Age variance on neurologic and functional recovery of traumatic paraplegic spinal cord injury patients after completion rehabilitation program from CRP

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We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled.

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Declaration

I declare that the work presented here is my own. All sources used have been cited appropriately. Any mistakes or inaccuracies are my own. I also declare that for any publication, presentation, or dissemination of information of the study, I would be bound to take the written consent of my supervisor & the Physiotherapy Department of Bangladesh Health Professions Institute (BHPI).

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Acronyms

BHPI	Bangladesh Health professions Institute
BMRC	Bangladesh Medical Research and council
CDC	Centre for Disease Control
CRP	Centre for the Rehabilitation of the Paralysed
IRB	Institutional of Review Board
IMSOP	International Medical Society Of paraplegia
PT	Physiotherapy
ROM	Range of Motion
SPSS	Statistical Package of social science
SCIM	Spinal Cord Independence measurement
SCI	Spinal Cord Injury
SCL	Spinal Cord Lesion
US	United States
WHO	World Health Organization

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Abstract

Objectives: The aim of this study was to find out the age-related variance on neurologic and functional recovery of SCI patients. **Methodology:** The study design was a retrospective cohort study. This retrospective cohort study included of traumatic paraplegic spinal cord injury patient who was admitted to Centre for rehabilitation of the paralyzed from January 2018 to November 2021. The sample size was 221 and a purposive sampling technique was used for sample selection who was admitted in the Centre For The Rehabilitation Of the Paralyzed (CRP) in Bangladesh which is the largest spinal cord injury rehabilitation Centre in South Asia. Data was collected by an assessment form of CRP from the CRP nursing station and it was analyzed by SPSS software version 20**. Results**: Among 221 traumatic paraplegic spinal cord injury patients, most of the patients age were (21-30) years old and the parcentage of age were 73(33%). The age range are (10-70) years old and male 193(87.3%) and are predominantly higher than female 28(12.7%). Majority of the participants were came from rural area 144 (65.20 %).Most of the patients education level were secondary 91(41.2%). Majority patient were married person 153(6.9.2%). Most of the functional recovery at ages at (21-30)) years old their imrprovement of mean±SD were (25.62±30.370) . Most of the neurological sensory recovery at ages are(41-50) years old where the mean±SD were (29.20±36.75). The results indicate that age is not associated with functional recovery and neurological recovery after rehabilitation for traumatic paraplegic spinal cord injury patient **Conclusion**:The study may help to provide greater awareness of the potential of patients with traumatic paraplegic spinal cord injury patient to achieve functional recovery and neurological recovery regardless of age. This study may help to provide awareness among the people of Bangladesh. So that SCI can be reduced through taking preventative measure.

Keywords: Spinal cord injury (SCI), Traumatic Paraplegic, Age, Functional recovery Neurological motor recovery, Neurological sensory recover

CHAPTER-I INTRODUCTION

1.1Background

Spinal Cord Injury (SCI) is one of the most disabling conditions, affecting primarily younger generations, particularly following violent events. The most common age of onset of traumatic SCI is between 20 and 48 years (Franceschini et al., 2011).

Traumatic spinal cord injury (T-SCI) is a potentially devastating event because it is associated with significant permanent functional disabilities. Predicting function following a traumatic spinal cord injury (T-SCI)is critical to optimizing patient care, rehabilitation planning, and resource utilization. Predicting functional outcomes following acute SCI, on the other hand, remains challenging. Failure to consider the various clinical factors affecting acute care hospitalization and to emphasize the most important ones among them may contribute to this problem. According to previous research, the severity of the traumatic spinal cord injury (T-SCI)at the time of initial presentation is the primary predictor of neurologic and functional outcomes, with complete SCI predicting a poor outcome (Abdul-Sattar AB et al., 2014). Other clinical and sociodemographic characteristics, such as the severity of the SCI or age, are controversial (Wilson, J.R et al., 2012). While most predictive factors of functional recovery following SCI are non-modifiable, potentially modifiable predictors, such as clinical events occurring during acute care hospitalization may be of importance. Increases in average life expectancy are leading to a shiftin societal demographics, with the proportion of the US population aged 65 and older expected to double over the next 40 years (Administration On Age, 2012) This demographic restructuring is likely to lead to changes in the epidemiology of traumatic spinal cord injury (SCI) and result in a greater proportion of in- juries among the elderly (Farry A et al., 2011). As a result, there is a needto achieve an enhanced understanding of how increasing age impacts clinical outcomes after SCI. Such an understanding will facilitate the counseling of patients and families within the acute clinical realm, as well as the design of patient-specific rehabilitation programs within the chronic phases after SCI.

The existing evidence suggests that, although older SCI patients experience a similar degree of motor recovery as younger patients, older patients experience diminished functional outcomes at long-term follow-up (Furlan J et al., 2009).

Although spinal cord injury (SCI) is a rare occurrence, it has incalculable individual and social consequences. SCI impairs body systems and results in profound alterations and limits in numerous areas of life (psychological, social, and socio-professional), ultimately culminating in disability. These alterations have a substantial impact on patients' quality of life (QOL) following discharge from a rehabilitation ward (Frasuńska et al., 2020).

Spinal cord injury (SCI) causes a person's physical functioning and independence to be altered, but it also puts them at risk for a number of long-term medical issues that could affect their quality of life, health, and ability to engage in social activities and work productively. People with SCI have been demonstrated to have significant rates of early readmission, especially in the first year following discharge. These rates then decline over the following 5 to 10 years before rising once again later in life (McColl et al., 2005).

Spinal cord injury may be defined as damage of the spinal cord resulting from trauma, disease or degeneration (WHO). Spinal cord injury is an injury to the spinal cord causing in a change either temporary or permanent in the cord's normal motor, sensory, or autonomic function. Spinal cord injury results in permanent or partial paralysis and loss of sensation to many individuals. After spinal cord injury people are confronted with discontinuity in almost all areas of life, leading to question on how to live a meaningful life again (Littooij et al., 2015).

Traumatic paraplegia is caused by a spinal cord lesion (SCI) that develops as a result of trauma, such as a vertebral fracture puncturing the spinal cord. SCI is most frequently caused by road accidents, gunshot wounds, knife wounds, falls, and sports injuries. There is a high correlation between functional status and the extent of the injury, as well as the severity of the injury. SCI results in loss of independence and physical function, as well as a variety of complications, such as neurogenic bladder and bowel, urinary tract infections, pressure ulcers, orthostatic hypotension, fractures, deep vein thrombosis, spasticity, autonomic dysreflexia, pulmonary and cardiovascular problems, and depressive disorders. SCI results in a significant handicap for the patient, which

results in job loss, resulting in psychosocial and economic difficulties (Yazmalar et al ., 2015).

The most prevalent source of damage is a motor vehicle collision, and more than half of traumatic spinal cord injury (T-SCI)patients spent less than 70 days in the hospital. Numerous indicators, including AIS grade conversion rates, have been demonstrated to be insufficient predictors of future functional capacity. In light of these findings, the International Campaign for the Cure of Spinal Cord Injury Paralysis has advocated for a broader definition of health outcomes in future SCI clinical trials by emphasizing the use of neurological and functional evaluation techniques. The Functional Independence Measure (FIM) has been widely used to assess disability in patients with spinal cord injury (SCI). Patients with low motor scores at discharge are more dependent and thus more likely to be discharged to a long-term care facility, whereas those with high motor FIM scores at discharge are more likely to return to community living, even if the living environment may need to be modified to support independent living. Sociodemographic characteristics, the level of injury, and the severity of the injury all influence function results. The purpose of this study was to evaluate which characteristics were substantially linked with poor functional outcomes in patients with traumatic spinal cord injury following inpatient rehabilitation in Saudi Arabia (Abdul-Sattar et al., 2014).

Spinal injuries caused by trauma continue to be a major public health concern. Motor vehicle accidents (VMAs), particularly among the young, have continuously been the primary cause of severe spinal injury. Due to the residual handicap experienced by survivors, this is a significant healthcare burden on the national level. As a result, vehicle technology and public health campaigns have worked to minimize these injuries through the development of protective measures such as seatbelts and airbags. Each year, it is estimated that patients with SCI cost the United States $9.7 billion. Rigid boards and semi-rigid collars have become standard procedure for any pre-hospital transfer of trauma patients. Additionally, intensive multidisciplinary assessment for at-risk patients has been implemented, along with early diagnostic work-up and surgical intervention, in an attempt to lessen the societal burden of injury. While numerous treatments have demonstrated signs of aiding functional recovery following SCI in animal models, all of these treatments have had limited therapeutic value in humans. When the spinal cord is damaged, it has been demonstrated that local mechanical forces

disturb the intricate vascular network. After SCI, the breakdown of vascular networks exacerbated ischemia, resulting in a widening cascade of secondary injury (Oliver et al., 2012).

