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FUNCTIONAL INDEPENDENCE MEASURE ASSOCIATION WITH PRESSURE SORE RISK AMONG THE PEOPLE WITH SPINAL CORD INJURY AT CENTRE FOR THE REHABILITATION OF THE PARALYSED (CRP)

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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 decline that same any publication, presentation or dissemination of information of the study. I would bind to take consent from the department of Physiotherapy of Bangladesh Health Profession Institute (BHPI).

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Contents

Acronyms

BHPI   : Bangladesh Health Professions Institute

BMRC   : Bangladesh Medical Research Council

CRP   : Center for the Rehabilitation of the Paralysed

IRB   : Institutional Review Board

PU   : Pressure Ulcer

SCI   : Spinal Cord Injury

TSCI   : Traumatic Spinal Cord Injury

NTSCI   : Non-traumatic Spinal Cord Injury

SPSS   : Statistical Package for the Social Sciences

USA   : United State of America

WHO   : World Health Organization

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Abstract

Purpose: To investigate the relationship between Functional Independence Measure (FIM) and pressure sore risk among the people with spinal cord injury at Centre for the Rehabilitation of the Paralysed. *Objectives:* The objective of this study was to identify the association between functional Independence Measure (FIM) and pressure sore risk as well as the prevalence of pressure sore at CRP. *Methodology:* The study design was cross-sectional. Total 145 samples were selected conveniently for this study from Centre for the rehabilitation of the paralyzed (CRP), Spinal cord injury unit, at Savar. Data was collected by using of questionnaire where functional independence was measured by FIM scale and pressure sore risk was assessed by the Braden scale. The study was conducted by using quantitative descriptive analysis through using SPSS software 20.0 version. *Results:* 48 patients out of 145 were found to have active pressure sores, with a prevalence of 33.1%. The Braden scale had significant (P=0.0001) association with the presence of active pressure sore. Among 145 SCI patients evaluation, 8 (5.50%) respondents had severe risk, 45 (31%) respondents had high risk, 12 (8.30%) respondents had moderate risk, 33 (22.80%) respondents had mild risk and 47 (32.80%) respondents had no risk of pressure developing pressure sore. It was found that there was a major correlation between Braden scale (severe, P=0.0001), with the thirteen motor components of FIM scale. Respondents who were smokers, had greater odds ratio (OR=5.115) of having PU than the non-smokers. Functional Independence Measure was associated (P<0.01) with risk of developing pressure sore. *Conclusion:* Pressure sore is the common and costly complications following SCI, which have a profound effect on the affected individual. The prevalence of pressure sore among the SCI patients at CRP was 31.1%. The Braden Scale, severity of injury according to ASIA Impairment Scale and having unhealthy behaviors such as smoking was positively associated with current PU. This study also found a positive association between Functional Independence Measure and pressure sore risk among the people with spinal cord injury at CRP.

Key words: Pressure Sore, Functional Assessment, Risk Assessment, Spinal Cord Injury.

| **CHAPTER – I** | **INTRODUCTION** |

1.1 Background

Damage to the spinal cord caused by trauma or illness or degeneration is referred to as a "spinal cord injury". The annual global incidence is expected to be between 40 and 80 cases per million people. Up to 90% of these instances are caused by traumatic events, however non-traumatic spinal cord damage looks to be on the rise. The severity of the injury and its placement on the spinal cord determine the symptoms of a spinal cord injury (World Health Organization, 2013).

Paralysis, paresthesia, spasticity, discomfort, and cardiovascular, bowel, bladder, or sexual dysfunction are just some of the symptoms of SCI (Hayta & Elden, 2018). The degree of disability is determined by the severity and extent of the spinal cord injury. The American Spinal Injury Association (ASIA) developed the International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI), which is widely used to assess the severity of injury (Roberts et al., 2017).

The prevalence of SCI was highest in the United States of America (906 per million) and lowest in the Rhone-Alpes region, France (250 per million) and Helsinki, Finland (280 per million). With respect to states and provinces in North America, the crude annual incidence of SCI was highest in Alaska (83 per million) and Mississippi (77 per million) and lowest in Alabama (29.4 per million), despite a large percentage of violence injuries (21.2%). Annual incidences were above 50 per million in the Hualien County in Taiwan (56.1 per million), the central Portugal region (58 per million), and Olmsted County in Minnesota (54.8 per million) and were lower than 20 per million in Taipei, Taiwan (14.6 per million), the Rhone-Alpes region in France (12.7 per million), Aragon, Spain (12.1 per million), Southeast Turkey (16.9 per million), and Stockholm, Sweden (19.5 per million). The highest national incidence was 49.1 per million in New Zealand, and the lowest incidences were in Fiji (10.0 per million) and Spain (8.0 per million). (Singh, et al., 2014) In Tehran, the yearly incidence rate of SCI is 44 cases per 1,000000 individuals, whereas in European countries, the rate is 5.5 to 195.4 cases per million (Li et al., 2016).

In both industrialized and developing countries, there were considerable disparities in etiology, incidence, prevalence, mortality, patient demographics, or the level and severity of damage, which may be attributed to economic, science and technology, medical, geographical, and even social factors. Falls (simple falls, falls from great heights), motor vehicle accidents (MVAs)/motor vehicle crashes, sports-related accidents, violence, and other forms of injury are among the many causes of SCI. MVAs used to be the leading cause of SCI in wealthy countries, but new studies have found that falls are now the leading cause. Gunshot wounds, for example, were the leading cause of SCI in Brazil before to 2003. MVAs and falls have been the major cause as the economy and society have progressed. However, falls continue to be the most common cause of SCI in developing countries (Kang et al., 2018).

People with spinal cord injuries in low and middle income nations are more likely to have major complications after being discharged from the hospital. Pressure ulcers, respiratory and urinary tract infections, depression, faecal and urine incontinence, and autonomic dysreflexia are all common consequences. These problems have the potential to be life-threatening. It was discovered that 19% of wheelchair-dependent persons with spinal cord injuries released from a prominent hospital in Bangladesh died within two years, and 31% died within five years (Hossain et al., 2021).

The life expectancy of spinal cord injured people in impoverished countries like Bangladesh is substantially lower than in industrialized countries (Razzak et al., 2011). SCI is still a major source of disability in Asia, as well as in Bangladesh (Islam et al., 2011). Carrying heavy loads on the head is prevalent in Bangladesh, and spinal injuries caused by an unintentional fall while carrying such a burden are a public health concern. During harvest season, farmers and laborers in Bangladesh transfer their products from harvesting sites to local storehouses or from one vehicle to another by carrying them on their heads. Bangladeshi coolies often carry loads weighing 50–100 kg (Hoque, et al., 2012).

SCI affects between 15 and 40 people per million people worldwide, with an annual incidence rate ranging between 10.4 and 83 cases per million (Moghimian et al., 2015). According to the World Health Organization, about 10% of the population in Bangladesh is disabled, with 4.6 percent of those suffering from spinal cord injuries (Haque et al., 1999). The frequency of spinal cord injuries (SCI) in low-income nations

like Bangladesh is unknown, although most experts in the field believe it could be as high as 70 per million. That is, three to four times higher than the average for high-income countries (Hossain et al., 2018).

Traumatic spinal cord injury (SCI) is a devastating neurological condition that affects between 250,000 and 500,000 people per year. Motor vehicle accidents (MVAs), falls, violence, and sports injuries are the primary causes of spinal cord trauma, with road traffic accidents being the most common etiology. Traumatic SCI is more common in young adult males, with a two- to fivefold higher incidence in males than females and a peak in younger people. It is a significant societal issue that affects a significant portion of the economically active population. Traumatic SCI has a significant impact on the patients' professional lives and future ambitions, as well as their personal, familial, and social lives. According to studies, the government healthcare systems bear an annual economic burden of billions of dollars. The psychological impact of adapting a healthy individual to a paraplegic or quadriplegic in their early life can be catastrophic because it primarily impacts the younger adult population (Quadri et al., 2020).

The incidence of TSCI ranges from 3.6 to 195.4 patients per million around the world. One of the most catastrophic types of injury is traumatic spinal cord injury (TSCI), which can result in varying degrees of paralysis, sensory loss, and bladder or bowel problems. TSCI not only has a negative impact on one's health, but it also has a significant financial impact on the family and society. NTSCI (non-traumatic spinal cord injury) is a kind of SCI that does not occur as a result of a traumatic event. Vertebral spondylosis (spinal stenosis), tumorous compression, vascular ischemia, and congenital illness are all causes of NTSCI. According to one article, Australia's total NTSCI incidence rate was 367.2 per million. Economic stress has become an increasingly relevant worry for people and society at large, whether of TSCI or NTSCI. In Canada, the projected lifetime economic burden of SCI ranged from US$1.47 million to US$3.03 million per patient, depending on whether the patient had incomplete paraplegia or total tetraplegia (Jazayeri et al., 2015).

With the rise of human activities, the incidence and prevalence of SCI has increased. In industrialized countries, the incidence rates varied from 13.121 to 163.420 per million persons. In developing countries, the rates ranged from 13.019 to 220.022 per million people (Jazayeri et al., 2015).

When compared to the general population, the risk of death is highest in the first year after an accident and stays high. People who have had a spinal cord injury are 2 to 5 times more likely to die young than those who do not. The risk of death rises with the severity of the injury and is heavily impacted by the availability of timely, high-quality medical care. The means of transport to the hospital following an injury, as well as the time it takes to be admitted to the hospital, are crucial considerations (World Health Organization, 2013).

Mortality rises in direct proportion to one's age. SCI patients over 60 years of age have a substantially greater mortality rate than SCI patients under 60 years of age. The mortality rate was highest one year after SCI, according to reports. Heart disease, diabetes, poor pulmonary function, and cigarette smoking were all risk factors for death. Circulatory system disorders (40 percent) and respiratory diseases (24 percent) were the leading causes of death (Kang, et al., 2018). It has been proven to induce significant autonomic dysfunction, with neurogenic shock being one of the most common causes of mortality after severe SCI (Majdan et al., 2017).

Because men are the primary caregivers for their families and communities, there are more male SCI patients than female SCI patients. Male community activities are sometimes more regular and frequently involve risky activities. SCI categories at high risk included laborers, farmers, and the unemployed (Kang et al., 2018).

Low- and middle-income countries have considerably greater mortality rates upon hospital discharge than high-income countries. This could be because established follow-up programs are employed to prevent and manage subsequent problems in most high-income countries. Regular face-to-face follow-up with physicians who screen for complications and provide advise and support is typical of these programs. Most persons with spinal cord injuries in high-income countries have ongoing medical treatment and can be hospitalized if necessary. In many low- and middle-income nations, however, follow-up services are not routinely provided due to the high expense of providing such services and the difficulty of getting to clinics and hospitals, particularly for those living in rural areas (Hossain et al., 2021). The care and treatment of people with SCI involves a variety of medical professions. Neurosurgery, trauma surgery, neurology, psychiatry, pain management, and rehabilitation are some of the disciplines available (Quadri et al., 2020).

The first-line strategies for preventing and managing common consequences after spinal cord injury are neither prohibitively expensive nor technically challenging to execute. Pressure ulcers, for example, can be avoided and controlled by using appropriate cushions and mattresses and repositioning on a regular basis. Clean, regular self-catheterization and appropriate hydration intake can help prevent and control bladder infections. While the majority of these tactics are not based on high-quality trials, they are common sense and are suggested in all major guidelines. The solutions are likely to be appropriate and implementable in both high-income and low-income countries (Hossain et al., 2021).

1.2 Rationale

Pressure sore is the most common secondary complications in patients with spinal cord injury. The spinal cord injury patients loss their sensation below the neurological level they have chance to develop pressure sore due to excessive pressure being applied to the tissues over an excessive duration which causes lack of blood supply to the area and necrosis of the tissues. Even they can get pressure sore from wet bed and cloth if they have no bladder control. So they may get pressure sore within some days after spinal cord injury if they are not aware about these.

Now a days the evidence of spinal cord injury is increased in Bangladesh as increase population. Due to increasing population decreasing the working opportunities they are undertaking risky work as a result they are falling in spinal cord injuries for this increasing the chance of developing pressure sore. Increasing prevalence rates amongst individual with SCI are attributed to repeatedly spending prolong periods of time in sitting or lying position with limited mobility and sensation. Improved functional independence especially during in patient service could be a preventive way for developing pressure sore.

 This study will find out the find out the number of the patients who have active pressure sore correlation between functional independence measure and pressure sore risk among the patients with spinal cord injury. The patients may provide proper recommendation for every single risk which will be helpful for them. This study will also help to discover the lacking area of a patients, especially about their functional independence which is responsible for pressure sore. Beside this it will help to professional development which is mandatory for current situation. This study will find out the prevalence of pressure sore among the spinal cord injury patients in CRP which will pay the farther attention for the treatment procedure of pressure sore.

1.3 Research question

Is there any association between functional independence measure and pressure sore risk among the people with spinal cord injury at Centre for the Rehabilitation of the Paralysed?

1.4 Study Objectives

1.4.1 General objectives :

To investigate the relationship between the Functional Independence Measure (FIM) and pressure ulcer (PU) risk and occurrence following spinal cord injury (SCI).

1.4.2 Specific objectives :

1) To find out the demographic informations of the participants.
2) To find out the information about developing pressure sore of the participants.
3) To evaluate the frequency of pressure sore among the complete, incomplete paraplegia and tetraplegic people with spinal cord injury.
4) To determine the common factors that influence pressure sore of the participants.
5) To assess the functional independence measure of the participants.
6) To detect the pressure sore risk of the participants.
7) To investigate the relationship between the Functional Independence Measure (FIM) and pressure ulcer (PU) risk of the people with spinal cord injury.

