

## Traumatic Thoracolumbar Spine Injury –A Demographic Study

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### Abstract

**Study design and subjects:** Cross-sectional descriptive analysis of data of patients with thoracolumbar SCI admitted for rehabilitation at a tertiary care centre from January 2011 to September 2014.

**Objectives:** To identify the demographic pattern of TLSCI admitted to this centre.

**Setting:** Department of PM&R, King George's Medical University, Lucknow.

**Methods:** One hundred and thirty-three consecutive patients of traumatic TLSCI admitted for rehabilitation were included in the study. Detailed demographic, clinical, neurological evaluation as per ASIA scale and radiological assessment done and analyzed.

**Results:** Mean age of our sample was 29.62±5 years. There were 21.05% females and 78.95% males. A significant percentage (36.84%) was farmers/labourers, followed by students 26.31%. Majority (67.67%) had fall from height followed by road traffic accidents (21%). Only 3.76% received ambulance for transport and majority (87.22%) of the cases transported by hired four wheelers. Only 18.78% cases came to tertiary center within 2 hours and majority (70%) came after 8 hours of injury. Ratio of complete and incomplete injuries being 1.7:1. Most common vertebral involvement in 58.64% cases were of T12 and L1.

**Conclusions:** Majority of Indian population live in rural areas which have minimal accessibility to even primary care. This disparity should be removed by even distribution of specialty hospital and trauma care centres in rural areas with better transportation with trained staff for trauma care. A national SCI registry system is needed and SCI case should be reported from all hospitals so that rehabilitation programme planning can be done accordingly.

**Key words:** Thoracolumbar spinal cord injury (TLSCI), American Spinal Injury Association (ASIA), paraplegia, demography.

### Introduction:

The most devastating event which can occur in an individual's life is spinal cord injury (SCI). Not only the sensory-motor system is affected, there is multisystem

involvement and long term disability to the individual. Complete restoration of functions is not yet amenable despite the ongoing research in the treatment of SCI, which is a big obstacle in independent living of the victim.

Traumatic injury to thoracolumbar spine is second most common site after cervical spine injury, compromising the cord functions i.e. motor, sensory, autonomic reflex resulting in paraplegia. Conus medullaris, cauda equina injury are also included in this group. Due to the non-existence of spinal cord registries in India, no reliable data set is available, on the basis of which the demographics, economic and disability burden of the same can be ascertained. An epidemiological data helps us to make plans for better allocation of resources directed towards preventing SCI and rehabilitating the resulting disabled individuals.

Developing countries like India are at high risk of this kind of injury due to progressive socialisation and industrialisation with unawareness about safety

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programme. This is a hospital based study from a single tertiary care rehabilitation centre in Northern India.

### Materials and Methods:

One hundred and thirty-three consecutive patients of traumatic thoracolumbar SCI admitted for rehabilitation to the department of PM&R, King George's Medical University, Lucknow, from January 2011 to mid September 2014 were included in the study. Detailed clinical, neurological evaluation as per American Spinal injury Association Classification (ASIA) and radiological assessment done including identification of mechanism of injury, mode of ambulation and delay in transport. This is a cross-sectional descriptive study, data analysis was done in October 2014 and results were compiled and analysed.

### Results:

Mean age of the sample was  $29.62 \pm 5$  years, a significant number 55 (41.35%) were from the age group of 16 to 25 years (Table 1). There were 21.05% females and 78.95% males, with a male to female ratio of 3.75:1. A significant number 49 (36.84%) were farmers and labourers, followed by students 35 (26.31%) (Table 2). Average monthly income of the sample was Rs. 7000 approximately (Table 2). Nineteen i.e. 14.29% were illiterate and majority 63 (47.37%) were educated in between 6th to 10th standard. Taking into account educational status, income and job profile of each individual, we attempted to find out the socio-economic strata of the sample through Kuppuswamy score. Majority of the sample belonged to the lower socio-economic group, thus after SCI drastic deterioration in economy of the family occurs. Majority 90 (67.67%) had fall from height followed by road traffic accidents in 28 (21%) as the cause of injury. About 6% cases had fall of weight on back and 3 cases were developed after gunshot (Table 3). Only 5 (3.76%) received ambulance for transport and

**Table 1:** Age and Sexwise Distribution of Cases

Age group (years)	Male	Female	No of cases	Percentage (%)
6-15	3	2	5	3.76
16-25	43	12	55	41.35
26-35	22	9	31	23.31
36-45	25	4	29	21.80
46-55	8	0	8	6.02
55-65	4	1	5	3.76
Total	105 (78.95%)	28 (21.05%)	133	100

majority 116 (87.22%) of the cases transported by hired four wheelers. Only 25 (18.78%) cases came to tertiary care centre within 2 hours and majority 93 (70%) came after 8 hours of injury (Table 3). Most of the injured presented with neurologically complete picture i.e., 84 (63.16%). Ratio of complete and incomplete injuries was 1.7:1 at the time of presentation at the tertiary care centre. Most common vertebral involvement in 78 (58.64%) cases was of T12 and L1 (Table 4).