Spinal cord injury or disease can result in permanent impairment and anguish for individuals, as well as a tremendous economic burden on society. Given the global population's aging over the last few decades, changes in the demographics of individuals with spinal cord injury or disease (SCI/D) are expected (Furlan et al., 2013).

Falling from a standing height is the most common cause of injury in the elderly, which may be compounded by age-related degenerative disc disease. Even when neurological recovery occurs, older individuals are physiologically less capable of improving functional recovery with complicated by a higher prevalence of pre-existing conditions, including degenerative disc disease and susceptibility to secondary health conditions such as pneumonia and pressure injury (Banaszek et al., 2020).

In addition , it has been demonstrated that the expense of healthcare and the use of services related to medical issues rise with age and the length of time following an injury (Menter et al., 2009). Despite the fact that models have been developed to predict the risk of re-admission based on a variety of factors, including age, sex, race, marital status, employment, and the level and severity of neurological impairment, a significant amount of variation in regression models remains unaccounted for (Meyers et al., 2011).

In Australia a study showed that most devastating medical conditions are Spinal cord injury (SCI) or damage. In all facets of human functioning and existence it causes life changing consequences. The incidence of Traumatic SCI a recent review reported that worldwide varied between 10-4 and 83 per million per year. About 15–17 cases per million per year over the past decade the age-adjusted incidence rate of TSCI in adults aged 15 years has remained at and older surviving to reach hospital. In currently 11.9 cases per million adults per year is the incidence in Victoria in Australia (New & Sundararajan, 2008).

1.2 Rationale

Paraplegia is a typical complication of spinal cord injury. This study were confined to prevention, effective initial resuscitation, minimal medication, and nursing care. As a developing country, Bangladesh is attempting to develop its health care system. We need to be more conscientious of management. SCI patients require extensive rehabilitation. Medical rehabilitation aims to improve the patient's quality of life and ability to operate independently. In Bangladesh, physiotherapy is a relatively new and difficult health care profession, and CRP is the sole facility that uses a holistic approach to rehabilitate SCI patients. It is critical to assess the function and independence of spinal cord damaged individuals following rehabilitation. Although the majority of traumatic spinal cord lesions occur in children, roughly 20% of all spinal cord injuries occur in people aged 65 years or older. The overall population's progressive aging will almost certainly result in an increased proportion of elderly patients. Although older people had a reduced life expectancy in terms of severity, aetiology, and time from beginning. However, they are comparable to younger participants in terms of bladder and bowel independence. Due to the varied causes of SCI, younger patients are more likely to sustain complete motor deficits at the thoracic and lumbar levels, whereas older patients are more likely to suffer incomplete tetraplegia. This trait will have a considerable impact on the result of rehabilitation. Diverse study reveals contradictory findings for various age groups. To the best of the researcher's knowledge, no study had been undertaken in Bangladesh to ascertain this topic. As a result, this study will aid in the exploration of age-related changes in functional and neurological recovery. This finding will assist Bangladeshi clinicians in developing a new rehabilitation plan based on the patient's age and expected outcome. It will also help to determine the functional independence or outcome of paraplegia patient in order to make more successful rehabilitation program. As a physiotherapist, we need to maximize the functional independence or outcomes of the peoples with SCI. That is why we have to set specific functional activities and neurological development which the patients can achieve. The research will help to assess the level of functional independence or outcome of SCI patient and neurological recovery which dependent on different age group.

1.3 Research question

What were the age variance on neurological and functional recovery of traumatic paraplegic spinal cord injury after completion rehabilitation program

Was their any correlation between age variance with neurological and functional recovery of traumatic paraplegic spinal cord injury after completion rehabilitation program?

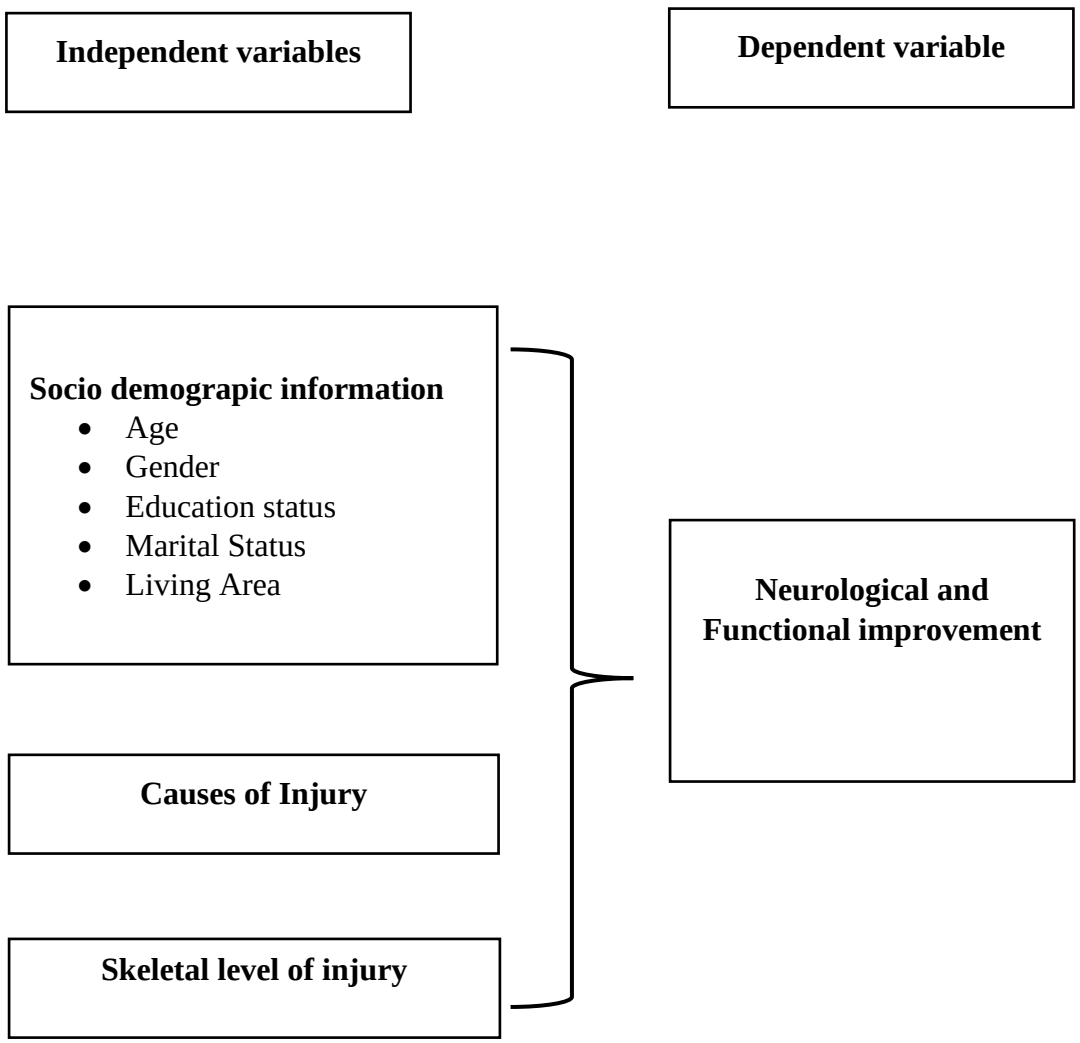
1.4 Aim of the study

- To find out the age-related differences of a population of traumatic spinal cord injury patients.
- To find out the neurological recovery of traumatic paraplegic spinal cord injury patients.
- To find out the functional recovery of traumatic paraplegic spinal cord injury patients.

1.5 Objectives of the study

- To find out socio demographic(age, sex, educational level, marital status and living area)
- To find out clinical (skeletal level, neurological level, causes of injury, ASIA scale and length of stay in CRP) information about spinal cord injury patient.
- To identify age related differences in neurologic improvement of traumatic paraplegic SCI patients.
- To identify age related differences in functional improvement of traumatic paraplegic SCI patient

1.6 List of variables:



1.7 Operational definition :

Spinal Cord Injury (SCI): When the spinal cord is damaged by any causes like trauma or disease that result sensory and motor loss is called SCI.

Neurological level Up to the level where both sensory and motor function is remains intact.

Motor level- The most caudal key muscle group that is graded3/5 or greater with the segment cephalic to the level graded normally.

Sensory level- It is the most caudal dermatome which have normal sensation for both pinprick and light touch on both sides.

