ASSOCIATION OF SONOGRAPHIC FINDINGS WITH SHOULDER PAIN AMONG PATIENTS WITH ACUTE SPINAL CORD INJURY

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ABSTRACT

BACKGROUND

Shoulder pain following spinal cord injury (SCI) is the most prevalent type of pain and throughout the course of the disease, it can affect up to 50% of those with SCI. Early detection of any structural anomalies or injuries to the shoulders is quintessential in preventing chronic shoulder pain. The lack of available data and initial findings of previous studies then encouraged the implementation of a wider-scale study of patients with newly diagnosed spinal cord injury, and its association with shoulder pain.

METHODS

This was a prospective-cohort study of patients following newly acquired SCI admitted from June 2023 to September 2023. Demographic data, clinical characteristics, American Spinal Cord Injury Association (ASIA) Classification, Spinal Cord Injury Independence Measure (SCIM), and physical activity level prior to SCI were obtained. Primary outcomes of interest include ultrasound findings and shoulder pain.

RESULTS

Among the included participants in the study, 8 (53.3%) had ultrasound abnormality while 7 (46.7%) had normal ultrasound. Of the 8 participants with ultrasound abnormality, 3 (37.5%) had it both sides (left and right), 4 (50%) had left only ultrasound abnormality, and 1 (12.5%) had right only ultrasound abnormality. The most common abnormalities were Biceps Tendon Intra sheat effusion and Lesser and Greater tuberosity cortical irregularities.

CONCLUSION

Abnormal shoulder ultrasound findings were prevalent in individuals with newly diagnosed SCI. The most common sonographic abnormalities in patients with newly diagnosed SCI were biceps tendon intra sheat effusion, lesser tuberosity cortical irregularities, greater tuberosity cortical irregularities. This study concluded that there is an association of shoulder ultrasound to the development of shoulder pain among newly diagnosed spinal cord injury patients.

KEYWORDS

Shoulder pain, Acute Spinal Cord Injury, Shoulder Sonographic Findings

INTRODUCTION

Spinal cord injury (SCI) refers to any damage to the spinal cord, either permanent or temporary, that can be a result of trauma (direct or indirect impact to the vertebral column) or disease or degeneration. It has been estimated that 250,000 to half a million people suffer any form of spinal cord injury each year [1]. SCI typically manifests as either total or partial loss of motor or sensory functions, pain, numbness of any part of the body below the transected or injured cord, or loss of the ability to control micturition and defecation [2], all of which could greatly affect their activities of daily living (ADLs).

Pain in an SCI patient can either be acute or chronic and can be located anywhere in the body. Typically, pain recedes as healing occurs but may be chronic in some instances which may be frequent and highly disabling [3]. It has been reported that up to 80% of patients with SCI experience chronic pain [5], and a wide array of treatment modalities may be needed to address such pain ranging from physiotherapy, NSAIDS, intrathecal medications, surgery, or a combination of these [6]. Shoulder pain following an SCI is the most prevalent type of pain and throughout the course of the disease, it can affect up to 50% of those with SCI. The most common etiology attributed to SCI would be an injury to the rotator cuff, and despite adequate therapy, pain might still persist [7]. However, shoulder pain can be found regardless of the site of injury. Among paraplegics for example, shoulder pain is caused by use and movement of the upper limbs to carry out activities of daily life [8]. Among quadriplegics, shoulder pain is caused by lack of muscle balance and the disuse or lack of active movements of the shoulders due to their paralysis [9]. In a study done in Iran, in patients with cervical SCI, thoracic SCI and lumbar SCI, prevalence of shoulder pain were 80%, 58.2% and 20% respectively [10].

Shoulder pain can be easy to diagnose when presented late into the injury – physical examination and several diagnostics could be used to ascertain the exact causes of the pain, and shoulder pain presenting in a newly diagnosed SCI patient can easily be assumed to be

a sequela of the trauma that caused it. However, it is also easy to assume that absence of shoulder pain in a newly diagnosed patient is indicative of absence of other underlying injuries which might cost the patient a great deal of suffering in the future. Arthrography through Magnetic Resonance Imaging (MRI) and Computed Tomography are the imaging of choice for direct visualization of the tendons and other soft tissues of the shoulders as Arthro-CT is very accurate in identifying partial and anterior tears, while Arthro-MRI is able to visualize the rotator cuff and adjacent bone structures [10], but both modalities are expensive and invasive. Ultrasound however is non-invasive, accurate and dynamic, but is often times open for error as it is very much operator-dependent.

