Effects and Prevalence of Shoulder Pain among Patients of Spinal Cord Injury

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Published: 31 October 2020

Cite this article: Kazmi, S.A.M., Badar, S., Farooqui, S. I., Khan, A. A., Kumar, S., Muhammad, Y. A. & Faruqui, Z. (2020). Effects and prevalence of shoulder pain among patients of Spinal cord injury. *European International Journal of Science and Technology*, 9(10), 94-100.

ABSTRACT

Patients with Spinal cord injury (SCI) may suffer from moderate to high degree of shoulder pain. Multiple studies have reported that 30 to 64 percent of SCI patients suffered from chronic shoulder pain. The aim of this study was to identify the effects and prevalence of chronic shoulder pain along with determining the activities that can exacerbate or cause this pain and assessing patients emotional and functional response to this problem. Approximately hundred SCI patients were surveyed by a questionnaire with seventy-five participants responding. The data was assessed by using the Statistical Analysis System and the Cornell Personal Adjustment Scale. According to the results shoulder pain was more prevalent than previously indicated such as wheelchair propulsion and transfers caused most pain and also increased the degree of pain. Patient's age, neurologic level and time since injury were not statistically significant in the study and emotional responses did not significantly vary between groups with and without pain. Furthermore, it was noticed that among the pain group, various routine therapies were not effective. This study concludes that alternative methods for wheelchair propulsion and transfers should be developed that decreases the stress and cumulative trauma in order to diminish the incidence of chronic upper limb pain.

Key Words: shoulder pain, cumulative trauma, SCI, wheelchair propulsion, transfers

INTRODUCTION

The rehabilitation program of Spinal cord injury (SCI) revolves around the goal to increase functional independence of the patients. The prevalence of shoulder pain in SCI patients was reported to be 51 percent (Nicholas et,. al) with an incidence rate of 30 percent (Bayley et,. al). According to one study out of two hundred and thirty-nine patients fifty percent of quadriplegic and sixty four percent of paraplegics were suffering from shoulder pain (Gellman et,. al). The occurrence of UEs pain among SCI patient are common because they are needed for daily living functions such as in mobility they are used more frequently and strenuously and subject to increased stresses compared to those of an able-bodied individual. In addition, because the SCI patients rely on their UEs more than able-bodied individuals, UE pain and impairment might be of greater functional consequence. However patients with SCI also use various modes for ambulation (eg, motorized wheelchairs, cane, crutches and independent mobility) in addition to hand-propelled wheelchairs. These patients with SCI who use ambulatory devices or modes other than a manual wheelchair also experience significant shoulder pain because of biomechanical muscle imbalance. The purpose of this study was to identify inpatient rehabilitation along with the prevalence and effects of shoulder pain in spinal cord injured individuals and assess the impact of such pain on functional status and emotional responses. UE pain is a common problem in individuals with SCI and has impact on daily activities. UE pain prevention and management programs are needed for SCI patients.

METHODS

Hundred patients who had been injured at least 1 year before this study were mailed a questionnaire which was specifically designed for this study. Demographic data were obtained. The patients were questioned about the time since they were suffering from SCI, injury level, onset time of shoulder pain after SCI, current activity levels and activity levels prior to the start of shoulder pain problem and the impact of pain on the subject's activity level and emotional responses. The questions also

dealt with the presence and severity of pain (mild, moderate, or severe) in the shoulders. The limitation of independence because of shoulder pain was screened. Patients were asked to indicate how often (never/ rarely, sometimes/usually, or always) they had shoulder pain during functional daily activities. Patients also answered questions about their medical treatment seeking history for shoulder pain, types of treatments they received and benefits of these treatment approaches. SCI patients were also observed while performing transfer activities, propelling wheelchairs and dressing their upper bodies. Physician's impressions of functional limitations and pain were recorded. In select cases, additional investigations, consultations or therapeutic interventions were suggested to patients. Data extracted from questionnaires, chart audits and medical evaluation forms were analyzed using the statistical analysis system (SAS). Data was analyzed by SAS in several ways: descriptive statistics including measures of central tendency, standard deviations and frequencies were used to identify prevalence. Severity of pain by location was compared with activities of daily living using descriptive statistics. Patient satisfaction, depression and hopelessness were determined using the Cornell Personal Adjustment Scale. This instrument was ideal for mail survey in that it is brief, easy to comprehend and unobtrusive. Finally, multivariate techniques such as multiple and logistic regression were used in an exploratory manner to identify categories of SCI patients who experienced pain.

RESULTS

Responses to the survey were received from seventy-five participants out of hundred. The mean age of respondents was 50 years (range 25-70). The average number of years since SCI was 22.8 (range 1-48). Injury level among subjects was: C1-C4, 9.2 percent; C5-T1, 34.6 percent; T2-Tll, 37.9 percent; T12-L1, 13.1 percent; L2 and lower, 5.8 percent. percent of respondents had injury levels between C5 and T11 (see Figure 1).

