Non Traumatic Spinal Cord injury in Khyber Pakhtunkhwa Pakistan; Epidemiology, Clinical Characteristics and Complications

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ABSTRACT

Background: Spinal Cord Injury (SCI), regardless of traumatic or non-traumatic origin, is a life altering event. NTSCI is a major but under reported cause of paralysis and represent considerable proportion of SCI patients admitted to rehabilitation centers in Pakistan.

Objective: To determine the demographic information, neurological presentation, clinical features and complications of NTSCI patients in Pakistan.

Material & Methods: It was cross-sectional study based on review of secondary data (medical Records) of patients with spinal cord injuries admitted at Paraplegic center from July 2011 to March 2017. All record of patients with spinal cord injuries were retrieved and reviewed thoroughly and impairment was categorized using *"American Spinal Cord Injury Association (Asia) Impairment Scale"*. Data were analyzed using SPSS version 20.

Results: A total of 1370 SCI patients were admitted to Paraplegic Centre Peshawar, out of which 77 (5.63%) patients with mean age of 37.3±18.4 years were diagnosed with NTSCI. Out of total 77 participants, 48 (62.3%) were males and 29 (37.7%) were females. Regarding the neurological status 44 (57.1%) had incomplete SCI (ASIA B, C, D and E) while 33 (42.9%) patients were suffered from complete SCI (ASIA A). The main causes of NTSCI (in descending orders) include; postoperative paralysis 22(28.6%), degenerative Spondylosis18 (23.4%), spine tumor 10(13.0%), tuberculosis 8 (10.4%), transverse myelitis 8 (10.4%), Spina bifida 5 (6.5%), epidural abscess (45.2%) and scoliosis 2(2.6%). Secondary complication in terms of pressure ulcer was reported in 46 (59.7%). Other co-morbidities included; Deep venous thrombosis (DVT) in 2 (2.6%), bone fractures 5 (6.5%), diabetes mellitus 3 (3.9%) and hypertension 2 (2.6%).

Conclusion: NTSCI patients had preventable causes, if not treated could lead to complete and incomplete SCIs, leading to pressure ulcers and DVT, diabetes myelitis and hypertension.

Key words: *Pressure ulcers, spinal cord injuries, Non traumatic injuries, epidemiological*

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INTRODUCTION

Spinal Cord Injury (SCI), regardless of traumatic or non-traumatic origin, is a life altering event[1,2]. It changes every aspect of life and in most cases these changes are irreversible[3,4]. Spinal stenosis, tumorous compression, vascular malformations, congenital diseases and autoimmune disorders are the leading causes of NTSCI[5-7]. Previous studies reported that NTSCI comprises 31% of patients under the age of 40 years while 87% of those were over 40 years of age[8,9] Regarding NTSCI in different age groups, previous research studies reported that Spina bifida was the most common cause of NTSCI in pediatric population, while tumors in young people and intervertebral disc diseases were the most common causes of NTSCI in those over the age of 50 years[8,10].

Literature regarding NTSCI is scarce in Pakistan. Majority of studies previously conducted in Pakistan focused on traumatic SCI[11,12]. Khan et al. reported that NTSCI comprised of 20% of total SCIs in Pakistan[13]. To the author's knowledge, there is only study conducted previously regarding NTSCI in Pakistan, which assessed NTSCI on MRI findings[14]. That study reported only causes of NTSCI in Pakistan and no information regarding demographics, clinical characteristics and complications of NTSCI patients were reported.

NTSCI are significant but under reported cause of paralysis in Pakistan and represent considerable proportion of SCI patients admitted to rehabilitation centers in Pakistan[12-14]. Demographics and clinical features of NTSCI population have not been well studied in Pakistan. Facts and figures about NTSCI are necessary to understand burden of NTSCI in Pakistan and to optimize health care planning and development of specialized spinal cord rehabilitation centers. Therefore, there was a dire need to conduct this study in order to asses, demographic information, neurologic presentation, clinical features and complications of NTSCI patients in Pakistan. The aim of this study was to determine the demographic information, neurologic presentation, clinical features and complications of NTSCI patients in Khyber Pakhtunkhwa, Pakistan.

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MATERIAL AND METHODS

This was a descriptive cross sectional study based on secondary data of Paraplegic Centre Peshawar (PCP). The organization provides rehabilitative services that are second to none in Pakistan. Moreover PCP is the only organization for civilian population in the entire country which provides comprehensive & integrated rehabilitation services to patients with post-traumatic SCIs 100% free of cost. These services include Physiotherapy, Occupational Therapy, Orthotic Management, Psychological Counseling, provision of Custom Made Wheel Chairs, Adoptive/Supportive equipments, Recreational Activities, Skills Building/Vocational training, Community Re-Integration along with Medical and Nursing care to persons with Post Traumatic Spinal Cord Injuries from Khyber Pakhtunkhwa, FATA and the rest of the country. The center has also got the credit to be the only one of its kind when it comes to Follow Up Services, where patients are visited at the comfort of their homes for the next six months after discharge from the center which include minor home modifications like installment of ramps, wheelchair accessible washrooms and provision of medical and surgical accessories.

