



## A Cross Sectional Study of Spinal Cord Injury-Induced Musculoskeletal Pain

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### ABSTRACT

#### Background:

Musculoskeletal pain is a common consequence in a person with spinal cord injury. It brings a major impact on the quality of life, making prone to complications in both the short and the long term.

**Purpose:** The purpose of the study to determine the spinal cord injury-induced musculoskeletal pain.

**Materials and Methods:** A cross-sectional study was conducted at two different reputed institutes in Dhaka city. Ninety spinal cord injury subjects were selected with their inform consent. Data were collected by face to face interview with the interviewer-administered structured questionnaire. Numerical Pain Rating Scale was used to assess the grade of musculoskeletal pain and American Spinal Injury Association scale was used to find out the types of injury. Chi-square test was used where p-value ( $p < 0.05$ ) indicated as the level of significance.

**Results:** Results indicated that more than two-third of the person with spinal cord injury complained to musculoskeletal pain. Neck, shoulder, and back were the more prevalent site of musculoskeletal pain found in this study. Road traffic accident and fall from height were the common causes of injury. Cervical and thoracic levels were the vulnerable site in person with spinal cord injury. However, there was a highly significant relationship found between the level of injury and musculoskeletal pain ( $p = 0.001 < 0.05$ ).

**Conclusion:** The prevalence of musculoskeletal pain is extremely high in person with spinal cord injury which is concluded in this study. Some factors like spinal levels and causes of injury are significantly accountable for musculoskeletal pain. Adequate physiotherapy might help to reduce the incidence and intensity of spinal cord injury-induced musculoskeletal pain.

#### Abbreviations

SCI: Spinal Cord Injury

NPRS: Numerical Pain Rating Scale

ASIA: American Spinal Injury Association

MSK: Musculoskeletal Pain

MSDs: Musculoskeletal Disorders

RTA: Road Traffic Accident

SPSS: Statistical Package for the Social Sciences

**Key words:** Musculoskeletal pain–Spinal cord injury–Spinal levels–Causes of injury–Physiotherapy

### 1 INTRODUCTION:

Musculoskeletal pain (MSK) is a common problem for many people with spinal cord injury (SCI). Pain after SCI can occur in parts of the body where there is a normal sensa-

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tion as well as areas that have little or no feelings. Musculoskeletal pain is a common health problem in a person with SCI which caused by a problem in the muscles, joints, or bones [1]. Motor and sensory deficits are especially known effects of SCI [2]. It is identified as the single largest category of work-related illness, representing a third or more of all, resisted occupational disease in the United States [3]. In Bangladesh, near about 10% of the total population are disabled and about 4.6% of people are disabled due to SCI [1, 4].

It brings affects not only the economic loss of individual levels but also the organizational level and the company as a whole [5] [5]. SCI is known as a serious accidental event that causes functional, psychological and socioeconomic disorders [6] [6]. Traffic accidents, gunshot injuries, knife injuries, falling and sports injuries are the most common causes of SCI in the world [7]. Disorder of the MSK system is the single largest group of work-related illness in the developed world [8]. The term MSDs identifies a large group of conditions that results from traumatizing the body in either a minute or way over a period. It affects the MSK system like bone, joint, and muscles [9]. SCI results not only damage independence and physical function, but also involve many injury complications. Incontinence of bladder and bowel function, UTI, bed sores, contracture, pain, Postural hypotension, DVT, spasticity, pulmonary and cardiovascular abnormalities, and depressive disorders are frequent complications after SCI [10, 11] Spinal cord injury-related pain interferes with daily activities of patients and significantly influence their quality of life [12]. Therefore, in patients with SCI, prevention, early diagnosis and treatment of chronic secondary complications are critical to limiting these complications, improving survival, community participation, and quality of life-related to health. Complications prevention can reduce the economic burden of traumatic injury to the spinal cord [13]. It is also important for SCI specialists, families and caregivers as well as patients to manage complications of SCI. In SCI Patient's rehabilitation program or long-time management is a major treatment, where physiotherapy is essential. So, this study enhances the knowledge and awareness of SCI induced MSK pain. Physical therapy is used to treat MSK pain with the formulation of some therapeutic interventions & optimum rehabilitation measures. The expected outcome of this study is that factors like age, types of injury, and level of injury have a significant role in MSK pain because these factors are directly related to changes in the mechanical efficiency of joints. The purpose of the study is to find out the factors of SCI which induce MSK pain.

## 2 MATERIALS AND METHODS:

### 2.1 2.1 Study design and Participants

A cross-sectional study was conducted in National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR) and Bangladesh Health Professions Institute (BHPI), Savar, Dhaka. The Investigators selected ninety SCI subjects to

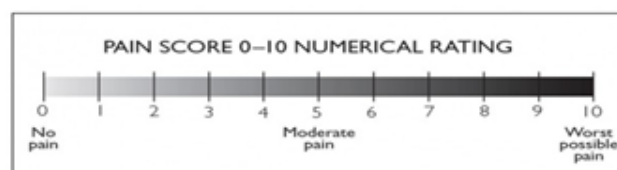
conduct this study. After approval from the ethical committee of State College of Health Sciences, Investigator started data collection from these selected institutes.

