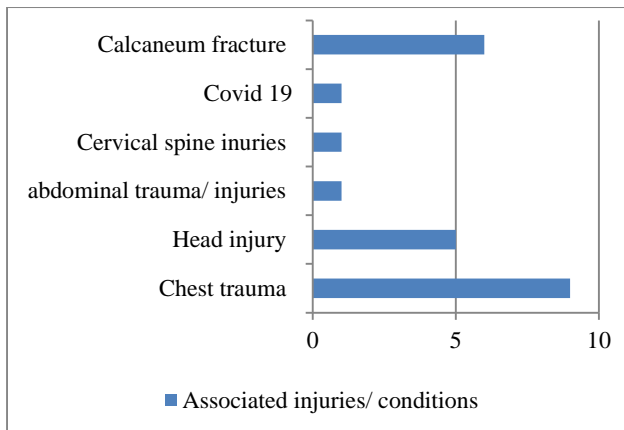


Figure 8: Associated conditions/ injuries.

DISCUSSION

When a young individual has a spinal cord injury, they often become the family's burden and miss out on years of earning potential as a result of being bedridden for an extended period of time. In addition, poor nations like India lack the infrastructure and specialised facilities necessary to properly care for individuals who have suffered a spinal cord injury as a result of a traumatic event.^{12,13} Optimal results may be achieved with rehabilitation treatments, although they are often not accessible in many institutions in low- and middle-income nations.^{14,15} Because of this, bedridden individuals have a harder time recovering, which might cause more difficulties. Therefore, it is crucial to learn about the patient demographics of spine trauma in order to enhance the development of preventative measures, treatment options, and rehabilitation options.

With a mean age of presentation of 41.25 years (± 16.46) in the current study, we found that the majority of spine trauma patients belonged to the 30-60-year age group, indicating that middle aged, active patients are more susceptible to spine trauma in the central Indian region. This finding is consistent with other studies conducted in India in the past: Birua et al 20-39 years; Mathur et al, 20-49 years; Singh et al, 27 years.¹⁶⁻¹⁸ They are the major source of income for their family and are the most productive age group. These young people may be at a high risk of spinal injury due to their daily travel to remote locations and their employment in jobs like tree cutting.¹⁶

Our research showed that men were 2.75 times more likely to sustain an injury than females. Researchers in India have consistently shown that males are more likely to suffer from spine damage. Male involvement in this trauma is disproportionately high, as shown by the male:female ratios reported by Aleem et al-1.5:1; Agarwal et al-3.6:1 and Mathur et al-4.2:1.¹⁸⁻²⁰ Males, because of their increased movement for earning, have a high incidence of spine trauma, as noted in our study, leading to a financial burden.

Majority of injury in this study was caused by falls from height (58.33%) and car accidents (30%). Previous Indian research confirmed what had already been seen in our study: that falls from height are the leading cause of spine trauma in poor nations, whereas in the West, road traffic accidents (RTAs) are the leading cause of spine trauma.^{16,18-20}

Patients experiencing spine trauma most often sustained injuries to the thoracolumbar spine, next by the cervical spine.⁵ Despite the fact that the cervical spine has been identified as the most frequent site in prior studies.^{16,18} It's possible that this finding is the result of occupational variations between rural, hilly, urban, and semi-urban locations. Due to the prevalence of activities including farming, construction, heavy physical labour, and transferring weights in central Indian areas, the thor-acolumbar spine (the junctional area) is particularly vulnerable to the effects of trauma. In metropolitan regions and industrialised nations, cervical spine injuries are more prevalent as a result of traffic accidents.⁵

The 23.33% patient showed neurological involvement of all thoracolumbar fracture patients. spinal cord injury reported in our study is lower as compared to other studies Agarwal et al with SCI at 66.67%. The fact that patients with no neurological impairment after a fall from a height or a car accident did not reach the hospital in the aforementioned trials may help to explain the bias in the pattern of neurological impairment in our region. Before reaching the hospital setting indicated in the research above, the majority of uncomplicated fractures without neurological sequelae may be treated by nearby doctors or hospitals. The 76.66% of those with Spinal cord injury showed no neurological damage at all (ASIA grade E) and rest was having some motor or sensory deficit.

Our study is one of the few handfuls of studies done to document the pattern of spine fracture and vertebral level involvement in this geographic location in India. With the patient who had sustained fractures to the thoracolumbar spine, there were single as well as multiple levels. The second lumbar vertebra was the most often affected vertebra in thoracolumbar injuries, followed by the first and third lumbar vertebrae. In the thoracic region, vertebrae D11 and D12 were most common, accounted for about similar numbers of cases. In 42% of all cases, the TLICS score of the resulting injury was 4, which was an ambiguous region where the surgeon had more leeway in deciding whether to operate or conserve. The majority (45%) of fractures were of the burst kind (AO types A3 and A4), followed by compression (AO types A1 and A2) (28.3%), and then translation or rotation (AO type C) (21.6%). And the most-rare of all was the distracted type (AO type B) (just 5%).

Our study confirmed the results of a prior study by Birua et al about the most prevalent age group, type of fractures, causes of trauma, and vertebral level of injuries.¹⁶

Limitations

Patients with high velocity trauma and neurological deficits were not brought to the emergency department for treatment, which could have accounted for selection bias and over-reported SCI rates in our study.

CONCLUSION

Fall from height is the leading cause of damage among young people predominantly male, accounting for 58.33 percent of all spinal cord injury cases. The majority (45%) of fractures were of the burst kind, followed by compression (28.3%), and then translation/rotation (21.6%). And the most-rare of all was the distracted type (just 5%). An only 15% of patients had had a complete spinal injury (AIS grade A), whereas the remaining 85% had sustained incomplete/ no spinal cord injury (AIS grade B-E).

Knowledge about the burden brought on by Spinal cord injury makes it clear that preventing such injuries is the backbone of care. Studies from developing countries, such as India, are few due to a lack of well-defined Spinal injuries registries for documenting and following up on these patients. Individuals in high-risk professions should be educated on preventative measures to lessen the frequency of spine damage. It is important to educate paramedical professionals on how to transfer patients with spine injuries to hospitals in order to improve prehospital treatment. Considering the paucity of prior research on the sociodemographic characteristics of patients with spine trauma in India, the results of this study may be extrapolated to represent a national trend in areas with comparable topography and demands for more studies for forming nation-wide database.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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