Paraplegia : The term paraplegia means impairment of motor and/ or sensory function in the thoracic, lumber and sacral segments of the spinal cord which is secondary to the damage of neural elements within the spinal canal. Paralysis occurs of lower portion of the body and of both legs.

Complete lesion: Absence of sensory and motor functions in the lowest sacral segments is called complete lesion.

Incomplete lesion :An incomplete lesion is the term used to describe partial damage to the spinal cord. With an incomplete lesion, some sensory and/or motor function remains at the lowest sacral segments. Including the lowest sacral segments preservation of sensory or motor function below the level of injury is called incomplete lesion.

Rehabilitation: Rehabilitation is the course of training that is required to develop who some disability illness their physical progress, psychological well-being, social status and capacity for gainful occupational according to their capability.

CHAPTER- II LITERATURE REVIEW

A traumatic spinal cord injury can result in motor, sensory, and autonomic deficits as well as a substantial economic burden for the individual and society. The incidence of traumatic SCI varies from 6.2 to 174 per million people annually, and its prevalence ranges from 50 to 906 per million people worldwide (Furlan ,et al.,2013). Care for older adults with tSCI is relatively more costly than care for their younger counterparts with the same level of effectiveness. According to reports, the proportion of services utilized in the acute care hospital to treat older patients with acute spine injuries was comparable to that of younger patients (Furlan et al.,2019). Due to poor documentation and transfers to higher institutions, the spinal cord injury causes life-threatening injuries and lifelong impairments and creates a life-threatening predicament. (Phalkey et al., 2011).

Mortality rates among older patients with traumatic spinal cord injuries (SCI) were significantly greater than those of younger patients. Older patients also experienced greater functional deficit despite similar rates of sensorimotor recovery. Given this fact, rehabilitation protocols that are morefocused on functional recovery may reduce disability among older people with acute traumatic SCI (Furlan et al .,2009).

Individuals with traumatic spinal cord injury may experience motor, sensory, and autonomic abnormalities, imposing a significant economic burden on them and society. Globally, the incidence of traumatic SCI varies between 6.2 and 174 per million inhabitants per year, and its frequency varies between 50 and 906 per million persons worldwide (Furlan et al., 2013).

Nas ,k et al., 2015 stated that Spinal cord injury (SCI) is the injury of the spinal cord from the foramen magnum to the cauda equina which occurs as a result of compulsion, incision or contusion. The most common causes of SCI in the world are traffic accidents, gunshot injuries, knife injuries, falls and sports injuries. There is a strong relationship between functional status and whether the injury is complete or not complete, as well as the level of the injury. The results of SCI bring not only damage to independence and physical function, but also include many complications from the injury. Neurogenic bladder and bowel, urinary tract infections, pressure ulcers, orthostatic hypotension, fractures, deep vein thrombosis, spasticity, autonomic

dysreflexia, pulmonary and cardiovascular problems, and depressive disorders are frequent complications after SCI. SCI leads to serious disability in the patient resulting in the loss of work, which brings psychosocial and economic problems. The treatment and rehabilitation period is long, expensive and exhausting in SCI. Whether complete or incomplete, SCI rehabilitation is a long process that requires patience and motivation of the patient and relatives. Early rehabilitation is important to prevent joint contractures and the loss of muscle strength, conservation of bone density, and to ensure normal functioning of the respiratory and digestive system. An interdisciplinary approach is essential in rehabilitation in SCI, as in the other types of rehabilitation. The team is led by a physiatrist and consists of the patients' family, physiotherapist, occupational therapist, dietician, psychologist, speech therapist, social worker and other consultant specialists as necessary.

A spinal cord injury may be caused by trauma or non-trauma. Auto accident, including jeep, truck, and bus; fall, including jumping and being accidently pushed (not as a result of an act of aggression); gunshot wound; motorbike accident; 2-wheeled, diving, medical/surgical complications: deterioration of spinal cord function due to unfavorable consequences of diagnostic procedures and treatment, bicycle, tricycles. Auto racing, glider kite, slide, swimming, bungee jumping, scuba diving, lightning, kicked by an animal, mechanical accidents, tractor, bulldozer, go-cart, steamroller, train, road grader, forklift, sledding, snow tubing, tobogganing, playing ice hockey, snowboarding. As a result of being pushed, personal contact, even being smacked with a blunt item, decreases. Football and other piercing injuries: stabbing, impalement, boating, parachuting, etc. Other gymnastic events besides trampoline include baseball/softball, water skiing, basketball/volleyball, high jump, bomb, grenade, dynamite, and gasoline. These are the causes of trauma. The non-traumatic causes include spinal tumor, tuberculosis of the spine, transverse myelitis, physical attack, and physical weakness, among others (Chen et al., 2013).

The spinal cord is situated within the spinal column; it extends down from the brain to the L1−L2 vertebral level, ending in the conus medullaris. Continuing from the end of the spinal cord, in the spinal canal, is the cauda equine (or "horse‟s tail"). The spinal cord itself has neurological segmental levels that correspond to the nerve roots that exit the spinal column between each of the vertebrae. There are 31 pairs of spinal nerve roots: 8 cervical, 12 thoracic, 5 lumbar, 5 sacral and 1 coccygeal. Owing to the

difference in length between the spinal column and the spinal cord, the neurological levels do not necessarily correspond to the vertebral segments (International perspective of spinal cord injury, 2013).

A five scale subdivision was used: A = complete motor and sensory function disorder; B = motor complete and sensory incomplete function disorder; C = motor and sensory incomplete function disorder; D = useful motor function with or without auxiliary means; E = no motor or sensory function disorder which is the modified by Frankel and known as Frankel score (Capaul et al., 1994). The epidemiological study in Japan showed that no survivors with complete tetraplegia, mostly paraplegics (89%), a significant pediatric population (17%), predominant female victims (ratio of 1:1.3) (Rathore et al., 2007).

A study indicated that the average life expectancy of patients with SCI in Bangladesh is 5.36 years. Overall, 56.4% of those diagnosed with SCI died within 5 years, while 43.6% survived at least 5 years following their injury. According to a study, the most vulnerable age groups at CRP in Bangladesh were 20 to 40 years old, comprising 55.6% of the population. The incidence of SCI was lower among those younger than 20 and older than 50. 86.1 percent of the 158 individuals had traumatic injuries and 13.9% had non-traumatic injuries, resulting in 79.75 percent paraplegia and just 20.25 percent tetraplegia (Razzak et al., 2011). In Bangladesh, 63% of SCI is caused by falling from a height (Hoque et al., 1999). Another common cause (18%), in Bangladesh Falling while carrying a heavy load on the head, usually resulting in tetraplegia (Razzak, 2011).

As the life-span is prolonged, epidemiological surveys in the USA have reported increasing trend of SCI onset in the older population . From an epidemiological point of view, they may be due to the greater numbers of older individuals who carry out more dynamic living activities and to better and prompt intervention by the emergency medical system, resulting in an improved survival rate of older SCI individuals . Rehabilitation programs around the world all focus on functional aims. Even in the case of serious neurological conditions, when life expectancy is long, all rehabilitation programs are addressed to the recovery of a person’s functional independence. Prior research has produced contradictory findings about the effect of injury age on the motor, sensory, and pain function of patients with spinal cord injury. However, studies that account for potential confounding variables indicate that the patient's age has no

significant effect on the degree of damage following spinal cord injury. Given that impairment can result in disability in a wide variety of clinical illnesses, one might expect that functional recovery at the level of daily living activities following inpatient rehabilitative therapy is unaffected by the patient's age at the time of diagnosis. However, according to a recent research by the Canadian Information for Health Information, the proportion of older adults with spinal cord injury who got inpatient rehabilitation treatments in 2000/2001 in Canada was significantly higher than that of their younger adult counterparts (Furlan et al.,2013).

Traumatic SCI has a low prevalence, yet it has a large economic cost. Complete tetraplegia costs an individual with traumatic SCI an estimated $2.35 million throughout his or her lifetime in Canada (Krueger et al., 2013).

Previous study has produced contradictory findings about the effect of a patient's age at the time of injury on motor, sensory, and pain function following a spinal cord injury. When relevant criteria are taken into account, it appears that the patient's age has no substantial effect on the extent of damage following a spinal cord injury. We may infer that functional recovery at the level of daily living activities during inpatient rehabilitation is unaffected by the patient's age at the time of diagnosis, as impairment can exacerbate impairment in a variety of clinical settings. According to a recent review by the Canadian Institute for Health Information, the proportion of seniors with spinal cord injuries who received inpatient rehabilitation care in Canada in 2000/2001 was much greater than the proportion of younger adults (Furlan et al., 2013).