A study found that among patients with chronic shoulder pain, the most common findings on ultrasound of the shoulder in quadriplegic patients were unilateral subdeltoid-subacromion bursitis (65.7%), unilateral supraspinatus tendinosis (45.7%), and unilateral biceps tendon effusion (37.2%), while it was unilateral subdeltoid-subacromion bursitis (64.3%), unilateral biceps tendon effusion (55.4%), and unilateral supraspinatus tendinosis (53.6%) among paraplegics [11]. In another study, it was found that osteophytes in acromioclavicular joint (14%, 22%, and 26%), and shoulder effusion (6%, 27% and 25%) were seen among able bodied, paraplegic and tetraplegic patients respectively [12]. Unfortunately, these studies done focused primarily on patients with chronic shoulder pain and very little to no studies identified existence of shoulder pain within the early stages of the spinal cord injury.

Shoulder pain among spinal cord injury patients within their first year of injury predicts and can drive the course of frequent complaints of shoulder pain presenting chronically over a patient's lifetime [13]. Therefore, early detection of any structural anomalies or injuries to the shoulders is quintessential in preventing chronic shoulder pain. Dingco, Espinosa-Cunanan & Ongchuan (2021) of a local Orthopedic and Rehabilitation Specialty Hospital considered this inadequacy of literature and did a small-scale study among newly diagnosed SCI patients. It has been found out that despite only 6 out of 17 patients (35.3%) having shoulder pain, majority had early findings that may predispose patients to chronic pain in the future. Out of the 34 shoulders (17 pairs) that were visualized with ultrasound, a total of 23 shoulders were asymptomatic [14].

The lack of available data and initial findings of the previous research then encouraged the researcher to implement a wider-scale study of patients with newly diagnosed spinal cord injury admitted and undergoing rehabilitation at the same local Orthopedic and Rehabilitation Specialty Hospital from November 2022 to August 2023, to be able to identify not only the sociodemographic characteristics, but also to identify presence of any forms of unusuality in the ultrasound of the shoulders of newly diagnosed SCI patients, which could potentially prevent chronic pain among this group.

Prior attempts to identify shoulder sonographic findings and to map out characteristics of shoulder pain among newly diagnosed spinal cord injury (SCI) patients at the said local Orthopedic and Rehabilitation Specialty Hospital have been successfully done by Dingco, Espinosa-Cunanan & Ongchua (2021) which provided critical data that showed pain and other pathologies (as evidenced by ultrasonographic findings) are also very common among newly diagnosed patients. Despite what current studies suggest that such findings are only very common among chronic SCI patients, the study done by the researchers at POC however shows that unusualities are present in the sonographic findings of newly diagnosed SCI patients despite being asymptomatic. Recommendations to perform shoulder ultrasound among such patients may be put up depending on the findings of this study.

METHODS

STUDY DESIGN AND SETTING

This study utilized prospective cohort design and was conducted at Philippine Orthopedic Center (POC), a 700-bed tertiary specialty hospital under the Department of Health. The study commenced from June 2023 to September 2023.

SELECTION AND DESCRIPTION OF PARTICIPANTS

All patients with newly diagnosed spinal cord injury admitted from June 2023 to September 2023 aged 18 years old and over, presenting with our without shoulder pain, were included in this study. Patients admitted and diagnosed with Acute Spinal Cord Injury are part of this study. As such, patients newly diagnosed, who had history of trauma within the past 6 weeks, and had conditions predisposing the patient to SCI (such as Pott's disease) but has never been diagnosed as SCI until their admission to POC, were included in this study.

Patients who were medically unstable, mentally or cognitive impaired, with rheumatic disease or other systemic inflammatory disease, patients having sustained or previously with fracture or any bony lesions in the upper extremities, those that have a history of shoulder surgery, and those with complaints of shoulder pain on admission were excluded from the study.

TECHNICAL INFORMATION

Sociodemographic and clinical data such as age, gender, height, weight, body mass index (BMI), hand dominance, diagnosis, cause of spinal cord injury, level of injury, date of admission, other injuries and other underlying diseases were collected from the patients. Shoulder ultrasound on admission, determined whether any abnormalities were noted in such patients.

The respondents were divided into cases and controls – the control group being patients with normal shoulder ultrasound, and the cases were patients with abnormal shoulder ultrasound findings in either or both shoulders. The respondents were followed over time from hospital day 1, on 4th week, 8th week and 12th week after initiation of shoulder ultrasound.