1.5 Conceptual Framework

| Independent Variables |

| Dependent Variables |

Socio-demographic variable

e.g, Age, Personal habit (smoking)

Self-care

Sphincter Control

Transfers

Locomotion

Sensory Perception

Moisture

Activity

Mobility

Nutrition

Friction and Shear

Active Pressure Sore

Pressure Sore Risk
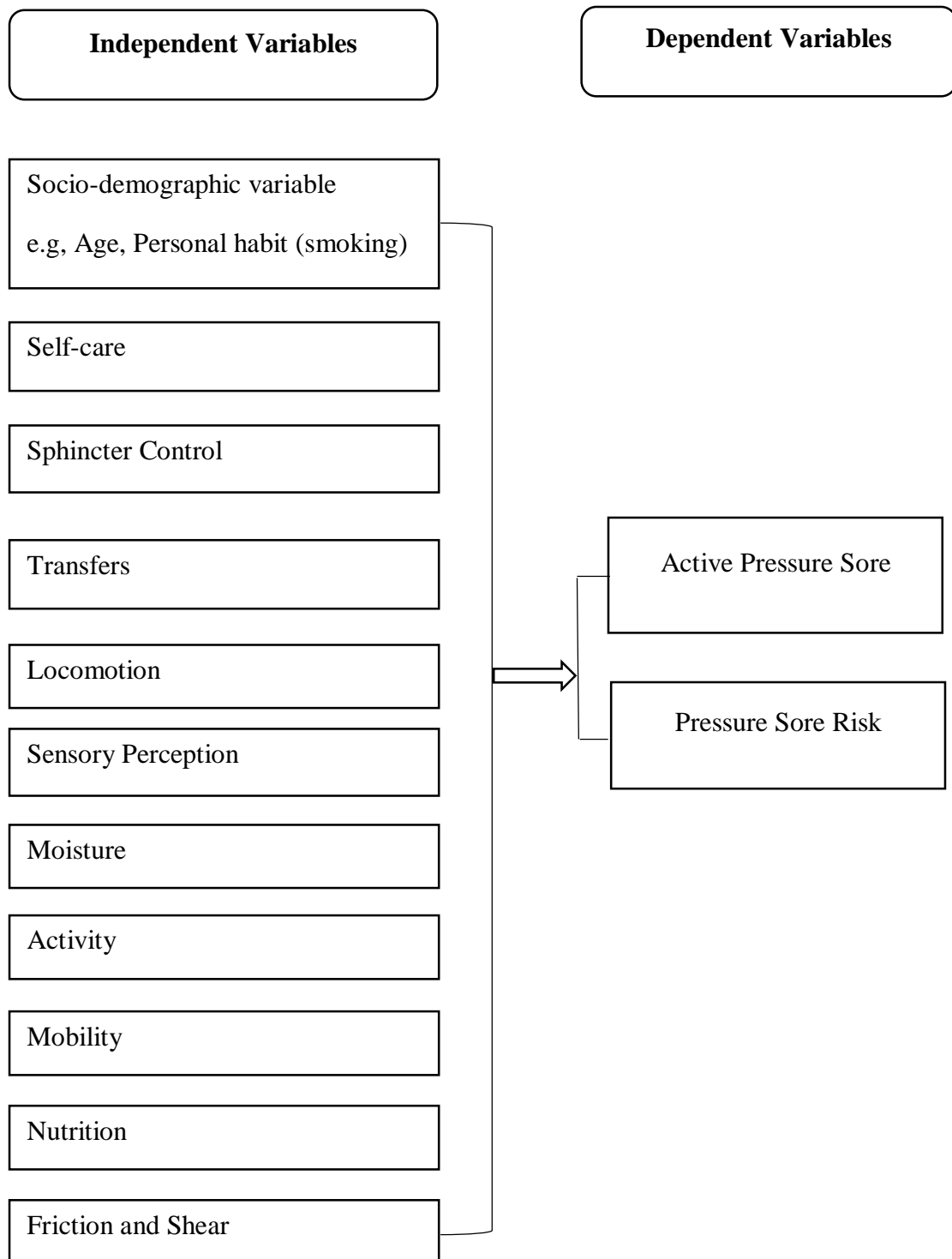
1.6 Operational Definition

Spinal Cord Injury

Spinal cord injury is defined as the occurrence of an acute traumatic lesion of neural elements in the spinal canal resulting in temporary or permanent sensory and/or motor deficit.

Prevalence

Prevalence is a frequently used epidemiological measure of how commonly a disease or condition occurs in a population. Prevalence measures how much of some disease or condition there is in a population at a particular point in time.

Pressure sore

A sore area of skin which develops due to cut off the blood supply to the area for more than two to three hours because of pressure and lack of movement

Neurological level

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

Incidence

Incidence measures the rate of occurrence of new cases of a disease or condition. Incidence is calculated as the number of new cases of a disease or condition in a specified time period (usually a year) divided by the size of the population under consideration who are initially disease free.

Paralysis

Injury or disease to the nervous system can affect the ability to move a particular part of the body. This reduced motor ability is called paralysis.

Paraplegia

Partial or complete paralysis of the lower half of the body with involvement of both legs that is usually due to injury or disease of the spinal cord in the thoracic or lumbar region.

Tetraplegia

Tetraplegia is caused by damage to the brain or the spinal cord at a high level C1–C7—in particular, spinal cord injuries secondary to an injury to the cervical spine. The injury, which is known as a lesion, causes victims to lose partial or total function of all four limbs, meaning the arms and the legs.

Friction

The rubbing of one object or surface against another.

Muscle spasms

A sudden, violent, involuntary muscular contraction.

SCI is a life-threatening and disabling injury that has a significant immediate and long-term impact on the medical, social, psychological, and economic aspects of clients, carers, and society (Li et al., 2016). The global prevalence of TSCI ranges from 3.6 to 195.4 people per million. In Norway and Ireland, the incidence of TSCI ranges from 5.5 to 195.4 cases per million, respectively. In Canada, the incidence of TSCI varies from 3.6 to 52.5 cases per million depending on the year and region. However, a recent survey in Canada found 53.0 TSCI cases per million per year. In Sierra Leone, the incidence is estimated to be around 3.4 cases per million. In the Fiji Islands and China, the incidence of WPR ranges from 10.0 to 60.6 cases per million, respectively. Australia is the foremost country in the world for SCI registration. Since 1986, annual reports on SCI have been issued in Australia, and the registry is updated every year. In Australia, the incidence of TSCI has reduced from 20.7 cases per million in 1986 to 15.0 cases per million in 2007 (Jazayeri et al., 2015).

According to a study, the average life expectancy of patients with SCI in Bangladesh is 5.36 years. Overall, 56.4 % of persons admitted with SCI died within 5 years after their injury, whereas 43.6 % lived for 5 years or longer. According to a survey conducted by CRP in Bangladesh, the most susceptible age groups were those aged 20 to 40, which accounted for 55.6 %. SCI was shown to be less common in people under the age of 20 and in those over the age of 50. 86.1 % of the 158 people had traumatic injuries, while 13.9 % had non-traumatic injuries, leaving 79.75 % with paraplegia and only 20.25 % with tetraplegia (Razzak et al., 2011). Falling from a height is the cause of 63 % of SCI in Bangladesh (Hoque et al.,2012). In Bangladesh, another common cause (18%) is falling while carrying a big object on the head, which usually results in tetraplegia (Razzak et al., 2011).

According to registries across the US, the incidence of SCI is estimated to be 30.0–40.0 cases per million in the US. Nonetheless, this incidence number includes 8.5 % of cases with unknown origin, which might be due to non-traumatic etiologies like tumours and infections. In Brazil, the incidence of 17.3 cases per million of TSCI based on retrospective surveys might be an underestimation in a country with more than 200 million residents and a growing concern about traffic accidents. The incidence of 11.7

cases per million is estimated from national rehabilitation centre of trauma patients between 1988 and 1994 in Zimbabwe. Estimates of 48.5 cases of TSCIs in South Africa are based on a single centre report of patients with traumatic spine injuries between 1988 and 1992 in Johannesburg [103]. The incidence in these countries ranges from 5.1 cases per million in Pakistan to 72.4 cases per million in Iran. TSCI in Taiwan, between 14.6 and 63.2 cases per million (Jazayeri et al., 2015).

SCI is a neurologic condition that has significant physical, psychological, and socioeconomic consequences. Long-term consequences after traumatic SCI are linked to increasing age and severity of injury. Septicemia (88.6%) is the second most common cause of death in people with SCI, and it's frequently linked to UTIs, pneumonia, or the existence of pressure ulcers (Brienza et al., 2018). In high-income nations, preventable secondary diseases (such as infections from untreated pressure sores) are no longer among the major causes of death for people with spinal cord injuries, but they remain the leading causes of death in low-income countries (World Health Organization, 2013).

Pressure and time to ulceration have an inverse connection, and different tissue types are more susceptible to ischemia than others. Muscle is more susceptible to ischemia than skin, and fat has less tensile strength than skin, which explains the "tip-of-the-iceberg" phenomenon, in which minor skin changes can conceal a serious, deep laceration down to the bone. Skin pressure relief over a bony prominence for 5 minutes every 2 hours is known to allow sufficient perfusion and prevent tissue damage. Using tissue perfusion measurements, researchers found a benefit to an off-loading position every 10 minutes during extended sitting when comparing wheelchair sitting protocols with pressure relieving approaches (wheelchair pushup vs. an off-loading position). Following these trials, it is now usual practice to turn bedridden, high-risk patients every 2 hours, and to give routine pressure reliefs during prolonged sitting (off-loading/pressure reliefs for 10 seconds every 10 minutes) for patients in wheelchairs (Kruger et al., 2013).

While it is clear that spinal cord injuries are widespread in low- and middle-income countries, reliable incidence data and population-based data on mortality rates following spinal cord injuries in these countries are lacking. One in every five patients who were wheelchair-dependent at discharge died within two years, according to a

longitudinal cohort study of 350 people with spinal cord injury who lived until discharge from a specialized hospital in Bangladesh. The majority of the people died as a result of pressure ulcer complications. Pressure ulcers are a well-known concern in low- and middle-income nations (Herbert et al., 2019).

It is not uncommon for people who have suffered a spinal cord injury (SCI) to develop health complications of their injury. Pressure ulcers, for example, are one of the most prevalent complications following an injury, with an incidence of around 30% among community-dwelling SCI Canadians. Individuals with SCI have an estimated 85 % lifetime prevalence of a pressure ulcer, putting a considerable strain on the health-care system. In Canada, the additional expense of caring for a community-dwelling person with SCI who has a pressure ulcer is almost $4800 per month, or nearly $57,000 per year. Pressure ulcers are most common in the ischial and sacral regions of people with SCI, and various risk factors have been identified. The following are some of them: Behavioral factors (e.g., smoking); sociodemographic factors (e.g., aging, being single, low level of education, unemployment); and medical factors (e.g., age at onset, completeness of injury, longer duration of SCI, urinary incontinence, severe spasticity) (eg, poor nutrition, cardiovascular disease, pulmonary disease, diabetes mellitus, and pressure ulcer history) (Lala et al., 2014).

According to pertinent spinal cord medicine literature, the prevalence of Pressure Ulcer (PU) during the first year after SCI is 8%, with a total number of 33% in resident-community cases. According to estimates, 50 % to 80 % of the persons with SCI will acquire PU at some point in their lives (Fazel et al., 2018).

In many healthcare settings, pressure ulcers are most common. According to the 2011 International Pressure Ulcer Prevalence Survey, the total facility prevalence of pressure ulcers and the facility-acquired prevalence of pressure ulcers were 11.2 % and 4.7 %, respectively, across all facilities assessed. Aside from the substantial pain and suffering that a pressure ulcer causes, it is linked to increased rates of morbidity and death, as well as a high medical cost and resource utilization. As of October 2008, the Centers for Medicare and Medicaid Services (CMS) no longer reimburses acute care hospitals for hospital-acquired stage III and IV pressure ulcers in order to improve patient care by encouraging facilities to engage in preventative initiatives. In addition, beginning in October 2012, the CMS mandated inpatient rehabilitation hospitals to report new or

worsening pressure ulcers (IRFs). There is a paucity of research on the influence of pressure ulcers on rehabilitation results. Patients with traumatic brain injury and nontraumatic spinal cord injury who were admitted with a pressure ulcer had a higher IRF length of stay (LOS) (Wang et al., 2014).

SCI patients are predisposed to PU for a variety of reasons. Prolonged immobilization is one of the key predisposing factors, producing undue pressure over bony prominences and leading in ischemia of the surrounding soft tissues. Nutritional deficiencies, stiffness, loss of feeling, and bladder and bowel malfunction, which causes skin wetness, are all risk factors. Comorbidities such as diabetes mellitus, as well as renal, cardiovascular, and pulmonary illnesses, have been linked to PU following a SCI. Smoking, poor albuminemia, anemia, and advanced age have all been linked to the development of PU (Richard-Denis et al., 2016).

The pressure ulcer risk score of senior deconditioned patients on admission to rehabilitation was a significant independent predictor of walking and transfer function at release, as well as rehabilitation length of stay. Stroke patients with dementia and pressure ulcers were more likely to have rehabilitation program disruptions, poor patient outcomes or quality-of-life indicators, and mortality when admitted to the IRF. These investigations were largely conducted on a limited sample size in non-Y United States IRF settings (DiVita et al., 2013).

In people with SCI, pressure ulcers are a critical secondary health consequence that not only impacts their health but also has a significant influence on their quality of life (QOL). People with a pressure ulcer had lower QOL and limits in physical and social activities in a cross-sectional study of 320 people with traumatic SCI in Stockholm, Sweden. Unfortunately, this study did not identify which activities were restricted and to what extent the participants' activities were restricted as a result of their pressure ulcer. People with SCI who have pressure ulcers have poorer levels of well-being and activity, as well as more health problems. Pressure ulcers have also been shown to have an impact on QOL in people who do not have a spinal cord injury in studies. Pressure ulcers, for example, were found to have a significant impact on health-related QOL in a case-control study among the able-bodied population receiving community nursing. They stated that doing activities of daily living (ADL) had become more difficult for them. Given the enormous impact of pressure ulcers on daily activities in people

without SCI, it's reasonable to assume that pressure ulcers in people with SCI would have an even greater impact (Lala et al., 2014).

