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Prevalence of Chronic Pain and Its Effect on Functional Independence in Spinal Cord Injury Patients

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Abstract: *A cross sectional study of 100 people with traumatic spinal cord injury (SCI) was performed to determine the prevalence and severity of different types of pain (musculoskeletal, neuropathic) at 6 months following SCI. In addition, we sought to determine the relationship between the presence of pain and FIM score related to the injury such as level of lesion, completeness and clinical SCI syndrome. The study demonstrates that pain after years of SCI is common problem with prevalence of 80%. It was found that 36% had only neuropathic pain, 18% had only musculoskeletal pain, while 26% people had both neuropathic and musculoskeletal pain. The minimum age was 21 years and maximum was 72 years and mean of 41 years.88% were male and 12% were female. The mean years of SCI injury was 14 years. L1 level of injury was the highest with 21%; D8 to D12 was the least injured level with 2%.Mc Gill pain questionnaire was used 34 % had mild pain, 46 % had moderate pain, and 20% severe pain. Neuropathic pain was present in 58% of the SCI subjects. Musculoskeletal pain was present in 54 % of SCI subjects. The minimum FIM score was 38 and maximum was 121 with the mean of 88 and the standard deviation 28.16.Correlation is significant at the level 0.01 between neuropathic pain and FIM score (Pearson correlation 0.553) Correlation is significant at the level of 0.01 level between musculoskeletal pain and FIM score (Pearson correlation 0.459). When compared between neuropathic and musculoskeletal pain it was found there was significance in difference in FIM score. The study revealed that musculoskeletal pain had more impact on FIM score when compared to neuropathic pain. Those with neuropathic pain early following their injury are likely to continue to experience on going pain and the pain is likely to be severe. In contrast, chronic musculoskeletal pain is more common but less likely to be severe and cannot be predicted by the presence of pain in the following injury.*

I. Introduction

Traumatic spinal cord injury (SCI) can result in motor, sensory and autonomic dysfunction, all of which can be devastating for the individual, both socially and economically. Further, many individuals with SCI require extensive medical attention due to the complexities and secondary conditions associated with this injury. Therefore, effective healthcare policies to promote efficient practices are of upmost importance to ease the burden on the healthcare system, while at the same time maintaining high standards of care.

A deeper understanding of the epidemiology of SCI is required in order to gain a better appreciation of the potential impact of healthcare management strategies and health policies to prevent and minimize the consequences of SCI.

Spinal cord injury (SCI) is a low-incidence, high-cost disability requiring tremendous changes in an individual's lifestyle. [1]

Etiology and Classification:

Spinal cord injuries can be grossly divided into two broad etiological categories: traumatic and non-traumatic damages. Traumas are the most frequent cause of injury. Statistics from National spinal cord injury database (NSCID) indicates that accidents involving motor vehicles are most frequent cause of traumatic SCI (45.6%), falls (19.6%), violence (17.8%), recreational sports (10.7%) and other etiologies (6.3%).[1]

SCI are typically divided into two broad functional categories: Tetraplegia and paraplegia. Tetraplegia refers to complete paralysis of all four extremities and trunk, including respiratory muscles and results from lesions of cervical cord. Paraplegia refers to complete paralysis of all or part of trunk and lower extremities resulting from thoracic and lumbar spinal cord injury or cauda equina lesions.[1]

Clinical Implications:

Spinal shock, Motor and sensory impairments, Autonomic dysreflexia, Postural hypotension, Impaired temperature control, Respiratory impairment, Spasticity Bowel and bladder dysfunction, Sexual dysfunction. [1]

Prognosis for Spinal Cord Injury

Immediately after SCI, there is a period of profound dysfunction due to a poorly understood phenomenon called spinal shock. During this period, all spinal cord reflexes, including the muscle stretch reflexes, are suppressed, whereas they will eventually be exaggerated, and the muscles are flaccid, whereas later they will be stiff. Spinal shock lasts from a few days to several weeks, and tends to last longer the more severe the injury. It appears that the recuperative ability of the nervous system relies on there being enough preserved structure to allow functional accommodation. Unless the initial impairment is so mild that improvement is not needed, the probability of functional recovery is greater the less complete the injury. According to reviews of the literature carried out by the Consortium for Spinal Cord Medicine, the chances that a person with an initial ASIA A classification will eventually regain the ability to walk, even with an assistive device such as a cane or walker, is only 3 %. If sensation is preserved, including the ability to detect the sharpness of a pin in the area around the anus, the chances go up to 50 %. If the patient has some movement below the level of injury, even though the muscles are so weak that they cannot do anything useful, the chances of regaining the ability to walk go up to 75 %. Additionally, if the muscles are strong enough to do useful things, such as raise the leg off the bed, the probability that the patient will eventually be able to walk is 95 %. The higher the level of injury, the larger the number of muscles that will be affected and the more area of skin that will lose sensation. Thus, the impact of SCI also depends on the level of the injury; this is reflected in the additional financial cost of living. [2]

Recognized Pain Condition in Spinal Cord Injury.