To avoid bias, a separate physician did monthly monitoring if the patient is still admitted, and followed up via telephone communication once discharged, to ask for development of shoulder pain. Over the course of 12 weeks, a tally sheet for each respondent was provided and filled out to determine presence of shoulder pain. This continued after patient has been discharged, where assigned resident for outpatient rehab monitored for shoulder pain at 4,8 and 12 weeks. Monitoring stopped when patients complained of shoulder pain at any given point of the observation, and a complaint of shoulder pain in either or both shoulders were considered as incidence.

American Spinal Injury Association (ASIA) classification according to the International Standards for Neurological Classification of Spinal Cord Injury [14] were determined for each patient. Functional outcome measurement were measured through the use of the Spinal Cord Independence Measure (SCIM) [15] and determination and categorization of physical activity level of patients prior to SCI were based on Classification of lifestyles in relation to the intensity of habitual physical activity, or Physical Activity Level [16].

STATISTICAL METHODS

All statistical analyses were done through the use of IBM SPSS statistics version 19.0 where continuous data were presented as mean, median and standard deviation and ordinal data were presented as frequencies and percentages. Similar to what Dingco, et. al (2021) did, independent/paired sample T-test and the Fischer's Exact/Chi-square test will be used to determine the difference of mean, median and frequency between cases and controls. Null hypothesis were rejected at p value of 0.05. Binary logistic regression were done to determine predictiveness of either normal ultrasound and abnormal ultrasound in the development of shoulder pain.

ETHICAL CONSIDERATIONS

Ethical approval were obtained from the Hospital Research Committee of the POC. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

An Informed consent were provided for participation in this study. Written informed consent were given to participants. Participants were given time to decide. Participants were offered a copy of the consent afterwards. The purpose of the study, and right to refuse without any detrimental consequences, were explained to all participants. The research team was available to discuss any questions relating to aspects of the study with the participant before consenting. Participants were free to withdraw from the study at any time, was informed during the consent process.

DATA PROCESSING AND ANALYSES

Data were encoded and tallied in SPSS version 23 for windows. Descriptive statistics were generated for all variables. For nominal data frequencies and percentages were computed. For numerical data, mean ± SD were generated. T-test, Chi-square test , Fisher Exact test, and logistic regression analysis were used in the analysis of data.

RESULTS

A total of 45 Spinal Cord Injury Patients were admitted from June 2023 to September 2023. Fifteen were included in this study with the rest of the participants being excluded due to the following reasons: 6 medically unstable, 4 discharged, 7 Old SCI, 4 did not meet age criteria, 5 with shoulder pain on admission, 2 mortality, and 2 upper extremity fracture. Among the included participants in the study, 8 (53.3%) had ultrasound abnormality while 7 (46.7%) had normal ultrasound. Of the 8 participants with ultrasound abnormality, 3 (37.5%) had it both sides (left and right), 4 (50%) had left only ultrasound abnormality, and 1 (12.5%) had right only ultrasound abnormality.

The demographic and clinical profile of asymptomatic spinal cord injury patients admitted at POC (table 1), showed that there was no significant differences noted in the different characteristics listed in the table as proven by all p values >0.05, except for age (p=0.02).

Amongst the 4 participants with right ultrasound abnormality, 3 also had abnormality in the left ultrasound. Hence, for the left ultrasound abnormality, 4 had left ultrasound abnormality only (Table 2).

Result showed that there was a significant association of shoulder ultrasound to the development of shoulder pain among spinal cord injury patients admitted at POC, which was proven by the p value of 0.04 derived from the Fisher Exact test. (Table 3) Furthermore, the association of the demographic and clinical profile with shoulder pain among asymptomatic spinal cord injury patients admitted at POC, shows no significant associations noted as proven by all p values >0.05 (Table 4).

The multivariate analysis on the factors associated with shoulder pain among spinal cord injury patients, initially presenting without shoulder pain, admitted at POC using logistic regression analysis, showed that none of the variables listed in the table is a factor for shoulder pain (Table 5).