Globally, the age of individuals who incur a catastrophic spinal cord injury has shifted epidemiologically. Although the age of individuals who incur a severe spinal cord injury has shifted epidemiologically.Although the majority of people who sustain traumatic spinal cord injuries are between the ages of 16 and 30, the number of people over the age of 70 has steadily increased. The average age of injury has risen to 40 years from 29 years. By 2032, it is expected that patients over the age of 70 will account for the majority of new traumatic spinal cord injuries. This shift is partly due to the aging of the baby boom generation. It is unknown whether older patients' management and outcomes differ from those of younger individuals. Patients aged 70 years or older who had a traumatic spinal cord injury had less severe incomplete neurologic damage, most usually at the cervical level and caused by low-energy falls, compared to younger

patients. Additionally, elderly patients encountered delays in transferring to a specialist treatment center and increased complications during the period from admission to surgery. They encountered much more adverse events and died at a significantly higher rate (Ahn et al., 2015). Paraplegia is the impairment or loss of motor and/or sensory function in the thoracic, lumbar, or sacral (but not cervical) portion of the spinal cord, caused by subsequent injury to neuronal components within the spinal canal. Arm function is preserved in paraplegia, but depending on the severity of the injury, the trunk, legs, and pelvic organs may be affected. The word refers to caudaequina and conusmedullaris injuries, but not lumbosacral plexus lesions or peripheral nerve injuries outside the neural canal (Krishblum et al 2011).

Early identification of mid- to long-term function predictors would allow for improved communication between the patient and his or her family members, promote efficient coordinated care, and maximize resource utilization. This study identified acute clinical factors associated with function six months after a T-SCI, taking into account various factors specific to individuals who sustained tetraplegia and paraplegia while hospitalized for acute care.

Richard-Denis et al.,2018 stated that The severity of a cervical or thoracic SCI remains the most significant acute factor associated with chronic functional outcome. As indicated by the beta coefficients of both models, the association between motor-complete SCI and total SCIM score was particularly strong. . This finding further supports previous work (Abdul-Sattar et al.,2014) suggesting that a motor-complete SCI predicts limited neurological recovery, thereby leading to worst functional outcome (Al-Habib et al.,2011).

In a retrospective study of 387 Norwegian patients with SCI, the relative risk of death increased by 0.08 per year of injury-related age advancement (Lidal et al., 2007). Uncertainty surrounds the causes of this higher mortality rate in the elderly following SCI. An earlier study indicated that pre-existing medical co-morbidities contribute to the increased mortality in the elderly population following traumatic SCI (Furlan et al., 2008). Although ‘‘ageism’’ has been reported among scientists, clinicians, and allied health professionals who care for patients with neurotrauma, further investigation is needed to determine the potential influence of ageism on mortality and other outcomes

after traumatic SCI (Furlan et al., 2009). In addition to those two factors, it is reasonable to assume that older people have a more limited life span than younger individuals.

Ahn, H et al., 2015 stated that There are age-related differences in the treatment of traumatic spinal cord injuries between older and younger patients. they discovered that chronological age influences treatment decisions, but not at the 70-year age threshold we hypothesized. Injury-to-surgery times were significantly lengthened for patients aged 70 and older. Their time from injury to admission to an acute care facility was roughly double that of younger patients. Once admitted, older patients waited twice as long as younger patients before undergoing surgery. Older patients had a significantly higher mortality rate than younger patients. The majority of spinal cord injuries in older patients were caused by low-energy falls and were neurologically incomplete (AIS grade C or D). Patients who were younger were more likely to sustain motor complete (AIS grade A or B) injuries. Older patients were more likely to sustain incomplete cervical injuries (78 percent), which would theoretically indicate a better prognosis than younger patients who sustained higher energy trauma and more severe spinal cord injuries.

Sipski et al.,2004 stated that their study investigated the extent of neurologic damage in males and females following SCI. In addition, gender-related effects of functional improvement and potential over a specified period of time as an indicator of CNS recovery were examined. Because few reports on gender effects on neurologic status after SCI have been published, little is known about the potential role of sex hormones in this type of CNS injury. A direct comparison of our patient population with that of the general SCI population would not be entirely accurate because a larger proportion of unfunded patients in the general population would likely experience difficulties gaining access to medical and rehabilitative care, which could negatively impact their health and function. The influence of early surgical decompression on neurological recovery in patients with traumatic spinal cord injuries has been the subject of a great number of research (Furlan et al .,2016).

The spinal cord is situated within the spinal column; it extends down from the brain to the L1−L2 vertebral level, ending in the conus medullaris. Continuing from the end of the spinal cord, in the spinal canal, is the cauda equine (or “horse‟s tail”). The spinal cord itself has neurological segmental levels that correspond to the nerve roots that exit

the spinal column between each of the vertebrae. There are 31 pairs of spinal nerve roots: 8 cervical, 12 thoracic, 5 lumbar, 5 sacral and 1 coccygeal. Owing to the difference in length between the spinal column and the spinal cord, the neurological levels do not necessarily correspond to the vertebral segments (International perspective of spinal cord injury, 2013).

There are two forms of spinal cord injuries, including full and incomplete. In a complete injury, a person loses the ability to feel and move voluntarily below the neurological level of the injury, but in an incomplete injury, there is some functioning below the level of the injury. (WebMD, 2011)Complete spinal cord injuries result in the loss of all function below the point of injury, whereas incomplete spinal cord injuries result in some sensation and feeling below the point of injury. In incomplete injuries, the manner in which the spinal cord has been destroyed is depending on the level and degree of function (Brain and Spinal Cord.org, 2012). Rehabilitation techniques can greatly improve patients' health and quality of life byHelping them learn to use their remaining abilities. They start by setting functional goals. Functional goals are a realistic expectation of activities that a person with SCI after spinal injury many people are not immediately treated and a person acquiring a spinal cord injury stays at home and wants to a traditional treatment. So, many people face medical complications such as urine infections and bedsores. In other hand, the other hospital refers the patient to a specialized hospital or medical college hospital or to CRP for further treatment although there are no specialized government hospitals for the treatment and rehabilitation of people with SCL. Most of the patients come from the rural area and their career is also illiterate as a result they cannot know about the lesion of spinal cord. So they think the patient will be recovering by day to day. The patient believes that he will come back his normal life and provide support to his/her family. CRP has enhanced a full and average system to provide services for people with SCL. CRP is all-time ready to play a vital contribution to the rehabilitation of paralyzed people. A social worker or a Community Based Rehabilitation (CBR) worker visits the patient’s home, because after rehabilitation they need some necessary things which they supplied. CRP wants to give the fully support to people with SC, so the people can lead a normal, happy and peaceful life (Momin et al.,2005). Acute hospital care is needed after immediately following a SCI where all medical and surgical treatment is completed. After completeacute care, they should be considered for rehabilitation. Rehabilitation care is the most effective

fortraumatic or non-traumatic events. A research showed that specialist spinal rehabilitation unit has great outcomes for people with a SCI. Specialist rehabilitation unit are better than a general rehabilitation unit (Spinal Hub, 2010).

However, life expectancy of patients with SCI continues to increase, and the median survival time of patients sustaining a SCI between the age of 25 and 34 years has been predicted to be 38 years post injury, with 43% surviving for at least 40 Years. Spinal cord injury and disease that are complicated by neurological damage are an important health problem in Bangladesh because they carry high rates of morbidity and mortality. (Wyndaele et al., 2006). Spinal cord injury (SCI) occurs suddenly, primarily to young people, and result in different degrees of impairment (Kreuter et al., 2008). Nearly every aspect of a person's life physical health, work, personal relationships, and recreation may be affected following SCI (Thomas et al., 2016).

CHAPTER- III METHODOLOGY

Methodology is the vital major part of conducting research project. It serves as a direction of principle of research and solid idea about what type of processive research including research design, area selection of study, sample procedure, technique of collecting data and how to evaluate data those are collected from field.This section delivers an impression of the methodological framework by emerging a research design, section of sample size and study area, the usage of data assembly technique in order to identify functional recovery of person with SCI with initial discharge and after 6-month progress or changes.

3.1 Study Design

Retrospective design is the most popular survey method to focus on the previous as well as current experience. A retrospective study design allows the investigator to formulate ideas about possible associations and investigate potential relationships (Anthonisen, 2009).

Retrospective data were suitable to compare functional outcome and social integration between immediate discharge time and 6 months after in recent time. This methodology was chosen to fulfill the aim of this research project.

3.2 Study site

Data were collected from CRP SCI registered unit in Bangladesh which is one of the largest SCI rehabilitation center in South Asia for patient with SCI. Standard data questionaries was established for data collection at first then collected from Registered unit of SCI at CRP.