Traumatic pain: pain experienced following acute traumatic injury related to extent and type of trauma sustained and structures involved. Pain may arise from fractures, ligamentous or soft tissue damage, muscle spasm or early surgical interventions. This acute pain usually subsides within 1 to 3 months of injury.[3]

Transitional zone pain: It is Nerve root pain. Pain or irritation may arise from damage to nerve roots at or near site of cord injury. Pain can be caused by acute cord compression or tearing of the nerve roots, or may arise secondary to spinal instability, periradicular scar tissue, adhesion formation or improper reduction. Nerve root pain is described as sharp, stabbing, burning, or shooting and typically follows dermatomal pattern. The distribution is most often within a few contagious segments and asymmetrical.[1]

Cauda eqina pain: it is type of nerve root pain with burning quality in legs perineum genitals and rectum.

Spinal cord Dysaesthesias: it is also called central Dysaesthesia syndrome. Patients experience many peculiar and painful sensations below the level of lesion. The sensations tend to be diffuse and do not follow dermatome distribution. They occur in body parts that otherwise lack sensation and are often described as burning, numbness, pins and needles, or tingling feelings. Dysaesthesias have been described as 'phantom' pains or sensation.[1]

The Dysaesthesias usually increases slowly in intensity and can follow three possible courses. The first and most frequent is the stable course that can linger for indefinite number of years, with some fluctuations in symptom intensity. The second is continuous escalation and third is decrease in intensity within few years. [3] This type of pain does not respond to opiods.

Musculoskeletal pain: most commonly occur above the level of lesion. It is triggered by change in physical activity and aggravated by increased muscle activity and movement. Musculoskeletal pain tends to appear when the patient becomes more active, with transfers, wheelchair activities or ambulation in cases of incomplete SCI.[3] shoulder and low back pain are most frequently found pain in SCI. Pathological changes at the shoulder are related to faulty positioning and or inadequate ROM, resulting in tightening of joint capsule and surrounding soft tissue structures. Low back pain and shoulder pain may occur due to overuse weight bearing and altered biomechanics.[1]

Visceral pain is deep abdominal pain usually related to urological procedures and concomitant bladder infections that are aggravated by bowel and bladder activity.[3]

Patients with spinal cord injuries (SCI) are confronted with motor and sensory deficits and dysfunction of the bladder and bowel, leading to disabilities in daily activities. Spinal cord injury (SCI) affects undemanding daily activities. Patients suddenly rely on the assistance of others for simple tasks. Independent functioning is a key to being active and socially involved and may contribute to a sense of control over one's life.[4]

Chronic pain is a significant complication in SCI patients. The pain is known to affect recreational activities, quality of sleep, daily functional activities and consequently rehabilitation outcome. It is particularly a matter of concern because several types of pain may exist simultaneously.[5]

Rehabilitation following SCI focuses on regaining functional independence. Therefore, important aspects of initial SCI rehabilitation are learning new (wheelchair) skills and training in activities of daily living

(ADLs). Additionally, during SCI rehabilitation effort is put in the prevention and treatment of complications, which not only contributes to a reduction in morbidity, but may also improve the rehabilitation process and functional independence following SCI .[6]

Aim: To find the prevalence of chronic pain and its effect on functional independence in spinal cord injury patients.

Objective:
1) To find prevalence of chronic pain.
2) To find the intensity and type of pain.
3) Effect on functional independence.

Need of Study

Spinal cord injury causes many health-related problems affecting patient's physical state and daily activities of life. Chronic pain is a common and significant complication in SCI patients. Although the pain often starts within initial 6 months of injury, it frequently persists and sometimes aggravates over time. The pain is known to affect recreational activities, quality of sleep and daily functional activities and rehabilitation outcome. For many of them, the pain is severe and accompanied by reduced physical functioning.[6]

To achieve functional independence, is an integral part of rehabilitation after SCI. Chronic pain may interfere in this goal. We aimed to find out the prevalence and characteristics of different SCI related pain and to assess the effect on functional independence.[6]

Most of the studies done on chronic pain and functional independence are done in American European or other countries. Limited research done on Indian population. This study will enable to document statistics of Indian population.

II. Materials And Methodology

Materials:
- Short form of Mc gill's pain questionnaire.
- LANSS (Leeds assessment of neuropathic symptoms and signs)
- Functional Independence Measure.
- **Methodology:**
- **Study Design:** Cross Sectional Survey Method.
- **Sample size:** 100
- **Sampling Method:** Purposive sampling
- **Place of study**: Inpatient Rehabilitation Center

Inclusion Criteria:
- Traumatic SCI.
- After 6 months of injury.
- Age above 18years.
- Gender: both males and females.

Exclusion Criteria:
- Concomitant traumatic brain injury.
- Acute SCI. (within 6 months).
- Clinically unstable patients.
- Other spinal cord pathology.

III. Results:

The study demonstrates that pain after years of SCI is common problem with prevalence of 80%. It was found that 36% had only neuropathic pain, 18% had only musculoskeletal pain, while 26% people had both neuropathic and musculoskeletal pain.