### 2.2 2.2 Data Collection procedure:

The sample was selected purposively and data were collected from participant's medical record, and face to face interview with a structural questionnaire. The Investigators used the following factors like socio-demographic, information related to SCI, site and severity of MSK pain to develop the questionnaire.

### 2.3 Statistical Analysis:

2.4 The statistical package for social sciences (version 20.0) was used for the analysis of collected data. MSK pain was graded by NPRS. The NPRS is a unidirectional measure of pain intensity in adults and easy to administer and score [14–19].



The level of injury was assessed clinically and radiologically found in the subject's record file and Investigators applied the ASIA scale to assess types of SCI [20, 21]. Statistical comparisons were carried out using the Chi-square test. In association, the p-value of < 0.05 was considered as significant, & p-value < 0.001 was considered as very highly significant.

## 3 RESULTS:

Table 1 reveals that the maximum participants (n=81, 90.0%) were male. The mean age of the participants was 34.26 ( $\pm 11.28$ ), where the majority of the participants were age between 30 to 39 and 40 to 49 years. Among them, most (n=47, 82.0) of the participants were students. Regarding SCI and Table 2 shows that about one third of the participants reported SCI due to RTA (n=26, 28.9%) and fall from height (n=37, 41.1%). According to the level of injury, maximum participants were diagnosed as cervical (n=32, 35.6%) and upper thoracic (n=37, 41.1%) region. According to the ASIA scale, more than half of the participants suffered in paraplegia (n=56, 62.22%), where maximum was reported as incomplete cord injury [Incomplete B (n=37, 41.60%), Incomplete C (n=24, 27.0%), Incomplete D (n=9, 10.1%)], followed by complete A (n=18, 20.2%). Figure 1 reveals that 92% prevalence of MSK pain in a patient with SCI. Considering MSK pain, the majority of the participants was reported neck (37.8%), shoulder (26.7%) and back (48%) pain as shown in Figure 2. Regarding the severity of pain,

maximum patients with SCI had a mild and moderate level of pain which is graded by NPRS scale as shown in Table 3 . There was highly significant relation between MSK pain and level of injury and no significant relation found between MSK pain with age and sex as shown in Table 4.

Table 1. Socio demographic characteristics (n=90)

Variables	n %
Age Group (years)	
< 20	12 (13.3)
20-29	12 (13.3)
30-39	22 (27.8)
40-49	23 (25.6)
>49	8 (8.9)
Mean±SD=	
34.26±11.28	
Gender	
Male	81 (90.0)
Female	9 (10.0)

Table 2. SCI related Factors

Variables	n %
Causes of SCI Injury	
RTA	26 (28.9)
Fall from Height	37 (41.1)
Fall of Weight	17 (18.9)
Others	10 (11.1)
Level of Injury	
Cervical	32 (35.6)
Upper Thoracic	37 (41.1)
Lower Thoracic	17 (18.9)
Lumber	10 (11.1)
Physical Status	
Quadriplegia	6 (6.7)
Quadripareisis	14 (15.56)
Paraplegia	56 (62.22)
Paraparesis	36 (40.0)
Neurological Level (ASIA Scale)	
Complete-A	18 (20.2)
Incomplete-B	37 (41.60)
Incomplete-C	24 (27.0)
Incomplete-D	9 (10.1)
Normal-E	1 (1.1)

