

FREQUENCY, CHARACTER, INTENSITY AND IMPACT OF NEUROPATHIC PAIN IN A COHORT OF SPINAL CORD INJURY PATIENTS

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ABSTRACT

Objectives: The purpose of this study was to determine frequency, character, approximate location and intensity of neuropathic pain in spinal cord injury and its impact on the quality of life.

Study Design: A cross-sectional survey

Place and Duration of Study: Armed Forces Institute of Rehabilitation Medicine (AFIRM), Rawalpindi from Feb 2009 to Feb 2010.

Material and Methods: Through non-probability convenience sampling 87 patients of both genders diagnosed with spinal cord injury based on American Spinal Injury Association criteria and admitted within a year of injury were included. Those in spinal shock, having poor cognition, inability to communicate, concurrent brain injury and history of chronic pain before injury were excluded. The history, localization and characteristics of the pain and interference with life activities were recorded. Neuropathic pain of patients was evaluated with Leeds Assessment of Neuropathic Symptoms and Signs Pain Scale. Visual analogue scale was used to measure the severity of pain.

Results: Out of 87 patients (mean age 36.9 years) seventy four were male and 13 were female. Seventy patients (80%) were AIS-A, 6 (7%) were AIS-B and 11 (13%) were AIS-C. Neuropathic pain was present in 57.5% (n=50). Most of the patients localized their pain below the neurological level of injury (78%) and rated pain intensity as "moderate pain" (54%). Majority (48%) described the pain as burning followed by electric shock like (42%), stabbing (8%) and pricking (2%). 48% patients reported that their quality of life was affected due to pain. 52% required two analgesics of different groups to relieve pain followed by 40% requiring three analgesics and 8% requiring one analgesic.

Conclusion: Neuropathic pain is prevalent in people with spinal cord injury and adversely affects life quality. Neuropathic pain is primarily described as a burning sensation of moderate intensity mostly referred to below the neurological level of injury.

Keywords: Neurological level of injury, Neuropathic pain, Spinal cord injury, Visual analogue scale.

INTRODUCTION

Pain is major problem in spinal cord injury (SCI) patients and affects the rehabilitation outcomes in acute and chronic settings¹. During the acute phase of SCI, pain is usually related to trauma to the soft tissue and skeletal system. In chronic phase, neuropathic pain predominates which results from the abnormal processing of sensory input due to damage to the nervous system².

Pain interferes with activities of daily living, social life, vocational and avocational pursuits and significantly influences human psychology often leading to depression³. Published pain prevalence rates vary according

to diagnostic criteria, although there is convergence amongst the larger trials with rates of 60-65% being agreed. Severe pain is estimated to occur in 20-30% of the SCI population⁴.

Most commonly applied measures for pain report in SCI research studies are numeric rating scale (NRS) and visual analogue scale (VAS)^{2,3}. NRS is an 11-point one-dimensional rating scale from zero to 10 for evaluation of self-reported pain intensity. VAS is a 100 mm long line with anchors marked as "no pain" and "worst pain possible". These scales are well established for validity, application facility and responsiveness^{2,3}. The purpose of conducting this study was to determine frequency, character, approximate location and intensity of neuropathic pain in SCI and its interference with life. This would help in better pain management, achieving rehabilitation goals and

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improving quality of life in SCI patients in the local population.

PATIENTS AND METHODS

This descriptive study was carried out at SCI rehabilitation indoor department of Armed Forces Institute of Rehabilitation Medicine (AFIRM), Rawalpindi from Feb 2009 to Feb 2010. Patients of both genders diagnosed with SCI based on American Spinal Injury Association (ASIA) criteria for diagnosis of SCI⁵ and admitted within a year of SCI were included in the study through non-probability convenience sampling. The exclusion criteria were: 1) Spinal shock 2) Inability to communicate. 3) Poor cognition. 4) Concurrent-traumatic or non-traumatic brain injury 5) History of chronic pain before SCI.

After taking permission from concerned authorities and hospital ethical committee, verbal informed consent was obtained from all patients. All enrolled patients were examined according to the criteria set by ASIA which is graded by ASIA impairment scale (AIS)⁵. The presence or absence of neuropathic pain was assessed with the Leeds Assessment of Neuropathic Symptoms and Signs (LANSS) Pain Scale which determines that the neuropathic and not the nociceptive mechanisms are likely to be contributing to the patient's pain if the total score is ≥ 12 ⁶. Data was collected using a proforma which included information regarding gender and age, aetiology and scale (AIS) of injury and character and intensity of neuropathic pain based on VAS. All patients were also inquired whether or not the pain interfered with their essential life activities and about the number of analgesic medications they were using to control pain.