Patients with spinal cord injuries are more likely to develop pressure ulcers (SCI). At least one pressure ulcer develops in 34% of patients receiving acute treatment or rehabilitation. Preventing pressure ulcers during rehabilitation reduces the length of stay in a rehabilitation facility and enhances the likelihood of going home (Verschueren et al., 2011).

According to the current findings, the global pooled prevalence of PU in individuals with SCI was 32.36%. Africa had the largest percentage of PU at 94 %, followed by Europe at 37.47 %. Chen et al.35 reported a PU prevalence of 11.5% at 1 year after injury and 21% at 15 years post injury in the United States (Li et al., 2016).

PUs are a major, expensive, and lifelong SCI complication. During the acute and recovery phases of a spinal cord injury, 30–40% of patients develop pressure ulcers. One of the most difficult clinical challenges in hospitals is the management of pressure ulcers, particularly among patients with spinal cord injuries (Shiferaw et al., 2020). Due to motor and sensory deficits, immobility, changes in skin composition, and protracted hospital stays, individuals with spinal cord injuries are at a greater risk of developing pressure ulcers (Li et al., 2016).

PUs impose a considerable financial burden, with treatment costs greatly outnumbering prevention costs. According to a study conducted in Canada, the total monthly cost of treating PU among SCI was 18,758 USD. The expense of treating paraplegic and tetraplegic patients may be as much as 25% of the total expenditure. Furthermore, a Canadian study found that the average monthly cost of treating PU in patients with SCI was $4745 (Shiferaw et al., 2020).

PUs have a complicated etiology with various risk factors. Duration after SCI (> 1 year), age (older age), sex (being male), poor nutritional status, quadriplegia, smoking, comorbidity, severe Braden scores, weight (being underweight), lower level of education, and lack of an intimate partner are all risk factors for PU in patients with SCI, according to studies. Patients with higher-level spinal cord injuries are also more vulnerable than those with lower-level lesions, according to research. As a result, risk

variables are identified and used as benchmarks to create appropriate prevention measures to increase client safety and resource efficiency (Shiferaw et al., 2020).

Different studies have found large variability in the amount of PUs in patients with SCI. In recent papers, for example, it ranges from 11-50%. In a research conducted in Switzerland, the incidence of PU was found to be 2.31 per patient-year. People with SCI acquire PU as a result of poor pressure reduction measures. The ischium (31%), trochanters (26%), sacrum (18%), heel (5%), malleolus (4%), and foot are the most common sites for pressure ulcers after two years of SCI (2%). Immobility, limited activity, lack of responsiveness, moisture owing to urine and fecal incontinence, muscular atrophy, prolonged time since injury, depression, smoking, and poor nutrition are all risk factors for pressure ulcers (Sazer et al., 2015).

Behavioral risk variables like cigarette smoking, alcohol consumption, and prescription medication use and addiction have all been linked to PU outcomes, but the number of studies examining these factors is limited. Cigarette smoking has long been known to have negative effects on wound healing and PU outcomes, and it is also regarded as a risk factor for PU onset and severity. Physiologically, smoking reduces cutaneous blood flow, resulting in poor PU outcomes such as more severe sores and slower healing ulcers. Furthermore, smoking can cause pulmonary illness, which has been linked to poor PU outcomes after SCI (Li et al., 2017).

The effect of smoking on cutaneous blood flow is the pathophysiological background of this factor. The impact of an educational program presented to SCI patients on the consequences of smoking on PU formation and scarring was studied by Viehbeck et al. This educational message was presented via videotape and was quickly remembered. The impact of this kind of prevention on the beginning of PU has yet to be determined. Cross-sectional research were used to measure "protective" factors (weight redistribution, self-repositioning, daily skin monitoring, etc.), resulting in a bias: it is difficult to tell if this behavior occurs before or after the development of a PU. The degree of evidence for these instructional methods, which are given to our patients on a regular basis, is woefully inadequate (Gelis et al., 2009).

Impairment, as measured by the FIM scale, was identified as a risk factor in a cross-sectional investigation and confirmed in a cohort analysis. The evidence is a moderate. In a case study and a historical cohort study, the mobility level (walking, wheelchair,

or bed) was assessed. A limited level of mobility is a moderately evidenced PU risk factor. (Gelis et al., 2009).

In epidemiological research, bladder or bowel incontinence has also been identified as a risk factor. In a cross-sectional study, Sumiya et al. discovered a causal link between bladder incontinence and the presence of PU. Another cross-sectional investigation by Raghavan et al. revealed no link between PU and bladder or bowel incontinence. Salzberg et al., on the other hand, discovered a statistical relationship in a low-methodological-level historical cohort study. Bladder incontinence is a risk factor, although there isn't enough evidence to support it (Gelis et al., 2009).

Pressure ulcers (PU) are a frequently occurring condition associated with spinal cord injury (SCI). Patients are especially vulnerable to PU during acute hospitalization because they are exposed to a variety of risk factors. To begin with, acute hospitalization is linked to extended immobility since the neurologic condition is at its most critical and recovery may not have begun yet. Furthermore, related injuries and surgery recovery are risk factors for PU since these illnesses can limit patients' mobility and impair their nutritional status and deconditioning. According to a recent study, those with acute traumatic SCI had lower sacral blood flow than people who have had another orthopedic trauma or healthy people. Time spent in transfering and time spent on a long board have both been identified as PU risk factors. During hospitalization in the authors' acute care facility, surgical delay of more than 24 hours, ASIA (American Spinal Injury Association) Impairment Scale (AIS) grade, and tetraplegia (as opposed to paraplegia) were observed to predict the development of PU. Although the presence of PU may lengthen the overall hospital stay, the LOS in the acute care center appeared to increase the risk of PU. Low blood pressure on admission in the emergency room has also been linked to PU in SCI patients. 4 The prevalence of PU during the acute hospitalization phase following a SCI ranges from 18 to 37 %. According to a multicenter prospective cohort research, the presence of PU during acute hospitalization is a major risk factor for the development of PU during intense functional rehabilitation (IFR) (Richard-Denis et al., 2016).

According to the Canadian Paraplegic Association, roughly 35 people per million in Canada may suffer a spinal cord injury each year (SCI). In the Canadian community, pressure ulcers (PU) are a prevalent secondary health problem among persons with SCI,

with an incidence of 278 percent. This high rate of SCI occurs most frequently over the ischial tuberosity, as a result of persistent prolonged pressure. across bony prominences, skin, muscle, or soft tissue, causing damage to the affected areas. PU is responsible for significant healthcare expenses to the system, in addition to infection, death, and diminished quality of life. According to a recent study from the United States, the cost of a stage IV PU in US dollars is around $130 000 per hospital admission for a hospital-acquired ulcer and $31 000 per admission for a community-acquired PU. These findings were limited to the costs of a newly diagnosed PU's initial hospitalization (Chan et al., 2013).

Patients with SCI who develop PU may experience limited mobility, rehabilitation delays, the need for additional surgeries, and serious medical problems like as local and systemic infections. After a SCI, the death rate due to PU is predicted to be 7% to 8%. The presence of PU has been demonstrated to raise treatment costs more than many other medical problems. According to estimates, the cost of healing a PU in the United States might vary between $5000 and $25,000, although effective preventative efforts cost around a tenth of that. According to Markova & Mostow, chronic ulcers of all etiologies cost the US health care system between $6 and $15 billion each year. PU is also one of the most common causes of rehospitalization in SCI, which necessitates even more financial and community support. Indeed, the financial cost of this frequently preventable secondary illness is significant (Richard-Denis et al., 2016).

Allen and Houghton calculated that a stage III PU would cost $27 500 in a Canadian community setting over three months (roughly $9000 per month of community care with electrical stimulation and an interdisciplinary wound team, including costs associated with healthcare professionals, rental equipment, supply use, and lost productivity). However, because this cost was based on a single patient's case study, the results' generalizability and representativeness are restricted (Chan et al., 2013).

Functional Independence Measure (FIM) is a functional assessment tool and is used to assess the impact of SCI on the patient's functional abilities (Ditunno et al., 2007). It is an 18-item, 7-level ordinal scale designed to assess severity of patient disability, estimate burden of care and determine medical rehabilitation functional outcome. (Dawson et al., 2008). FIM scores range from one to seven: a FIM item score of seven is categorized as "complete independence" while a score of one is "total assistance"

(performs less than 25% of the activity). Scores falling below six require another person for supervision or assistance (Wright, 2000).

The Braden Scale consists of six domains, including sensory perception, moisture, activity, mobility, nutrition, and friction and shear. Nursing staff assessed and assigned a score using a 4-point scale (1-4) to each domain, except for the friction and shear (3-point scale, 1-3). A total Braden score ranges from 6 to 23, with lower numbers indicating greater risk for developing a PU. The study administered the Braden Scale at admission, weekly thereafter, and at discharge. A total score of 15 to 18 indicates mild risk for developing a PU, a score of 13 to 14 indicates moderate risk, a score of 10 to 12 indicates high risk, and a total score of 9 or less indicates severe risk (DeJong et al., 2014).

CHAPTER – III	METHODOLOGY

3.1 Study Design

A cross-sectional descriptive study was performed with structured questionnaires and interviews were conducted with persons having spinal cord injury (SCI). This study design was appropriate to find out the objectives. The data was collected all at the same time or within a short time frame.

3.2 Study Area

Data was collected from SCI patients attending at Center for the Rehabilitation of the Paralysed, Savar, Dhaka. CRP is the biggest hospital and renowned rehabilitation centre for Spinal Cord Injury (SCI) among South Asia.

3.3 Study Period

The study period was June 2021 to November 2021.

3.4 Study Population and Sample Population

A population is the total group or set of events or totality of the observation on which a research is carried out. It is the group of interest to the researcher, the group whom the researcher would like to generalize the result of the study. In this study the SCI people taking treatment at CRP was chosen as a sample population to carry out this study. About 145 samples were selected for this study.

3.5 Sampling Technique

Sampling refers to the process of selecting the subjects or individual. The researcher was selected convenience sampling technique due to small size of population.

3. 6 Sample Size

When the sample frame is finite,

The equation of finite population correction in case of cross sectional study is :

$$n = \frac{Z^2 pq}{d^2}$$

$$= \frac{(1.96)^2 \times 0.28 \times 0.72}{(0.05)^2}$$

$$= 310$$

Here,

Z (confidence interval) = 1.96

P (prevalence) = 28% (Fazel et al., 2018)

And, q = (1-p)

$$= (1\text{-}0.28)$$

$$= 0.72$$

The actual sample size was, n= 310.

As it is academic thesis, self funding and data was collected from a single specialized hospital by considering the feasibility and time limitation 145 sample were selected conveniently.

3.7 Inclusion Criteria

- Persons with Spinal Cord Injury attending at CRP.
- Both Paraplegia and Tetraplegia are included.
- Both male and female are included.

3.8 Exclusion Criteria

- Any concomitant impairment that might influence everyday function (such as cognitive impairment, hearing loss or difficulty)
- People who had Spinal cord injury > 2 years ago
- Undiagnosed injury
- Head injury
- Any other major disease except SCI.

3.9 Data collection tools

The researcher used a questionnaire which concludes four section: 1) Demographic, 2) Clinical characteristics, 3) FIM Motor Subscale, 4) Braden scale for predicting pressure sore risk.

3.10 Data collection Procedure

The questions will be asked in face to face interviews. It is useful because this technique ensures that the researcher will obtain all the information required, while at the same time it gives the participants freedom to respond and illustrated concepts.

3.11 Duration of data collection

Data was collected carefully and confidentiality and maintained all ethical considerations. The researcher gave each participant a particular time to collect the data. Each questionnaire took approximately 15-20 minutes to complete.

3.12 Data analysis

The collected data were processed and analyzed in the statistical package for the social sciences (SPSS) v20.0 for windows. The analysis focuses on pressure sore risk of the patient. There is cut point for subscales; higher score represent less risk of pressure sore. Researcher analyzed the data by descriptive statistics using frequency (n), percentage(%), Pie diagram and Bar diagram and also shown the associations by non-parametric test which was Chi square (χ2) Test.

3.12.1 Chi square (χ2) Test

Chi square (χ2) Test is the most popular discrete data hypothesis testing method. It is a non-parametric test of statistical significance for bivariate tabular analysis with a contingency table. In this study Chi square (χ2) test was done to measure the associations between two variables. It was used to test the statistical significance of results reported in bivariate tables.

Assumption

Different and Independent variable

Variables were quantitative

Normal Distribution of the variable

Formula: the test statistics follow

$\chi2 = \sum (O - E) \, ki$

$= 1^2/E$

Here,

$\chi2$ = Chi square value

$\sum$ = The sum of

O = Observed count

E = Expected count

Chi square is the sum of the squared differences between observed (O) and the expected (E) data divided by expected (E) data in all possible categories.

Level of significance

The researcher has used 5% level of significant to test the hypothesis. If the p value for the calculated χ^2 is $p<0.05$ conclude that there is significant association between the two variables.

Example:

Pressure sore risk (Braden)	Clinical Characteristics	Chi-square value (χ^2)	P-value	Significance
Severe risk High risk Moderate risk Mild risk No risk	Causes of Injury	5.793	0.444	Not significant
	Type of Injury	26.024	0.0001**	Significant
	ASIA	39.182	0.0001**	Significant

3.12.2 Spearman Correlation test:

Spearman's rank correlation coefficient is a nonparametric measure of rank correlation (statistical dependence between the ranking of two variables). It assesses how well the relationship between two variables that can be described using monotonic function (Cavallo, 2020). In this study Spearman correlation test was done to measure the correlation between two variable.

