



Epidemiological Profile of Spine Cases in a Tertiary Care Hospital

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ABSTRACT

Introduction. The global incidence and prevalence of spine disorders are increasing with population growth. Traumatic spine injury and non-traumatic spine disorders are life-changing conditions. Despite growing literature about spine disorders, we found little published Asian epidemiological data. This study aimed to thoroughly understand the epidemiology of patients with spine disorders in our institution.

Methodology. This study utilized a descriptive retrospective cohort study design, and included patients with spine disorders admitted from January 1, 2016, to December 31, 2022. The patient records were retrieved, and data was collected according to the demographic profile, level of spinal disorders, type of management, and mortality rate.

Results. Of 474 patients with spinal disorders admitted to our institution, most were young and older adults at 31.4% and 36.3%, respectively. Most were males at 70.3%. Traumatic spinal disorders were more common at 66.2%. Infection was the most common non-traumatic disorder at 56.9%. The cervical spine was most affected by traumatic etiology (56.1%), while the thoracic spine was most affected by non-traumatic causes (57.5%). Among non-traumatic cases, infectious etiology, particularly tuberculosis, accounted for the highest number, followed by degenerative causes and tumors (74.7%, 70.0%, and 25.8%, respectively). Surgical management was primarily used for traumatic spinal disorders, while the majority of non-traumatic cases received conservative treatment (55.1% and 72.5%, respectively). There has been a steady decrease in mortality for spinal disorders for the past seven years.

Conclusion. Both traumatic and non-traumatic etiologies of spine disorders show a steady decrease in mortality rate, which may indicate an improvement in the hospital's orthopaedic spine service. The reduced mortality rates indicate improvement in spine care in the locality and can be used to advocate for public health measures.

Keywords. traumatic spine injury, non-traumatic spine injury, spine disorder epidemiology

INTRODUCTION

Spinal disorders include a heterogeneous spectrum of diseases that affect the vertebrae, intervertebral discs, facet joints, tendons, ligaments, muscles, spinal cord, and nerve roots. These conditions often lead to permanent changes in strength, sensation, and other body functions below the site of involvement. Traumatic spine injuries, especially to the cervical spine, have the worst mortality, morbidity, and disability. For a growing population of spine patients, proper treatment is crucial.¹ Traumatic spine injury remains a global health priority. It represents a burden for healthcare systems due to the expensive and complex medical support required.²⁻⁴ In addition, this condition is a leading cause of disability due to the loss of productivity.^{5,6}

The incidence of cervical, thoracic, and lumbar or sacral injuries, varies widely. In China, cervical lesions account for less

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than <5% of patients hospitalized with traumatic spine injuries, while in Turkey this percentage rises to 92%.⁷ This variability may be partly explained by underreporting, the availability of treatment, and geographical and financial factors. Socio-economic disparities could play a role as indigent patients may die before receiving medical care and are therefore not detected.⁸ Data are available for 41 countries, mostly European and high-income countries. Research efforts encouraged to gather information in developing and low-income countries to plan appropriate cost-effective preventive strategies.⁹ Epidemiological data in China are only available for a few provinces and are mostly outdated. Updated data are needed for targeted implementation of preventive strategies.^{10,11}

The incidence of non-traumatic spine disorders has increased rapidly in recent years. The incidence of non-traumatic spine disorders in Ireland was 26.9 per million per year, more than double the incidence of traumatic spine disorders (with degenerative and neoplastic conditions being the most common causes). Older females are more likely to be affected, and incomplete paraplegia is the most common neurological outcome.¹²

The incidence rates of both traumatic and non-traumatic spine disorders are higher in older individuals, particularly those in their 70s and 80s. Injuries secondary to falls and traffic accidents are the most common causes, with falls being more prevalent in older adults. Traumatic spine disorders involving the cervical spine were reportedly higher, especially in high-income countries like South Korea.¹³ There is little published epidemiological data for Asia.¹⁴ This study aimed to describe the epidemiological profile of spine disorder patients seen and managed in a tertiary government hospital in the Philippines.