Every pain complaint identified by the participant originating from different parts of the body was classified based on its location relative to the neurological level of injury (NLI) according to the recently published consensus guidelines for pain in SCI⁷. Any pain that was located in the dermatomes above the NLI was excluded from analysis as it was not directly due to the spinal injury. Pain that was located at or up to three dermatomal levels below the NLI was defined as confined to the area of injury.

Pain identified as "below level" was restricted to more than three dermatomes below the NLI⁷. All patients were categorized into four groups based on VAS measurement. VAS measurement of 0 to 4 mm was considered "no pain"; 5 to 44 mm "mild pain"; 45 to 74 mm "moderate pain"; and 75 to 100 mm "severe pain"⁸.

The data had been analysed with the help of statistical program SPSS V 20. Mean and standard deviation were calculated for age. Frequencies along with percentages were calculated for gender, character of pain, pain severity, level of neuropathic pain in relation to NLI, interference of life and the number of analgesics used to treat pain.

RESULTS

A total of 87 patients with a mean age of 36.9 years (range 20 - 60 years) were recruited. Seventy four (85%) patients were male and 13 (15%) were female. Based on AIS classification, 70 patients (80%) were SCI AIS-A, 6 (7%) were AIS-B and 11 (13%) were AIS-C. Neuropathic pain was present in 57.5% patients with SCI. Most of the patients localized their pain below the NLI (78%) rather than at the NLI (22%). Discussing the character of pain, most patients (48%) described it as burning, followed by electric shock like (42%), stabbing (8%) and pricking (2%) (Table-1).

Regarding pain intensity, twenty seven patients (54%) rated pain intensity as "moderate pain" followed by 21 (42%) patients rating as "severe pain" and 2 (4%) patients rating as "mild pain" (Table-2). 48% patients reported that their quality of life was affected due to pain. Out of 50 patients presenting with pain, 26 patients (52%) required two analgesics of different groups followed by 20 (40%) requiring three analgesics and 4 patients (8%) requiring one analgesic to relieve pain.

DISCUSSION

Though loss of mobility is often considered the most serious consequence of SCI, pain has a direct bearing on the ability of those with such injuries to regain their optimal level of activity. It is interesting to note that people with SCI consistently rate pain as one of the most difficult problems to manage, despite the

presence of other problems that interfere with daily life⁹. The impact has been highlighted by a report which stated that 23% to 37% of SCI

study by Nakipoglu-Yüzer from Turkey also discovered that neuropathic pain localized to below the NLI in 97.1% and at the lesion level in

Table-1: Table showing the main descriptions of neuropathic pain given by patients.

Frequency and %	Description of pain by patients			
	Burning	Stabbing	Pricking	Electric Shock like sensation
Frequency	24	4	1	21
% of Total	48%	8%	2%	42%

Table-2 : Showing distribution of patients in groups based on pain intensity measured by visual analogue scale.

Frequency and %	Pain intensity group based on visual analogue scale		
	Mild Pain	Moderate pain	Severe Pain
Count	2	27	21
Percentage of total	4%	54%	42%

patients with variable NLI were willing to trade pain relief for loss of bladder, bowel or sexual function¹⁰. In this study, we aimed at exploring prevalence, character, intensity and impact of neuropathic pain in a cohort of Pakistani SCI population.

Considering the whole sample, the frequency of neuropathic pain was 57.5%. This prevalence is in accordance with several other studies with some variability. Some studies have indicated the prevalence of pain in people with SCI around 65–85%¹¹. Bonica et al found prevalence of neuropathic pain in 69% while surveying data of 2,449 SCI patients¹². A postal survey documented a prevalence of 66%¹³ and two longitudinal studies revealed a prevalence of 64% at 6 months¹⁴ and 63% at 12 months in SCI patients following discharge from acute hospitalization¹⁵.