Assumption:

Data must be at least ordinal

The scores on one variable must be monotonically related to the other variable

Formula:

The test statistics follow-

$$\rho = 1 - \frac{6\sum d_i^2}{n(n^2-1)}$$

ρ = Spearman's rank correlation coefficient

d_i = the difference between the ranks of corresponding variables

n = number of observations

3.12.3 Measurement of relative risk factors

To evaluate the risk factor of developing pressure sore, the existence of pressure active sore was considered as the dependent variable and other factors were considered as the independent variables. With the help of SPSS version 20, we analyzed data through regression. In regression odd ratio and 95%, CI was also calculated to evaluate the relationship. 95% CI was applied to show the significance between the two variables. The odds ratio was computed to determine how much risk there was in the presence of certain exposure compared to those who didn't have that exposure.

3.13 Ethical consideration

IRB approved the proposal. Researcher has followed the Bangladesh medical research council (BMRC) guideline & WHO research guideline. This protocol presentation was firstly submitted to the Institutional Review Board (IRB) of BHPI and initial permission was taken. Permission was taken from the Head of the Department of Physiotherapy, BHPI and head of the Department of Physiotherapy, CRP before data collection. Permission was takem from the In-Charge of SCI Unit, CRP for data collection from the patients. Researcher maintained the confidentiality of the collected data from the individuals. Researcher ensured the confidentially of participants and shared the information only with research supervisor. All rights of the participants were reserved and researcher was accountable to the participant to answer any type of study related question.

3.14 Informed Consent

Written consent (appendix) was given to all participants prior to completion of the questionnaire. The researcher explained to the participants about his or her role in this study and aim and objective of this study. The researcher received a written consent from every participants including signature. So the participant assured that they could understand about the consent from and their participation was on voluntary basic. The participants were informed clearly that their information would be kept confidential. The researcher assured the participants that the study would not be harmful to them. It was explained that there might not a direct benefit from the study for the participants but in the future cases like them might be get benefit from it. The participants had the rights to withdraw consent and discontinue participation at any time without prejudice to present or future care at the spinal cord injury (SCI) unit of CRP. Information from this study was anonymously coded to ensure confidentiality and was not personally identified in any publication containing the result of this study.

3.15 Rigor of the study

The rigorous manner was maintained to conduct the study. The study was conducted in a clean and systemic way. During the data collection it was ensured participants were not influenced by experience. The answer was accepted whether they were in negative or positive impression. No leading questions were asked or no important questions were avoided. The participant information was coded accurately and checked by the supervisor to eliminate any possible errors. The entire information was handled with confidentiality. In the result section, outcome was not influenced by showing any personal interpretation. Every section of the study was checked and rechecked by the research supervisor.

CHAPTER – IV	RESULTS

4.1 Socio-demographic Variables of the respondents

One hundred forty-five people with SCI completed the survey. The age range of the respondents was between 7 to 73 years. The Median age was 33 years. 107 participants were <40 years and rest of 38 participants were >40 years. There were 125 men and 20 women respondents. Only 2 participants had higher degree, 11 completed graduation, 14 completed higher secondary education, 35 completed secondary education, 24 completed primary education and the remaining 59 had never attended school. There were 98 participants married, 8 participants were unmarried, 2 participants were divorced and 4 participants were widow or widower. The majority of respondents 113 lived in rural area, 32 participants lived in urban area. Among all respondents, 125 respondents were from nuclear family and rest of 20 participants were from extended family. Eighteen respondents were service holder, 12 were businessman, 13 were housewives, 30 were students and the remaining 72 indicated they had other occupations such as farmer, day labor, driver, etc. Among the respondents, 42 participants were smoker and 103 participants were non-smoker (Table-1).

Table 1: Demographic information of included people (145) with spinal cord injury

Demograpgic	% (n)	Demograpgic	% (n)
Age		**Educational Status**	
Mean age ± SD	33.71 ±13.96	Illiterate	40.7% (59)
<40 years	73.8% (107)	Primary education	16.6% (24)
>40 years	26.2% (38)	Secondary education	24.1% (35)
Gender		Higher secondary	9.7% (14)
Male	85.5% (124)	Graduation	7.6% (11)
Female	14.5% (21)	Post graduation	1.4% (2)
Marital Status		**Occupation**	
Married	67.6% (98)	Service Holder	12.4% (18)
Unmarried	28.3% (8)	Businessman	8.3% (12)
Divorced	1.4% (2)	Housewife	9% (13)
Widow/widower	2.4% (4)	Students	20.7% (30)
		Others (Farmer, day labor, driver etc.)	49.7% (72)
Living area		**Monthly Income**	
Rural area	77.9% (113)	<12000 BDT	60.7% (88)
Urban area	22.1% (32)	>12000 BDT	39.3% (57)
Type of Family		**Smoking**	
Nuclear Family	77.9% (113)	Yes	29% (42)
Extended Family	22.1% (32)	No	71% (103)

4.2 Prevalence of Pressure Sore
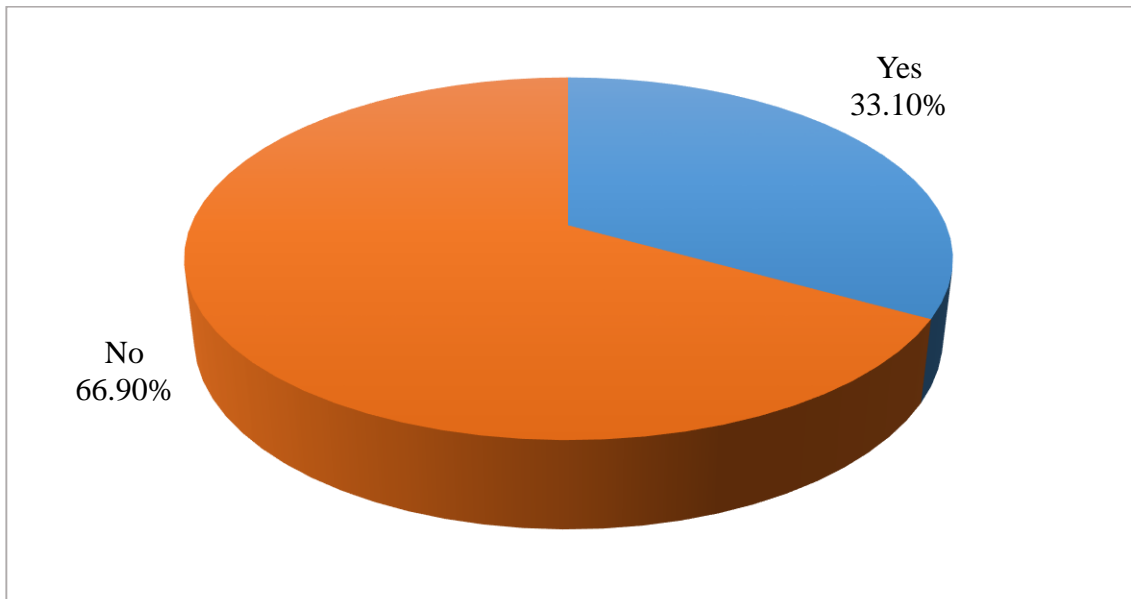
Figure - 1: Prevalence of pressure sore among the SCI patients

Among the 145 participants 33.1% (n=48) participants had suffered from pressure sore and 66.9% (n=97) participants were not suffered from pressure sore.

4.3 Type of Injury of the Participants
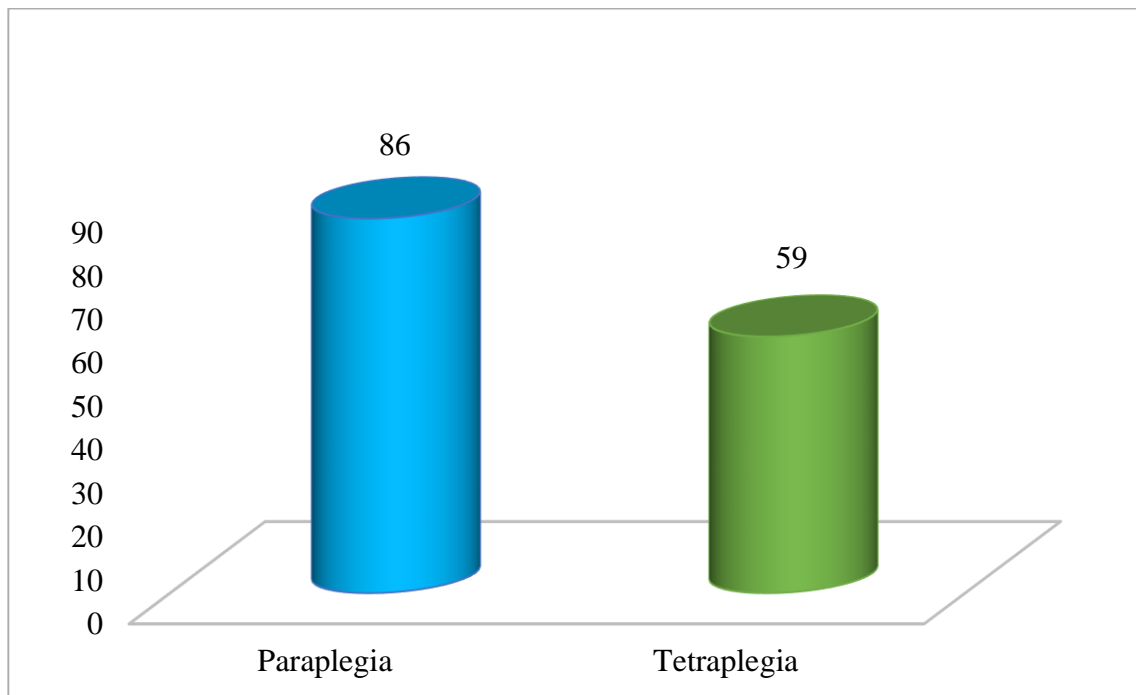
Figure – 2: Diagnosis of the participants

Total participants were 145 (n=145), among them Paraplegia were 59.3% (n=86) and Tetraplegia were 40.7% (n=59).

4.4 Severity of Injury of the Participants
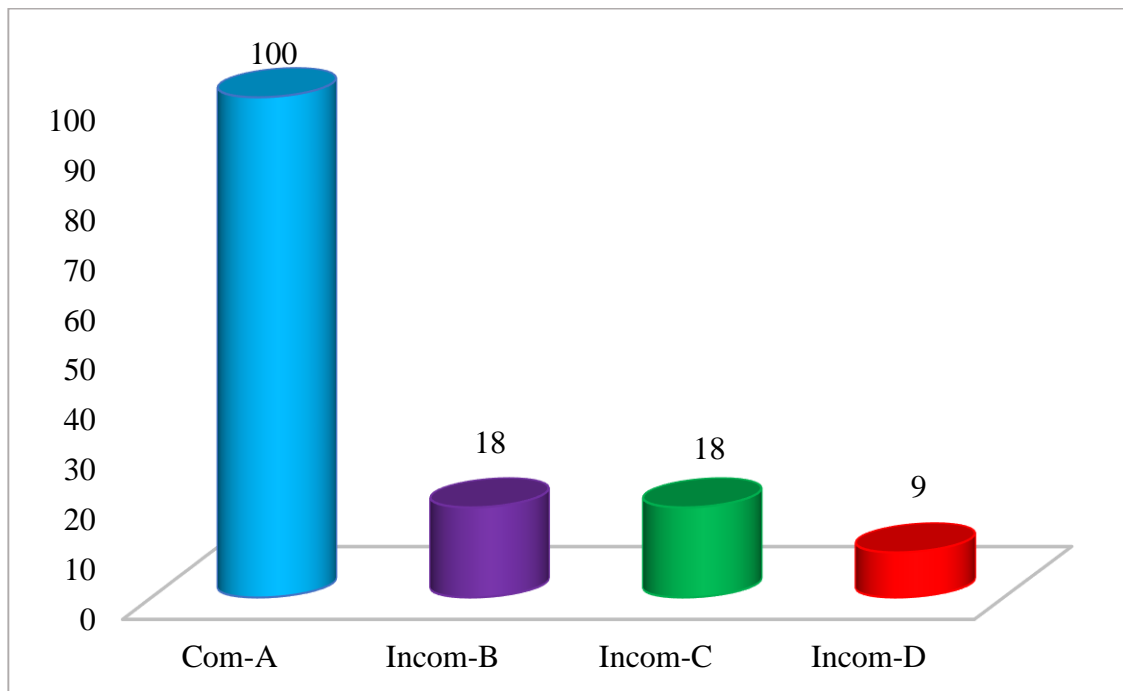
Figure–3: Severity of Injury of the Participants

Among 145 participants , Complete A in ASIA Scale were 69% (n=100), Incomplete B in ASIA Scale were 12.4% (n=18), Incomplete C in ASIA scale were 12.4% (n=18) and Incomplete D in ASIA scale were 6.2% (n=9).