METHODOLOGY

This study utilized a descriptive retrospective cohort study design and was done in Corazon Locsin Montelibano Memorial Regional Hospital (CLMMRH), a tertiary government hospital in Bacolod City, Negros Occidental. The institution's PHREB Accredited Research Ethics Review Committee approved the study. The study included all 474 admitted patients with traumatic and non-traumatic spine disorders treated by the Department of Orthopedic and Traumatology from January 1, 2016, to December 31, 2022. The study excluded patients who refused admission. Patients were screened using the hospital database. The following data was collected from the patient records: demographic profile, level of spinal disorders, management, and mortality outcomes. Statistical analysis was done using Excel and SPSS (v.26, IBM) applications. Kolmogorov-Smirnov (KS) statistic (D) was used to calculate normality, The Chi-Square Test of Independence was used to test for association among observations, and the Shapiro-Wilk statistic (W) was used to calculate normality.

RESULTS

The patients were primarily young (21 to 39 years old) and older adults (40 to 59 years old). Males were more commonly

involved (70.3%). Traumatic spine disorders were more common (66.2%) than non-traumatic spinal disorders. Among non-traumatic disorders, infectious etiologies (e.g., Tuberculous infection) predominated (56.9%) (Table 1).

The cervical spine was the most affected level for traumatic spine disorders (56.1%). On the other hand, the thoracic spine was the most affected by non-traumatic etiologies (57.5%). The most common sites per non-traumatic category were the thoracic spine for infection (74.7%), the lumbar spine for degenerative (70.0%), and the thoracic spine for tumors (38.7%) (Table 2).

Traumatic cases were more likely to receive surgical management than non-traumatic spinal disorders (55.1% vs 27.5%, $p < 0.001$) (Table 3).

Mortality for both traumatic and non-traumatic spine disorders has been decreasing for the past seven years (Figures 1 and 2). This may indicate an improvement in the hospital's orthopaedic spine service with an orthopaedic spine specialist consultant. The overall mortality rate for the past seven years was 20.7%, with no significant difference in the mortality rates between traumatic and non-traumatic cases (20.1% vs 21.9%, $p = 0.1667$) (Table 4).

DISCUSSION

Spine disorders and their debilitating sequelae place a considerable bio-psychological and socio-economic burden on the healthcare system, necessitating detailed epidemiologic data.^{7,15} This study corroborates local and global epidemiological profiles where males and adults were the most commonly affected.^{16,17} Young adults may engage in more high-risk activities, such as sports or extreme sports, which can increase their risk of fractures.^{17,18} On the other hand, old

Table 1. Demographic profile of patients and test for normality

Patient characteristics	f	%	KS (D)	p
A. Age (in years)			0.155	0.338
Children (1-12)	13	2.7		
Adolescents (13-20)	53	11.2		
Young Adult (21-39)	149	31.4		
Older adult (40-59)	172	36.3		
Geriatric (60 and above)	87	18.4		
B. Sex			0.212	0.489
Male	333	70.3		
Female	141	29.7		
C. Etiology			0.174	0.730
Traumatic	314	66.2		
Non-traumatic	160	33.8		
			0.197	0.198
c.1) Tumor	31	19.4		
c.2) Infectious	91	56.9		
c.3) Degenerative	30	18.8		
c.4) Deformity	8	5.0		

Note: Kolmogorov-Smirnov (KS) statistic (D) was used to calculate normality; all p-values suggest no deviation from normality.

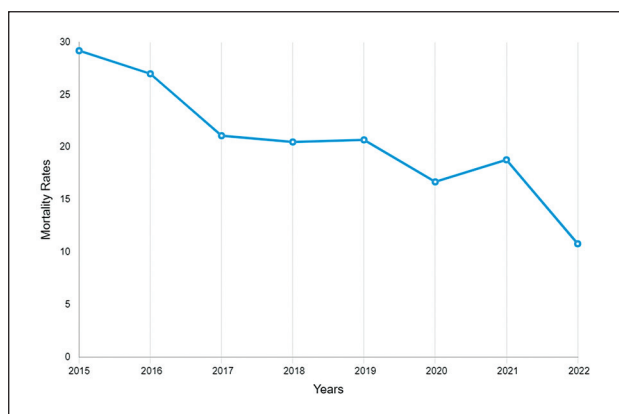


Figure 1. Mortality rates of spinal disorders for the past 7 years.