Regarding pain character, the most common character of pain was burning sensations (48%) followed by electric shock like sensations (42%). Widerstrom-Noga et al conducted an analysis of the patients' description of pain after SCI and discovered that 59.9% complained of burning sensations while 54.9% described their pain as electric shock like sensations¹⁶. Cruz-Almeida and colleagues also found the most common description of pain as burning (43.6%) followed by aching (34.8%), sharp (30.6%), throbbing (22.4%), stabbing (19.4%) and electric (19.1%)¹⁷. They described that the pain was localized primarily (59.4%) to below the NLI. A recent

2.9% patients¹⁸. The results of our study are similar to this study, concluding below the NLI pain to be more prevalent (78%) followed by the NLI (22%). However, conflicting results have been promoted by some studies. Siddall and colleagues, in an Australian study, found neuropathic pain to be more common at the NLI (36%) than below the NLI (19%)¹⁴. Similar results had been obtained by another Australian study¹⁹.

Taking in view the intensity of pain, majority (54%) rated pain intensity as "moderate pain" followed by 42% patients rating as "severe pain" and 4% patients rating as "mild pain". A number of past studies have measured severity of pain with verbal scales (e.g., mild, moderate, severe) and with numerical scales (e.g., 0 to 10, 0 to 100, 1 to 5). Using verbal scales, 39% of the participants in one study²⁰ and 58% in another²¹ reported severe pain. On numerical scales, average pain intensity has ranged from 41 to 59% of the maximum score²²⁻²⁴.

The patients who reported neuropathic pain were interviewed about the impact of pain on their routine daily life. 48% were of the opinion that their pain was severe enough to affect their routine daily life. Significant life interference related to pain was also reported by Cruz-Almeida and colleagues who also suggested that multiple types of mechanical stimuli, such as touch or pressure are frequently encountered when performing daily life activities, therefore, exacerbation of pain due to

frequent exposure to these factors may reduce a person's ability or willingness to perform certain daily activities¹⁷. The relationship between life interference and pain after SCI is complex and appears to be independent of injury characteristics^{16,17,25,26}.

Most of patients were prescribed two to three analgesics of different groups to relieve their pain. The rationale behind drug combinations is that multiple mechanisms generate neuropathic pain and it is unlikely that a single drug will effectively treat these multiple mechanisms. Rodent models have demonstrated synergy between monoamine reuptake inhibitors and opioids, gabapentin and opioids and gabapentin and monoamine reuptake inhibitors²⁷. Reported use of sodium channel blockers with gabapentin, tricyclic antidepressants with morphine and gabapentin with morphine suggest benefits to two drug combinations²⁷.

The findings from this study are important in the care of patients with chronic SCI because it is one of the initial efforts to study the problems in such patients. The findings of the study will provide the basis for formulation of clinical guidelines based on Pakistani population for improved rehabilitation of these patients. In turn, this characterization of a set of problems, which are second only to the loss of mobility will lead to improved care of such patients suffering from the complications of SCI.

CONCLUSION

Neuropathic pain is prevalent in people with SCI and adversely affects life quality. Neuropathic pain is primarily described as a burning sensation of moderate intensity mostly referred to below the NLI.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