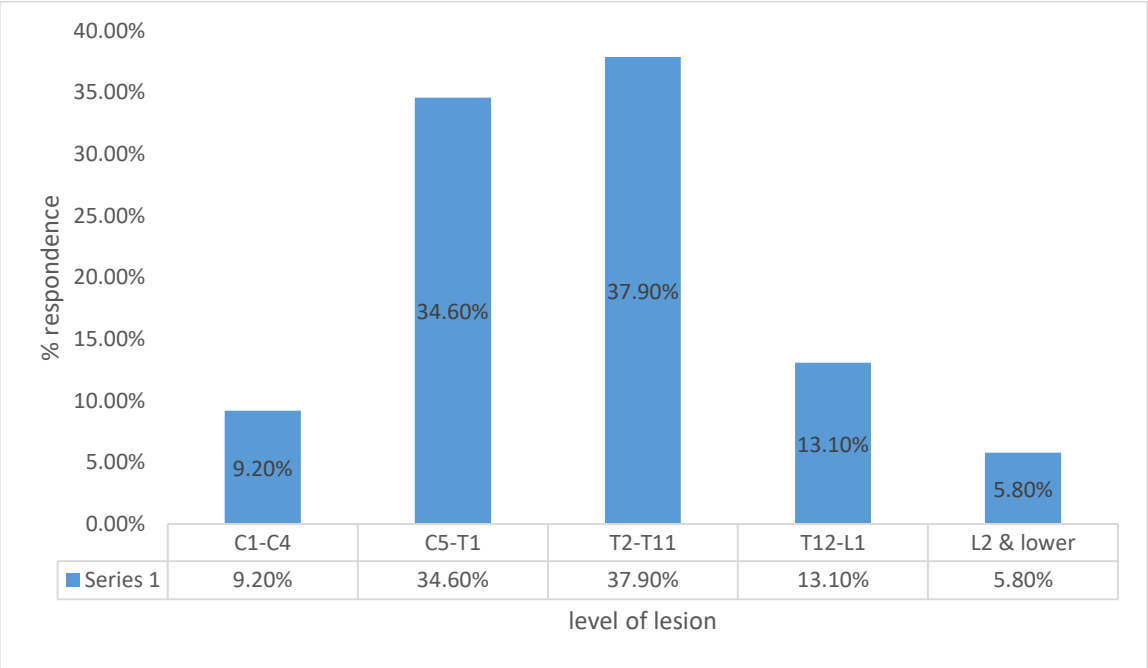

FIG: 1 Neurologic level of respondents

Some of the respondents reported pain at rest and 59 percent were awakened from sleep due to pain. While propelling the wheelchair, 54 percent of respondents reported moderate to severe pain, while 59 percent experienced moderate to severe pain during transfers. Lifestyle changes due to pain. This study found that only 51 percent of respondents reported their upper extremity pain to their doctor and they did not get relief from the majority of treatments they C1 -C4 C5-T1 T2-T11 T1 2-L 1 L2 & lower Level of lesion Fig 1. Activities associated with moderate to severe pain received medication, heat modalities and exercises. Due to upper extremity pain, 69 percent of the respondents required wheelchair modifications. Motor vehicle modifications were required in 25 percent of the cases to accommodate the change from a manual to a motorized chair. 48.4 percent reported difficulty in lifting the wheelchair into vehicles because of shoulder pain. Of the total responding, 69.7 percent continue to propel a manual wheelchair while 24.5 percent use a motorized wheelchair, with occasional use of a manual chair. Almost half (41.8 percent) of the respondents travel more than two blocks per day. All respondents reported continued changes in self-care status due to fluctuating pain. Cornell Personal Adjustment Scale testing revealed that respondents generally remained happy and satisfied with their lives. No significant differences were noted between the groups with and without pain, each group being relatively hopeful, self-approving and satisfied with life, even though the overwhelming majority complained of shoulder pain. As the respondent's age increased, time since injury increased and distance traveled decreased. Similarly, with higher levels of injury, age and distance traveled decreased and the injury was more likely to be complete.

Analysis of Variance

Variable	**Chi-square**	**probability**
Time since injury	5.38	P<.02
SCI level of injury	0.75	P<.38
Wheel chair distance	0.88	P<.35
age	0.31	P<.58
Satisfaction with life	0.18	P<.71
Feeling of dejection	0.14	P<.71

Table 1 comparison of groups with and without pain

DISCUSSION

A considerable amount of interest has been directed toward the musculoskeletal problems of patients with chronic SCI. The prevalence of UE pain in SCI patients following comprehensive rehabilitation has been thoroughly studied. Most of these studies dealt with the presence of shoulder or wrist pain and carpal tunnel syndrome However, severity of UE pain, functional limitations and the social impact of this type of pain have not been studied properly and little is known about the treatment and outcome of UE pain problems in individuals with SCI. Nichols found shoulder pain in 51% of SCI patients whereas Bayley reported that the prevalence of shoulder pain in SCI patients was 30% and the most common diagnosis was chronic impingement. Both of these studies attributed shoulder problems to overuse. In contrast another study found that moderate joint activity protected shoulders from degeneration; radiographs and medical records of 38 patients with paraplegia 20 years or more postinjury were studied, and it was found that 45% of