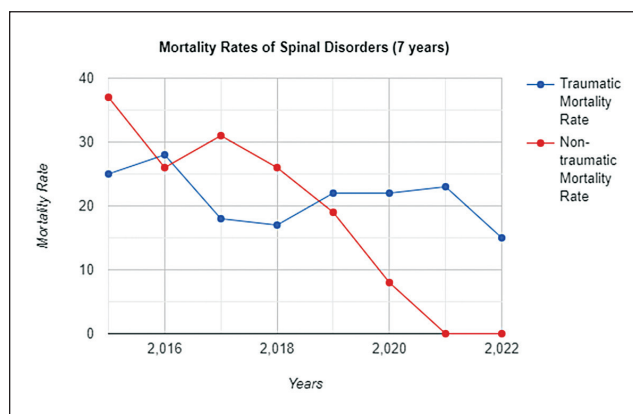


Figure 2. Mortality rates of traumatic vs non-traumatic etiologies.

Table 2. Incidence of spinal injury by spinal level according to etiology

Spinal Levels	Cervical		Thoracic		Lumbar		Sacral		N	X ²	p
	f	%	f	%	f	%	f	%			
Etiology										81.460	<0.001
Traumatic	176	56.1	84	26.8	51	16.2	3	0.9	314		
Non-traumatic	21	13.1	92	57.5	45	28.1	2	1.3	160		
										49.370	<0.001
c.1) Tumor	8	25.8	12	38.7	10	32.3	1	3.2	31		
c.2) Infectious	9	9.9	68	74.7	13	14.3	1	1.1	91		
c.3) Degenerative	4	13.3	5	16.7	21	70.0	0	0.0	30		
c.4) Deformity	0	0.0	7	87.5	1	12.5	0	0.0	8		

Note: The Chi-Square test of independence was used to test for association among observations.

Table 3. Management by etiology

Management	Conservative		Surgical		N	X ²	p
	f	%	f	%			
Etiology						32.517	<0.001
Traumatic	141	44.9	173	55.1	314		
Non-traumatic	116	72.5	44	27.5	160		
						6.6854	0.0826*
c.1) Tumor	20	64.5	11	35.5	31		
c.2) Infectious	70	76.9	21	23.1	91		
c.3) Degenerative	22	73.3	8	26.7	30		
c.4) Deformity	3	37.5	5	62.5	8		

Note: The Chi-Square test of independence was used to test for the association among observations; the asterisk (*) denotes no significant association among observations.

adults are more prone to fractures because their bones become weaker and more brittle as they age.^{19,20} This is due to lower bone density, which can be caused by various factors, including hormonal changes, poor nutrition, and lack of exercise. Additionally, older adults may be more prone to falls due to balance issues or medical conditions, such as osteoporosis or arthritis.

The cervical spine was the most affected level for traumatic spine disorders while the thoracic spine was the most affected by non-traumatic etiologies such as Tuberculous infections and degenerative causes. When tuberculosis infects the lungs, it can spread to other parts of the body through the bloodstream. The proximity of the thoracic spine to the lungs makes it

more susceptible to infection. In addition, the thoracic spine is surrounded by a network of blood vessels that can transport the bacterium throughout the body.²¹

Spine disorders can cause significant pain and discomfort. While there are a variety of treatment options available, surgical methods are often the most effective way to address these disorders. Surgical methods offer a more direct and targeted approach to treating spinal disorders, through decompression and stabilization with instrumentation. Surgical management of traumatic spine disorders may lead to faster and more effective relief of symptoms, as well as a reduced risk of long-term complications and mortality. Additionally, surgical methods are often necessary for severe cases.

We found few publications on non-traumatic spine disorders, but we anticipate that the incidence will increase substantially secondary to an aging population.²² Most tumors, tuberculous infections, and degenerative disorders of the spine undergo conservative treatment, while deformities undergo surgical correction. The high incidence of non-traumatic spine disorders in older adults in other high-income countries is consistent with our findings. In Norway and Scotland, non-traumatic spine disorders were more prevalent in older adults aged 60–74 years and 66–75 years, respectively.²³⁻²⁵ A prospective population-based study in Ireland found the highest incidence in adults 76 years and older.²⁶ Similarly, studies from Canada, Finland, and Australia found a higher incidence in adults aged 61 to 70 years.^{12,27,28} These non-traumatic spine disorders can cause pain, discomfort, and limited mobility. While surgery may be necessary in some cases, conservative methods are often the preferred treatment option.