4.5 Causes of Spinal Cord Injury
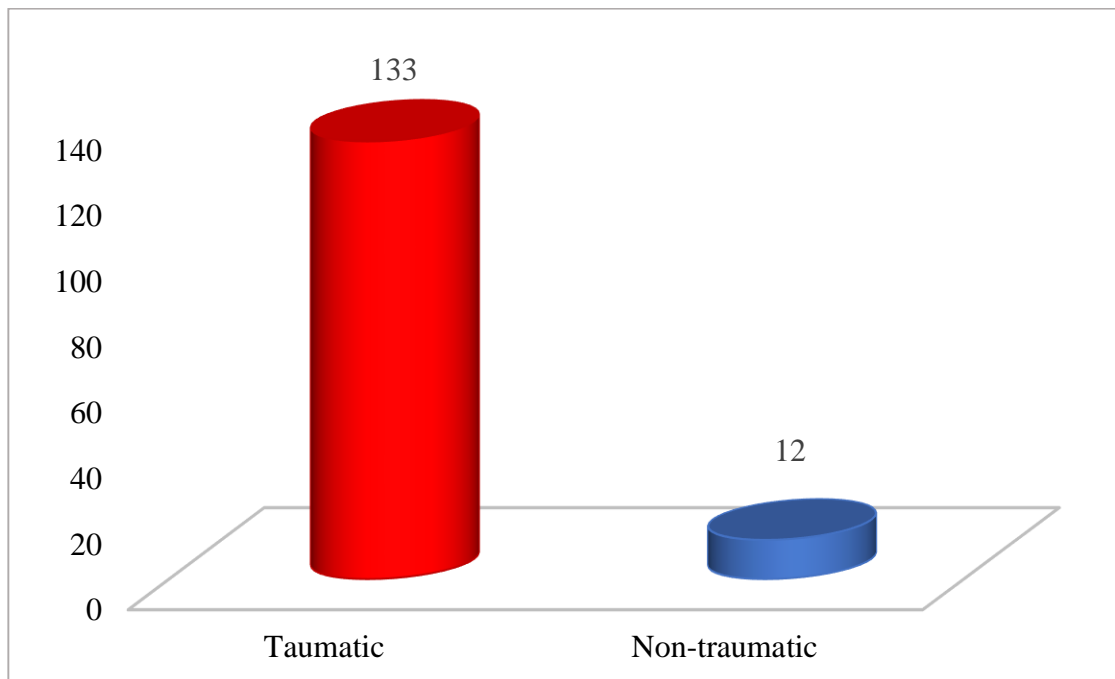
Figure-4: Causes of Injury of the Participants

Among 145 participants, 91.7% (n=133) participants had experienced with spinal cord injury due to Traumatic cause such as Fall from height, RTA, Falling of heavy object over head or on back etc and 8.3% (n=12) participants got SCI due to Non-traumatic cause such as TB Spine, Multiple sclerosis, Transverse myellitis etc.

4.6 Frequency of Site of Pressure Sore
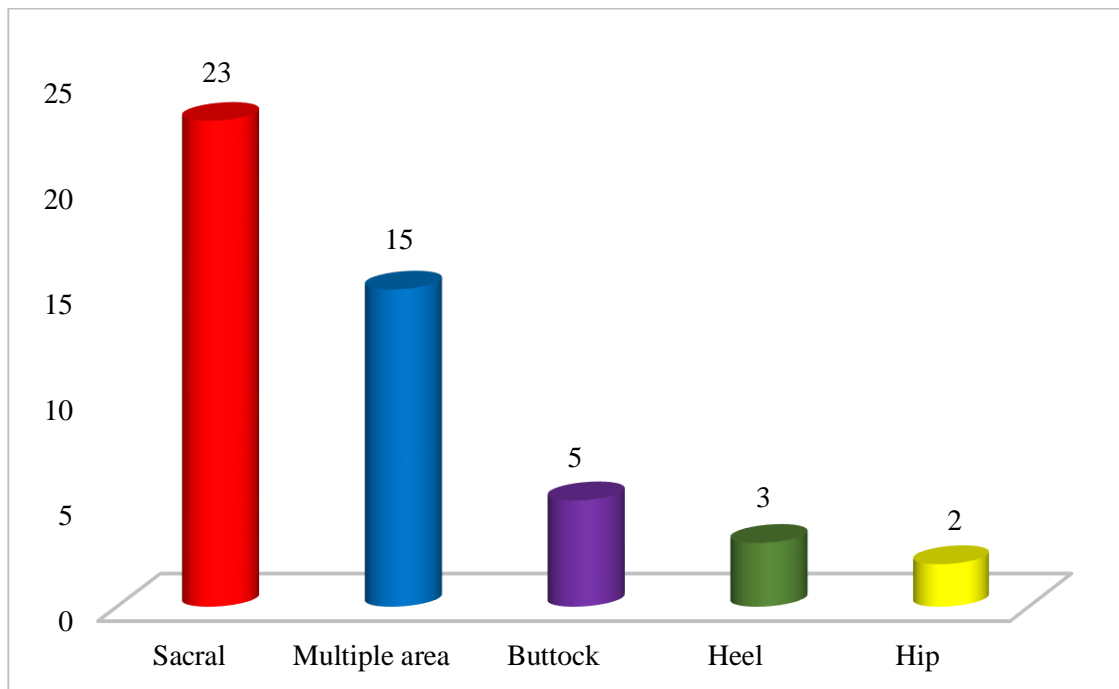
Figure-5: Frequency of Site of Pressure Sore

Among 145 participants from whom data were collected 48 were suffering from pressure sore. The frequency of the site of pressure sore were 47.9% (n=23) participants got pressure sore in sacral, 10.4% (n=5) participants got pressure sore in buttock, 4.1% (n=2) participants got pressure sore in hip, 6.3% (n=3) participants got pressure sore in heel and 31.3% (n=15) participants got pressure sore in multiple area of the body.

4.7 Predicting Pressure Sore Risk (Braden Score)
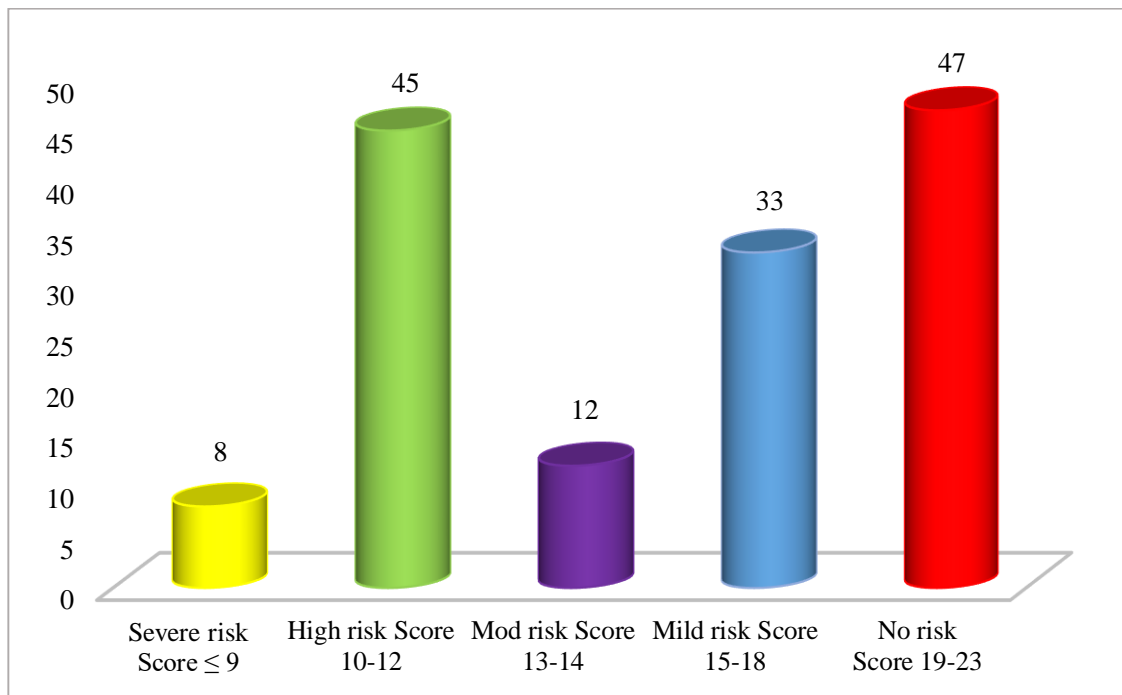
Figure-6: Pressure Sore Risk (Braden Score)

Among 145 respondents, 5.50% (n=8) respondents had severe risk (score $\leq$ 9) of pressure sore, 31% (n=45) respondents had high risk (score 10-12) of pressure sore, 8.30% (n= 12) respondents had moderate risk (score 13-14) of pressure sore, 22.80% (n=33) respondents had mild risk (score 15-18) of pressure sore, 32.80% (n=47) respondents had no risk (score 19-23) of pressure sore.

4.8 Pressure sore risk according to the demographic variables (age, gender, marital status, living area, educational qualification, family type, occupation, smoking):

No association found between the pressure sore risk and the age of the participants and which was not statistically significant (P=0.552); No association found between the pressure sore risk and the gender of the participants which was not statistically significant (P=0.787); No association found between the pressure sore risk and the marital status of the participants which was not statistically significant (P=0.351); No association found between the pressure sore risk and the educational status of the participants which was not statistically significant (P=0.544); No association found between the pressure sore risk and the occupation of the participants which was not statistically significant (P=0.787); No association found between the pressure sore risk and the monthly family income of the participants which was not statistically significant (P=0.164); Personal habit (smoking) of the participants has significant association with pressure sore risk which was statistically significant (P=0.002). Smoking is one of the important factor which has a great impact on pressure ulcer risk of a spinal cord injury patient.

Table 2: Association of Pressure Sore Risk (Braden Scale) with Demographic

Demographic Variables	Chi-square value ($\chi 2$)	P-value
Age	1.792	0.552
Gender	2.071	0.787
Marital Status	17.054	0.351
Living Area	5.471	0.422
Educational Qualification	17.188	0.544
Occupation	49.708	0.565
Monthly Family Income	6.518	0.164
Personal Habit (Smoking)	17.437	0.002**

P value *=<0.05, **=<0.01

4.9 Pressure Sore Risk (Braden scale) according to Clinical Characteristics (cause of injury, type of injury and severity of injury according to ASIA):

No association found between the pressure sore risk and the cause of injury of the respondents and which was not statistically significant (P=0.444). Type of injury and severity of the injury according to ASIA has significant association with pressure sore risk which was statistically highly significant (P=0.0001). So, type of injury and severity of the injury according to ASIA are the important factors which has a great impact on pressure ulcer risk of a spinal cord injury patient.

Table 3: Association of pressure sore risk with clinical characteristics

Clinical Characteristics	Chi-square value ($\chi 2$)	P-value
Causes of Injury	5.793	0.444
Type of Injury	26.024	0.0001***
Severity of Injury (ASIA)	39.182	0.0001***

P value *=<0.05, **=<0.01

4.10 Pressure Sore Risk (Braden Scale) according to the motor components of FIM Motor Subscales:

Strong positive correlation (ρ=0.900) had been found between the pressure sore risk (Braden Scale) and FIM motor subscales which was highly significant (P=0.000). This indicated that respondents who had more **f**unctional Independence had high Braden scores which indicated the less risk of developing pressure sore. So, FIM was one of the important factor which had a great impact on the pressure ulcer risk of a spinal cord injury patient.

Table 4: Correlation between functional independence measure and pressure sore risk (by Braden Scale)			
Independent Variable	**Dependent Variable**	**Spearman's ρ**	**P-value**
Functional Independence (Complete dependence, Modified dependence, Independent)	Pressure Sore Risk (Severe risk, high risk, moderate risk, mild risk, no risk)	0.900	0.000

4.11 Existence of active pressure sores in 48 involved respondents according to clinical characteristics

Among the 48 respondents who had active pressure sore, 37 participants were <40 years and rest of 11 participants were >40 years. There were 41 men and 7 women respondents. Only 1 participants had higher degree, 4 completed graduation, 2 completed higher secondary education, 13 completed secondary education, 9 completed primary education and the remaining 19 had never attended school. The majority of respondents 38 lived in rural area, 10 participants lived in urban area. Among 48 respondents, 25 respondents had bad personal habit of smoking. 28 respondents had monthly family income of <12000 BDT and 20 respondents had monthly family income of >12000 BDT.

In the association test using chi-square, revealed a major correlation between smoking and active pressure sore where the value was 18.637 which indicates among the variable was significant because P value was 0.000 (P<0.05). There was no significant association between age, sex, living area, monthly family income and the chance of having at least one active pressure sore. (Table-5)

Table 5: Association of existence of active pressure sores with demographic

Clinical Characteristics	% (n)	Chi-square value (χ2)	P-value
Age			
<40 years	77.1% (37)	0.402	0.526
>40 years	22.9% (11)		
Gender			
Male	85.4% (41)	0.038	0.846
Female	14.6% (7)		
Living Area			
Rural area	79.2% (38)	0.210	0.896
Urban area	20.8% (10)		
Monthly Income			
<12000 BDT	58.3% (28)	0.167	0.683
>12000 BDT	41.7% (20)		
Smoking			
Yes	52.1% (25)	18.637	0.000**
No	47.9% (23)		

P value *=<0.05, **=<0.01

4.12 Existence of active pressure sores in 48 involved respondents according to clinical characteristics

Among the 48 respondents who had active pressure sore, 44 respondents had traumatic and rest of 4 had non-traumatic spinal cord injury. 27 participants were paraplegic and 21 participants were tetraplegic. According to the ASIA Impairment Scale, 41 respondents had complete and 7 participants had incomplete spinal cord injury.

In the association test using chi-square, revealed a major correlation severity of injury according to ASIA and active pressure sore where the value was 9.073 which indicates among the variable was significant because P value was 0.002 (P<0.05). There was no significant association between age, sex, living area, monthly family income and the chance of having at least one active pressure sore.

Table 6: Association of existence of active pressure sores with clinical characteristics

Clinical Characteristics	% (n)	Chi-square value ($\chi 2$)	P-value
Cause of Injury			
Traumatic	91.7% (44)	0.0001	0.986
Non-traumatic	8.3 % (4)		
Type of Injury			
Paraplegic	56.2% (27)	0.278	0.598
Tetraplegic	43.8% (21)		
Severity of Injury			
Complete injury	85.4% (41)	9.073	0.002**
Incomplete injury	14.6% (7)		

P value *=<0.05, **=<0.01

4.13 Information about age and causes of SCI

Among 145 participants, who were < 40 years old age, 99 (68.3%) participants had traumatic spinal cord injury and 8 (5.5%) participants had non-traumatic spinal cord injury. Participants who were > 40 years old age, 34 (23.4%) participants had traumatic spinal cord injury and 4 (2.8%) participants had non-traumatic spinal cord injury.