DISCUSSION

This study investigated the shoulder sonographic findings of newly diagnosed SCI patients in association to shoulder pain. Shoulder sonographic findings in chronic SCI patients are known, however, sonographic findings at the diagnosis of SCI is limited. Most studies regarding shoulder pain in SCI involve those who are chronic or those who are manual wheelchair users since they have increased demands placed on the structures of the shoulder. [5] Shoulder pain experienced by individuals with spinal cord injuries during the initial year of injury serves as a predictive factor and may influence the development of persistent shoulder pain complaints throughout their lifetime. [13] In this study, out of 15 patients with newly diagnosed SCI, there were 3 participants with bilateral abnormalities, 4 with left only abnormality and 1 with right only abnormality. Seven presented with normal ultrasound. The most common abnormalities were Biceps Tendon Intra sheat effusion and Lesser and Greater tuberosity cortical irregularities. In a study done by Sirasporn et.al, [11] SASD bursitis, unilateral supraspinatus tendinosis and biceps tendon effusion were the commonly identified sonographic findings on SCI patients. While in the study by Nino-myia, et.al, [13] the changes on rotator cuff tendons were detected in 56%, and 12% of the patients presented changes in humeral tuberosities. Similar results can be seen with this study in comparison to the mentioned researches

During the course of the study, seven patients developed shoulder pain. Six patients with ultrasound abnormalities developed shoulder pain, while only 1 patient developed shoulder pain despite not having any ultrasound abnormality at baseline. A total of 8 patients did not develop shoulder pain during the course of the study, with two patients showed ultrasound abnormalities, while 6 patients did not have any shoulder abnormality. It was found that most of the SCI patients with shoulder pain had sonographic abnormalities in at least one of the structures assessed and this is consistent in this study as well.

The study's primary limitation was less reliability and generalizability to the population being studied due to a small sample size. It is recommended that an adequate sample size be recruited and analyzed. Also, the short duration of follow up limits the ability of this study to monitor the development of shoulder pain over an extended term.

CONCLUSION

Abnormal shoulder ultrasound findings were prevalent in individuals with newly diagnosed SCI. This study concluded that there is an association of shoulder ultrasound to the development of shoulder pain among newly diagnosed spinal cord injury patients.

REFERENCES

1 World Health Organization. (2013, November 2013). *Spinal Cord Injury*. Retrieved from World Health Organization: https://www.who.int/news-room/fact-sheets/detail/spinal-cord-injury

2 American Association of Neurological Surgeons. (2021, August 19). *Spinal Cord Injury*. Retrieved from American Association of Neurological Surgeons: https://www.aans.org/en/Patients/Neurosurgical-Conditions-and-Treatments/Spinal-Cord-Injury

3 Hagen, E. M. (2015). Acute complications of spinal cord injuries. *World J Orthop*, 17-23.

4 Consortium for Spinal Cord Medicine Clinical Practice Guidelines. (2001). Pressure ulcer prevention and treatment following spinal cord injury: a clinical practice guideline for health-care professionals. *J Spinal Cord Med*, 40-101.

5 Dijkers, M., Bryce, T., & Zanca, J. (2009). Prevalence of chronic pain after traumatic spinal cord injury: a systematic review. J Rehab Res Dev, 13-29.

6 Rekand, T., Hagen, E. M., & Gronning, M. (2012). Chronic pain following spinal cord injury. Tidsskr Nor Laegeforen, 974-979.

7 Van Straaten, M., Cloud , B. A., Zhao, K. D., Fortune, E., & Morrow, M. M. (2017). Maintaining Shoulder Health After Spinal Cord Injury: A Guide to Understanding Treatments for Shoulder Pain. *Arch Phys Med Rehabil*, 1061-1063.

8 Kentar, Y., Zastrow, R., Bradley, H., Brunner, M., Pepke, W., Bruckner, T., . . . Akbar, M. (2018). Prevalence of upper extremity pain in a population of people with paraplegia. *Spinal Cord*, 696-703.

9 Cifu, D. (2015). *Braddom's physical medicine and rehabilitation E-book. 5th ed.* USA: Elsevier Health Sciences.

10 Azadvari, M., Razavi, S. E., Tavasol, T., & Rakshan, A. (2019). Prevalence of Shoulder Pain in Spinal Cord Injury Patients Referring to the Brain and Spinal Cord Injury Research Center of Tehran University of Medical Sciences. *Online ahead of Print*, 7(1).

11 Godefroy, D., Sarazin, L., Rousselin, B., Dupont, A., Drape, J., & Chevrot, A. (2001). Shoulder imaging: what is the best modality? *J Radiol*, 333-334.