### Discussion:

In contrast to developed countries where RTA are the main cause of SCI<sup>1-5</sup>, fall from height is the main culprit of SCI in India (Singh *et al*<sup>6</sup>). Fall from roof and wall is the leading cause due to lack of fencing on roof, no guarding of staircases and sleeping on unprotected roof. In rural areas fall from tree is another important cause of this catastrophic event. In this study, RTA is the second most common cause with an increasing trend after fall from height. Uncontrolled motorisation, socio-economic growth and increased traffic load with industrialisation have made injuries as major public health problem in India.

**Table 2:** Distribution of Cases according to Education, Occupation, and Family Income

	Characteristics	No of cases	Percentage (%)
Education	Illiterate	19	14.29
	Up to 5th standard	16	12.03
	6th to 10th standard	63	47.37
	11-12th standard	17	12.78
	>12th standard	18	13.53
Occupation	Labourer	22	16.54
	Farmer	27	20.30
	Student	35	26.31
	Housewife	12	9.02
	Government job	5	3.76
	Lineman	5	3.76
	Business	6	4.51
	Private job	5	3.76
	Driver	4	3.01
	Others	12	9.03
Family income / month	<Rs.5,000	69	51.88
	5,001-10,000	46	34.59
	10,001-20,000	12	9.02
	20,001-50,000	6	4.51
	>50,000	0	0

**Table 3:** Mechanism of Trauma, Mode of Transport, and Delay in Ambulation

Characteristics		No of cases	Percentage (%)	
Mechanism of trauma	I. Road traffic accident	28	21.05	
	II. Fall from height	o Fall from tree	25	18.80
		o Fall from roof/wall	53	39.85
		o Fall from stairs	3	2.25
		o Fall on ground	4	3.01
		o Fall from height after electric sock	5	3.76
	III. Fall of heavy weight	8	6.02	
	IV. Assault	o Fire arm injury	3	2.25
o Beaten with stick		1	0.76	
V. Miscellaneous (Machinery, Train accident)	3	2.25		
Mode of ambulation	Ambulance	5	3.76	
	Tricycle	3	2.25	
	Two-wheeler	4	3.01	
	Three-wheeler	5	3.76	
	Four-wheeler	116	87.22	
Delay in transport	<2 hours	25	18.80	
	2-8 hours	15	11.28	
	9-12 hours	34	25.56	
	13-24 hours	39	29.32	
	> 24 hours	20	15.04	

Agrawal *et al*<sup>7</sup> reported a sex ratio of 3.6:1 and Li *et al*<sup>8</sup> documented a sex ratio of 3.1:1 which is similar to our study, in contrast of some studies which show large male and female ratio. Most common age group in our study was 16-25 years. The age distribution of patients is comparable with studies<sup>9-12</sup> from other parts of the world.

The “108” ambulance facilities have definitely improved the transportation but because of lack of awareness, trained paramedical staff, SCI evacuation equipment in the form of spinal board, collar, straps etc, this has failed to do any good to the injured and secondary injury to the cord is much common. Only 5 cases (3.76%) were transported by ambulance to specialised centre in our study which is very low and needs to be improved. None of the injured in this study received the primary management as per SCI protocols, also seen in studies of Solagberu *et al*<sup>13</sup> and Nguyen *et al*<sup>14</sup>.

Neurologically complete injuries (ASIA A) were the most common in this study, as against the higher percentage of incomplete injuries in the developed world<sup>15,16</sup>. Only 18.8% cases reached the tertiary centre in <2 hours while majority (69.9%) cases reached with a delay of >8 hours.

**Table 4:** Distribution of Cases according to Vertebral Level

	Characteristics	No of cases	Percentage (%)
Vertebral level	T2	1	0.76
	T3	2	1.50
	T4	4	3.01
	T5	3	2.25
	T6	5	3.76
	T7	3	2.25
	T8	8	6.02
	T9	6	4.51
	T10	4	3.01
	T11	11	8.27
	T12	34	25.56
	L1	44	33.08
	L2	4	3.01
L3	4	3.01	
Neurological level	A	84	63.16
	B	21	15.80
	C	17	12.78
	D	10	7.51
	E	1	0.75

In order to prevent fall from height, people should be made aware of the precautions that should be taken while building their houses, safety guards should be provided for workers, unprotected tree climbing should be discouraged. Injury prevention strategies should focus towards the need for better transport facilities, provision of safer roads, greater allocation of public transport and stringent traffic rules, as wearing of safety belts, alcohol awareness in India.

### Conclusions:

Greater than 68.84% of Indian population live in rural areas<sup>17</sup> instead comprehensive emergency and acute trauma care and tertiary care centres are available in urban areas and there is no or minimal availability of even primary care in rural areas. This disparity should be removed by even distribution of government specialty hospital and trauma care centres in rural areas. Better ambulance facilities with trained staff for trauma care including primary management of SCI should be instituted. There should be SCI management team in hospitals managing trauma to be led by rehabilitation medicine specialist and public should be educated about safety measures. Gururaj *et al*<sup>18</sup> in 2011 reported the increasing trend of road crashes and deaths with a national average of 110/million, though the real incidence is not yet known due to lack of national registry system. Sekhon and Fehlings<sup>19</sup> reported the incidence of SCI 15-40/million/year in developed countries.

In this study we have tried to find out the demographic trend of thoracolumbar SCI of cases presenting at our Rehab centre which is definitely not the true representation of demography, but it can give some clue about the problem. A national SCI registry system is needed and SCI case should be reported from all government as well as private hospitals so that rehabilitation programme planning can be done accordingly.

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