SCI patients admitted to the paraplegic center from July 2011 to March 2017, who were diagnosed with NTSCI, were included in this study. Clinical records of total 1370 SCI patients admitted to the paraplegic center from July 2011 to March 2017 were reviewed to see the frequency of patients with non-traumatic spinal cord injuries (NTSCI). Demographic information, cause of injury, neurological level, ASIA impairment scale, complications, co-morbid conditions and other relevant medical information of these patients were analyzed using SPSS version 20.

RESULTS

A total of 1370 SCI patients were admitted to Paraplegic Centre, Peshawar from July 2011 to March 2017, out of which 77(5.63%) patients were diagnosed with NTSCI. The mean age of these patients was 37.3±18.4 years, out of whom 48(62.3%) were male while 29(37.7%) were female. Most of the patients 69 (89.6%) belong to Khyber Pakhtunkhwa while rest 8(10.4%) of patients belongs to other provinces of Pakistan. Nearly half 35 (45.5%) of these patients were illiterate while 52(67.5%) were having different levels of education ranging from primary level to PhD degree. Only 30(38.9%) of these patients had jobs of different nature, 9(11.7%) were unemployed and 13(16.9%) were students and, 5 (6.5%) were doing labor work, while most of the female were house wives.

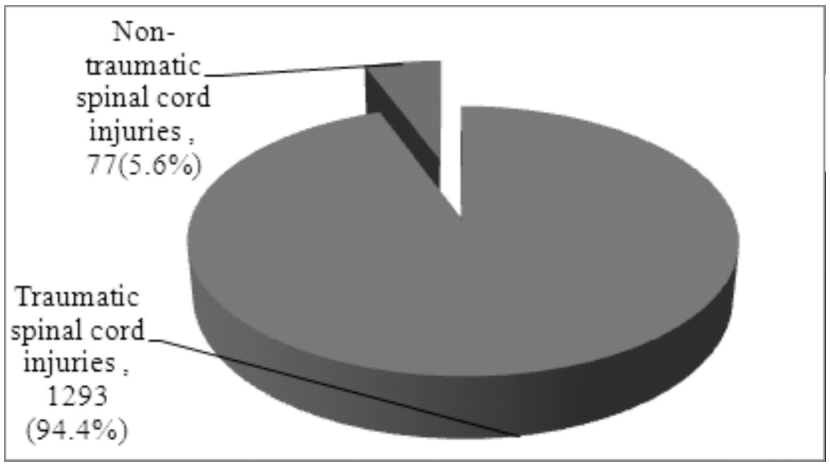
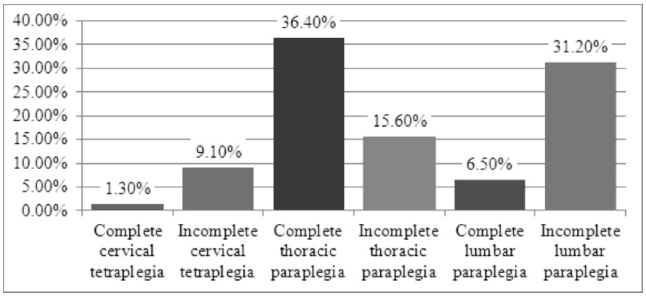


Figure 1. Proportion of Non-traumatic Spinal Cord injuries

Regarding the causes of NTSCI, postoperative paralysis was found among 4(05.1%) patients while 19(24.4%) were diagnosed as degenerative Spondylosis. Tumor of spine accounted for 13(16.7%) of NTSCI. Other causes of NTSCI include Spine Tuberculosis (TB) 9(11.5%), transverse myelitis 12(15.4%), Spina bifida 8(10.3%), Epidural Abscess 7(09.0%) and Scoliosis6 (07.6%). Further age wise distribution is shown in table 1

Clinical characteristics

Majority of NTSCI patients 44(57.1%) were having Incomplete SCI (ASIA B, C, D and E) while remaining 33(42.9%) patients were having complete SCI (ASIA A). Majority of patients 28(36.4%) were having complete thoracic paraplegia. (Figure 2 for details of different SCI levels in NTSCI patients). Almost half of the patients 39(50.6%) underwent different surgeries while remaining 38(49.4%) were having no surgical history.