Table 7: Information about age and causes of SCI

Age	Count and Percentage	Causes of SCI		Total
		Traumatic	Non-traumatic	
< 40 years	(n)	99	8	107
	%	68.3%	5.5%	73.8%
> 40 years	(n)	34	4	38
	%	23.4%	2.8%	26.2%
Total	(n)	133	12	145
	%	91.7%	8.3%	100%

4. 14 Risk Factor Related to Pressure Sore

Existence of pressure sore was associated (P<0.01) with personal habit. A positive association (β=1.632) had found between the presence of active pressure sore and smoking which was highly significant (P=0.0001, OR=5.115, 95% confidence interval (CI): 2.366-11.060). The strongest predictor of reporting smoking habit was risk factor of active pressure sore, recording a higher odds ratio (OR=5.115). This indicated that respondents who were smokers, had 5.115 times more likely to report presence of an active pressure sore compared to those who were non-smokers.

Presence of active pressure sore was associated (P<0.01) with severity of injury. A positive association (β=1.328) had found between the presence of active pressure sore and ASIA Impairment Scale which was highly significant (P=0.004, OR=3.772, 95% confidence interval (CI): 3.210-15.360). The strongest predictor of reporting ASIA was predicted risk factor of active pressure sore, recording a higher odds ratio (OR=3.772). This indicated that respondents who had complete spinal cord injury, were 3.772 times more risk of pressure sore compared to those who had incomplete injury.

Table 8: Binary logistic regression of existence of active pressure sore with other variables

Predictor Variable	Dependent variable : Existence of Active Pressure Sore (Present and Absent)					
	R^2	β	P Value	OR	95% CI (confidence interval)	
					Lower	Upper
Smokers	0.163	1.632	0.0001**	5.115	2.366	11.060
Severity of Injury (complete injury)	0.091	1.328	0.004**	3.772	1.535	9.272

P value *=<0.05, **=<0.01

4.15 Predicted Braden risk factor for developing pressure sore in clinical characteristics:

Braden scale was associated (P<0.01) with severity of injury. A positive association (β=1.949) had found between the Braden scale and ASIA Impairment Scale which was highly significant (P=0.0001, 95% confidence interval (CI): 3.210-15.360). The strongest predictor of reporting ASIA was predicted risk of Braden score, recording a higher odds ratio (OR=7.022). This indicated that respondents who had complete spinal cord injury, were 7.022 times more risk of pressure sore compared to those who had incomplete injury.

Table 9: Binary logistic regression of pressure sore risk with ASIA

Predictor Variable in Clinical Characteristics	Dependent variable : Risk of Pressure Sore (Risk and No risk)					
	R^2	β	P Value	OR	95% CI (confidence interval)	
					Lower	Upper
Severity of Injury (complete injury)	0.227	1.949	0.0001**	7.022	3.210	15.360

P value *=<0.05, **=<0.01

4.16 Predicted risk for developing pressure sore:

Functional Independence Measure was associated (P<0.01) with risk of developing pressure sore. A positive association (β=0.893) had found between total Braden score and total FIM score which was highly significant (P=0.000, 95% confidence interval (CI): 0.151-0.169). A positive association (β=0.819) had found between total Braden score and FIM Category (no helper) which was highly significant (P=0.000, 95% confidence interval (CI): 4.414-5.159). A positive association (β=0.560) had found between total Braden score and Dependency (Independent) which was highly significant (P=0.000, 95% confidence interval (CI): 6.220-8.356). This indicated that respondents who had more functional Independence had high Braden scores which indicated the less risk of developing pressure sore.

Table 10: Linear regression of functional independence with pressure sore risk

Predictor Variable	Dependent variable : Pressure Sore Risk (Braden Score)				
	R^2	β	P Value	95% CI (confidence interval)	
				Lower	Upper
FIM Score (Predictor higher)	0.893	0.945	0.000**	0.151	0.169
FIM Category (No helper)	0.819	0.905	0.000**	4.414	5.159
Dependency (Independent)	0.560	0.748	0.000**	6.220	8.356

P value *=<0.05, **=<0.01

| CHAPTER – V | DISCUSSION |

This study used a cross-sectional design and find out the prevalence of pressure sore among the SCI patients in CRP. The results of this study showed that the prevalence of pressure sore among the SCI patients at CRP was 31.1% which is comparatively higher than other studies. A European study published in 2007 and conducted in five countries (Belgium, Italy, Portugal, UK, and Sweden) reported Pressure ulcer prevalence (Stage I through Stage IV, based on the National Pressure Ulcer Advisory Panel scale) of 18.1% (Zhao et al., 2010). A cross sectional study of five hundred and eighty SCI patients by Fazel et al. (2018) found that, one hundred and sixty-three patients had active pressure sores (the total prevalence of patients with PU was 28.1%).

This study conducted on one hundred forty five participants and forty eight participants had active pressure sore. The frequency of the site of pressure sore were sacral 47.9%, buttock 10.4%, hip 4.1%, heel 6.3% and remaining 31.3% participants got pressure sore in multiple area of the body. Mervis & Phillips (2019) reported that approximately 70% of pressure ulcers occur over the sacrum, ischial tuberosity, or greater trochanter, while 15% to 25% occur on the lower extremities, typically the heel or lateral malleolus. Though these locations are the most classic, pressure ulcers can occur at any site of prolonged pressure, including the elbow, ear, nose, chest, and back.

This study found that 91.7% participants had experienced spinal cord injury due to traumatic cause such as fall from height, RTA, falling of heavy object over head or on back etc and 8.3% participants had got SCI due to non-traumatic cause such as TB Spine, multiple sclerosis, transverse myellitis etc. Chen et al. (2013) stated that the most common etiologies of SCI were automobile crashes (31.5%) and falls (25.3%), followed by gunshot wounds (10.4%), motorcycle crashes (6.8%), diving incidents (4.7%), and medical/surgical complications (4.3%). In North America the main cause of traumatic spinal cord injury (TSCI) was motor vehicles accident rather than fall from height (Mothe & Tator, 2013). But Sing et al. (2003) reported that the most common cause of injury was fall from height followed by road traffic accidents. This could be due to the fact that a greater percentage of people live in the villages in Bangladesh, similar to neighboring countries like India.

This study discovered that 73.8% respondents were <40 years and rest of 26.2% participants were >40 years. Participants who were < 40 years old age, 99 (68.3%) participants had traumatic spinal cord injury and 8 (5.5%) participants had non-traumatic spinal cord injury. Participants who were > 40 years old age, 34 (23.4%) participants had traumatic spinal cord injury and 4 (2.8%) participants had non-traumatic spinal cord injury. Traumatic spinal cord had seen more in younger adults participants (<40 years old) in this study. This supports the findings of Chen et al. (2013) that the etiology profile varied substantially by age of the people with spinal cord injury. Thompson et al. (2015) reported that the age of T-SCI individuals was significantly correlated with trauma etiology. 80% of all MVA, 90.6% of sporting accidents, and 95.0% of violent events occurring in younger individuals (<55-years old). In contrast, 60.5% of T-SCI due to accidental falls occurred in older individuals (≥55-years-old). Sex did not affect the etiology of T-SCI.

This study found that only 1.4% participants had higher degree, 7.6% completed graduation, 9.7% completed higher secondary education, 24.1% completed secondary education, 16.6% completed primary education and the remaining 40.7% had never attended school. Eslami et al. (2012) found that among the study subjects, 24.1% were illiterate, 22.1% had secondary school diplomas and 4.4% had university degrees.

This study found that 86.2% were male and 13.8% female. And among the 48 participants who were suffered from pressure sore 85.4% were male and 14.6% were female. Kang et al. (2018) stated that that, the numbers of males were always more than the number of females among the SCI patients.

In this study, no association found between the pressure sore risk and the age of the participants and which was not statistically significant (P=0.552); No association found between the pressure sore risk and the gender of the participants which was not statistically significant (P=0.787); No association found between the pressure sore risk and the marital status of the participants which was not statistically significant (P=0.351); No association found between the pressure sore risk and the educational status of the participants which was not statistically significant (P=0.544); No association found between the pressure sore risk and the occupation of the participants which was not statistically significant (P=0.787);); No association found between the pressure sore risk and the monthly family income of the participants which was not

statistically significant (P=0.164). Fazel et al. (2018) stated that there was no significant association between sex, age, education level, level of injury, using wheelchair pad at the time of evaluation, and the chance of having at least one active PU.

This study discovered that personal habit (smoking) of the participants had significant association with pressure sore risk which was statistically significant (P=0.002). Smoking is one of the important factor which has a great impact on pressure ulcer risk of a spinal cord injury patient. This study found a higher odds ratio (OR=5.115) which indicated that respondents who were smokers, had 5.115 times more likely to report presence of an active pressure sore compared to those who were non-smokers. A cross sectional study conducted on three hundred twenty six participants by Li et al. (2016) stated that smokers had greater odds of having PU than the non-smokers.

In this study, no association had been found between the pressure sore risk and the cause of injury of the participants and which was not statistically significant (P=0.444). Type of injury, neurological level of the participants and severity of the injury according to ASIA had significant association with pressure sore risk which was statistically highly significant (P=0.0001).

The researcher initiated that there is a highly significant (P=.0001) relationship between Braden scale and pressure sore development. Fazel et al. (2018) reported that, there was a major correlation between Braden scale (severe, P=0.001),), with pressure sore development.

Association had been found between the Braden (pressure sore risk) and the thirteen motor components of FIM which including FIM self-care subscale (eating, grooming, bathing, dressing-upper body, dressing-lower body, toileting), FIM Sphincter Management Subscale (bladder management, bowel management), FIM Transfer Subscale (bed/chair transfer, tub/shower transfer, toilet transfer), FIM Locomotion Subscale (walk/wheelchair, stairs).

Strong positive correlation (ρ=0.900) had been found between the pressure sore risk and FIM motor subscales which was highly significant (P=0.000). This indicated that respondents who had more functional Independence had high Braden scores which indicated the less risk of developing pressure sore. So, FIM was one of the important factor which had a great impact on the pressure ulcer risk of a spinal cord injury patient.

Gelis et al. (2009) found that impairment as measured by the FIM scale, was identified as a PU risk factor in a cross-sectional investigation and confirmed in a cohort analysis.

5.1 Limitation of the Study:

There were a number of limitations and barriers in this research project which had affect the accuracy of the study, these are as follow:

Due to COVID-19 pandemic, the samples were collected only from the CRP at Savar and the sample size was small, so the result of the study could not be generalized to the whole population of Spinal Cord Injury in Bangladesh. There was little evidence to support the result of this project in the context to Bangladesh. A convenience sampling was used that was not reflecting the wider population under study. The research project was done by an undergraduate student and it was first research project for her. So the researcher had limited experience with techniques and strategies in terms of the practical aspects of research. As it was the first survey of the researcher so might be there were some mistakes that overlooked by the supervisor and the honorable teacher.

CHAPTER – VI   CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The prevalence of pressure sore among the SCI patients at CRP is 31.1%. This result is significantly high to the complete paraplegic patients and most of them who have no sense about bowl and bladder movements. Most of the patients have poor socioeconomic status and low literacy rate. Majority has no knowledge of proper transferring technique which is important for prevent pressure sore and they are not aware about taking a lift timely and avoiding friction to prevent pressure sore. So it is necessary to grow more awareness about pressure sore among the SCI patients and their caregiver. Having unhealthy behaviors such as smoking was positively associated with current PU.

PIs are common and costly complications following SCI, which have a profound effect on the affected individual. Despite this, our ability to screen and accurately identify individuals at risk for developing PI during inpatient SCI rehabilitation is limited.

In general from this study can be concluded that people with SCI are vulnerable across their lifespan to tissue breakdown or pressure sore that can interfere with initial rehabilitation in the acute post-traumatic recovery phase and successful reintegration into the communities, as well as lead to more serious medical complications. Pressure ulcers are responsible for physical, social, vocational, and economic costs and impair quality of life.

6.2 Recommendations

The aim of the study was to investigate the relationship between the Functional Independence Measure (FIM) and pressure ulcer (PU) risk. Though the study had some limitations but investigator identified some further step that might be taken for the better accomplishment of further research. The main recommendations would be as follow:

While the study identified variables that help determine individuals' risk for developing PU during inpatient rehabilitation, this does not establish causation nor does it identify specific targets (eg, incontinence, poor compliance with turning and repositioning, etc) for preventative strategies and interventions. Although risk screening is essential, it is merely the initial step in preventing PU. Individuals identified as at risk of PU would benefit from a comprehensive risk assessment to identify factors that can be modified and targeted by interventions and prevention strategies.

The random sampling technique rather than the convenience sampling technique would be chosen in further in order to enabling the power of generalization the results.

The duration of the study was relatively short, so in future wider time would be taken for conducting the study.

Investigator used 145 participants as the sample of this study, in future the sample size would be more.

In this study, the investigator took the participants only from the one selected hospital of Savar as a sample for the study. So for further study investigator strongly recommended to include the SCI patients from all over the Bangladesh to ensure the generalize ability of this study.

An additional consideration is that this study focused on identifying individuals at risk for developing PI during participation in inpatient rehabilitation. It is possible that other factors may be better determinants of PU risk for different stages along the care continuum (eg, acute care, community).

REFERENCES

Bellucci, C.H.S., de Castro Filho, J.E., Gomes, C.M., de Bessa Jr, J., Battistella, L.R., De Souza, D.R., Scazufca, M., Bruschini, H., Srougi, M. and Barros Filho, T.E. (2015). Contemporary trends in the epidemiology of traumatic spinal cord injury: changes in age and etiology. Neuroepidemiology, 44(2):85-90. https://doi.org/10.1159/000371519.

Bourassa-Moreau, É., Mac-Thiong, J.M., Feldman, D.E., Thompson, C. and Parent, S. (2013). Complications in acute phase hospitalization of traumatic spinal cord injury: does surgical timing matter? Journal of Trauma and Acute Care Surgery, 74(3):849-854. doi: 10.1097/TA.0b013e31827e1381.

Brienza, D., Krishnan, S., Karg, P., Sowa, G. and Allegretti, A.L. (2018). Predictors of pressure ulcer incidence following traumatic spinal cord injury: a secondary analysis of a prospective longitudinal study. Spinal cord, 56(1):28-34.