The minimum age was 21 years and maximum was 72 years and mean of 41 years.88% were male and 12% were female. The mean years of SCI injury was 14 years.

L1 level of injury was the highest with 21%; D8 to D12 was the least injured level with 2%.

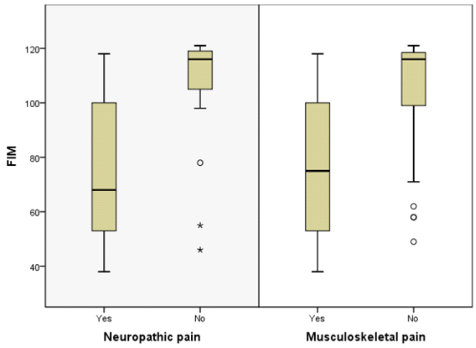
Mc Gill pain questionnaire was used 34 % had mild pain, 46 % had moderate pain, and 20% severe pain.

Neuropathic pain was present in 58% of the SCI subjects. Musculoskeletal pain was present in 54 % of SCI subjects. The minimum FIM score was 38 and maximum was 121 with the mean of 88 and the standard deviation 28.16.

Correlation is significant at the level 0.01 between neuropathic pain and FIM score (Pearson correlation 0.553)

Correlation is significant at the level of 0.01 level between musculoskeletal pain and FIM score (Pearson correlation 0.459)

When compared between neuropathic and musculoskeletal pain it was found there was significance in difference in FIM score. The study revealed that musculoskeletal pain had more impact on FIM score when compared to neuropathic pain



IV. Discussion And Limitations

Pain after SCI is a common phenomenon, with an often significant impact on functioning and quality of life, well beyond the effects of SCI itself. Knowledge of pain prevalence rates is important for a number of reasons. The overall prevalence of pain, combined with information on the severity and impact of pain, suggests the significance of problem and the priority pain should have for researcher. The purpose of our study was to assess chronic pain after SCI and assess potential statistical summary for traumatic SCI.

Unfortunately, the SCI pain prevalence estimates reported in the studies varied so widely that questionnaires' was not feasible. The reasons presumably are methodological- major differences exist in data collection methods employed, the inclusion and exclusion criteria, and definitions of minimum pain duration and minimum pain severity applied. Differences in sample makeup in terms of current mean age and time of onset may also be of relevance. In addition to calculation of mean prevalence rates for different SCI pathologies or subsamples, in studies another potential approach to explaining key outcome differences between studies might be useful in future studies.

While the individual assessment of pain prevalence in males and females, people with tetraplegia and paraplegia and those with complete or incomplete SCI may differ. We have not differentiated the prevalence rates separately in this study.

Authors should offer an explicit definition of pains in terms of chronicity and severity. Anything less than moderate pain may only minimally affect functioning and lifestyle even if untreated. Thus for research, knowing how many people have moderate or more severe may be more important. A 0-10 point numeric rating scale was used to quantify intensity of pain. The consistent findings in studies have reported1-3 pain as mild 4-7moderate and 8-10 severe. Patients having musculoskeletal pain scored less in transfer items of FIM score.

This study demonstrates that moderate to severe musculoskeletal pain impairs the functional abilities of the patient. It was seen that subjects undergone structured supervised multidisciplinary neurorehabilitation had relatively no or mild chronic pain not affecting functional abilities. Patients having no pain were physically active and indulging in recreational activities and vocational rehabilitation.

Clinical Implication:

We recommend that structured multidisciplinary SCI rehabilitation will improve the condition of patient and reduce prevalence of pain and its effect on functional independence. Patients having chronic pain were found to be depressed. Further studies should be carried out on emotional aspect and its relation to pain and functional independence.

Limitations

The selection of our study sample needs to be considered when interpreting results as we included only those subjects whose level of physical capacities were established so functionally poor were excluded. Only patients in rehabilitation centre were included so data of patients not undergoing rehab and patients from community were not considered. Our study sample included relatively more males than females. The outcome measures need consideration as we did not investigate communicative psychological and emotional items of

FIM score. There may be cross-cultural differences in interpreting FIM items or differences due to translation problems cannot dismissed. Furthermore, the FIM suffers from a lack of sensitivity to change.

It is studied that patient's Psychological status affects the status of chronic pain and overall patient's abilities. Chronic pain leads to depression and vice versa. This viscous cycle of pain and depression reduces the functional independence of the patient. However in this study we have not assessed psychological status of the patients. Study has to be done to establish relationship between pain depression and functional independence.
This study does not demonstrate Relationship between age, gender, years of injury, level of injury, intensity of pain, and functional independence separately.

V. Conclusion

It was found that prevalence of chronic pain of was 80% in SCI patients. Functional independence score was found to be low in subjects having both musculoskeletal and neuropathic pain and only musculoskeletal pain. However, subjects who had only neuropathic pain below the level of lesion had comparatively less impact on the functional independence.

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