Complications and co-morbid conditions The commonest complication among NTSCI patients was pressure ulcer (PU). Out of these 77 patients, 46 (59.7%) patients were having PU while the skins of the remaining 31 (40.3%) patients were intact. Out of 46 patients who had PU, 20 (43.5%) were having single PU while 26 (56.5%) were having multiple PU. In majority of patients (n=21) location of worst PU was found to be sacrum-coccyx region (Table 3). 25 (25/46; 54.3%) patients were having Grade IV PU while 1 (1/46; 2.17%), 12 (12/46; 26.1%), and 8 (8/46; 17.4%) patients were having Grade I, Grade II and Grade III PU, respectively. other co-morbidities included; Deep venous thrombosis (DVT) 2(2.6%), fracture at different location of body5 (6.5%), diabetes mellitus 3(3.8%), and hypertension 2(2.6%). Furthermore, the mortality due to NTSCI was 4 (5.19%).

Table: Causes of Non Traumatic Spinal Cord Injuries (NTSCI)

Cause of injury	Age groups 0-20 years	21-40 years	41-60 years	>60 years	Total
Degenerative Spondylosis	0(0.0%)	7(36.8%)	8 (42.2%)	4(21.1%)	19(24.4%)
Spine tumor	5(38.5%)	2(15.4%)	4(30.7%)	2(15.4%)	13(16.7%)
Transverse Myelitis	2(16.7%)	7(58.3%)	2(16.7%)	1(8.3%)	12(15.4%)
Spine TB	2(22.2%)	4(44.5%)	2(22.2%)	1(1.1%)	9(11.5%)
Spina bifida	8(100%)	0(0.0%)	0(0.0%)	0(0.0%)	8(10.3%)
Epidural Abscess	4(57.2%)	2(28.6%)	1(14.2%)	0(0.0%)	7(09.0%)
Scoliosis	0(0.0%)	1(16.7%)	4(66.6)	1(16.7%)	6(07.6%)
Post Operative	0(0.0%)	1(25.0%)	2(50.0%)	1(25.0%)	4(05.1%)

Table 2. Cross-tabulation among pressure and level of nature of spinal cord injuries

Level of SCI	Location of worst Pressure sore						
	Sacrum	Gluteal	Ischium	Trochanters	Ankle/ Feet	Skin intact	
CCT						1 (100%)	1
ICT	2(28.6%)	2(28.6%)	0 (0%)			3(42.9%)	7
CTT	11(39.3%)	1(3.6%)	2(7.1%)	8(28.6%)	3(10.7%)	3(10.7%)	28
ITT	1(8.3%)	0 (0%)	0 (0%)	1(8.3%)	0 (0%)	10 (83.3%)	12
CLP	2 (40.0%)	1(20.0%)	1(20.0%)	0 (0%)	0 (0%)	1(20.0%)	5
ILP	5(20.8%)	0 (0%)	4(16.7%)	1(4.2%)	1(4.2%)	13(54.2%)	24
Total	21(27.3%)	4(5.2%)	7(9.1%)	10(13.0%)	4(5.2%)	31(40.3%)	77

CC= Complete cervical tetraplegia, ICT = Incomplete cervical Tetraplegia, CTT = Complete thoracic paraplegia, ITT = Incomplete thoracic paraplegia, CLP = Complete lumbar paraplegia, ILP = Incomplete lumbar paraplegia

DISCUSSION

Results of current study showed that NTSCI comprised 5.63% SCI patients in patient admitted in Paraplegic Center from Khyber Pakhtunkhwa particularly and from Pakistan as whole. Compared to other studies regarding NTSCI[13,15]. Results of current study showed very low prevalence of NTSCI. But the result can't be generalized because in PPC only those NTSCI patients are admitted, who are medically stable and their disease is not progressive. Strict criteria are followed for admission of NTSCI patients in Paraplegic center. Moreover, due to lack of awareness in Pakistani society about rehabilitation, NTSCI patients are seldom referred to Paraplegic center and that's why most of these cases went unreported. Analysis of demographic information showed that mean age of NTSCI patients was 37.3±18.4. Previous studies regarding SCI, conducted in Pakistan center which included both traumatic and non traumatic SCI patients reported lower mean age[16,17], while studies about NTSCI patients also reported high mean age in NTSCI patients as compared to traumatic SCI patients[18], which shows that NTSCI patients tended to be much older as compared to traumatic SCI patients. In contrast to other studies which reported even gender distribution of NTSCI patients[18], male predominance of NTSCI patients was reported in current study among NTSCI patients. This can be explained by the fact that Paraplegic center is 78 bed rehabilitation center in which 60 beds are in male unit while only 18 beds are in female unit. Moreover, due to male dominant society in Pakistan and due to cultural barriers, mostly female patients are kept in home until they are in critical condition. Male predominance of SCI patients is also reported in other studies conducted in Pakistan[14,16,17]. Though other studies conducted in Pakistan reported high percentage of laborers as SCI patients[16,17], current study reported small percentage (6.5%) of laborers having NTSCI. Due to lack of safety measures in Pakistan, majority of traumatic SCI patients were reported to be laborers while current study demonstrate that NTSCI is not common cause of SCI in laborers.