3.3 Study population and sampling

In this study, people with SCI and those getting treatment and rehabilitation were chosen to participate. The sample size was discharged patient's documents of November 2021 – January 2018.

3.5 Inclusion criteria

- The assessment which had been diagnosed.
- The complete and well fill out assessment (assessment form and discharge summery) for the necessary information
- Persons with SCI those had accomplished full rehabilitation from Center for the Rehabilitation of the Paralyzed (CRP), Savar, Dhaka, Bangladesh.
- Both male and female was nominated.
- Age more than 18 years.
- Subject were listed in the assessment of CRP nursing station.

3.6 Exclusion criteria

- Subject who was not enthusiastic to join.
- Subject were not listed in the assessment form.

3.7 Data collection tools

Data was collected using ASIA scale, Papers, Pen, Pencil, Diary, Computer and pendrive,previous documents.

3.8 Data collection procedure

A structured questionnaire were used to collect data. In this study researcher took 221 samples where the questionnaire was initial and discharge cases.. Researcher collect the data from those patients who are re- admitted in CRP at SCI unit and also collected the data from data source that was kept securing in nursing station. In the case when data were missing that time.

3.9 Data analysis plan

The total subjects' names were coded to maintain confidentiality. Subjects were evaluating by spinal cord injury secondary complication scale. The demographic information's were analyzed through the SPSS 20.00 version software program. Data were analyzing mostly in terms of analytic and descriptive statistics and were present in the form of table, graphs and charts. Throughout the analysis of the data, the researcher had identified the socio-demographic status of the people which are re admitted.

3.10 Statistical test

Variable	Description	Data Type	Normality Test	Data Distribution
Age	10-20 years 21-30 years 31-40 years 41-50 years 51-60 years 61-70 years	Ordinal		Non-Parametric
Sex	Male Female	Nominal		Non-Parametric
Educational level	Non education Primary Secondary Higher secondary Bachelor	Ordinal		Non-Parametric
Marital status	Married Unmarried	Nominal		Non-Parametric
Skeletal level	T1-T12 L1-L5	Ordinal		Non-Parametric
Causes of injury	Fall from height Fall from tree Accident Others	Nominal		Non-Parametric
Neurological level initial	T1-T12 L1-L5	Ordinal		Non-Parametric
Discharge	T1-T12 L1-L5	Ordinal		Non-Parametric

ASIA scale (impairment grading scale) Initial	Complete A Incomplete B Incomplete C Incomplete D Normal E	Ordinal		Non-Parametric
ASIA scale (impairment grading scale) Discharge	Complete A Incomplete B Incomplete C Incomplete D Normal E	Ordinal		Non-Parametric
Neurological Improvement	Total motor score change	Ratio	P= (0.000), (0.0000)	Parametric
	Total sensory score change	Ratio	P= (0.000), (0.0000)	Parametric
Functional Improvement Change		Ratio	P= (0.000), (0.0000)	Parametric
Length of Stay		Interval	P= (0.200), (0.572)	Parametric

3.12 Ethical considerations

The researcher ensured that all participants were informed about their rights and reserves and about the aim and objectives of the study. Researcher also ensured that the organization (CRP) was not hampering by the study. All kinds of confidentiality highly maintained. The researcher explained to the participants about his or her role in this study. The participants were informing clearly that their information would keep confidential. It was explain that there might not a direct benefit from the study for the participants but in the future cases like them might get benefit from it. Information from this study will anonymously code to ensure confidentiality and will not personally identify in any publication containing the result of this study.

CHAPTER -IV RESULT

4.1. Socio-demographic Characteristics:

The total participant were 221.The table presented here reveals that the frequency of people between the ages of (10 to 20) is 24 % (n=53), the frequency of people between (21 to 30) was 33 %(n=73), the frequency of people between (31 to 40) is 21.3 %(n=47), the frequency of people between (41 to 50) is 13.6 %(n=30), that the frequency of people between (51 to 60) is 5.9 %(n=13), the frequency of people between (61 to70) is 2.3 %(n=5).

The findings of this study include information on a total of 221 participants, with a higher proportion of male participant information than female participant information. The number of male participants in this study made up 87.30% (n = 193) of the total, while the number of female participants made up just 12.70 %(n = 28). The majority of the participants educational level was Secondary level 91(41.2%), primary 23(10.4%), Higher 90(40.7%), No education 15(6.8%), bachelor 2(0.9%). According to the findings of the study, which provide information on around 221 patients, 30.80% of them were unmarried while 69.2% of them were married. That indicates there were 68 unmarried people and 153 married people in the population.

Table No: I Socio-demographic Characteristics:

Variable	Description of data (frequency %)
Age	
(10-20) years	53(24%)
(21-30) year s	73(33%)
(31-40) years	47(21.3%)
(41-50) years	30(13.6%)
(51-60) years	13(5.9%)
(61-70) years	5(2.3%)
Sex	
Male	193(87.3%)
Female	28(12.7%)
Education level	
Non education	15(6.8%)
Primary	23(10.4%)
Secondary	91(41.2%)
Higher secondary	90(40.7%)
Bachelor	2(0.9%)
Marital status	
Married	153(69.2%)
Unmarried	68(30.8%)

4.2. Living area :

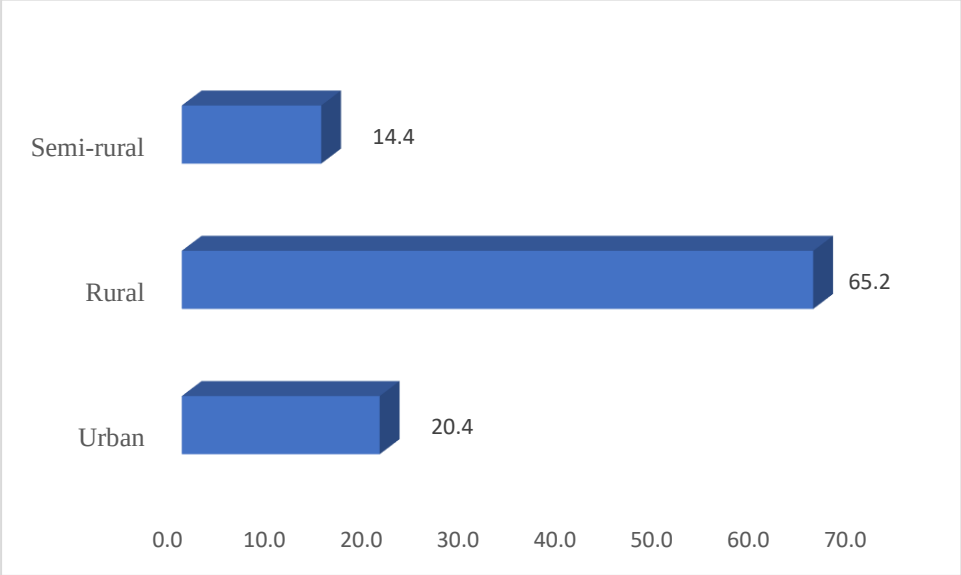


Fig- I: living area of the patient

The figure above shows that who stay in urban, rural and semi-rural the living areas of the patients were broken down as follows: urban area 46 (20.40 %), rural area 144 (65.20 %), and semi-rural 31. (14.40%) .

4.3 Clinical Characteristics:

Table II contains different variable such as skeletal level of the patient,causes of injury,neurological level,causes of injury,neurological level initial,neurological level discharge,ASIA impairment scale initial, ASIA impairment scale at discharge ,total neurological improvement and length of stay of the patient .

Out of 221 patient the skeletal level were T1-T12 150(67.9%) ,L1-L5 were 71(32.1%).patient were injured by different cause .Such as fall from height 54(24.4%),fall from tree 74(33.5%), accident 71(31.1%),others causes include 22(10%).At the initial neurological level T1-T12 were187(84.6%) ,L1-L5 were 34(15.4%). At the discharge of the patient neurological level were T1-T12 150(67.9%), L1-L5 71(32.1%)

Out of 221 patients the impairment grading in ASIA scale A were147(66.5%) , ASIA scale B were 27(12.2%) ,ASIA scale C were 24(10.9%) , ASIA scale D were 21(9.5%) Normal E were 2(.9%). At discharge ASIA Scale A were 138(62.4%), ASIA scale B were 16(7.2%) ,ASIA scale C were 24(10.9%), ASIA scale D were 32(14.5%) and Normal E were 11(5%).