Cavallo, B., (2020). Functional relations and Spearman correlation between consistency indices. Journal of the Operational Research Society, 71(2):301-311.

Chan, B.C., Nanwa, N., Mittmann, N., Bryant, D., Coyte, P.C. and Houghton, P.E. (2013). The average cost of pressure ulcer management in a community dwelling spinal cord injury population. International wound journal, 10(4):431-440. https://doi.org/10.1111/j.1742-481X.2012.01002.x.

DeJong, G., Hsieh, C.H.J., Brown, P., Smout, R.J., Horn, S.D., Ballard, P. and Bouchard, T. (2014). Factors associated with pressure ulcer risk in spinal cord injury rehabilitation. American journal of physical medicine & rehabilitation, 93(11):971-986. doi: 10.1097/PHM.0000000000000117.

DiVita, M.A., Wang, H., Niewczyk, P., Camicia, M., Appelman, J., Mix, J.M. and Sandel, M.E. (2013). Impact of Pressure Ulcers on Outcomes in Inpatient Rehabilitation Facilities. PM&R, 5:S143-S143. https://doi.org/10.1016/j.pmrj.2013.08.041.

Eslami, V., Saadat, S., Arejan, R.H., Vaccaro, A.R., Ghodsi, S.M. and Rahimi-Movaghar, V. (2012). Factors associated with the development of pressure ulcers after spinal cord injury. Spinal Cord, 50(12):899-903.

Fazel, F.S., Derakhshanrad, N., Yekaninejad, M.S., Vosoughi, F., Derakhshanrad, A. and Saberi, H. (2018). Predictive value of Braden risk factors in pressure ulcers of outpatients with spinal cord injury. Acta Medica Iranica, 56-61.

Gelis, A., Dupeyron, A., Legros, P., Benaim, C., Pelissier, J. and Fattal, C. (2009). Pressure ulcer risk factors in persons with spinal cord injury part 2: the chronic stage. Spinal cord, 47(9):651-661.

Hayta, E. and Elden, H., (2018). Acute spinal cord injury: A review of pathophysiology and potential of non-steroidal anti-inflammatory drugs for pharmacological intervention. Journal of chemical neuroanatomy, 87:25-31. https://doi.org/10.1016/j.jchemneu.2017.08.001

Herbert, R.D., Harvey, L.A., Hossain, M.S., Islam, M.S., Li, Q. and Billot, L. (2019). Community-based interventions to prevent serious complications following spinal cord injury in Bangladesh: the CIVIC trial statistical analysis plan. Trials, 20(1):1-7.

Hoque, M.F., Hasan, Z., Razzak, A.T.M.A. and Helal, S.U. (2012). Cervical spinal cord injury due to fall while carrying heavy load on head: a problem in Bangladesh. Spinal Cord, 50(4):275-277.

Hossain, M.S., Harvey, L.A., Islam, M.S., Rahman, M.A., Glinsky, J.V. and Herbert, R.D. (2019). A prediction model to identify people with spinal cord injury who are at high risk of dying within 5 years of discharge from hospital in Bangladesh. Spinal Cord, 57(3):198-205.

Hossain, M.S., Harvey, L.A., Liu, H., Islam, M.S., Rahman, M.A., Muldoon, S., Biering-Sorensen, F., Cameron, I.D., Chhabra, H.S., Lindley, R.I. and Jan, S. (2018). Protocol for process evaluation of CIVIC randomised controlled trial: Community-based InterVentions to prevent serIous Complications following spinal cord injury in Bangladesh. BMJ open, 8(7):e024226. http://dx.doi.org/10.1136/bmjopen-2018-024226.

Hossain, M.S., Harvey, L.A., Islam, M.S., Rahman, M.A., Muldoon, S., Biering-Sorensen, F., Jan, S., Liu, H., Li, Q., Cameron, I.D. and Taylor, V. (2021). A community-based intervention to prevent serious complications and death 2 years after

discharge in people with spinal cord injury in Bangladesh (CIVIC): a randomised trial. Spinal Cord, 59(6):649-658.

Islam, M. S., Hafez, M. A., & Akter, M. (2011). Characterization of spinal cord lesion in patients attending a specialized rehabilitation center in Bangladesh. Spinal cord, 49(7), 783-786.

Jazayeri, S.B., Beygi, S., Shokraneh, F., Hagen, E.M. and Rahimi-Movaghar, V. (2015). Incidence of traumatic spinal cord injury worldwide: a systematic review. European spine journal, 24(5):905-918.

Kang, Y., Ding, H., Zhou, H., Wei, Z., Liu, L., Pan, D. and Feng, S. (2018). Epidemiology of worldwide spinal cord injury: a literature review. Journal of Neurorestoratology, 6(1)-3. https://doi.org/10.2147/JN.S143236.

Kruger, E.A., Pires, M., Ngann, Y., Sterling, M. and Rubayi, S. (2013). Comprehensive management of pressure ulcers in spinal cord injury: current concepts and future trends. The journal of spinal cord medicine, 36(6):572-585. https://doi.org/10.1179/2045772313Y.0000000093.

Lala, D., Dumont, F.S., Leblond, J., Houghton, P.E. and Noreau, L. (2014). Impact of pressure ulcers on individuals living with a spinal cord injury. Archives of physical medicine and rehabilitation, 95(12):2312-2319. https://doi.org/10.1016/j.apmr.2014.08.003.

Li, C., DiPiro, N.D., Cao, Y., Szlachcic, Y. and Krause, J. (2016). The association between metabolic syndrome and pressure ulcers among individuals living with spinal cord injury. Spinal cord, 54(11):967-972.

Li, C., DiPiro, N.D. and Krause, J. (2017). A latent structural equation model of protective behaviors and pressure ulcer outcomes among people living with spinal cord injury. Spinal cord, 55(2):135-140.

Majdan, M., Plancikova, D., Nemcovska, E., Krajcovicova, L., Brazinova, A. and Rusnak, M. (2017). Mortality due to traumatic spinal cord injuries in Europe: a cross-sectional and pooled analysis of population-wide data from 22 countries. Scandinavian journal of trauma, resuscitation and emergency medicine, 25(1):1-10.

Mervis, J.S. and Phillips, T.J. (2019). Pressure ulcers: Pathophysiology, epidemiology, risk factors, and presentation. Journal of the American Academy of Dermatology, 81(4):881-890. https://doi.org/10.1016/j.jaad.2018.12.069.

Moghimian, M., Kashani, F., Cheraghi, M. A., & Mohammadnejad, E. (2015). Quality of life and related factors among people with spinal cord injuries in Tehran, Iran. Archives of trauma research, 4(3).

Quadri, S.A., Farooqui, M., Ikram, A., Zafar, A., Khan, M.A., Suriya, S.S., Claus, C.F., Fiani, B., Rahman, M., Ramachandran, A. and Armstrong, I.I. (2020). Recent update on basic mechanisms of spinal cord injury. Neurosurgical review, 43(2):425-441.

Razzak, A.A., Helal, S.U. and Nuri, R.P., 2011. Life Expectancy After Spinal Cord Injury In a Developing Country-A Retrospective Study At CRP, Bangladesh. Disability, CBR & Inclusive Development, 22(2):114-123. http://doi.org/10.5463/dcid.v22i2.34.

Richard-Denis, A., Thompson, C., Bourassa-Moreau, É., Parent, S. and Mac-Thiong, J.M., (2016). Does the acute care spinal cord injury setting predict the occurrence of pressure ulcers at arrival to intensive rehabilitation centers? American journal of physical medicine & rehabilitation, 95(4):300-308. doi: 10.1097/PHM.0000000000000381.

Roberts, T.T., Leonard, G.R. and Cepela, D.J. (2017). Classifications in brief: American spinal injury association (ASIA) impairment scale. Clinical orthopaedics and related research, 475(5)-1499. doi: 10.1007/s11999-016-5133-4. PMid:27815685.

Sezer, N., Akkuş, S. and Uğurlu, F.G. (2015). Chronic complications of spinal cord injury. World journal of orthopedics, 6(1):24. doi: 10.5312/wjo.v6.i1.24. PMid:25621208.

Shiferaw, W.S., Akalu, T.Y., Mulugeta, H. and Aynalem, Y.A. (2020). The global burden of pressure ulcers among patients with spinal cord injury: a systematic review and meta-analysis. BMC musculoskeletal disorders, 21:1-11. https://doi.org/10.1186/s12891-020-03369-0.

Singh, A., Tetreault, L., Kalsi-Ryan, S., Nouri, A. and Fehlings, M.G. (2014). Global prevalence and incidence of traumatic spinal cord injury. Clinical epidemiology, 6:309. doi: 10.2147/CLEP.S68889. PMid:25278785.

Thompson, C., Mutch, J., Parent, S. and Mac-Thiong, J.M. (2015). The changing demographics of traumatic spinal cord injury: an 11-year study of 831 patients. The journal of spinal cord medicine, 38(2):214-223. https://doi.org/10.1179/2045772314Y.0000000233.

Verschueren, J.H.M., Post, M.W., de Groot, S., Van Der Woude, L.H.V., Van Asbeck, F.W.A. and Rol, M. (2011). Occurrence and predictors of pressure ulcers during primary in-patient spinal cord injury rehabilitation. Spinal cord, 49(1):106-112.

Van der Wielen, H., Post, M.W.M., Lay, V., Gläsche, K. and Scheel-Sailer, A. (2016). Hospital-acquired pressure ulcers in spinal cord injured patients: time to occur, time until closure and risk factors. Spinal Cord, 54(9):726-731.

Wang, H., Niewczyk, P., DiVita, M., Camicia, M., Appelman, J., Mix, J. and Sandel, M.E., 2014. Impact of pressure ulcers on outcomes in inpatient rehabilitation facilities. American journal of physical medicine & rehabilitation, 93(3):207-216. doi: 10.1097/PHM.0b013e3182a92b9c.

World Health Organization, (2013). Spinal cord injury: Fact sheet. World Health Organization, Geneva. Available from: https://www.who.int/news-room/fact-sheets/detail/spinal-cord-injury [accessed on 24 October 2021].

Zhao, G., Hiltabidel, E., Liu, Y., Chen, L. and Liao, Y. (2010). A cross-sectional descriptive study of pressure ulcer prevalence in a teaching hospital in China. Ostomy/wound management, 56(2):38.

সম্মতিপত্র বাংলা

(অংশগ্রহণকারীকে পড়ে শোনাতে হবে)

আসসালামু আলাইকুম/নমস্কার,

আমার নাম রাকিবা হোসনাইন দৃষ্টি, আমি এই গবেষণাটি বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউট (বি এইচ পি আই)-এ পরিচালনা করছি যা আমার ৪র্থ বর্ষ বি এস সি ইন ফিজিওথেরাপি কোর্সের অধিভূক্ত, এর শিরোনাম হল- **"সিআরপি তে চিকিৎসারত মেরুরজ্জুতে আঘাত প্রাপ্ত মানুষদের ক্রিয়ামূলক স্বাবলম্বিতার মান এবং চাপ জনিত ঘাঁ এর ঝুঁকির পারস্পরিক সম্পর্ক"**। আমি এক্ষেত্রে কিছু ব্যক্তিগত এবং আনুষঙ্গিক প্রশ্ন সম্পর্কে জানতে চাচ্ছি। যা আনুমানিক ১৫-২০ মিনিট সময় নিবে।

আমি আপনাকে অবগত করছি যে, এটা আমার অধ্যয়নের অংশ এবং যা অন্য কোনো উদ্দেশ্যে ব্যবহৃত হবে না। এই গবেষণায় অংশগ্রহণ আপনার বর্তমান এবং ভবিষ্যৎ চিকিৎসায় কোন প্রভাব ফেলবে না। আপনি যে সব তথ্য প্রদান করবেন তার গোপনীয়তা বজায় থাকবে এবং আপনার প্রতিবেদনের ঘটনাপ্রবাহে এটা নিশ্চিত করা হবে যে, এই তথ্যে উৎস অপ্রকাশিত থাকবে। এই অধ্যয়নে আপনার অংশগ্রহণ স্বেচ্ছাপ্রণোদীত এবং আপনি যেকোন সময় এই অধ্যয়ন থেকে কোন নেতিবাচক ফলাফল ছাড়াই নিজেকে প্রত্যাহার করতে পারবেন। এছাড়াও কোন নির্দিষ্ট প্রশ্ন অপছন্দ হলে উত্তর না দেয়ার এবং সাক্ষাৎকারের সময় কোন উত্তর না দিতে চাওয়ার অধিকার ও আপনার আছে।

এই অধ্যয়নে অংশগ্রহণকারী হিসেবে অধ্যয়ন সম্পর্কে যদি আপনার কোনো প্রশ্ন থাকে তাহলে আপনি আমাকে অথবা/এবং আমার সুপারভাইজার, এহসানুর রহমান, সহযোগী অধ্যাপক, ফিজিওথেরাপি বিভাগ, বিএইচপিআই, সিআরপি, সাভার, ঢাকা-তে যোগাযোগ করতে পারেন।

এটা শুরু করার আগে আপনার কি কোন প্রশ্ন আছে?

আমি আপনার অনুমতি নিয়ে এই সাক্ষাৎকার শুরু করতে যাচ্ছি?

হ্যাঁ ☐   না ☐

অংশগ্রহণকারীর স্বাক্ষর এবং তারিখ ....

উপাত্ত সংগ্রহকারীর স্বাক্ষর এবং তারিখ ....

গবেষকের স্বাক্ষর এবং তারিখ ....

English Verbal Consent Form

(Please read out to the participant)

Assalamualaikum/Namasker,

My name is Rakiba Hosnain Dristi, I am conducting this study for a B.Sc in Physiotherapy project study dissertation titled "**Functional Independence Measure Association with Pressure Sore Risk among the People with Spinal Cord Injury at CRP"** under Bangladesh Health Professions Institute (BHPI), University of Dhaka. I would like to know about some personal and other related questions about functional independence and pressure sore. This will take approximately 15-20 minutes.