Overall, the incidence and prevalence of traumatic and non-traumatic spine disorders vary from nation to nation, and most surveys were conducted in developed regions.^{2,29,30} In the last 7 years, there has been a significant reduction in the number of deaths caused by spine disorders in our locality. This reduction can be attributed to several factors, including improved spine care, available medical technology, increased awareness, and better treatment options. Regardless of the setting and anatomical level of the associated spinal cord injury, patients with traumatic etiology of spine disorders are at increased risk of premature death.³¹ There are wide geographical variations in the reported incidence, prevalence, and mortality related to spine disorders. This can be partly explained by differences in the mechanism of injury, demographic characteristics of patients, and cultural and lifestyle differences.³² The mortality rates in the first year post-injury are still generally high, and significantly higher than those observed at greater distance from the accident.³³ High cervical traumatic spine injuries such as levels C1–C4 were associated with the highest mortality rates at all time points, especially one month after the injury, as confirmed by previous studies.^{6,8} Factors contributing to the reduction in deaths from traumatic spine disorders are increased awareness and public education campaigns aimed at raising awareness about the recognition of the burden, outcomes, and prevention of spine disorders. This includes the use of protective gear in motorsports, precautions in lifestyle activities, maintaining a healthy lifestyle, exercising regularly, and seeking medical attention at the first sign of symptoms.

Table 4. Mortality Rates of Patients per year

Year	n of Mortality	N	Mortality rate	W	p
All Cases:				0.9035	0.3373
2022	4	37	10.8%		
2021	3	16	18.8%		
2020	5	30	16.7%		
2019	17	82	20.7%		
2018	23	112	20.5%		
2017	26	123	21.1%		
2016	20	74	27.0%		
Total	98	474	20.7%		
Traumatic:				0.8897	0.2503
2022	4	27	14.8%		
2021	3	13	23.1%		
2020	4	18	22.2%		
2019	11	50	22.0%		
2018	11	65	16.9%		
2017	17	94	18.1%		
2016	13	47	27.7%		
Total	63	314	20.1%		
Non-traumatic:				0.9182	0.4575
2022	0	10	0.00%		
2021	0	3	0.00%		
2020	1	12	8.33%		
2019	6	32	18.8%		
2018	12	47	25.5%		
2017	9	29	31.0%		
2016	7	27	25.9%		
Total	35	160	21.9%		

Note: Shapiro-Wilk statistic (W) was used to calculate normality; all p-values suggest no deviation from normality.

CONCLUSION

The cervical spine was the most affected level for traumatic spine disorders while the thoracic spine was the most affected level for non-traumatic spine disorders. Decreasing mortality rates may indicate improvements in spine trauma care, prompt diagnosis, strengthening of spine rehabilitation services, and support services. Both traumatic and non-traumatic spine disorders have significant determinants that can aid clinical decision-making.

Our sample size was relatively small because we excluded outpatient cases, usually those with deformity and degenerative etiologies. This data set may be used as a baseline for future analytical and epidemiological studies focused on specific etiologies.

STATEMENT OF AUTHORSHIP

All authors certified fulfillment of ICMJE authorship criteria.

Table 5. Mortality rates of non-traumatic spinal disorders

Non-traumatic Etiologies	n of Mortality	N (2022-2016)	Mortality rate	W	P
c.1) Tumor	9	31	29.0%	0.8711	0.1664
c.2) Infectious	19	91	20.9%	0.8804	0.2044
c.3) Degenerative	6	30	20.0%	0.8105	0.045*
c.4) Deformity	1	8	12.5%	0.4186	<0.001*

Notes: Shapiro-Wilk statistic (W) was used to calculate normality; all p-values suggest no deviation from normality; the asterisk (*) denotes significant deviation from normality. Data were reported in summary due to a lack of sample size.

AUTHOR DISCLOSURE

The authors declared no conflict of interest.

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