REFERENCES

- Breivik H, Collett B, Ventafridda V, Cohen R, Gallacher D. Survey of chronic pain in Europe: prevalence, impact on daily life, and treatment. *Eur J Pain* 2006; 10(4): 287-333.
- Siddall PJ, Loeser JD. Pain following spinal cord injury. *Spinal Cord* 2001; 39(2): 63-73.
- Finnerup NB, Jensen TS. Spinal cord injury pain--mechanisms and treatment. *Eur J Neurol* 2004; 11(2): 73-82.
- Spinal cord injury. Facts and figures at a glance. *J Spinal Cord Med* 2005; 28(4):3 79-80.
- Kirshblum SC, Burns SP, Biering-Sorensen F, Donovan W, Graves DE, Jha A, et al. International standards for neurological classification of spinal cord injury (revised 2011). *J Spinal Cord Med* 2011; 34(6): 535-46.
- Bennett M. The LANSS Pain Scale: the Leeds assessment of neuropathic symptoms and signs. *Pain* 2001; 92(1): 147-57.
- Maynard Jr FM, Bracken MB, Creasey G, Ditunno Jr JF, Donovan WH, Ducker TB, et al. International standards for neurological and functional classification of spinal cord injury. American Spinal Injury Association. *Spinal Cord* 1997; 35(5): 266.
- Jensen MP, Chen C, Brugger AM. Interpretation of visual analog scale ratings and change scores: a reanalysis of two clinical trials of postoperative pain. *J Pain* 2003; 4(7): 407-14.
- Widerstrom-Noga EG, Felipe-Cuervo E, Broton JG, Duncan RC, Yezierski RP. Perceived difficulty in dealing with consequences of spinal cord injury. *Arch Phys Med Rehabil* 1999; 80(5): 580-6.
- Nepomuceno C, Fine PR, Richards JS, Gowens H, Stover SL, Rantanuabol U, et al. Pain in patients with spinal cord injury. *Arch Phys Med Rehabil* 1979; 60(12): 605-9.
- Cairns DM, Adkins RH, Scott MD. Pain and depression in acute traumatic spinal cord injury: origins of chronic problematic pain? *Arch Phys Med Rehabil* 1996; 77(4): 329-35.
- Bonica JJ. Introduction: semantic, epidemiologic and educational issues. In: Casey KL, editor. *Pain and Central Nervous System Disease: the Central Pain Syndromes*. New York: Raven Press, 1991 13-29.
- Fenollosa P, Pallares J, Cervera J, Pelegrin F, Inigo V, Giner M, et al. Chronic pain in the spinal cord injured: statistical approach and pharmacological treatment. *Paraplegia* 1993; 31(11): 722-9.
- Siddall PJ, Taylor DA, McClelland JM, Rutkowski SB, Cousins MJ. Pain report and the relationship of pain to physical factors in the first 6 months following spinal cord injury. *Pain* 1999; 81(1-2): 187-97.
- Kennedy P, Frankel H, Gardner B, Nuseibeh I. Factors associated with acute and chronic pain following traumatic spinal cord injuries. *Spinal Cord* 1997; 35(12): 814-7.
- Widerstrom-Noga EG, Felipe-Cuervo E, Yezierski RP. Relationships among clinical characteristics of chronic pain after spinal cord injury. *Arch Phys Med Rehabil* 2001; 82(9):1191-7.
- Cruz-Almeida Y, Felix ER, Martinez-Arizala A, Widerstrom-Noga EG. Pain symptom profiles in persons with spinal cord injury. *Pain Med* 2009; 10(7): 1246-59.
- Nakipoglu-Yuzer GF, Atci N, Ozgirgin N. Neuropathic pain in spinal cord injury. *Pain Physician* 2013; 16(3): 259-64.
- Siddall PJ, McClelland JM, Rutkowski SB, Cousins MJ. A longitudinal study of the prevalence and characteristics of pain in the first 5 years following spinal cord injury. *Pain* 2003; 103(3): 249-57.
- Ravenscroft A, Ahmed YS, Burnside IG. Chronic pain after SCI. A patient survey. *Spinal Cord* 2000; 38(10): 611-4.
- Turner JA, Cardenas DD, Warmis CA, McClellan CB. Chronic pain associated with spinal cord injuries: a community survey. *Arch Phys Med Rehabil* 2001; 82(4): 501-9.
- Finnerup NB, Johannesen IL, Sindrup SH, Bach FW, Jensen TS. Pain and dysesthesia in patients with spinal cord injury: A postal survey. *Spinal Cord* 2001; 39(5): 256-62.
- Rintala DH, Loubser PG, Castro J, Hart KA, Fuhrer MJ. Chronic pain in a community-based sample of men with spinal cord injury: prevalence, severity, and relationship with impairment, disability, handicap, and subjective well-being. *Arch Phys Med Rehabil* 1998; 79(6): 604-14.
- Barrett H, McClelland JM, Rutkowski SB, Siddall PJ. Pain characteristics in patients admitted to hospital with complications after spinal cord injury. *Arch Phys Med Rehabil* 2003; 84(6): 789-95.
- Dalyan M, Cardenas DD, Gerard B. Upper extremity pain after spinal cord injury. *Spinal Cord* 1999; 37(3): 191-5.
- Putzke JD, Richards JS, Hicken BL, DeVivo MJ. Interference due to pain following spinal cord injury: important predictors and impact on quality of life. *Pain* 2002;100(3): 231-42.
- Gilron I, Bailey JM, Tu D, Holden RR, Weavre DF, Houlden RL. Morphine, gabapentin, or their combination for neuropathic pain. *N Engl J Med* 2005; 352(13): 1324-34.