

Epidemiology of Spinal Injuries, Geographical-Variations - Preventable Measures

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This prospective study was conducted at the department of Neurosurgery situated at Lahore General Hospital Lahore and Mayo Hospital Lahore/KEMC, Lahore, Pakistan. Study period extends from November 1998 to November 1999 on 82 patients. Purpose of this study was to evaluate correlation among the incidence of spinal injuries, age of the patients and variations in the occurrence of these injuries in relation to particular region with subsequent focus on preventive measures. Study reveal that trauma to the spine has a direct relation with age as it is commonest between 20-30 years of age group. As incidence of injury vary region wise according to their particular customs and culture. Therefore, preventive measures and strategies should be formulated and adopted according to the specific needs of the region.

Key words:- Spinal injuries, Geographical variations-spinal cord injured, seasonal variations-causes of injury

Spinal cord injuries has a worse effect on one's life and career and common cause of quadriplegia and paraplegia. It puts high economic burden on society and create multiple social problems. However, spinal cord injured if survived, spend a normal life span. In USA, 250,000 Americans are spinal cord injured, 52% of these are considered paraplegic and 47% quadriplegic, approximately 10,000 new injuries occur each year¹. Luckily, most spinal injuries are preventable. But unfortunately, spinal cord injuries in majority of cases cannot be cured as resulting disability persists for years or life time. Although very vast and extensive study is being conducted on SCI throughout the world but still it is in the process of finding a better treatment and cure is still in the dark. These features makes spinal injuries very important and focus on the need to adopt specific preventive measures according to its etiology. Spinal injuries has a direct relation with the age as incidence gets increased during certain period of life. Therefore, in this study, an effort is being made if any variation exist region wise and if age, sex and physical activity has a relation with the occurrence of spinal cord injured? So that preventive strategies should be planned accordingly to reduce the incidence of these incapacitating injuries.

Material and Methods

82 patients of cervical and dorso-lumbar spinal injuries with neurological deficit, were studied at the department of Neurosurgery, KEMC/ Lahore General Hospital Lahore and Mayo Hospital Lahore from November 1998 to November 1999. We recorded demographic characteristics of the patients, date and mechanism of injury and extent of paralysis at the time of admission. Female patients were only (n=06, 7.32%) while male were (n=76, 92.68%) in a ratio of 1:12.67 respectively. During summer, (n=46, 56.09%) injuries, in spring (n=22, 26.82%), in winter (n=04, 4.87%) and in Autumn (n=10, 12.19%) injuries were recorded in this study.

Table 1. Age incidence

Variable	n (%)
0-12	2 (2.43)
12-20	8 (9.75)
20-30	34 (41.46)
30-40	20 (24.39)
40-50	6 (7.31)
50-60	8 (9.75)
60-70	4 (4.87)
Range	12-70y
Mode	40y
Median	30y
*RR	*17 **8.5-

*Cumulative Incidence (RR) reveals that incidence is 17 times more in group 20-30 years as compared to that in 12-20 years. Similarly, it is 8.5 times more when compared with 60-70 years of age group.

Cumulative incidence (RR) reveals that relative incidence of SCI due to Falls is *1.62 times more than due to RSA and from firearm injury to **2.6 times more. + indicates preventable injuries, # shows injuries that can be prevented to a certain extent, \$ indicates injuries related with Physical activity.

Results

Injury predominate male sex (92.68%) in 20-30 years with a median age of 40 years although it fluctuates from 12-70 years of age in this study. In this study as shown in table-2, most of the spinal injuries are caused by falls (31.70%) from various sites i.e., fall from roof-tops (8%), electric pole (n=06), fall from tree (n=06) etc, then road side accidents (19.51%), firearm injuries (12.19%), comes on second and third fall of weight on patient (7.31%) and slipped foot (7.31%) on fourth and sports-related (4.87%) on fifth number respectively. As a result of injury, 26.82% patients develop paraplegia, 24.39% developed quadriplegia, 12.19% paraparesis, while it was miscellaneous in 36.58% patients as shown in table-3. But

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no patient with quadriparalysis was noted. 65.85% (n=54) injuries were related with physical activity, 60.97% (n=50) were preventable and 26.82% (n=22) could be prevented to a certain extent (table-2).

Table 2. Mechanism of injury

Mode of Injury	n %
Road side accident	16#(19.51%)
Falls	26+\$
a)Fall from roof- top	(31.70%)
b)Fall from electric pole	8(9.75%)
c)Fall from Tree	6(7.31%)
d)Fall from upstairs	6 (7.31%)
e)Fall in a well	2 (2.43%)
d) Fall from tractor trolley in attempt of climbing over it and fall of 200 lbs weight on him.	2(2.43%)
Firearm injury	10 (12.19%)
Slipped foot	06+\$ (7.31)
a)From upstairs	2(2.43%)
b)Miscellaneous	4(4.87%)
Fall of weight on patient	6 + \$ (7.31%)
a)Crane	2 (2.43%)
b)Heavy weight on neck	2(2.43%)
c)Tree on the back	2(2.43%)
Fall while carrying heavy weight on head	4+\$ (4.87)
Hit by a bull and cart passed over patient	2# \$ (2.43)
Hit by the belt of machine and rolled in it.	2+\$ (2.43)
Fight Related	4# \$ (4.87%)
a)During fight, hit by a brick on the neck	2 (2.43%)
b)Fight with robbers	2(2.43%)
Sports-Related	4+\$ (4.87%)
a)Diving in the canal in head down position(sports related).	2(2.43%)
b)Fall of wall on which patient was standing in search of a cricket ball	2(2.43%)
Struck by Tonga foot step	2+(2.43%)

Table 3. Extent of paralysis

Variable	On admission(n=)	%age
Paraplegia	22	26.82
Paraparesis	10	12.19
Quadriplegia	20	24.39
Quadriparesis	-	-
Miscellaneous	30	36.58%

Discussion

Spinal cord trauma is more common among young males(n=76) in this study probably because males are involved more in physical and out-door activities and bread earners whereas female stay at home to carryout household activities, therefore less prone to injury(n=06). In USA, almost three quarters (70%)are male². But in Canada, females outnumbered the males³. In china, an overall ratio of 2:1 male predominance was noted⁴.