12 Sirasporn, P., Saengsuwan, J., & Vichiansiri, R. (2021). Ultrasonographic findings of shoulders in individuals with spinal cord injury. *J Spinal Cord* Med, 357-363.

13 Kivimaki, J., & Ahoniemi, E. (2008). Ultrasonographic findings in shoulders of able-bodied, paraplegic and tetraplegic subjects. Spinal Cord, 50-52.

14 Ninomyia, A., Martins de Jesus, C., Auletta, L., de Medeiros Rimkus, C., Ferreira, D., Son, A., & Junior, A. (2007). Shoulders of patients with spinal cord injuries submitted to rehabilitation program - a clinical and ultrasound-based assessment. 15.

15 Dingco, M., Espinosa-Cunanan, M., & Ongchuan, M. (2021). Sonographic Findings of Shoulders in Individuals with Newly Diagnosed Spinal Cord Injury Undergoing Physical Rehabilitation: A Pilot Study.

16 Catz, A., Itzkovich, M., Agranov, E., Ring, H., & Tamir, A. (1997). SCIM--spinal cord independence measure: a new disability scale for patients with spinal cord lesions. *Spinal cord, 35*(12), 850856. https://doi.org/10.1038/sj.sc.3100504

17 *"Human energy requirements: Principles and Definitions". Report of a Joint FAO/WHO/UNU Expert Consultation. Food and Agriculture Organization of the United Nations. 2004. Retrieved 2009-10-15.*

18 Eriks-Hoogland, I., Hoekstra, T., de Groot, S., Stucki, G., Post, M. W., & van der Wourde, L. H. (2014). Trajectories of musculoskeletal shoulder pain after spinal cord injury: Identification and predictors. *J Spinal Cord Med*, 288-298.

19 Jinag, L., He, J., Chen, C. P., Xie, D., Mai, Y., Yue, B., & Dou, Z. (2020). TheUltrasonographic Features of Shoulder Pain Patients in a Tertiary Hospital in South China. *Biomed Research International.*

FIGURES AND TABLES

Table 1. Demographic and clinical profile of asymptomatic spinal cord injury patients admitted at POC

Characteristics	With Ultrasound Abnormality (n=8)	Without Ultrasound Abnormality (n=7)	P Value
Age (in years) (Mean ± SD)	43.63 ± 13.11	28.71 ± 8.16	0.02 (S) †
BMI (Mean ± SD)	25.23 ± 7.34	22.02 ± 2.39	0.29 (NS) †
SCIM Score (Mean ± SD)	32.88 ± 18.63	35.57 ± 22.13	0.80 (NS) †
Gender			
Male	6 (75.0%)	5 (71.4%)	1.00 (NS) †
Female	2 (25.0%)	2 (28.6%)	
Handedness			---
Right	8 (100%)	7 (100%)	
Occupation (before SCI)			
Employed	7 (87.5%)	6 (85.7%)	1.00 (NS) ‡
Unemployed	1 (12.5%)	1 (14.3%)	
Pre-injury Activity			
Light	1 (12.5%)	1 (14.3%)	0.98 (NS) §
Moderate	5 (62.5%)	4 (57.1%)	
Heavy	2 (25.0%)	2 (28.6%)	
Comorbids			
Bronchial Asthma	0	1 (14.3%)	0.36 (NS) §
Hypertension	1 (12.5%)	0	
NA/None	7 (87.5%)	6 (85.7%)	
Injury Level			
Paraplagia	5 (62.5%)	4 (57.1%)	1.00 (NS) ‡
Tetraplagia	3 (37.5%)	3 (42.9%)	
Vertebral Injury			
Cervical	2 (25.0%)	2 (28.6%)	0.35 (NS) §
Thoracic	4 (50.0%)	5 (71.4%)	
Without abnormality	2 (25.0%)	0	
ASIA Impairment Scale			
A	1 (12.5%)	1 (14.3%)	
B	0	1 (14.3%)	0.59 (NS) §
C	4 (50.0%)	4 (57.1%)	
D	3 (37.5%)	1 (14.3%)	

** p>0.05- NS (Not significant); p ≤0.05-(S) Significant*
†T- test; ‡ Fisher Exact test; §Chi-square test

Table 2. Common abnormalities in Shoulder ultrasound of asymptomatic spinal cord injury patients admitted at POC