Table No-II: Clinical characteristics

Variables	(Description of data (frequency ,%)
Skeletal level	
T1-T12	150(67.9%)
L1-L5	71(32.1%)
Causes of injury	
Fall from height	54(24.4%)
Fall from tree	74(33.5%)
Accident	71(31.1%)
Others	22(10%)
Neurological level	
Initial	
T1 -T12	187(84.6%)
L1-L5	34(15.4%)
Discharge	
T1-T12	167(75.6%)
L1-L5	54(24.4%)
ASIA scale (impairment grading scale)	
Initial	
Complete A	147(66.5%)
Incomplete B	27(12.2%)
Incomplete C	24(10.9%)
Incomplete D	21(9.5%)
Normal E	2(.9%)
ASIA scale	
Impairment grading scale)	
Discharge	
Complete A	138(62.4%)
Incomplete B	16(7.2%)
Incomplete C	24(10.9%)
Incomplete D	32(14.5%)
Normal E	11(5%)

4.4.Neurological improvement of the patient:

Table -III shows that neurological improvement of the patient total motor score mean±SD (55.90±15.14) initially and discharge it is changing that the score is mean ±SD (62.19±21.75). To discussing the neurology sensory level the score was initially mean±SD 126.8±44.8 and discharge level was mean±SD 123.21±49.30.

Table No-III: Neurological improvement:

Total motor score initial (Mean±SD)	**Total motor score discharge (Mean±SD)**	**Total sensory score initial (Mean±SD)**	**Total sensory score discharge (Mean±SD)**
55.90±15.14	62.19±21.75	126.8±44.8	123.21±49.30

4.5.Comparision of Age and neurological motor score

Table no IV described about compare between age and neurological motor initial score and discharge score.

According to the result 10-20 ages patients initial mean±SD is 50.51±9.59 and Discharge is 59.36±24.80, 21-30 ages patients initial mean±SD is 56.74±15.22 and discharge is 63.05±18.62, 31-40 ages patients initial mean±SD is 62.09±18.517 and discharge is 65.60±20.59, 41-50 ages patients initial mean±SD is 56.90±16.76 and discharge is 60.30±23.06, 51-60 ages patients initial mean±SD is 51.77±8.43 and discharge is 66.69±28.13, 61-70 ages patients initial mean±SD is 47.20±6.26 and discharge is 47.20±6.26.

As the improvement of motor score shows that at age 10-20 years old patient mean±SD 8.85±23.889; age between 21-30 years mean±SD were 6.32±12.488; age 31-40 years old betrween mean±SD were 3.51±12.688; age 41-50 years old between mean±SD were 3.40±13.428 ; age 51-60 years old between mean±SD were14.92±27.515

According to the table, patients between the ages of 50 and 60 years old had a mean score was higher than other age range. Since this is a higher score and it indicates that motor function improved more at the age of 50-60 years old.

Table no- IV: Compare between age and neurological motor score:

Age (Years)	Frequency, %	Initial motor score (Mean±SD)	Discharge motor score (Mean±SD)	Improvement (Mean±SD)
10-20 years	53(24%)	50.51±9.59	59.36±24.80	8.85±23.889
21-30 years	73(33%)	56.74±15.22	63.05±18.62	6.32±12.488
31-40 years	47(21.3%)	62.09±18.517	65.60±20.59	3.51±12.688
41-50 years	30(13.6%)	56.90±16.76	60.30±23.06	3.40±13.428
51-60 years	13(5.9%)	51.77±8.43	66.69±28.13	14.92±27.515
61-70 years	5(2.3%)	47.20±6.26	47.20±6.26	.00±.000

4.6 Comparision of Age and neurological sensory score :

Table – V showed that the initial mean and standard deviation (SD) for patients in the age range of 10 to 20 years old were 116.57±38.80, and the discharge were 137.38±42.02. The initial mean and standard deviation (SD) for patients in the age range of 21 to 30 years old were 130.05±46.05, and the discharge were 155.67±43.90. The initial mean and standard deviation for patients in the age range of 31 to 40 years old were 134.38±48.09 and the discharge were 147.98±46.62, At the age range between 41-50 years initial mean±SD were 128.13±48.91 and the discharge mean±SD were 157.33±47.33 . Age range between 51–60 year old year person initial mean±SD were131.00±39.99 and discharge mean±SD were 150.77±29.85 and lastly age between 61-70 years person initial mean±SD were 97.80±30.46 and discharge mean±SD were 121.20± 9.33.

At the age range between 41-50 years old neurological sensory score was improve of all ranges of ages person, and the mean±SD change score of age between 41-50 years old were 8.53±51.778.

Table no-V: Compare between age and neurological sensory score:

Age	Frequency	Initial sensory score (Mean±SD)	Discharge sensory score (Mean±SD)	Improvement (Mean±SD)
10-20 years	53(24%)	116.57±38.80	137.38±42.02	20.81±24.77
21-30 years	73(33%)	130.05±46.05	155.67±43.90	25.62±30.370
31-40 years	47(21.3%)	134.38±48.09	147.98±46.62	13.60±16.26
41-50 years	30(13.6%)	128.13±48.91	157.33±47.33	29.20±36.75
51-60 years	13(5.9%)	131.00±39.99	150.77±29.85	19.77±27.97
61-70 years	5(2.3%)	97.80±30.46	121.20± 9.33	23.40±26.28

4.7.Comparision of Age and functional improvement:

Table -VI shows about the functional improvement variation at the different ages .According to the studies at initial score of the functional level was highest for most of the ages at 31-40 years where the mean±SD were (35.26±32.30),followed by the ages 31-40 years where the mean ±SD were (128.21±30.12),at ages 10-20 the mean an standard deviation were (121.32±23.35), at ages 41-50 were (119.07±22.57), at ages 51-60 mean±SD were (26.77±8.34), 61-70 ages mean±SD were 27.40±6.54.

At the time of the discharge of the patient it had changed significantly with the majority of the improvement score occurring between the age 21-30 where the mean±SD were 129.59±28.30, and gradually changing occurring between ages the ages 21-30 years where the mean ±SD were),at ages 10-20 the mean an standard deviation were (28.43±15.652),at ages 41-50 were (27.03±7.58),at ages 51-60 mean±SD were (117.92±20.89), 61-70 ages mean±SD were (89.80±32.38).

In a comparison of the level of functional improvement level at different ages, it was found the the most of functional improvement occurred between at age 21-30 years old and the changing mean±SD was (96.93±30.268),while the lows score occurred between the ages of 61-70 years old where the mean±SD was (62.40±28.483)

Table no-VI : Relation between age and functional improvement

Age	Initial (Mean±SD)	Discharge (Mean±SD)	Change
10-20 years	28.43±15.652	121.32±23.35	92.89±25.140
21-30 years	32.66±20.54	129.59±28.30	96.93±30.268
31-40 years	35.26±32.30	128.21±30.12	92.96±34.811
41-50 years	27.03±7.58	119.07±22.57	92.03±25.678
51-60 years	26.77±8.34	117.92±20.89	91.15±25.337
61-70 years	27.40±6.54	89.80±32.38	62.40±28.483

4.8.Length of stay :

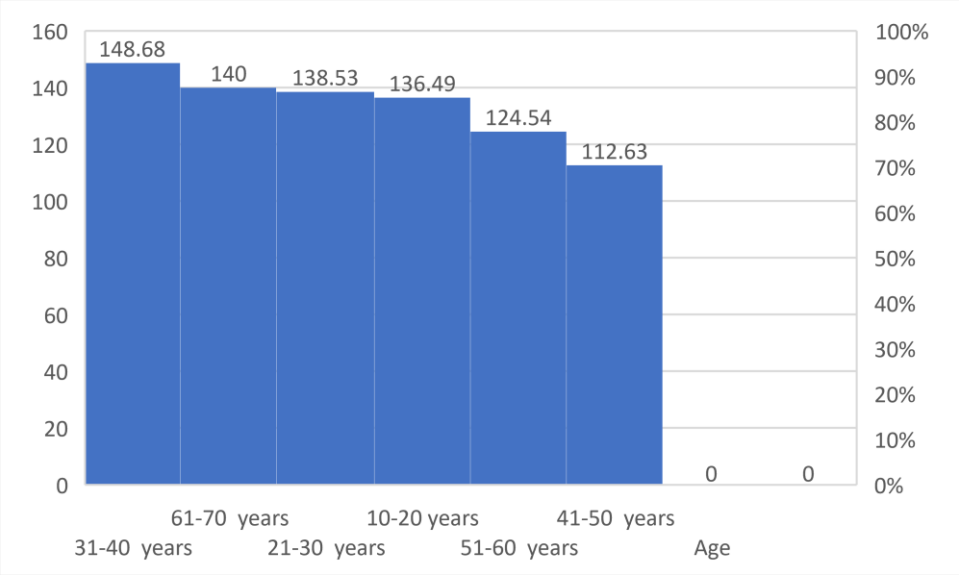


Fig -II Mean of the length of stay in the hospital

Figure II illustrates that hospital stays varied in length depending on the age of the patient. Ages 31–40 years old had the highest percentage of hospital stays, with a mean of 148.68. The age range with the lowest mean was 41 -50 years old. Patients between the ages of(61 – 70), (21 – 30) ,(10 – 20), and (51 – 60)years experienced respectively 140, 138.53, 136.49, and 124.54 in the hospital.