`inactive' patients had degenerative changes compared to 18% in the `active' group.6 Patients utilizing crutches for ambulation were evaluated and it was reported that there was no clinical or radiological evidence of degeneration in the shoulder, but subjects complained of wrist, hand, neck and shoulder soreness after ambulation. Sie et al examined 239 SCI patients and reported that 55% of the patients with tetraplegia had UE pain; most commonly at the shoulder and 64% of the patients with paraplegia had UE pain; complaints related to carpal tunnel syndrome were the most common, followed by those related to shoulder pain. A survey of 800 SCI patients concluded that 72.7% of the respondents (66%) reported some degree of chronic pain at the wrist and shoulder. Wheelchair propulsion and transfers caused most pain. Patient's age, neurologic level and time since injury were not statistically significant in the study and various routine therapies were not effective. The prevalence of upper extremity pain in spinal cord injury patients following comprehensive rehabilitation has not been thoroughly studied.

Wing S et al studied patients utilizing crutches for ambulation and reported that there was no clinical or radiologic evidence of degenerative changes in the shoulder. Bumham e al studied 19 paraplegic male athletes and 20 able-bodied male athletes without shoulder pain. Clinical and isokinetic examination of both shoulders with peak torque values in abduction, adduction and internal and external rotation were measured. Twenty-six percent of paraplegic athletes had rotator cuff impingement syndrome and it was concluded that shoulder muscle imbalance, with comparative weakness of the rotators and adductors, may be a factor in development and perpetuation of rotator cuff impingement syndrome in wheelchair athletes. Similarly, Pentland et al studied 11 paraplegic women (mean age= 43) with average duration of injury of 15 years and compared them to 11 activity level matched able-bodied women of similar age. Results indicated that development of pain in the upper limbs was clearly associated with paraplegia. In our study, 72.5 percent of respondents had neurologic levels from C5 to Tll - 43.8 percent of these are quadriplegics. Our study also suggests that patients experience severe pain during activities that require "loading and repetitive movements on the wrist and shoulder" such as propelling wheelchairs and transfers either with or without sliding boards. Bayley et al. studied intra-articular pressure in patients with shoulder pain and found that it was 2-112 times above the arterial pressure. They postulated that such increases in pressure lead to degenerative changes in the shoulder joint complex. Kinesiologically, the shoulder has three degrees of freedom and three axes for movement. The transverse muscles of the scapula draw the head of the humerus into the glenoid. The longitudinal muscles of the arm counteract the pull of gravity on loads carried by the upper extremity, by pulling the head of the humerus upward. In this study, we attempted to compare and contrast patients with and without pain. An unusually large number (72.7 percent) of respondents had pain and the small number of patients without pain as well as the number of variables to be compared did not lend themselves to meaningful statistical analysis. Age, neurologic levels and time since injury were not significantly different between patients with and without pain.

Waters et al and Sie et al noted decreased prevalence of upper extremity pain in quadriplegic patients after the first five years of post-injury along with the reduction in the prevalence of all upper extremity pain in patients with paraplegia more than 20 years post-injury. They postulated that "with advance of age, the activity level has decreased, thus pain might not be as noticeable and if pain is related to activity levels, a cessation or a decrease in activity may eliminate or decrease pain." In our study, a higher incidence of pain was noted less than one year following injury and

more than 15 years after onset of SCI. Bayley et al. 2 observed that, in their study, a majority of patients complaining of shoulder pain did not opt for additional testing and/or management of their distress. In our study, only 51.5 percent of responders went to their doctors and most did not find relief from the majority of the treatments utilized. Transfer activities and wheelchair propulsion over a long period of time leads to "cumulative trauma" to the wrist and shoulder, but such activities are essential if patients are to function in a wheelchair. Their joints "cannot be rested" to decrease the inflammatory response and pain. Due to upper extremity pain, 69 percent of respondents required modification of the type of wheelchair they had been using. Twenty-five percent required motor vehicle modification to accommodate the change from manual chair to a motorized chair.

CONCLUSION

This study concludes that the incidence rate of shoulder pain in SCI patients is very high. In our study, a bimodal incidence of pain following SCI was noted, suggesting that there may be different mechanisms for shoulder pain; perhaps acute trauma causes early pain and cumulative trauma late onset pain. Changes due to aging also contribute to this type of pain. Fortunately, presence of pain does not appear to affect these individuals' satisfaction with life or happiness. Most treatments utilized for pain have not resulted in satisfactory relief which may, in part; be explained by the fact that the original contributing factors, such as weight bearing and chronic irritation secondary to wheelchair propulsion and transfers, cannot be avoided by these individuals. They frequently require wheelchair modifications to accommodate pain. Future research should be focused upon new methods of wheelchair propulsion and transfer techniques that lessen stress and cumulative trauma on the shoulders.

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