Diagnosis of NTSCI is difficult due to varying clinical features[14]. Though there is no internationally accepted definition of NTSCI but SCI due to any cause other than trauma is called NTSCI[19]. Previous study regarding NTSCI conducted in Pakistan, reported that TB of spine is the commonest cause of NTSCI in Pakistan and comprised 38.0% of NTSCI cases in Pakistan followed by degenerative spondylosis (37.3%) and tumors(22.7%)[14]. While results of current study showed that the most common cause of NTSCI was postoperative paralysis and 28.6% patients suffered from postoperative paralysis followed by degenerative Spondylosis (23.4%) and spine tumor (13.0%). Other causes of NTSCI include Spine TB (10.4%), Transverse myelitis (10.4%), Spina bifida (6.5%), Epidural Abcess (5.2%), and Scoliosis (2.6%). The controversy can be due to the fact that previous study reported NTSCI assessed on MRI and that's why no postoperative paralysis was reported in that study. Other cause of NTSCI reported in current study like degenerative spondylosis, spine tumor, and transverse myelitis are in accordance with other studies[14,18]. NTSCI can occur at any age, but certain conditions are common in specific age groups[7,8,19]. In accordance with other studies, results of current study showed that spina bifida was the most common cause of NTSCI in pediatric population[8,20]. While results of current study were somewhat different regarding other age groups and showed that degenerative spondolysis was common cause of NTSCI in age group 20 to 40 while postoperative paralysis was common cause of NTSCI in patients with age above 40 years.

In comparison to other studies conducted in Pakistan[16,17,21], which reported that majority of patients were having complete SCI, Analysis of clinical characteristics of NTSCI patients in current study revealed that majority of NTSCI patients (57.1%) were having Incomplete SCI (ASIA B,C,D and E) while remaining 42.9% patients were having complete SCI (ASIA A). These results are supported by other studies, which also reported high number of incomplete injuries in NTSCI patients[18]. In accordance with results of current study, less severe pattern of injury in NTSCI patients compared to Traumatic SCI patients is also reported by previous study[18]. In current study only one (1.30%) NTSCI patient was having complete tetraplegia and 7 (9.10%) patients were having incomplete tetraplegia while other studies in Pakistan which included traumatic SCI patients reported high number of complete and incomplete tetraplegia patients[16,17].

Due to sensory and motor losses, SCI patients are prone to developing complications. Previous studies reported that the most common complication among SCI patients in Pakistan was PU[16]. Similar results are also reported by current study and found that 59.7% patients were having PU. Prevalence of DVT in NTSCI patients was low and only 2.6% patients were diagnosed with DVT. Similar prevalence of DVT was also reported by previous studies conducted in Pakistan[17]. Though previous studies regarding NTSCI patients, reported lower prevalence of complications among NTSCI patients, results of current study showed that NTSCI patients in Pakistan was having near same prevalence of complications as that of traumatic SCI patients. This can be explained by the fact that there is no proper preventive guidelines available regarding prevention of complications in SCI patients, in majority of Pakistani hospitals. Similarly lack of facilities and lack of lack of knowledge among Pakistani health care professionals regarding SCI patients is also reported in previous research studies[16,17].

Due to retrospective nature, current study has several limitations. Because current study was conducted in rehabilitation center where only those NTSCI patients are admitted whose disease is not progressive and who are medically stable. That's why majority of NTSCI patients having progressive condition are missed and many more causes of NTSCI like multiple sclerosis and infective diseases are not reported in current study. Secondly, as current study was conducted in a single rehabilitation center that's why the generalizability of the results is questionable. Moreover, patients with mild SCI who do not need inpatient rehabilitation and patients who died during acute medical care or those patients who had not accessed rehabilitation center were missed in current study, which definitely affects the results.

Regardless of the limitations, this is the first study describing NTSCI in Pakistan and offer important t information regarding demographics, clinical presentation and complications of NTSCI patients in Pakistan. Compare to NTSCI, demographics and complications of traumatic SCI have been relatively well studied in Pakistan and that's why previously health care planning regarding SCI was mainly focused on traumatic SCI. The findings presented in this research paper are will help in optimizing health care planning for NTSCI patients and will provide a framework for efficient evaluation of needs and deliverance of rehabilitation services to NTSCI patients in Pakistan.

CONCLUSION

NTSCI patients represent a significant proportion of the SCI patients in Pakistan. NTSCI patients in Pakistan have different demographics and clinical characteristics as compared to traumatic SCI patients. Post operative paralysis is the most common cause of NTSCI in Pakistan followed by degenerative spondylosis, spine tumors, Spine TB and transverse myelitis .In Pakistan, NTSCI patients are prone to developing same complications as that of traumatic SCI patients.

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