When considering mechanism of injury , age and sex incidence, a fact come into the light that most of the injuries has occurred while doing some kind of Physical activity(n=54,65.85%). That injury occurred more commonly during the most active life period i.e. in 20-30 years (n=34) and 30-40 years (n=20) of age group as shown in table-1. Although incidence of injury fluctuates between two extremes of life (12-70years), risk of injury increases with the age up-to 30(n=34) years and then begins to decline as the age increases with consequent decrease of physical activities (n=04). In this study, 65.85% (n=54) injuries occurred during certain kind of physical activity. Therefore, spinal injury has a direct link with one's involvement in physical activity. In United states ,more than half (60%) of the SCI population were injured between the ages of 16 and 30²;the most frequently occurring age at injury is 19 years² but in this study ,it is 40 years. In Canada, sixty-seven percent were between the ages of 16 and 40⁵.

But ultimate, disability and illness is so horrible and damaging that a person has to remain confined either to the bed or to the wheel chair for ever (in majority of cases). Patient is so dependent that he is unable to do any act without the help of others. In this study, 24.39% patients develop quadriplegia,26.82% paraplegia,12.19% paraparesis etc. Then how a person with this disability can do a job and make money for himself and his family? Depression is common in them and there is no source of entertainment. Due to loss of sexual function, their married life and plans of marriage also suffer. Males in our society are lucky as they get more attention of their family as well as spouse. But females, lack it as being a passive member of the society and therefore, are more sufferer. Life becomes meaningless and burden for themselves and their families as it cause serious handicap and dependency. Because it is the ailment of "Younger age"⁶,therefore, cost spend on them and consequent losses are significant. In this study, injury was particularly preventable in (n=54,60.97%) patients while in (n=22,26.82%) patients , trauma was preventable to a certain extent (table-2).But unfortunately, preventable measures are not adequately followed in our set up due to lack of knowledge, literacy and non-implementation of rules. Therefore, risk of spinal trauma is also high.

Mechanism of trauma reflects traditional style of living in a particular culture and region. In this study, falls are responsible for the maximum injuries and then road-side accidents. Sports are less common in our society, therefore, related risk of injury is also less i.e.4.86%. Incidents gets increased during summer season as falls from roof-tops(n=08) and tree increases accounting for (n=06) injuries in this study. Whereas 2.43% patients got injury as struck by Tonga foot step indicating culture of our village life. In Canada, road side accidents and industrial accidents were the main causes (34.4% and 29.3%) respectively⁷. In another study from Canada, road side accidents was first, sports-recreational injuries second and industrial injuries third cause⁸. In a study from

Germany, 39 falls out of 101 were suicidal⁹ and it is common cause in western countries^{9,10} but in this study, no such cause was noted. In India, the commonest cause of spinal injury was fall from the trees (55.2%)¹¹. In Burma, most spinal injuries results from falls from height especially trees¹². Camel collisions were a major cause of vehicle accidents 39(33%), after roll over accidents 70(59%), and much more than head-on-collision 9(7.5%) in Middle East¹³. Taiwan, especially in its suburban and rural areas has higher rate of spinal cord injuries in the world⁴. So causes of spinal injuries vary from region to region and preventive measures should be formulated and adopted according to the need of the particular region. . People usually sleep on roof - tops during summer season in our country and get spinal injury. It is usually documented that falls from roof-tops occurred accidentally but in fact, it occurred due to negligence and ill designed protective boundary walls or roofs without it. Two patients, got cervical spinal cord injury due to fall from roof-tops while kiting. This mode of injury is peculiar to our country. Moreover, people climb-up on Jamman tree for plucking fruit and contract injury, although they know very well that it is composed of delicate branches and risk of trauma is there. Due to these facts, "summer injuries" are common in this country i.e., 56.09%(n=46) in this study.

For our country, where falls are responsible for most of the spinal injuries (31.70%), people should be informed through mass media about the hazards of climbing trees and consequent resulting disability and its worse effects on the life and family, that a proper ladder should be used. Boundary walls of roof of adequate height should be compulsory by rule. People working with high tension wires on electric poles should adhere to their preventive measures as wearing of safety belts, rubber gloves, shoes as well as use of wooden ladder for climbing up. People should avoid unnecessary sports and activities and should learn correct swimming techniques. Use of seat belt during driving and strict implementation of traffic rules should be assured as in Taiwan¹⁴, incidence of spinal injuries has reduced markedly just due to the strict implication of helmet and seat belt as well as traffic rules. It also resulted in a significant saving of nation's money. Up-stairs should be built of equal and appropriate height i.e. neither too high nor too small. Floors should not be much smooth and frictionless. Appropriate precautionary measures for industrial and factory workers should be implemented according to their specific needs e.g. for weight transference, use of equipment etc. Public awareness about spinal trauma and its consequences should be initiated via mass media on priority basis and an introductory chapter on it should be added in syllabus at school and college level.

Conclusion

Spinal trauma is directly linked with male sex, younger age, physical activity and specific style of living and customs in different regions of the world. Rise in the incidents of spinal trauma and resulting marvelous losses can be prevented to a greater extent by strict implementation of precautionary measures based on the specific need of the region.

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