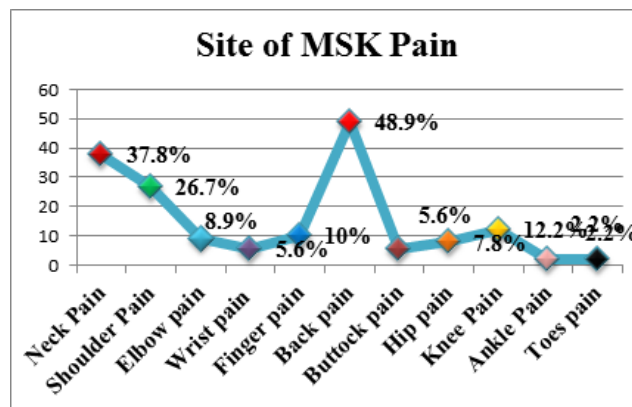


Figure 2. Site of MSK pain

4 DISCUSSION:

Spinal Cord-induced MSK pain was extremely high in this study. Reviewing the previous study found the same result [12]. Drongeler et al. (2006) [20] stated that tetraplegia patient with SCI showed more MSK pain. In this study, male SCI were more than female but there was no significant relationship found between gender and MSK pain. The previous study also found no significant gender differences with regard to pain prevalence or pain intensity [12]. Finnerup et al. (2004) [21] found an increased risk of pain in men compared to women. On the other hand, Stormel et al. (1997) [22] found that the prevalence of chronic pain is greater in women than in men. The current study found that the RTA and fall from height is the major reason for SCI and majority experienced of cervical and upper thoracic MSK pain. However, there is a significant relationship found between low back pain and level of injury. A past study initiated that the cervical was the commonest site of SCI induced MSK pain [12]. Most of the participants in this study were reported paraplegia and paraparesis, where maximum subjects were diagnosed with incomplete cord injury. Reviewing another study, complete cord injury was the more prevalent types of injury. [12]. Neck, shoulder and back pain was experienced for the majority of the SCI subjects and most of the time they complained mildly to moderate level of pain. On the other hand, previous studies have shown that the most prevalent sites of pain are back, shoulders, and legs and feet [15, 23]. Another previous study stated that the distal lower extremity pain was the more prevalent site of SCI patient [12].

5 CONCLUSION:

SCI induced MSK pain was extremely high which concluded in this study. Some factors are directly responsible to develop MSK pain. However, there was a significant relationship between the level of injury and MSK pain. Neck, shoulder, and Back were the common and most prevalent site of SCI induced MSK pain.

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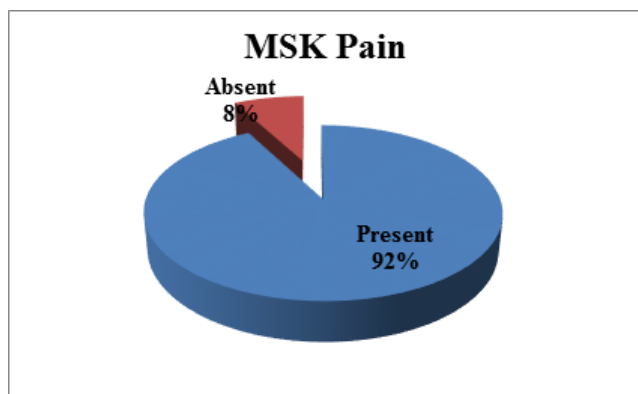


Figure 1. Prevalence of MSKpain

**Table 3. Severity of MSK pain**

Site of Pain	Severity of Pain	
Neck pain (n=34)	Mild	15 (44.1)
	Moderate	16 (47.1)
	Severe	3 (8.8)
Shoulder Pain (n=24)	Mild	9 (37.5)
	Moderate	15 (62.5)
	Severe	0 (0.0)
Elbow Pain (n=8)	Mild	5 (62.5)
	Moderate	3 (37.5)
	Severe	0 (0.0)
Wrist Pain (n=5)	Mild	4 (80.0)
	Moderate	1(20.0)
	Severe	0 (0.0)
Finger Pain (n=9)	Mild	8 (88.9)
	Moderate	1 (11.1)
	Severe	0 (0.0)
Back Pain (n=44)	Mild	17 (38.6)
	Moderate	24 (54.5)
	Severe	3 (6.8)
Buttock Pain (n=5)	Mild	3 (60.0)
	Moderate	2 (40.0)
	Severe	0 (0.0)
Hip Pain (n=7)	Mild	3 (42.9)
	Moderate	4 (57.1)
	Severe	0 (0.0)
Knee Pain (n=11)	Mild	7 (63.6)
	Moderate	4 (36.4)
	Severe	0 (0.0)
Ankle Pain (n=2)	Mild	2 (100.0)
	Moderate	0 (0.0)
	Severe	0 (0.0)
Toes Pain (n=2)	Mild	2 (100.0)
	Moderate	0 (0.0)
	Severe	0 (0.0)

**Table 4. Association of MSK pain with age, gender, and level of injury**

Variables	MSK Pain		Total	p value
	Present	Absent	n %	
Age group	n %	n %	n %	
< 20 Years	11 (91.67)	1 (8.37)	12 (100.0%)	0.268
20-29 Years	22 (100.0)	0 (0.0)	22(100.0%)	
30-39 Years	23 (92.0)	2 (8.0)	25(100.0%)	
40-49 Years	21 (91.3)	2 (8.0)	23(100.0%)	
>49 years	6 (75.0)	2 (7.78)	8(100.0%)	
Gender				
Male	76 (93.83)	7 (77.88)	83 (92.22)	0.088
Female	5 (617)	2 (22.12)	7 (7.78)	
Level of Injury				
Cervical	32 (100.0)	0 (0.0)	32 (100.0%)	0.001*
Upper Thoracic	25 (96.15)	1 (3.75)	26 (100.0%)	
Lower Thoracic	15 (93.75)	1 (6.25)	16 (100.0%)	
Lumber	11 (68.75)	5 (31.25)	16 (100.0%)	

p- value reached from chi-square. Mark (\*) represents a highly significant association between level of injury and MSK pain (p value 0.001<0.05).

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