4.9. Association between the dependent variable and independent age in category variable:

Table-VII shows that, there were association in between age and neurological total motor score improvement change In this statement chi-square ($\chi 2$) value was .625 which was not statistically significant ($p<0.533$) with age . And association in between age and neurological total sensory score improvement change In this statement chi-square ($\chi 2$) value was .401 which was not statistically significant ($p<0.533$) with age. Then the association in between age and Total functional improvement change score improvement change In this statement chi-square ($\chi 2$) value .272 was which was not statistically significant ($p<0.533$) with age.

Table -VII :Association between the dependent variable (Neurological total motor score improvement change) and independent age in category variable.

Independent variable	Dependent variable	P value	Remark
Age 10-20 years 21-30 years 31-40 years 41-50 years 51-60 years 61-70 years	Neurological total motor score improvement change	.625	Not significant
Age 10-20 years 21-30 years 31-40 years 41-50 years 51-60 years 61-70 years	Neurological total sensory score improvement change	.401	Not significant
Age 10-20 years 21-30 years 31-40 years 41-50 years 51-60 years 61-70 years	Total functional improvement change.	.272	Not significant

CHAPTER- V DISCUSSION

The purpose of the study was to determine the age-related differences among patients with spinal cord injuries admitted at CRP between June 2018 and November 2021. Even it is impossible to determine the total number of Bangladeshi patients with spinal cord injuries. Currently, there are little survey data on spinal cord damage in CRP. In this investigation, approximately 221 samples were collected.

The research population was composed of 193 males (87.3%) and 28 females (12.7%). The patients' ages ranged from 10 - 70 years, with a mean of 31.62 years and a standard deviation (±12.727). The majority of patients were between 31 to 40 years old . The majority of patients were in middle age. All 221 patients had traumatic paraplegic spinal cord injuries. In the other studies of Bangladesh on showed Males were 81.8% (n=491) and females 18.2% (n=109). And the age ranges from (16-83) years old where the mean age was 35.53 years (Razzak et al.,2016). Another study shows in Bangladesh male were 83%(n=99) and female were 17% (n=21) (Kader, M et al.,2018). Other countries in studies showed that the mean age 34.8 years and a standard deviation (±14.6) years (Lee, B.A et al.,2016).

In case educational status most of them up to secondary level 91(41.7%). Others are non -education 15 (6.8%) primary 23(10.4%) higher secondary 90 (40.7%) bachelor 2 (.9%). Other study shows in Bangladesh the education level of spinal cord injury patient was no formal education 71(59%), secondary 49(41%) .And there is no found in graduated person in this study (Kader, M et al.,2018).

In this survey, there were married people 153 (69.2%), and unmarried people 68(30.8 %). In Pakistan, a study showed that the number of married people was 65% (Rathore et al., 2007).

This study reveals that 144 (65.20 %) spinal cord lesions occurred in rural areas. Other significant areas are urban 46 (20 %) and semi-rural 31 (14 %). In Bangladesh, the majority of the population lives in rural areas, and 27 percent of the workforce is directly or indirectly involved in agriculture. These may play a significant influence in

injury-causing regions. According to Indian research, 53.95 %were from rural areas and 40.51 % were from semi-rural areas (Chhabra & Arora, 2012).

The causes of injuries to the spinal cord can differ from one region to the next. According to these studies, the primary mechanism responsible for traumatic experiences was a fall from a tree (33.5%), an accident (31.1%), and a fall from a height (24.5%). Other reasons accounted for 22% of cases (10 %). pedestrian vehicle crush, motor cycle and pedal cycle accident. Study conducts in Jordan, Otom, Doughan &Kawar, (1997) shows fall 21.2% & RTA 44%, in Iran Chabok, et al (2009) RTA 52% & fall 45.4%. But in India Singh et al, 2003, p.185 fall was 47% & RTA 34.78%. The other case of injury was struck crushed by object\animal 8.5%. In Otom, Doughan &Kawar, 1997; study it was 3.3%.

The skeletal level of thoracic was most prevalent than lumber level. The skeletal level of thoracic were 67.9 % (n=150) and lumber 32.1 5 (n=71). The neurological level during first were thoracic level 84.6% (n=187) and lumber 15.4 % (n=34). Thoracic level was most prevalent than lumber level. At the discharge of the patient neurological level of thoracic were 75.6 % (n=167) lumber were 24.4 percent (n=54). The most common levels of injury at admission were T12 (17.2%), T10 (15.1%), T11 (12.2%) and T4 (11.6%).

The most common 66.5 % (n=147) impairment grade in ASIA scale was complete-A, then Incomplete B were 12.2 % (n=27), Incomplete C 10.9 % (n=24), Incomplete D 9.5 %(n=21), Normal E .9% (n=20) at initial cases of the patient. At the discharge of the patient this level was changing where the grading was Complete A 62.4 % (n=138), Incomplete B 7.2 % (n=16), Incomplete C 10.9% (n=24), Incomplete D 14.5%(n=32), Normal E 5% (n=11). In Pakistan there was no case of ASIA A, 46% were in ASIA B, 41% were ASIA C and 8% were ASIA D (Rathore et al., 2007). According to another research, the majority of participants sustained complete injuries (73 % was ASIA impairment grade A); 12 % were grade B, 9 % were grade C, and 6 % were grade D at the time of the initial evaluation. 23.8 % of subjects across all AIS grades had lost one or more levels in the one-year exam, while 30.9% remained the same and 45.3% improved (Lee, B.A et al.,2016).

Among the 221 of the traumatic Paraplegic patient shows at (31-40)ages the most of the functional recovery score was 35.26±32.30 at initially, and the lowest score shows

at 61-70 years ages were 27.40±6.54. When discharging the patient it was improved .The most improved level at ages 31-40 where the score was 128.21±30.12 and the lowest score shows at ages 61-70 years where the score was 89.80±32.38. Although the level was improve from the initial score but it was less than the 31-40 ages patient . It was collected from CRP spinal cord injury assessment form. Other studies showed that decreased FIM motor score s at follow-up; however, the relative impact of this age effect varied depending on the severity of the acute ASIA impairment scale (AIS). However, the relative impact of this age effect varied depending on the acute AIS grade related with reduced functional status within the first year after SCI, using either unadjusted regression analyses or after controlling for potential confounders (Furlan, J.C. et al., 2009).

Among the 221 of traumatic paraplegic patient shows at 31-40 ages the most of the neurological improvement of motor score was at 62.09±18.517 initially, and the lowest score shows at 61-70 years ages were 47.20±6.26 .When discharging the patient it was improved .The most improved level at ages 21-30 where the score was .and the lowest 129.59±28.30 score shows at ages 61-70 years where the score was 47.20±6.26. Although the level was improve from the initial score but it was less than the 21-30 ages patient .And the neurological improvement of sensory score was 134.38±48.09 initially at 31-40 years old , and the lowest score shows at 61-70 years ages were 97.80±30.46.When discharging the patient it was improved .The most improved level at ages 41-50 where the score was157.33±47.33. and the lowest score shows at ages 61-70years where the score was 121±9.33. Although the level was improve from the initial score but it was less than the 21-30 ages. Length of stay was longer of mean interval at ages 41-50 years old and the mean interval was 148.68.Other studies showed that length was longer in patients under 50 years old and mean interval was 98.77 ±68.13 days.They also showed the age group of spinal cord injury which is under 50 years old were younger group and over 50 were older group. Younger patients showed better neurologic recovery(intended as ASIA impairment grade improvement and motor scores increase (Scivoletto et al., 2003).

Limitations

Complete accuracy is not being possible in any research so that some limitations may exist. Regarding this study, there were some limitations or barriers to consider the result of the study as below:

- The first limitation of this study was small sample size. The data was taken only in four year.
- As the study was conducted at Centre for the Rehabilitation of the paralyzed (CRP) which may not represent the whole country.
- The study was only the demography of the spinal cord injury patients, in further
- study would be carry out the other sectors of the Spinal cord injury.