I would like to inform you that this is a purely academic study and will not be used for any other purpose. The researcher is not directly related with this SCI area, so your participation in the research will have no impact on your present or future treatment. All information provided by you will be treated as confidential and in the event of any report or publication it will be ensured that the source of information remains anonymous. Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any negative consequences, You also have the right not to answer a particular question that you don't like or do not want to answer during interview.

If you have any query about the study or your right as a participant. you may contact with Rakiba Hosnain Dristi, researcher and/or Ehsanur Rahman, Associate Professor, Department of Physiotherapy, BHPI, CRP, Savar, Dhaka.

Do you have any questions before I start?

So may I have your consent to proceed with the interview?

YES ☐   NO ☐

Signature of the Participant with date _____

Signature of the Interviewer with date _____

Signature of the Researcher with date _____

<div align="center">

Questionnaire-বাংলা

</div>

অংশ-১: রোগীর ব্যক্তিগত বিবরণ

১.১	উত্তরদাতার নামঃ	
১.২	ঠিকানাঃ	
১.৩	মোবাইল নম্বরঃ	
১.৪	রোগীর আইডিঃ	
১.৫	সাক্ষাতের তারিখঃ	

অংশ-২: সামাজিক-বৈষয়িক তথ্যাবলি

প্রশ্ননম্বর	প্রশ্নাবলী	উত্তর
২.১	বয়সঃ	.... বছর
২.২	লিংগঃ	(১) পুরুষ (২) মহিলা
২.৩	বৈবাহিক অবস্থাঃ	(১) বিবাহিত (২) অবিবাহিত (৩) তালাকপ্রাপ্ত (৪) বিধবা/বিপত্নীক (৫) আলাদা
২.৪	শিক্ষাগত যোগ্যতাঃ	(১) কোনো প্রাতিষ্ঠানিক শিক্ষা নেই (২) প্রাথমিক শিক্ষা সম্পন্ন করেছে (৩) মাধ্যমিক শিক্ষা সম্পন্ন করেছে (৪) উচ্চমাধ্যমিক শিক্ষা সম্পন্ন করেছে (৫) স্নাতক সম্পন্ন করেছে (৬) স্নাতোকোত্তর সম্পন্ন করেছে
২.৫	বসবাসের জায়গাঃ	(১) গ্রাম (২) উপশহর (৩) শহর

২.৬	পরিবারের ধরনঃ	(১) একক পরিবার
		(২) যৌথ পরিবার
২.৭	পেশাঃ	(১) কৃষক
		(২) গার্মেন্টস কর্মী/কারখানা শ্রমিক
		(৩) গাড়ি-চালক
		(৪) দিনমজুর
		(৫) চাকুরিজীবী
		(৬) ব্যবসায়ী
		(৭) অবসরপ্রাপ্ত
		(৮) বেকার
		(৯) গৃহিণী
		(১০) ছাত্র/ছাত্রী
		(১১) অন্যান্য
২.৮	মাসিক পারিবারিক আয়ঃ	.... টাকা

<u>অংশ-৩: অংশগ্রহণকারী সম্পর্কিত তথ্যাবলি</u>

আঘাত প্রাপ্তের তারিখঃ

সিআরপি তে ভর্তির তারিখঃ

স্কেলেটাল লেভেলঃ

প্রাথমিক নিউরোলোজিকাল লেভেলঃ

প্রশ্ননম্বর	প্রশ্নাবলী	উত্তর
৩.১	মেরুরজ্জুতে আঘাত প্রাপ্তের কারণঃ	(১) আঘাতজনিত (২) আঘাতজনিত নয়
৩.২	আঘাতের প্রবলতা আমেরিকান স্পাইনাল অ্যাসোসিয়েশন স্কেল অনুসারেঃ	(১) কমপ্লিট এ (২) ইনকমপ্লিট বি (৩) ইনকমপ্লিট সি (৪) ইনকমপ্লিট ডি
৩.৩	আঘাতের ধরনঃ	(১) প্যারাপ্লেজিয়া (২) টেট্রাপ্লেজিয়া
৩.৪	আপনার শরীরে কোনো চাপ জনিত ঘাঁ আছে?	(১) হ্যাঁ (২) না
৩.৫	আপনার শরীরে কয়টি চাপজনিত ঘাঁ আছে?	
৩.৬	আপনার শরীরে এটা কোথায় হয়েছে?	(১) পশ্চাৎ দেশে (২) উরু (৩) স্যাক্রাম (৪) পায়ের কব্জি (৫) পায়ের গোড়ালি (৬) পায়ের গিরা (৭) মাথা বা কানের পেছনে (৮) প্রযোজ্য নয়
৩.৭	আপনার কি ধূমপানের অভ্যাস আছে?	(১) হ্যাঁ (২) না

অংশ-৪: ফাংশনাল ইনডিপেনডেন্স মেসার (মডিফাইড ফিম স্কেল)

ফাংশনাল ইনডিপেনডেন্স রেটিং স্কেলঃ

৭= স্বয়ংসম্পূর্ণ

৬= সাহায্যকারী ডিভাইস/সহায়ক

৫= তত্ত্বাবধান

৪= অল্প সাহায্য

৩= বেশী সাহায্য

২= খুব বেশী সাহায্য

১= অক্ষম

কর্মশীলতা	স্কোর
নিজের যত্ন	
ক) খাদ্যগ্রহন	
খ) পরিষ্কার-পরিচ্ছন্নতা	
গ) গোসল করা	
ঘ) জামাকাপড় পরা – শরীরের উপরের অংশ	
ঙ) জামাকাপড় পরা – শরীরের নিচের অংশ	
চ) টয়লেটিং	
স্ফিংটার নিয়ন্ত্রন	
ছ) মূত্রাশয় পরিচালনা	
জ) মলদ্বার পরিচালনা	
স্থানান্তর	
ঝ) বিছানা, চেয়ার, হুইলচেয়ার	
ঞ) টয়লেট	
ট) টব, ঝরনা	
লোকোমোশন	
ঠ) হাঁটাঁ/হুইলচেয়ার	
ড) সিড়িঁ	
মোট	

অংশ-৪: চাপজনিত ঘাঁ এর ঝুঁকি (ব্রাডেন স্কেল)

ঝুঁকির কারণ	বিবরণ/শ্রেণী				স্কোর
সংবেদনশীল অনুভূতি	১. সম্পূর্ণ সীমাবদ্ধ	২. খুব সীমিত	৩. সামান্য সীমাবদ্ধ	৪. কোনও প্রতিবন্ধকতা নেই	
আর্দ্রতা/ স্যাঁতসেঁতে অবস্থা	১. সর্বদা আর্দ্র	২. প্রায়শই আর্দ্র	৩. মাঝেমধ্যে আর্দ্র	৪. খুব কমই আর্দ্র	
কার্যকলাপ	১. শয্যাশায়ী	২. চেয়ারফাস্ট	৩. মাঝেমাঝে হাঁটে	৪. ঘনঘন হাঁটে	
সচলতা	১. সম্পূর্ণ অচল	২. খুব সীমিত	৩. সামান্য সীমাবদ্ধ	৪. কোনও সীমাবদ্ধতা নেই	
পুষ্টি	১. খুব অভাব	২. সম্ভবত অপর্যাপ্ত	৩. পর্যাপ্ত	৪. অতি উত্তম	
ঘর্ষণ এবং শিয়ার	১. সমস্যা	২. সম্ভাব্য সমস্যা	৩. আপাত সমস্যা নেই		
মোট					

[এই প্রশ্নগুলির উত্তর সম্পন্ন করার জন্য আপনাকে ধন্যবাদ]

Questionnaire-English

Part-1: Personal Information

1.1	Name of respondent:	
1.2	Address:	
1.3	Mobile Number:	
1.4	Identification number:	
1.5	Date of interview:	

Part-2: Socio-demographic Information

QN	Question and filters	Response
2.1	Age:	……..... years
2.2	Gender:	1. Male 2. Female
2.3	Marital status:	1. Married 2. Unmarried 3. Divorced 4. Separated 5. Widow 6. Widower
2.4	Educational Qualification:	1. No formal education 2. Complete primary 3. Complete secondary 4. Complete higher secondary 5. Complete graduation 6. Complete post graduation
2.5	Living area:	1. Rural 2. Semirural 3. Urban
2.6	Family Size:	1. Nuclear Family 2. Combinded Family

2.7	Occupation	1. Farmer
		2. Garments/Factory worker
		3. Driver
		4. Day Laborer
		5. Service Holder
		6. Businessman
		7. Retired
		8. Unemployed
		9. Housewife
		10. Student
		11. Others
2.8	Monthly family income:	………………..taka

Part-3: Participant related information

Date of injury:

Date of Admission to CRP:

Skeletal Level:

Initial Neurological level:

QN	Questions and Fillers	Response
3.1	Cause of SCI:	1. Traumatic 2. Non-traumatic
3.2	Severity of Injury according to American Spinal Association Scale (ASIA):	1. Complete A 2. Incomplete B 3. Incomplete C 4. Incomplete D
3.3	Type of Injury:	1. Tetraplegia 2. Paraplegia
3.4	Do you have any pressure sore?	1. Yes 2. No
3.5	How many pressure sore do you have?	
3.6	Where is it developed in your body?	1. Buttock 2. Hip 3. Sacral region 4. Ankle 5. Heel 6. Malleolus 7. Back of the head or ear 8. Not applicable
3.7	Do you have smoking habit?	1. Yes 2. No

Part-4: Functional Independence Measure (Modified FIM Scale)

Functional Independence Rating Scale:

7= Independent

6= Independent with assisted device

5= Supervision

4= Minimal assistance

3= Moderate assistance

2= Maximal assistance

1= Unable to do

Activities	Score
Self-Care	
A. Eating	
B. Grooming	
C. Bathing	
D. Dressing – Upper Body	
E. Dressing – Lower Body	
F. Toileting	
Sphincter Control	
G. Bladder Management	
H. Bowel Management	
Transfers	
I. Bed, Chair, Wheelchair	
J. Toilet	
K. Tub, Shower	
Locomotion	
L. Walk/Wheelchair	
M. Stairs	
Total	

Part-5: Braden Scale for Predicting Pressure Sore Risk

Risk Factors	Description				Score
Sensory Perception	1. Completely Limited	2. Very Limited	3. Slightly Limited	4. No Impairment	
Moisture	1. Constantly Moist	2. Often Moist	3. Occasionally Moist	4. Rarely Moist	
Activity	1. Bedfast	2. Chairfast	3. Walks Occasionally	4. Walks Frequently	
Mobility	1. Completely Immobile	2. Very Limited	3. Slightly Limited	4. No Limitations	
Nutrition	1. Very Poor	2. Probably Inadequate	3. Adequate	4.Excellent	
Friction and Shear	1. Problem	2. Potential Problem	3. No Apparent Problem		
Total Score					

Permission Latter

Date: June 14, 2021

Head

Department of Physiotherapy

Centre for the Rehabilitation of the Paralysed (CRP)

Chapain, Savar, Dhaka-1343

Through: Head, Department of Physiotherapy, BHPI.

Subject: Prayer for seeking permission to collect data for conducting research project.

Sir,

With due to respect and humble submission to state that I am Rakiba Hosnain Dristi, a student of 4th year B.Sc. in physiotherapy at Bangladesh Health Professions Institute (BHPI). The Ethical committee has approved my research project entitled: **"Functional Independence Association with Pressure Sore Risk among Persons with Spinal Cord Injury at Centre for the Rehabilitation of the Paralysed (CRP)"**. under the supervision of Ehsanur Rahman, Associate professor, Department of Physiotherapy, BHPI. I want to collect data for my research project from the Department of Physiotherapy at CRP. So, I need permission for data collection from the Spinal Cord Injury, Unit of Physiotherapy Department at CRP-Savar, Dhaka-1343. I would like to assure that anything of the study will not be harmful for the participants and the Department itself.

I, therefore pray and hope that you would be kind enough to grant my application and give me permission for data collection and oblige thereby.

Yours faithfully,

Rakiba Hosnain Dristi

Rakiba Hosnain Dristi

4th Year B.Sc. in Physiotherapy

Class Roll:25; Session: 2015-16

Bangladesh Health Professions Institute (BHPI) (An academic Institution of CRP)

CRP-Chapain, Savar, Dhaka-1343.

Forwarded
E-Rah
19.06.21

Recommended
16.06.21
Md. Shofiqul Islam
Associate Professor & Head
Department of Physiotherapy
Bangladesh Health Professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343

Approved
MOHAMMAD ANWAR HOSSAIN
Senior Consultant &
Head of Physiotherapy Dept
Associate Professor, BHPI
CRP Savar, Dhaka-1343

Ref: CRP/BHPI/IRB/06/2021/463

Date:
16/06/2021

To
Rakiba Hosnain Dristi
B.Sc. in Physiotherapy
Session: 2015-16, Student's ID:112150296
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal **"Functional Independence Measure Association with Pressure Sore Risk among the People with Spinal Cord Injury at Centre for the Rehabilitation of the Paralysed (CRP)"** by ethics committee.

Dear Rakiba Hosnain Dristi,

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 Ehsanur Rahman as thesis supervisor. The Following documents have been reviewed and approved:

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

The purpose of the study is to investigate the association between Functional Independence Measure (FIM) and pressure sore risk among the person with spinal cord injury at CRP that may take 15 to 20 minutes to answer, have no likelihood of any harm to the participants and have possibility of benefit of patients on pressure sore prevention strategies. Data collectors will receive informed consents from all participants. Any data collected will be kept confidential. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 10:00 AM on 1st March, 2020 at BHPI 23rd 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,

[signature]

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

CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404
E-mail : principal-bhpi@crp-bangladesh.org, Web: bhpi.edu.bd, www.crp-bangladesh.org

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