Ultrasound Abnormalities	Frequency (%) (n=15)
Abnormality (Left)	
SASD Bursitis	1 (6.7%)
Lesser Tuberosity Cortical Irregularities; Greater Tuberosity Cortical Irregularities	1 (6.7%)
Biceps Tendon intra sheat Effusion	2 (13.3%)
Greater Tuberosity Cortical Irregularities	1 (6.7%)
Subscapularis Tendinosis	1 (6.7%)
Supraspinatus Cortical Irregularities ; Greater Tuberosity Cortical Irregularities	1 (6.7%)
Normal	8 (53.3%)
Abnormality (Right)	
Biceps Tendon intra sheat Effusion	1 (6.7%)
Lesser Tuberosity Cortical Irregularities	1 (6.7%)
Subscapularis Tendinosis	1 (6.7%)
Supra Tendinosis, cortical irreg GT	1 (6.7%)
Normal	11 (73.3%)

Table 3. Association of Shoulder Ultrasound to the Development of Shoulder Pain Among Spinal Cord Injury Patients Admitted at POC

	With Shoulder Pain (n=7)	Without Shoulder Pain (n=8)	Total	P Value
Ultrasound Abnormality				
With	6 (75.0%)	2 (25.0%)	8	0.04 (S) ‡
Without	1 (14.3%)	6 (85.7%)	7	

Table 4. Association of the Demographic and Clinical Profile with Shoulder Pain Among asymptomatic spinal cord injury patients admitted at POC

Characteristics	With Shoulder Pain (n=7)	Without Shoulder Pain (n=8)	P Value
Age (in years) (Mean ± SD)	40.29 ± 13.08	33.50 ± 13.28	0.34 (NS) †
BMI (Mean ± SD)	24.71 ± 8.06	22.88 ± 2.60	0.55 (NS) †
SCIM Score (Mean ± SD)	31.43 ± 19.63	36.50 ± 20.66	0.64 (NS) †
Gender			
Male	7 (100%)	4 (50.0%)	0.08 (NS) †
Female	0	4 (50.0%)	
Handedness			
Right	8 (100%)	7 (100%)	---
Occupation (before SCI)			
Employed	6 (85.7%)	7 (87.5%)	1.00 (NS) ‡
Unemployed	1 (14.3%)	1 (12.5%)	
Pre-injury Activity			
Light	1 (14.3%)	1 (12.5%)	0.38 (NS) §
Moderate	3 (42.9%)	6 (75.0%)	
Heavy	3 (42.9%)	1 (12.5%)	
Comorbids			
Bronchial Asthma	0	1 (12.5%)	0.36 (NS) §
Hypertension	1 (14.3%)	0	
NA/None	6 (85.7%)	7 (87.5%)	
Injury Level			
Paraplagia	3 (42.9%)	6 (75.0%)	0.32 (NS) ‡
Tetraplagia	4 (57.1%)	2 (25.0%)	
Vertebral Injury			
Cervical	3 (42.9%)	1 (12.5%)	0.38 (NS) §
Thoracic	3 (42.9%)	6 (75.0%)	
Without abnormality	1 (14.3%)	1 (12.5%)	
ASIA Impairment Scale			
A	1 (12.5%)	1 (14.3%)	0.11 (NS) §
B	0	1 (14.3%)	
C	4 (50.0%)	4 (57.1%)	
D	3 (37.5%)	1 (14.3%)	

** p>0.05- NS (Not significant); p ≤0.05-(S) Significant*
†T- test; ‡ Fisher Exact test; §Chi-square test

Table 5. Factors Associated with Shoulder Pain Among spinal cord injury patients admitted at POC

Characteristics	OR	95% CI	P Value
Age	1.05	0.96 – 1.14	*0.32 (NS)*
BMI	1.06	0.87 – 1.30	*0.53 (NS)*
SCIM Score	0.98	0.93 – 1.04	*0.60 (NS)*
Gender (Male)	0.00	---	*0.99 (NS)*
Occupation (unemployed)	1.17	0.06 – 22.94	*0.92 (NS)*
Pre-injury Activity	2.19	0.38 – 12.79	*0.38 (NS)*
Comorbids (with)	1.17	0.06 – 22.94	*0.92 (NS)*
Injury Level (Tetraplagia)	4.00	0.45 – 35.78	*0.21 (NS)*
Vertebral Injury (Cervical)	5.25	0.40 – 68.95	*0.20 (NS)*
ASIA Impairment Scale	0.85	0.28 – 2.54	*0.76 (NS)*

** p>0.05- NS (Not significant); p ≤0.05-(S) Significant*
Logistic Regression analysis