CHAPTER- VI Conclusion and recommendation

6.1 Conclusion

Spinal cord injury (SCI) is an insult to the spinal cord resulting in a change, either temporary or permanent, in its normal motor, sensory, or autonomic function. In Bangladesh, the number of spinal cord injury patients is increasing day by day. Spinal cord injury (SCI) is one of the most destructive conditions known to mankind. Although spinal cord injury is one of the most serious injuries that a person can survive, it is possible to return to a healthy, happy, and productive life after even the most severe of cord injuries. In Bangladesh, many people every year face Spinal Cord Injury and there is a lack of information. This study aimed to find out the neurological and functional recovery of different ages. For the fulfillment of the study, researcher designed a quantitative and retrospective study cohort design and collected 221 data from the samples through a standard questionnaire from the registered unit of Spinal Cord Injury. From the database, it was found that the age range between 10-70 years is more vulnerable to have spinal cord injury (SCI). Male are predominantly more affected than females. The educational level was very poor in most of the patients, and most of them are from rural areas and live with low economic levels. It is difficult to stop the responsible cause of Spinal Cord Injury. And the functional improvement level was more at the age of (21-30) years old neurological sensory was more at the age of 41-50 years old and neurological motor improvement level was at the age of 50-60 years old. Spinal Cord Injury management and rehabilitation is a long-time process so it is important to create awareness and receive proper steps to reduce the risk of Spinal Cord Injury.

6.2 Recommendations

The aim of the study was to find out the neurological and the functional recovery of the spinal cord injury in Bangladesh which is varied for different ages. Researcher recommended the following things:

- More samples should be collected in order to improve the validity and reliability of the findings.
- More samples should be collected for the pilot study in order to verify the validity of the questionnaire.
- More time should be spent on this. It is recommended that a sample be taken from the country's sole rehabilitation facility.

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Appendix:

Questionnaire

Part- I: Patient identification:

1.1	Identification number:
1.2	Name of the patient:
1.3	Address:
1.4	Mobile number:

Part- II: Socio-demographic information

2.1	Age (In the year)……Years		
2.2	Sex	Male Female	1 2
2.3	Educational level	……	
2.3	Marital status	Married Unmarried Divorced Separated	1 2 3 4

2.4	Living area	Urban Rural Semi-rural	1 2 3

Part-III: Clinical characteristics:

<table>
<tr><td>3.1</td><td colspan="3">Diagnosis:</td></tr>
<tr><td>3.2</td><td colspan="3">Date of Injury:</td></tr>
<tr><td>3.3</td><td colspan="3">Skeletal level:</td></tr>
<tr><td>3.4</td><td colspan="3">Causes of injury:</td></tr>
<tr><td rowspan="2">3.5</td><td rowspan="2">Neurological level:</td><td>Initial</td><td>Discharge</td></tr>
<tr><td></td><td></td></tr>
<tr><td rowspan="2">3.6</td><td rowspan="2">ASIA scale (Impairment grading)</td><td>On admission</td><td>On discharge</td></tr>
<tr><td></td><td></td></tr>
<tr><td rowspan="2">3.7</td><td rowspan="2">Length of stay</td><td>On admission</td><td>On discharge</td></tr>
<tr><td></td><td></td></tr>
</table>

Neurological improvement:

Activities	Initial	Discharge
Total motor score		
Total sensory score		

Functional progress rating scale:

7=Independent
6=Independent with assisted device
5=Supervision
4=Minimal assistance
3=Moderate assistance
2=Maximal assistance
1=Unable to do

Functional improvement

Activities	Initial scores	Discharge scores
Bed mobility		
Rolling		
Lying to sitting		
Sitting to lying		
Prone lying		
Sitting balance		

Lifting		
Lifting in wheelchair		
Lifting on bed		
Lifting to forward		
Lifting sideways		
Lifting backward		
Transfers		
Wheelchair to bed, a bed to a wheelchair		
High and low transfers		
Wheelchair skill		
Wheelie		
Up and down slopes		
Rough ground		
Small steps		
Standing		
Sit to Stand		
Standing Balance		
Standing Table		
Tilt Table		
Walking		
Flat surface		
Rough surface		
Steps /Slops		
Fitting brace		
Total		

The Chairman
Institutional Review Board (IRB)
Bangladesh Health Professional Institute (BHPI), CRP
Savar, Dhaka-1343.Bangladesh

Subject: Application for review and ethical approval.

Dear sir,

With due respect, I am Taslima Akter etha, student of final year B.Sc. in Physiotherapy program at Bangladesh Health Professional Institute (BHPI) the academic institute of Centre for the Rehabilitation of the Paralyzed (CRP) under the Faculty of Medicine, University of Dhaka. As per the course curriculum, I have to conduct a research project entitled "**Age variance on neurologic and functional recovery of traumatic paraplegic spinal cord injury after complete rehabilitation: A retrospective cohort study**" under the supervision of MST. Fatema Akter, Assistant Professor, Department of Physiotherapy, BHPI.

The purpose of the study is to evaluate the Age variance on neurologic and functional recovery of traumatic paraplegic spinal cord injury after complete rehabilitation. The study involves using a questionnaire from the record file of the CRP Nursing station to explore Neurological and functional recovery of different ages at CRP hospital in Savar that may take 10-15 minutes to fill in the questionnaire and there is no likelihood of any harm to the participants. Data collectors will receive from the previous record file and the collected data will be kept confidential.

Therefore, I look forward to having your kind approval for the research project and to starting data collection. I can also assure you that I will maintain all the requirements for the study.

Thesis presentation date: 17th October, 2021

Sincerely,

Taslima Akter Etha
Final Year B.Sc. in Physiotherapy
Session: 2016 – 2017,
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Head of Department
B.Sc. in Physiotherapy, BHPI.

Recommendation from the Supervisor,

MST. Fatema Akter
Assistant Professor
Department of Physiotherapy, BHPI.

The Chairman
Institutional Review Board (IRB)
Bangladesh Health Professions Institute (BHPI), CRP
Savar, Dhaka-1343.Bangladesh

Subject: Application for review and ethical approval.

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Sincerely,

Taslima Akter Etha

Taslima Akter Etha
Final Year B.Sc. in Physiotherapy
Session: 2016 – 2017,
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Thesis presentation date: 17th October 2021

Head of Department
B.Sc. in Physiotherapy, BHPI.

Md. Shofiqul Islam
Associate Professor & Head
Department of Physiotherapy
Bangladesh Health Professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343

Recommendation from the Supervisor

Mst. Fatema Akter,
Assistant Professor
Department of Physiotherapy, BHPI.

Permission Letter

Date: 19.12.2021

Head of the medical services wing

Centre for the Rehabilitation of Paralyzed (CRP)

Savar, Dhaka-1343

Subject: Application for permission of data collection.

Dear Sir,

I beg most respectfully to state that, I am a student of 4th year B. Se in physiotherapy at Bangladesh Health Professions Institute (BHPI) under the University of Dhaka. I am researching "Age variance on neurologic and functional recovery of traumatic paraplegic spinal cord injury after complete rehabilitation" as a part of our course curriculum, under the supervision of MST. Fatema Akter, Assistant professor, BHPI. I need to collect more data from the SCI unit of CRP.

I, therefore, pray and hope that you would be kind enough to grant me and thus oblige thereby.

Sincerely yours,

Taslima Akter

Taslima Akter Etha

B.Sc in physiotherapy 4th year,

Roll-34

Session: 2016-2017

BHPI, CRP, Savar, Dhaka,

Forwarded
19.12.2021

বাংলাদেশ হেলথ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The Academic Institute of CRP)

Ref

CRP/BHPI/IRB/03/2022/586

Date

06/03/2022

Taslima Akter Etha
4th Year B.Sc. in Physiotherapy
Session: 2016 – 2017
BHPI, CRP, Savar, Dhaka- 1343, Bangladesh

Subject: Approval of the research project proposal **"Age variance on neurologic and functional recovery of traumatic paraplegic spinal cord injury after complete rehabilitation: A retrospective cohort study"** by the ethics committee

Dear Taslima Akter Etha,

Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned dissertation, with yourself, as the principal investigator and Mst. Fatema Akter as thesis supervisor. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Dissertation Proposal
2	Questionnaire (English version)
3	Information sheet & consent form.

The purpose of the study is to evaluate the age variance on neurologic and functional recovery of traumatic paraplegic spinal cord injury after complete rehabilitation. Since the study involves questionnaire that takes maximum 10-15 minutes and have no likelihood of any harm to the participants, the members of the Ethics committee approved the study to be conducted in the presented form at the meeting held at 09:00 AM on 12th October, 2021 at BHPI (30th IRB Meeting).

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and ask to be provided a copy of the final report. This Ethics committee is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,

Muhammad Millat Hossain
Assistant Professor, Dept. of Rehabilitation Science
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh