FUNCTIONAL OUTCOME OF SPINAL CORD INJURY (SCI) PATIENTS AFTER REHABILITATION AT CRP: RETROSPECTIVE DOCCUMENT REVIEW

By

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Statement of Authorship

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Abstract

Background: Spinal cord injury (SCI) is a condition which affects many people at every year. It is continuous major cause of disability throughout Asia as well as Bangladesh. SCI is a common injury and it adversely affects person's daily life. SCI negatively can raise depression and reduce functional ability. Functional recovery also associated with a person's age, sex, occupation, educational status**.**

Purpose: The aim of this study was to assess the functional outcome of SCI patient after completing rehabilitation.

Objective: The objectives were to find out functional outcome of a group of patients with spinal cord lesions being achieved after rehabilitation from CRP and the association between functional outcome and socio-demographic characteristics of SCI patients.

Methodology: The study design was cross – sectional study. The sample size was the discharged patient's documents of January 2016 – December 2016. Total 230 patients discharged from CRP after completing rehabilitation in 2016. Among them 147 patients fulfill the research criteria. But 40 patients were the participants of other study. That's why the target population of this study was about 107. Previous documents were used for sample selection from inpatient unit of Centre for the Rehabilitation of the Paralyzed (CRP) in Bangladesh which is the largest SCI rehabilitation centre in South Asia. Data was collected by SCIM scale and it was analyzed by SPSS software version 20.0.

Results: After analyzing data result was found the recovery level of function. The study shows that out of 107 respondents, (37.4%) were in the young adult group ranging from 21 to 30 years and the mean ages of the patients were 34.22 years with standard deviation (±14.420). The numbers of male respondents are higher than females. The major cause of SCI of the study was traumatic 97.2 percent and non traumatic cause of injury was 2.8 percent. In the study 68.2 percent male and 7.5 percent female did not need any assistance during discharge for feeding. But this study didn't found any statistically significant difference between sex and recovery self care activities (2.807< 0.05). Most of the patient discharge after 2-4 month rehabilitation. 38.3% patient discharge became fully independent in feeding. Study didn't not found any statistical significant difference (0.117<0.05) between two areas like rehabilitation duration and recovery in Self care activities. Maximum

participants' age range was 31 -40 years (19.6%) who became independent in feeding during discharge whose age range was 31 – 40 years. 9.3% people became independent during discharge of 10 - 20 years aged people. On the other hand, between 41 – 80 years of people, little amount of people became fully independent in feeding during discharge. The study shows that, statistically there is highly significant relationship ($p<0.05$) between age and recovery in self care activities. 31.8% person became independent in grooming activity during discharge whose age range was 21 – 30 years. The second most participants of this study aged in between 31 - 40 years. 17.8% people became independent during discharge of this aged people. On the other hand, between 41 – 80 years of people, little amount of people became fully independent during discharge. This study shows that, statistically there is highly significant relationship ($p<0.05$) between age and recovery in self care activity (grooming).

Conclusion: SCI is a consequence which may impact a person's whole life. The results of this study provide more insight into the functional independents of a group of patients with spinal cord injury.

Key Words: Spinal cord injury, functional recovery, Impacts of SCI on patient's daily life

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Lists of acronyms

ASIA: American Spinal Injury Association
BHPI: Bangladesh Health Professions Institute
CRP: Centre for the Rehabilitation of the Paralyzed
BHPI: Bangladesh Health Professions Institute
FIM: Functional Independence Measure
SCIM: Spinal Cord Independence Measure
SCI: Spinal Cord Injury
SCL: Spinal Cord Lesion
QOL: Quality of life
SPSS: Statistical Package of Social Science
US: United States
WC: Wheelchair
WHO: World Health Organization
Occupational therapists: OTs

Chapter 01
Introduction

1.1 Introduction

Spinal cord injury (SCI) is a traumatic or non- traumatic event that results in disturbances to normal sensory, motor, or autonomic function and ultimately impacts a patient's physical, psychological and social well- being. [1] Psychological and psychosocial issues have the possibilities risk of anxiety disorders, feelings of helplessness, poor coping skills, low self-esteem, and depression.[2] According to Berg et al. 2010, SCI is also characterized by high morbidity, high cost, and young patient age and it often leads to severe permanent disability.[3]

SCI is one of the major causes of locomotors disabilities, both in developing and developed countries and causes disturbances in daily activities.[4] The causes of SCI may differ from person to person due to different age, sex, and race and socio-cultural activities.[5-6] The most frequent cause of traumatic SCI is motor vehicle accidents, followed by falls in America and Nigeria.[7-9] The third most common cause of SCI in America is violence.[9] In Bangladesh, most of the SCI takes place due to accidental fall while carrying load (47.5%).[2] Other common causes of SCI are road traffic accidents (41.3%), falling from a height (27.3%), sports (7.9%) and others (8.5%) - fall of a heavy object onto the head or neck, bull attack and diving into shallow water.[1] Depending on the lesion, SCI can be either traumatic or non-traumatic. The ratio of the traumatic and non- traumatic SCI is 58.3%: 41.3%.[8]

In Asia, the incidence rates of SCI range from 12.06 -61.6 per million, while the average age range of affected persons is 26.8 -56.6 years.[5] In the United States (U.S), the annual incidence of traumatic SCI is 54 cases per million or 17,000 new cases each year. The number of people in the U.S. who are alive in 2016 who have SCI has been estimated to be approximately 282,000 persons, with a range from 243,000 to 347,000 persons.[9] The worldwide incidence of SCI is 10.4 and 83 per million per year and the mean age is 33 years.[1] According to the World Health Organisation (WHO), between 20-40 people per million of population acquire spinal injury each year. Approximately 60% of cases occurred in people 16-40 years of age.[10]

Epidemiological studies from several countries presented the incidence of SCI. The impacts of SCI can be illustrated by functional impairment of the patient.[11]

The most important physical consequences of a SCI are motor and sensory loss, impairments of bladder, bowel and sexual function. It results in extensive disabilities of daily life.[12] Many articles focus on self-care of patients with tetraplegia.[13] C6 and C7 are critical levels for achieving functional independence.[11] Recovery of paraplegic patients in self care skills is faster than tetraplegia.[12]

According to the International Classification of Functioning; Disability and Health (ICF), the functional outcome can be described in three dimensions, namely functions and anatomical structures, activities and participation.[14] Health care professionals' work with these dimensions of ICF to recover the function and well being of the patient. So they should have proper knowledge about these dimensions. It will help them to ensure maximum functional independence of the patient. It will also help to provide correct information to the patients and caregivers about the rehabilitation process. So that health care professionals should be about these three dimensions as the functional outcome or gain in functional ability during rehabilitation reflects the effectiveness of rehabilitation.

1.2 Background

Spinal cord is an important and vital part of human body.[15] SCI has adverse effect on life; actually it is a life changing injury. It leads to a vast change in an individual's lifestyle.[16] Many persons with SCI face challenges regarding their physical, psychological and social functioning.[17] Dickson et al. 2010 has highlighted that, '*significant loss includes almost all domains of the injured person's life'*.[18] SCI can lead to reduced mobility as well as self-care abilities.[19] SCI also can greatly reduce physical capacities, functional independence; carry out daily routines, impairment of social communication and vocational activities.[20] People with SCI have difficulties adjusting their daily life with this condition. Many People with SCI have experience of secondary medical complications including pressure ulcers; pneumonia, deep venous thrombosis, spasticity, and pain.[21] For those reason persons with SCI need support in these areas rest of their lives. These often have a negative impact on the

quality of life (QOL) of the persons with SCI.[22] SCI not only affects the quality of patients' lives, but it also adds a burden to the family and the society[2].

Attaining an acceptable QOL can be seen as the ultimate goal of rehabilitation. Satisfaction with the QOL after a SCI depends on the way a patient learns to adapt to fundamental changes in his life.[22] Active involvement in activities and roles is strongly related to health and wellbeing and a high level of social activities leads to a better QOL. Reintegration in work, leisure activities and sports is considered to be a subsequent important goal of rehabilitation.[23] Functional activities returned depending on the spinal cord injury level.[24] It is assumed that motivation and expectations of the patient regarding reintegration in society will affect the outcome to a great extent.[22] There are no related and sufficient studies in Bangladesh. Completion of this study will help to assess the level of functional independence or outcome of SCI patient after rehabilitation program.

1.3 Significance

The aim of this study is to find out functional outcome of a group of patients with spinal cord lesions being achieved after rehabilitation from CRP and the association between functional outcome and socio-demographic characteristics of SCI patients. SCI affects a large number of young individuals with a significant cost to affected persons, families and societies both in terms in economic and non economic cost. Bangladesh is a densely populated country. Demography of SCI patient is important to know. It provides exact information about which causes, occupation, age, gender, diagnosis, residential area, educational level and economic level were responsible for that injury. It also helps to raise awareness among the population and will help to get information about SCI. And indicate that the SCI patient who needs a specialized and comprehensive rehabilitation services to continue their activities of daily living (ADL) in the community. SCI can destroy of one's life and his whole family. The patient can survive with full struggle. Life is so much challenging to him. The functional outcome among male and female is different and it also varies according to age.[1]

SCI patient needs long time rehabilitation program where occupational therapist plays a vital role. The goal of the rehabilitation is to enhance patient's quality of daily living and capacity to function independently. Occupational therapists (OTs) work with both

patient and his/ her caregiver.[20] To get better outcome, it is essential to make good therapeutic rapport with client and his/her caregivers.

Occupational therapy is a new profession in Bangladesh. Most of the people do not know about the profession and its services. The OTs and the students of occupational therapy will be able to enrich their knowledge and resource by using this study in Bangladesh. They will also establish different factors which may affects the recovery of function of the persons with SCI.

In rehabilitation program of SCI OTs and other professionals work together. By this study the other professionals will be benefited to have a proper guideline to think about the recovery of the persons with SCI and others associated factors which may play a vital role in functional independence. They will set their management strategies for facilitating the treatment according to their profession.

1.4 Study Aim

- To assess the functional recovery level of spinal cord injury patients after taking rehabilitation from CRP.

1.5 Study objectives

- To differentiate the functional recovery rate among male and female.
- To find out association between age and functional recovery among SCI patients.
- To find out the impact of treatment duration on functional recovery.

2.1 Spinal Cord

The spinal cord is situated within the spinal column; it extends down from the brain to the L_1−L_2 vertebral level, ending in the conus medullaris.[3] Continuing from the end of the spinal cord, in the spinal canal, is the cauda equine (or "horse‟s tail").[5] The spinal cord has neurological segmental levels that correspond to the nerve roots that exit the spinal column between each of the vertebrae.[1] There are 31 pairs of spinal nerve roots: 8 cervical (C_1-C_8), 12 thoracic (T_1-T_{12}), 5 lumbar (L_1-L_5), 5 sacral, 1 coccygeal.[26] Any traumatic or non- traumatic injury to the spinal cord may result SCI.

2.2 Spinal cord injury (SCI)

SCI refers to damage to the spinal cord resulting from trauma (e.g. a car crash) or from disease or degeneration (e.g. cancer).[27] It causes damage to the spinal cord that result in a loss of function. In most SCI cases, the spinal cord is intact, but the damage results in loss of function.[27] SCI can be divided into different types which may result in a either temporary or permanent change in its normal motor, sensory, or autonomic function.

2.3 Types of SCI

All spinal cord injuries are divided into two broad categories: incomplete and complete.[28]

2.3.1 Complete SCI

Complete SCI involve a permanent loss of ability to send sensory and motor nerve impulses to the brain, as well as a usually permanent loss of feeling and movement throughout the body below the level of the injury.[28]

2.3.2 Incomplete SCI

An incomplete lesion is the term used to describe partial damage to the spinal cord. With an incomplete lesion, some motor and sensory function remains.[29] Incomplete SCI differ from one person to another because the amount of damage to each person's nerve fibers is different.[29]

The most common types of incomplete or partial spinal cord injuries include:

2.3.2.1 Anterior Cord Syndrome

Anterior cord syndrome is when the damage is towards the front of the spinal cord. This can leave a person with the loss or impaired ability to sense pain, temperature and touch sensations below their level of injury. Pressure and joint sensation may be preserved.[30]

2.3.2.2 Central Cord Syndrome

Central cord syndrome is when the damage is in the centre of the spinal cord. This typically results in the loss of function in the arms, but some leg movement may be preserved. There may also be some control over the bowel and bladder preserved.[30]

2.3.2.3 Posterior Cord Syndrome

Posterior cord syndrome is when the damage is towards the back of the spinal cord. This type of injury may leave the person with good muscle power, pain and temperature sensation; however they may experience difficulty in coordinating movement of their limbs. [30]

2.3.2.4 Brown-Sequard Syndrome

Brown-sequard syndrome is result from a lesion in one (lateral) half of the spinal cord. This result in impaired or loss of movement to the injured side, but pain and temperature sensation may be preserved. The opposite side of injury will have normal movement, but pain and temperature sensation will be impaired or lost. [30]

2.3.2.5 Cauda Equina Lesion

Cauda equina lesion is caused by compression of the nerves, causing one or more of the following: bladder and/or bowel dysfunction, reduced sensation in the saddle (perineal) area, and sexual dysfunction, with possible neurological deficit in the lower limb (motor/sensory loss, reflex change).[31]

According to the lebel of lesion to the spinal cord, SCI can be divided into two types: Paraplegia and Tetraplegia [29]

2.3.3 Paraplegia is impairment in motor or sensory function of the lower extremities. The area of the spinal canal that is affected in paraplegia is either the thoracic, lumbar, or sacral regions.[27]

2.3.4 Tetraplegia The term tetraplegia refers to a condition that causes total or partial paralysis in all four limbs, including the whole of the body. Tetraplegia can be caused by injury or illness, both of which can damage the spinal cord permanently between the levels of C_{1-7}.[29]

SCI is also classified by the degree of impairment. The International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI), published by

the American Spinal Injury Association (ASIA), is widely used to document sensory and motor impairments following SCI.[27]

2.3.5 The ASIA Impairment Scale

Classification of SCI severity using the ASIA Impairment Scale, the main categories of the Impairment Scale are as follows: [33]

- *A (complete): No motor or sensory function is preserved in the sacral segments S_4–S_5.*[33]
- *B (incomplete): Sensory but not motor function is preserved below the neurological level and includes the sacral segments S_4–S_5.*[33]
- *C (incomplete): Motor function is preserved below the neurological level, and more than a half of key muscles below the neurological level have a muscle grade of <3.*[33]
- *D (incomplete): Motor function is preserved below the neurological level, and at least a half of key muscles below the neurological level have a muscle grade of ≥3.*[33]
- *E (normal): Motor and sensory functions are normal.*[33]

There are different types of SCI which may affect a person's every aspect of life. SCI causes paralysis and loss of sensation. Many consequences arise as a result of SCI.

2.4 Consequences of SCI

SCI is associated with a risk of developing secondary conditions that can be impairing and even life-threatening—e.g. deep vein thrombosis, urinary tract infections, muscle spasms, osteoporosis, pressure ulcers, chronic pain, and respiratory complications. SCI may offer a person dependent on caregivers. Assistive technology is often required to facilitate mobility, communication, self-care or domestic activities. An estimated 20-30% of people with SCI show clinically significant signs of depression, which in turn has a negative impact on improvements in functioning and overall health.[34]

Misconceptions, negative attitudes and physical barriers to basic mobility result in the exclusion of many people from full participation in society. Adults with SCI face barriers to economic participation, with a global unemployment rate of more than

60%. Children with SCI are less likely than their peers to start school, and once enrolled, less likely to advance.[35]

These consequences of SCI create many challenges which an individual may face in his/her everyday activities.

2.5 Challenges of SCI

The impact of SCI varies, depending upon level and degree of impairment. The impairment usually involves performance difficulties in all areas of occupation including; occupations of daily living, instrumental occupations of daily living, and socialization with others. Occupations of daily living, such as grooming, oral hygiene, eating, bathing, dressing and toileting, can pose performance problems for people with SCI. It is difficult for a person with SCI to complete these occupations because he or she may need a significant amount of assistance from another person or rely on the use of assistive device for functional mobility. It will be an adjustment for a person to get back into a regular routine with occupations of daily living post-injury.[36]

Instrumental occupations of daily living make up a significant amount of a person's lifestyle. Instrumental occupations of daily living are defined as, "*multistep activities to care for self and others, such as household management, financial management, and childcare*".[37] There are usually no cognitive deficits accompanying SCI that interfere with socialization/communication; however, architectural, environmental, and transportation barriers can pose problems in many of these areas.[36] These barriers, which are out of a person's control, along with decreased endurance and increased reliance on others, may present challenges to a person with a SCI in getting back to his or her pre-injury functional and social habits.

2.6 Functional recovery after SCI

A person's functional independence has a major impact on their quality of life (QOL), sense of self worth and consequential social participation.[36] Some people with SCI will have the ability to achieve a high level of independence while others, limited by their physical ability, will not be able to achieve a high level of independence. Recovery depends on the level of lesion to the spinal cord.

2.7 Expected functional outcome according to per level of injury of person with SCI [38]

Table- 1

Level	Abilities	Functional Goals
C1-C3	Limited movement of head and neck	**Breathing:** Depends on a ventilator for breathing.
		Communication: Talking is sometimes difficult, very limited or impossible. If ability to talk is limited, communication can be accomplished independently with a mouth stick and assistive technologies like a computer for speech or typing. Effective verbal communication allows the individual with SCI to direct caregivers in the person's daily activities.
		Daily tasks: Assistive technology allows for independence in tasks such as turning pages, using a telephone and operating lights and appliances.
		Mobility: Can operate an electric wheelchair by using a head control, mouth stick, or chin control. A power tilt wheelchair also for independent pressure relief.
C3-C4	Usually has head and neck control. Individuals at C4 level may shrug their shoulders.	**Breathing:** May initially require a ventilator for breathing, usually adjust to breathing full-time without ventilator assistance.
		Communication: Normal.
		Daily tasks: With specialized equipment, some may have limited independence in feeding and independently operate an adjustable bed with an adapted controller.
C5	Typically has head and neck control, can shrug shoulder and has shoulder control. Can bend his/her elbows and turn palms face up.	**Daily tasks:** Independence with eating, drinking, face washing, brushing of teeth, face shaving and hair care after assistance in setting up specialized equipment.
		Health care: Can manage their own health care by doing self-assist coughs and pressure reliefs by leaning forward or side -to-side.
		Mobility: May have strength to push a manual wheelchair for short distances over smooth surfaces. A power wheelchair with hand controls is typically used for daily activities.
C6	Has movement in head, neck, shoulders, arms and wrists. Can shrug	**Daily tasks:** With help of some specialized equipment, can perform with greater ease and independence, daily tasks of feeding, bathing, grooming, personal hygiene and dressing.

	shoulders, bend elbows, turn palms up and down and extend wrists.	**Health care:** Can independently do pressure reliefs, skin checks and turn in bed.
		Mobility: Some individuals can independently do transfers but often require a sliding board. Can use a manual wheelchair for daily activities but may use power wheelchair for greater ease of independence.
C7	Has similar movement as an individual with C6, with added ability to straighten his/her elbows.	**Daily tasks:** Able to perform household duties. Need fewer adaptive aids in independent living.
		Health care: Able to do wheelchair pushups for pressure reliefs.
		Mobility: Daily use of manual wheelchair. Can transfer with greater ease.
C8-T1	Has added strength and precision of fingers that result in limited or natural hand function.	**Daily tasks:** Can live independently without assistive devices in feeding, bathing, grooming, oral and facial hygiene, dressing, bladder management and bowel management.
		Mobility: Uses manual wheelchair. Can transfer independently.
T2-T6	Has normal motor function in head, neck, shoulders, hands and fingers. Has increased use of rib and chest muscles, or trunk control.	**Daily tasks:** Should be totally independent with all activities.
		Mobility: A few individuals are capable of limited walking with extensive bracing. This requires extremely high energy and puts stress on the upper body, offering no functional advantage. Can lead to damage of upper joints.
T7-T12	Has added motor function from increased abdominal control.	**Daily tasks:** Able to perform unsupported seated activities.
		Mobility: Same as above.
		Health care: Has improved cough effectiveness.
L1-L5	Has additional return of motor movement in the hips and knees.	**Mobility:** Walking can be a viable function, with the help of specialized leg and ankle braces. Lower levels walk with greater ease with the help of assistive devices.
S1-S5	There are various degrees of return of voluntary bladder, bowel and sexual functions.	**Mobility:** Increased ability to walk with fewer or no supportive devices.

These expected functional outcomes can be achieved or enhanced through rehabilitation. As rehabilitation plays an important role to restore function.

2.8 Importance of Rehabilitation for functional recovery of SCI

Rehabilitation begins in hospital shortly after a patient's injury.[38] Different health care providers specialising in Doctors, nurse, physiotherapy, psychiatry, occupational therapy, speech and language therapy and social welfare work together in rehabilitation program. The purpose of SCI rehabilitation is to optimise recovery and promote independence, self-reliance and self-esteem, helping patients understand their injury and the details surrounding their future care; helping patients regain a sense of independence; educating patients about their ADLs, future health needs and the risk of SCI-related medical complications; the promotion of physical and psychological well-being; helping patients reintegrate into their community environment by providing them with information about adaptive equipment, housing options and community resources.[39] Occupational therapy plays a vital role in rehabilitation program to make people independent in his/her everyday activities and to reintegrate in the community.

2.9 Role of Occupational Therapy intervention for functional recovery of SCI

Occupational therapy practitioners enable people with SCI to return to productive lives. Occupational therapy practitioners have the skills to facilitate collaborative goal setting and achievement by considering physical, psychosocial, occupational, and contextual factors that impact on occupational performance. They are expertise in analyzing activities and adapting tasks to help individuals develop the skills needed to accomplish their goals.[40]

The main areas of Occupational Therapy intervention are:

2.9.1 Daily living skills

Occupational therapist provide training and practice in self-care and domestic tasks such as washing, dressing, feeding, drinking, grooming and housekeeping. [41]

2.9.2 Bed mobility and functional transfers

Occupational therapist provide training and practice in bed mobility and in getting to and from the bed, wheelchair, shower chair, toilet, bath, stair lift, sofa, car and other transfers for daily living.[41]

2.9.3 Wheelchair, posture and cushion requirements

Occupational therapists assess wheelchairs for individuals with SCI that allows maximum independence and identify appropriate pressure relieving cushions. Posture assessment and identification of correction/support systems required. [41]

2.9.4 Hand therapy

Occupational therapist practice exercises to maintain range of movement, oedema management, assess and provide training of functional potential, provide splint to prevent deformity, maintain aesthetics and replace function.[41]

2.9.5 Communication aids

Occupational therapists provide equipment to aid communication such as telephone adaptations, writing splints, computer keyboard hand splints, mouth sticks etc.[41]

2.9.6 Community living skills

Occupational therapist provide advice on returning to work, returning to driving, training and practice in advanced wheelchair skills, arranging driving lessons, assistance with establishing routines and problem solving.[41]

2.9.7 Environmental modifications

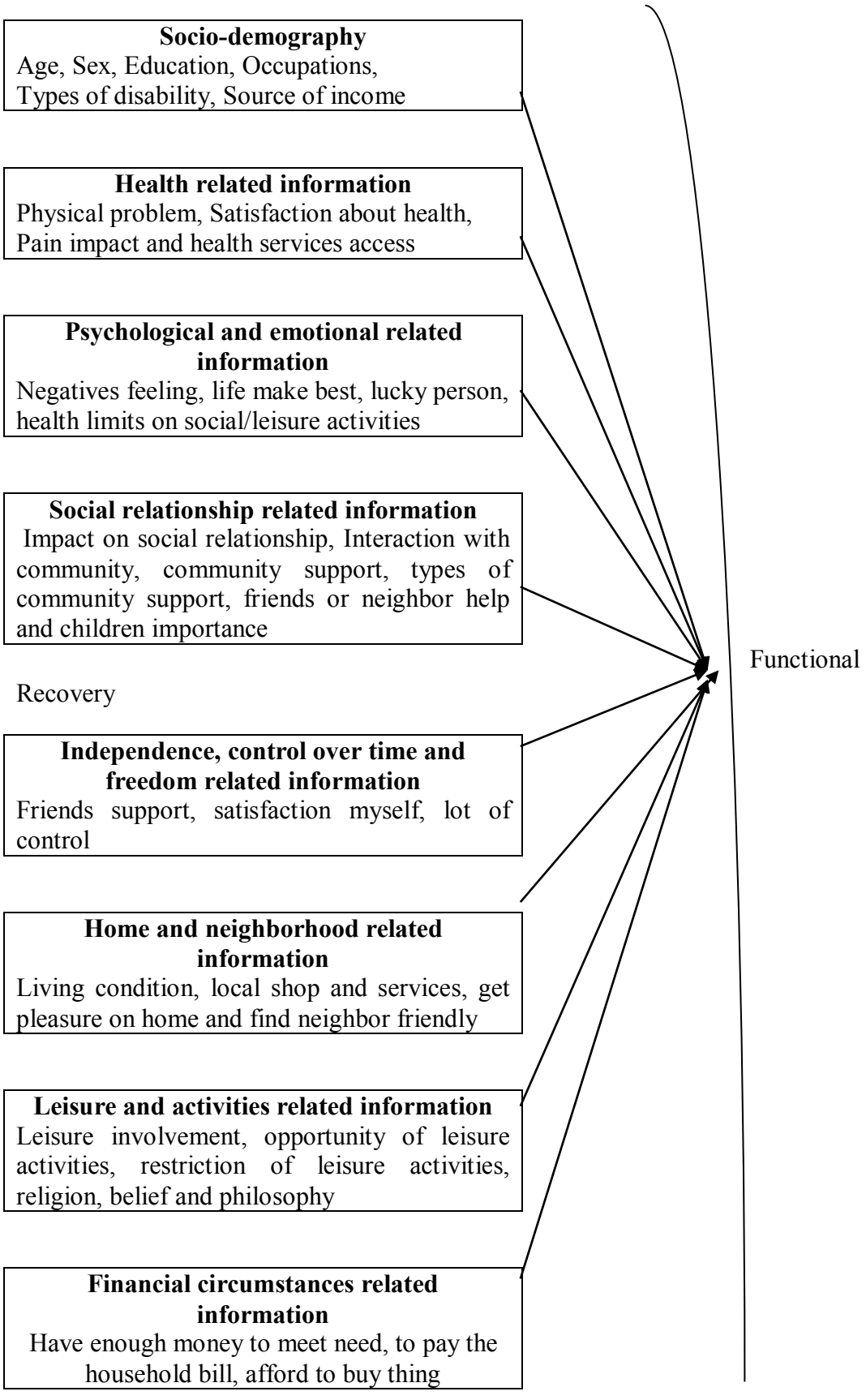
Occupational therapists assess and identify home/work/school adaptations in liaison with the community team.[41]

In CRP, Occupational therapists provide therapeutic treatment to the patient with SCI according to four stages-Acute, Active, rehabilitation and community re-integration phase.

3.1 Conceptual framework of the study

The people with SCI are facing lot of challenges such as poor physical status, poor mental status, unfavorable conditions, and environmental barrier due to limitation of functioning. They are also facing different community barrier .The researcher have identified that person with SCI have required to improve their awareness about disease.

3.2 List of Variables:



3.3 Conceptual and operational definition of the variables

SL No	Variables	Theoretical Definition	Operational Definition
1.	Age	The time of life when a person does something or becomes legally able to do something.[42]	The duration of human living length (between births to until death)
2.	Sex	The biological identification either the male or female division of a species, especially as differentiated with reference to the productive functions.[43]	Sex is the distinction between male, female and others who don't not have biological characteristics.
3.	Occupation	An activity in which one engages. Human pursuing pleasure has been his major occupation.[44]	This is the identification of productive life and income generating activity.
4.	Quality of life	"A person's sense of wellbeing that stems from satisfaction or dissatisfaction with the areas of life that are important to him/her".[45]	An individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.
5.	Income	Money that an individual or business receives in exchange for providing a good or service or through investing capital. Income is consumed to fuel day to day expenditure.[46]	Human being is earning salary by any productive activities.
6.	Physical Health	Physical health is a state of well being when all internal and external body parts, organs, tissues and cells can function properly as they are supposed to function.[47]	Physical health can be defined as a state of physical well – being in which a person is physically fit to perform their daily activities without restriction.
7.	Psychological wellbeing	Psychological well-being refers to how people evaluate their lives.[48]	Peaceful state of mental condition during the daily activity.
8.	Independence	Independence is not determined by or capable of being deducted or derived from or expressed in terms of members of the set under consideration.[49]	This is the capacity of an individual person's functional ability in daily living activities.
9.	Leisure	Freedom from the demands of work or duty.[50]	Free time when one is not working or attending other duties.

Table-2: Theoretical and operational definition of the variables

Chapter 04
Methodology

Methodology is a vital part of a research project, which helps the researchers how to follow principles of a research and what types of procedure to be followed in conduction the research smoothly. The methodological procedure of a research includes research design, selection of study area, sampling procedure, data collection technique and how to analyse collected data from the field. This chapter provides an overview of the methodological framework by developing a research design, section of sample size and study area, the use of data collection technique in order to identify functional recovery of person with SCI.

4.1 Study design

Quantitative research design was used in the form of cross-sectional type in the design. Retrospective design is the most common survey approach to focus on the past as well as present experience. A retrospective study design allows the investigator to formulate ideas about possible associations and investigate potential relationships.[51]

The aim of the study was to assess the functional outcome of SCI patients after taking rehabilitation from CRP. Retrospective study was suitable to collect large amount of data. It was also helpful to collect data about the condition before and after taking rehabilitation of a person with SCI. This methodology was chosen to fulfill the aim of the study.

4.2 Study site

The SCI registered unit at the CRP in Bangladesh which is the largest SCI rehabilitation centre for the patient with SCI. At first the standard questionnaire was developed and then collected data from SCI registered unit.

4.3 Study population and Sampling

The sample size was the discharged patient's documents of January 2016 – December 2016 and previous documents were used for sample selection from inpatient of CRP in Savar. Total 230 patients discharged from CRP in 2016 by completing

rehabilitation. Among 230 patients, total 147 patients fulfill the research criteria. 40 patients were the participants of other study. The target population of this study was about 107.

4.4 Sampling technique

Purposive sampling technique was used for sample selection. Purposive sampling starts with a purpose in mind and the sample is thus selected to include people of interest and exclude those who do not suit the purpose. The sample reflects the characteristics of the population from which it is drawn. [52]

4.5 Inclusion criteria

- Patient with SCI who completed rehabilitation program in January 2016-December 2016 successfully from CRP.
- All aged patient's data were included.
- Both male and female was included.
- Both complete and incomplete SCI patients were included in this study.

4.6 Exclusion criteria

- Those patients' data was not allowed who discharged from CRP before and after 2016.
- Incomplete document due to lack of information.
- Patients without SCI.

4.7 Method of data collection

The researcher used standardized questionnaire to collect data. Researcher collected the data independently. Researcher took permission from ethical committee at CRP for conducting study (APPENDIX-1). The researcher had been taken permission for data collection from the SCI unit of Savar, CRP and the Head of the Department of occupational therapy department (APPENDIX-2). Before data collection, the researcher selected a place where able to give adequate attention during collect data. In this study data was collected by Spinal Cord Independence Measure (SCIM) scale questionnaire. Following that the investigator went to register to take permission for data collection of discharged patients. Firstly, the investigator introduced her and the research project as well as its purpose. Then investigator took data from those documents and found different factors for functional recovery.

4.8 Data collection tools

Data was collected using SCIM scale, Papers, Pen, Pencil, Diary, Computer and pen drive, previous documents.

Spinal Cord Independence Measure (SCIM)

The SCIM has been designed specifically for individuals with SCI and measures the ability of performing routine daily tasks.[53] The SCIM was administered by occupational therapists, physical therapists, and nursing staff on admission and discharge. Each discipline assessed, by observation, specific SCIM items in which they had the most expertise: occupational therapy scored feeding, bathing, dressing, grooming, sphincter management, and use of toilet; nurses scored respiration, as well as collaborated with occupational therapy in regard to sphincter management; and physical therapy scored all mobility components.[54]

Sub-items and maximal scores of the SCIM

Area	Sub-item	Maximal score
Self-care	Feeding	3
	Bathing upper body	3
	Bathing lower body	3
	Dressing upper body	4
	Dressing lower body	4
	Grooming	3
Total score of area		20
Respiration and sphincter Management	Respiration	10
	Bladder management	15
	Bowel management	10
	Use of toilet	5
Total score of area		40
Mobility	Bed mobility	6
	Transfer bed–wheelchair	2
	Transfer wheelchair–toilet–tub	2
	Mobility indoors	8
	Mobility for moderate distances (10–100 m)	8

	Mobility outdoors (4100 m)	8
	Stair management	3
	Transfer wheelchair–car	2
	Transfer wheelchair–ground	1
Total score of area		40
Total score of SCIM		100

4.9 Data management and analysis

The data was collected using SCIM Scale. The data that was analyzed is descriptive data. The graph technique was used for analyzing data, calculated as percentages and presented this using bar and pie charts by SPSS (Statistical Package of Social Science) software version 20.0. SPSS is a comprehensive and flexible statistical analysis and data management solution. SPSS can take data from almost any type of file and use them to generate tabulated reports, charts, and plots of distributions and trends, descriptive statistics and conduct complex statistical analyses.

4.10 Ethical considerations

Ethical considerations were implemented to avoid ethical problems. The thesis proposal was approved by IRB of BHPI. The researcher had been taken permission from ethical committee at CRP for conducting study and for data collection from the SCI unit of Savar, CRP and the Head of the Department of occupational therapy department. The researcher was committed not to share the information given with others except the research supervisor. These materials will be disposed of after completion of the research project. Collected data will be destroyed after six months following the study.

Socio-demographic characteristics of the respondents (n=107):

Age group (n=107):

The study shows that most of the respondents were young. People can be affected by SCI in any age. The bar chart shows that out of 107 respondents, 40 (37.4%) were in the young adult group ranging from 21 to 30 years, followed by 24 (22.4%) were in the group of adult ranging from 31 to 40 years, 13 (12.1%) were ranging from 11 to 20 years, 11(10.3%) were ranging from 41 to 50 years, 9 (8.4%) were ranging from 51 to 60 years, 7 (6.5%) were ranging from 61 to 70 years, 2 (1.9%) were ranging from 0 to 10 years and 1 (0.9%) were ranging from 71 to 80 years of age. The mean ages of the patients were 34.22 years with standard deviation (±14.420). This study points out that large number of young adult and adults are living with SCI and they are more vulnerable for SCI.

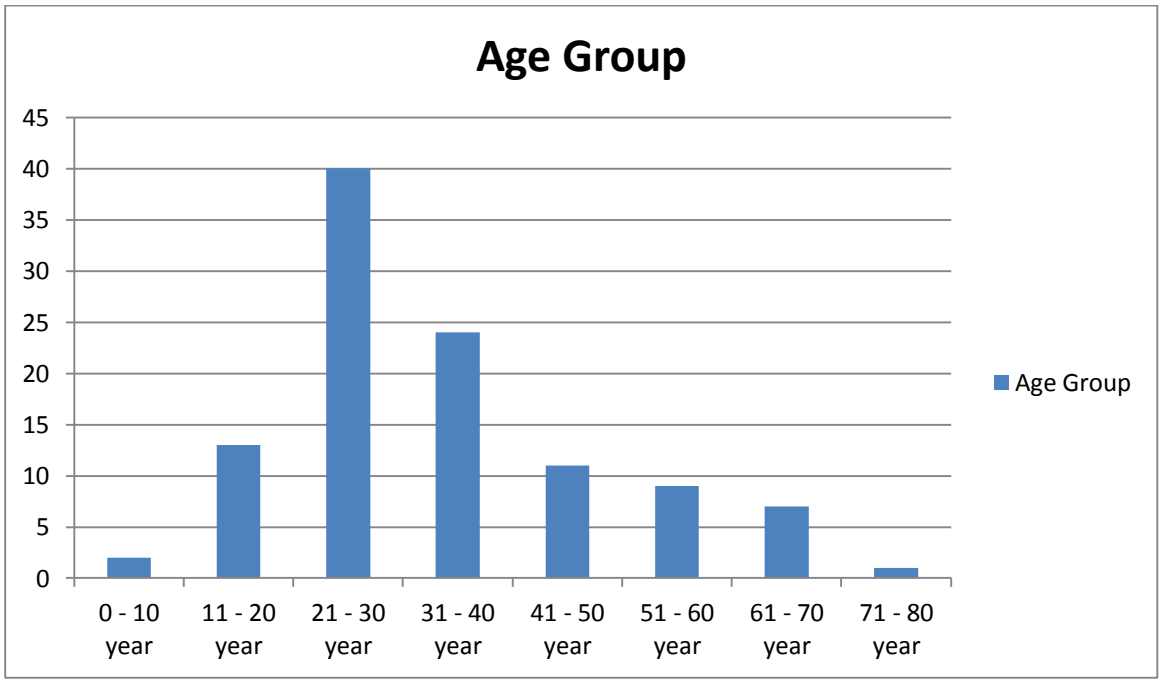
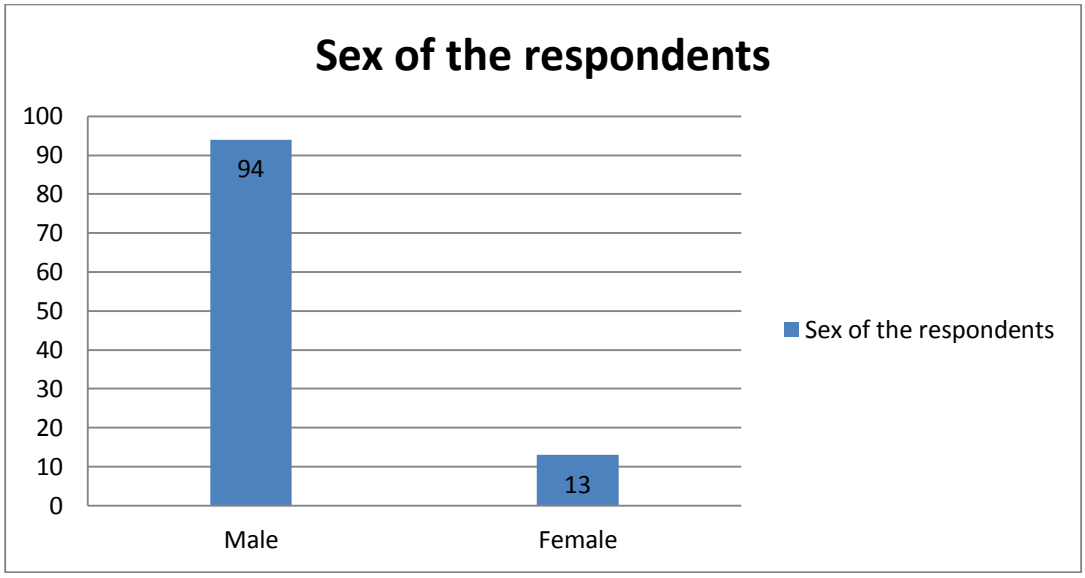


Figure 1: Age group

Sex of the respondents (n=107):

The study shows that out of 107 respondents 94 were male and rests of 13 were female. The numbers of male respondents are higher than females.



N= 107

Figure 2: Sex of the respondents

Level of education of the respondents (n=107):

The table shows that higher rate of SCI peoples (more than 25percent) have only primary education. This study also shows that 21.5 percent people were illiterate, 7.5 percent can sign only, secondary completed 16.8 percent, SSC completed 13.1 percent, HSC & Degree completed 4.7 percent, Masters completed 2.8% and others completed were 3.7 percent.

Educational status	Frequency	Percent (%)
Illiterate	23	21.5
Can sign only	8	7.5
Primary (Class I-V)	27	25.2
Secondary (Class VI- IX)	18	16.8
SSC	14	13.1
HSC	5	4.7
Degree	5	4.7
Masters	3	2.8
Others	4	3.7
Total	**107**	**100.0**

Table 3: Level of education of the respondents

Occupation (n=107):

Out of total respondents, most of them were farmers (46.7 percent), student were 14 percent, daily labour were 9.3 percent, businessman were 8.4 percent, house wife were 7.5 percent, service holder were 6.5 percent, garments worker were 2.8 percent and others were 4.7 percent.

Occupation	Frequency	Percent
House wife	8	7.5
Farmer	50	46.7
Service holder	7	6.5
Business	9	8.4
Student	15	14.0
Garments worker	3	2.8
Daily Labour	10	9.3
Others	5	4.7
Total	107	100.0

Table 4: Occupation

Residential area (n=107):

The study shows that, most of the SCI sufferers came from rural area. Among 107 people with SCI 79.4 percent came from rural area, 10.3 percent came from semi-urban and 10.3 percent from urban area.

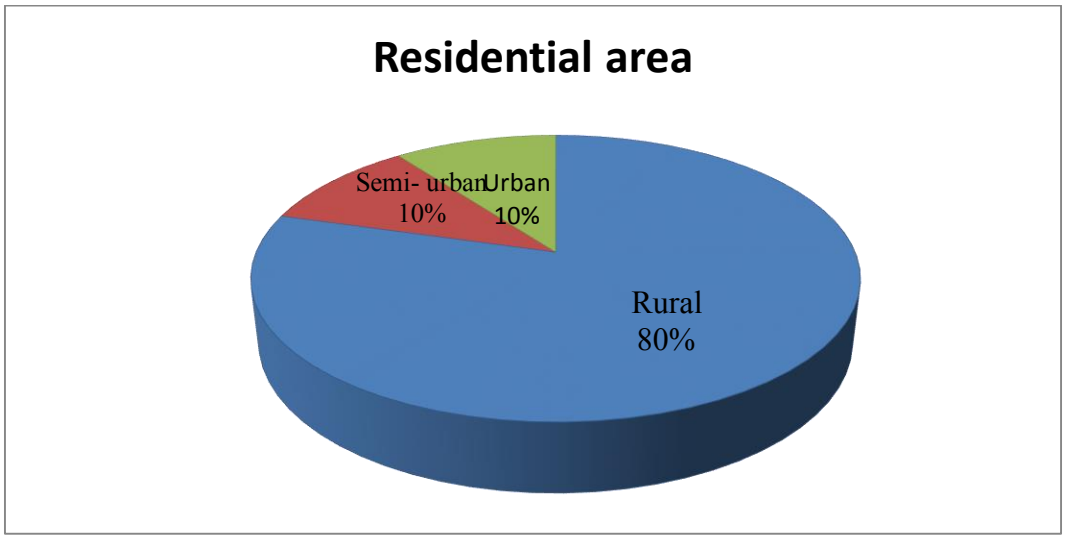


Figure 3: Residential area

Toilet type (n=107):

Among 107 people with SCI 96.3 percent use Asian toilet and 3.7 percent use western toilet.

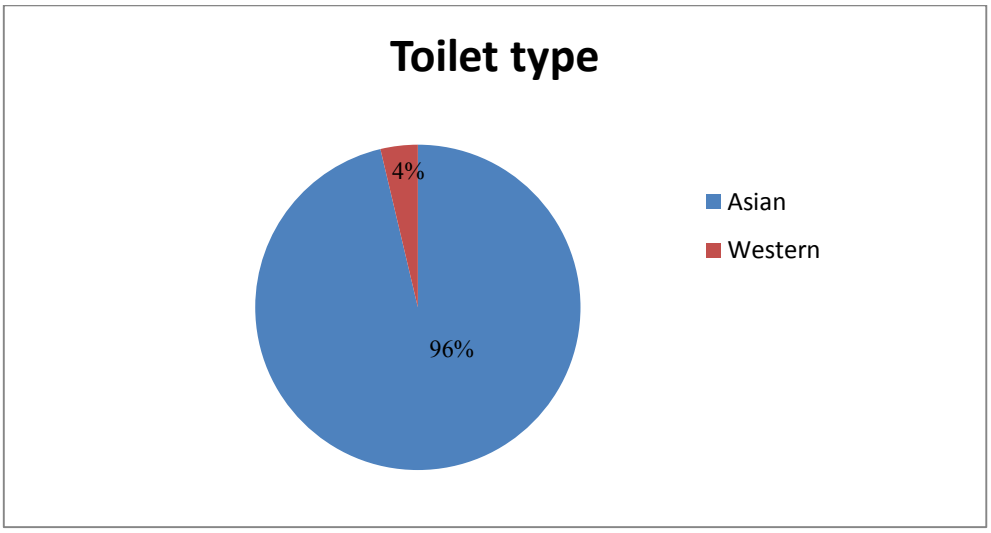


Figure 4: Toilet type

Water source (n=107):

Most of the participants (84.1 percent) drink water from tube well.14 percent drinks water from tap and 0.9 percent drink water from ponds and other sources.

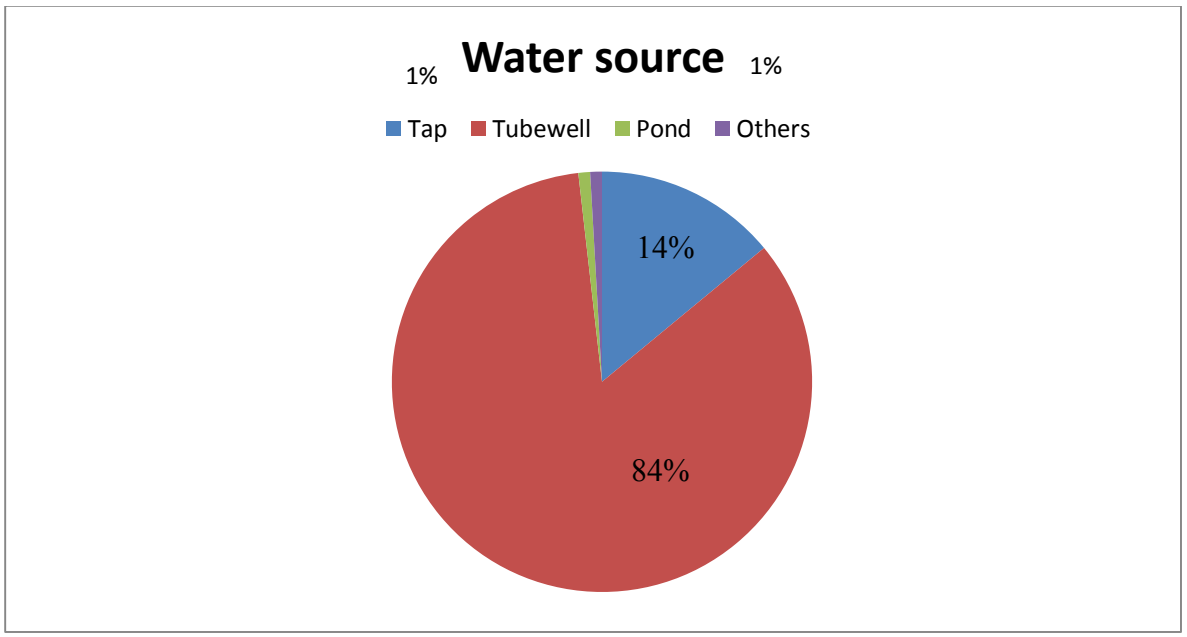


Figure 5: Water source

Types of injury of the participants (n=107):

The table shows that, among total participants 36 percent have incomplete tetraplegia, 24.3 percent have incomplete paraplegia, 27.1 percent have complete paraplegia, 10.3 percent have complete tetraplegia and 2.8 percent participants have no types of injury.

Injury types	Frequency	Percent (%)
Complete paraplegia	29	27.1
Incomplete paraplegia	26	24.3
Complete tetraplegia	11	10.3
Incomplete tetraplegia	38	35.5
SCI without neurological deficit	2	1.9
Spinal tumor	1	0.9
Total	**107**	**100.0**

Table 5: Types of injury

Cause of injury

The major cause of SCI of the study was traumatic 97.2 percent and non traumatic cause of injury was 2.8 percent.

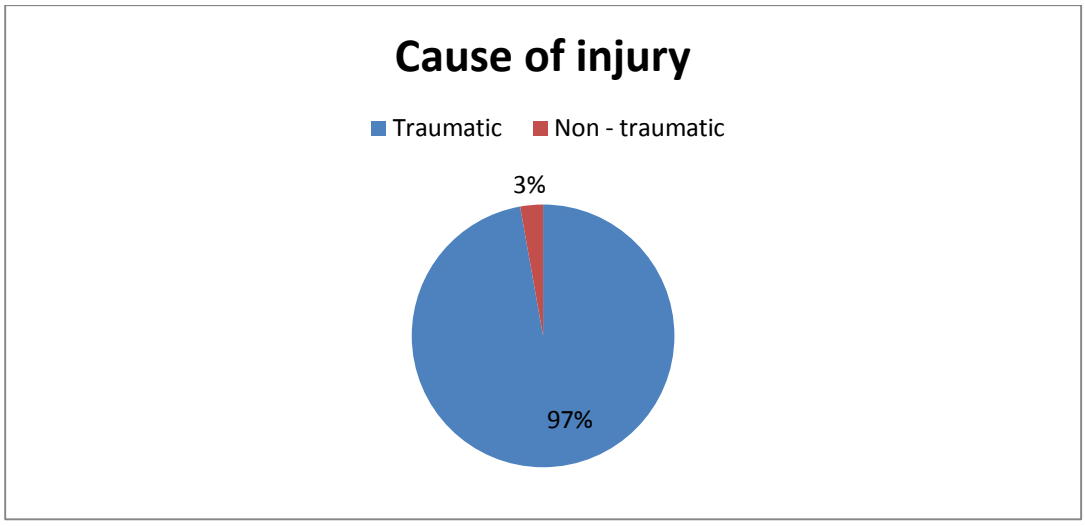


Figure 6: Cause of injury

Skeletal level of injury (n=107)

Among the participants the skeletal level of cervical were 27.1 percent, thoracic were 29.9 percent, lumber were 21.5 percent and no were 21.5 percent

.

Skeletal level	Frequency	Percent
Cervical	29	27.1
Thoracic	32	29.9
Lumber	23	21.5
No	23	21.5
Total	**107**	**100.0**

Table 6: Skeletal level of injury

Neurological level of injury (n=107)

Out of 107 patients the impairment grading in ASIA scale A were 37.4 percent, ASIA scale B were 13.1 percent, ASIA scale C were 19.6 percent, ASIA scale D were 28.0 percent and 1.9 percent had no level.

Impairment scale	Frequency	Percent
ASIA scale A	40	37.4
ASIA scale B	14	13.1
ASIA scale C	21	19.6
ASIA scale D	30	28.0
No	2	1.9
Total	**107**	**100.0**

Table 7: Neurological level of injury

Use of adaptive devices (n=107):

The study shows that, among total participants 48.6 percent participants reintegrate in the community without any assistive device, 29 percent uses wheelchair, 11.2 percent

uses walking frame, 3.7 percent use crutch and 7.5 percent uses other types of assistive device.

Adaptive device	Frequency	Percent
No	52	48.6
Wheelchair	31	29.0
Crutch	4	3.7
Walking frame	12	11.2
Others	8	7.5
Total	**107**	**100.0**

Table 8: Use of adaptive devices

Physical status

Oedema (n=107):

The study shows that, among total participants only 10.3 percent has oedema.

Muscle wasting (n=107):

The study shows that, among total participants only 8.4 percent has muscle wasting.

Pain (n=107):

The study shows that, among total participants 59.8 percent has pain.

	Physical status – n (%)		
	Oedema	**Muscle wasting**	**Pain**
Yes	11 (10.3%)	9 (8.4%)	64 (59.8%)
No	96 (89.7%)	98 (91.6%)	43 (40.2%)
Total	**107 (100.0%)**	**107 (100.0%)**	**107 (100.0%)**

Table 9: Physical status

Association between Sex and recovery in Self care activities (Feeding)

Sex	Self care- Feeding								Total (107)	χ2		P –value (p< 0.05)	
	Needs pare anal, gastrostomy, or fully assisted oral feeding		Needs partial assistance for eating and /or drinking, or for wearing adaptive devices		Eats independently; needs adaptive or assistance only for cutting food and/or pouring and/or opening containers		Eats and drinks independently; does not require assistance or adaptive devices						
	Initial	Discharge	Initial	Discharge	Initial	Discharge	Initial	Discharge		Initial	Discharge	Initial	Discharge
Male	36 (33.6%)	3 (2.8%)	38 (35.5%)	4 (3.7%)	13 (12.1%)	14 (13.1%)	7 (6.5%)	73 (68.2%)	94 (87.9%)	0.032	2.807	0.999	0.422
Female	5 (4.7%)	0 (0%)	5 (4.7%)	1 (0.9%)	2 (1.9%)	4 (3.7%)	1 (0.9%)	8 (7.5%)	13 (12.1%)				

Table 10: **Association between Sex and recovery in Self care activities (Feeding)**

The table shows that among 107 participants 87.9 percent were male,12.1 percent were female, 2.8 percent male needed full assistance, 3.7 percent male and 0.9 percent female needed assistance, 13.1 percent male and 3.7 percent female needed assistance only to cut food, 68.2 percent male and 7.5 percent female did not need any assistance during discharge for feeding. This study found that, statistically there was no significantly difference between sex and recovery self care activities ($p< 0.05$).

Association between Sex and recovery in Self care activities – Bathing (upper body)

Sex	Self care- bathing –A								Total	$\chi 2$		P- value (p< 0.05)	
	Requires total assistance		Require partial assistance		Washes independently with adaptive devices or in a specific setting (e.g., bars, chair)		Washes independently; does not require adaptive devices or specific setting (not customary for healthy people)						
	Initial	Discharge	Initial	Discharge	Initial	Discharge	Initial	Discharge		Initial	Discharge	Initial	Discharge
Male	53 (49.5%)	6 (5.6%)	34 (31.8%)	9 (8.4%)	6 (5.6%)	40 (37.4%)	1 (0.9%)	39 (36.4%)	94 (87.9%)	3.661	0.300	1.265	0.738
Female	8 (7.5%)	0 (0%)	4 (3.7%)	2 (1.9%)	0 (0%)	6 (5.6%)	1 (0.9%)	5 (4.7%)	13 (12.1%)				

Table 11: Association between Sex and recovery in Self care activities – Bathing (upper body)

The table shows that among 87.9 percent male and 12.1 percent female 5.6 percent male needed total assistance, 8.4 percent male and 1.9 percent female needed partial assistance, 37.4 percent male and 5.6 percent female needed specific setting, 36.4 percent male and 4.7 percent female did not need any assistance during discharge for bathing (upper body). This study found that, statistically there was no significantly difference between sex and recovery self care activities ($p< 0.05$).

Association between Sex and recovery in Self care activities – Bathing – Lower body

Sex	Self care- bathing –B								Total	X^2		P – value (p< 0.05)	
	Requires total assistance		Require partial assistance		Washes independently with adaptive devices or in a specific setting (e.g., bars, chair)		Washes independently; does not require adaptive devices or specific setting (not customary for healthy people)						
	Initial	Discharge	Initial	Discharge	Initial	Discharge	Initial	Discharge		Initial	Discharge	Initial	Discharge
Male	83 (77.6%)	8 (7.5%)	8 (7.5%)	13 (12.1%)	2 (1.9%)	43 (40.2%)	1 (0.9%)	30 (28%)	94 (87.9%)	2.988	2.525	0.394	0.471
Female	11 (10.3%)	2 (1.9%)	1 (0.9%)	0 (0%)	0 (0%)	6 (5.6%)	1 (0.9%)	5 (4.7%)	13 12.1%				

Table 12: Association between Sex and recovery in Self care activities – Bathing – Lower body

The table shows that 7.5 percent male and 1.9 percent female needed total assistance, 12.1 percent male needed partial assistance, 40.2 percent male and 5.6 percent female needed specific setting, 28 percent male and 4.7 percent female did not need any assistance during discharge for bathing (lower body). This was found to be a statistically non-significant difference between two areas ($p<0.05$) such as sex and recovery self care activities (bathing lower body).

Association between Sex and recovery in Self care activities – Dressing (Upper body)

Sex	Self care Dressing- A										Total	$\chi 2$		P – value ($p< 0.05$)	
	Requires total assistance		Requires partial with clothes without buttons, zippers or laces (cwobzl)		Independent with cwobzl; requires adaptive devices and/ or specific settings (adss)		Independent with cwobzl; does not require adss; needs assistance or adss only for bzl		Dresses (any cloth) independently; does not require adaptive devices or specific setting						
	Initial	Discharge	Initial	Discharge	Initial	Discharge	Initial	Discharge	Initial	Discharge		Initial	Discharge	Initial	Discharge
Male	49 (45.8%)	3 (2.8%)	17 (15.9%)	5 (4.7%)	24 (22.4%)	12 (11.2%)	3 (2.8%)	31 (29%)	1 (0.9%)	43 (40.2%)	94 (87.9%)	3.970	3.355	0.410	0.500
Female	5 (4.7%)	0 (0%)	5 (4.7%)	1 (0.9%)	2 (1.9%)	2 (1.9%)	1 (0.9%)	7 (6.5%)	0 (0%)	3 (2.8%)	13 (12.1%)				

Table 13: Association between Sex and recovery in Self care activities – Dressing (Upper body)

The table shows that 2.8 percent male needed total assistance, 4.7 percent male and 0.9 percent female needed partial assistance, 11.2 percent male and 1.9 percent female needed specific setting, 29 percent male and 6.5 percent female needed assistive device, 40.2 percent male and 2.8 percent female did not need any assistance during discharge for dressing upper body. This was found to be a statistically non-significant difference between two areas ($p<0.05$) such as sex and recovery self care activities (dressing upper body).

Association between Sex and recovery in Self care activities – Dressing (Lower body)

Sex	Self care Dressing- B										Total	$\chi 2$		P–value (p<0.05)	
	Requires total assistance		Requires partial with clothes without buttons, zippers or laces (cwobzl)		Independent with cwobzl; requires adaptive devices and/ or specific settings (adss)		Independent with cwobzl; does not require adss; needs assistance or adss only for bzl		Dresses (any cloth) independently; does not require adaptive devices or specific setting						
	Initial	Discharge	Initial	Discharge	Initial	Discharge	Initial	Discharge	Initial	Discharge		Initial	Discharge	Initial	Discharge
Male	83 (77.6%)	7 (6.5%)	5 (4.7%)	10 (9.3%)	3 (2.8%)	12 (11.2%)	2 (1.9%)	32(29.9%)	1 (0.9%)	33 (30.8%)	94 (87.9%)	7.114	1.567	0.130	0.815
Female	9 (8.4%)	2 (1.9%)	3 (2.8%)	1 (0.9%)	0 (0%)	2 (1.9%)	1 (0.9%)	5 (4.7%)	0 (0%)	3 (2.8%)	13 (12.1%)				

Table 14: Association between Sex and recovery in Self care activities – Dressing (Lower body)

The table shows that 6.5 percent male and 1.9 percent female needed total assistance, 9.3 percent male and 0.9percent female needed partial assistance, 11.2percent male and 1.9 percent female needed specific setting, 29.9 percent male and 4.7 percent female needed assistive device,

30.8 percent male and 2.8 percent female did not need any assistive device during discharge for lower body dressing. This was found to be a statistically non-significant difference between two areas ($p<0.05$) such as sex and recovery self care activities (dressing lower body).

Association between Sex and recovery in Self care activities - grooming

Sex	**Self care- Grooming**								**Total**	**$\chi 2$**		**P-value** ($p<0.05$)	
	Requires total assistance		Requires partial assistance		Grooms independently with adaptive devices		Grooms independently without adaptive devices						
	Initial	Discharge	Initial	Discharge	Initial	Discharge	Initial	Discharge		Initial	Discharge	Initial	Discharge
Male	43 40.2%	4 3.7%	37 34.6%	7 6.5%	10 9.3%	13 12.1%	4 3.7%	70 65.4%	94 87.9%	3.107	3.910	0.375	0.271
Female	5 4.7%	0 0%	4 3.7%	3 2.8%	2 1.9%	1 0.9%	2 1.9%	9 8.4%	13 12.1%				

Table 15: Association between Sex and recovery in Self care activities – grooming

The table shows that 3.7 percent male needed total assistance, 6.5 percent male and 2.8 percent female needed partial assistance, 12.1 percent male and 0.9 percent female needed adaptive device, 65.4 percent male and 8.4 percent female did not need any adaptive device during discharge for grooming. Study result found that, there is no significantly difference ($p<0.05$) between two areas like sex and self care activities (grooming).

Association between Sex and recovery in Toilet use activities

Sex	Toilet use										Total	$\chi 2$		P-value ($p<0.05$)	
	Requires total assistance		Requires partial assistance; does not clean self		Requires partial assistance; cleans self independently		Uses toilet independently in all tasks but needs adaptive devices or special setting (e.g., bars)		Uses toilet independently; does not require adaptive devices or special setting						
	Initial	Discharge	Initial	Discharge	Initial	Discharge	Initial	Discharge	Initial	Discharge		Initial	Discharge	Initial	Discharge
Male	77 72.0%	7 6.5%	14 13.1%	11 10.3%	2 1.9%	11 10.3%	0 0.0%	35 32.7%	1 0.9%	30 28%	94 87.9%	8.078	2.139	0.089	0.710
Female	11 10.3%	1 0.9%	1 0.9%	1 0.9%	0 0.0%	2 1.9%	1 0.9%	7 6.5%	0 0.0%	2 1.9%	13 12.1%				

Table 16: Association between Sex and recovery in Toilet use activities

The table shows that 6.5 percent male and 0.9 percent female needed total assistance 10.3 percent male and 1.9 percent female needed partial assistance, 10.3 percent male and 1.9 percent female needed partial assistance and clean self, 32.7 percent male and 6.5 percent female needed assistive device, 28 percent male and 1.9 percent female did not need any assistive device during discharge for toilet use. Study result found that there is no significantly difference ($p<0.05$) between two areas like sex and self care activities (toilet use).

Association between Age and recovery in Self care activities (Feeding)

Age	Self care – Feeding								Total	χ2		P–Value (p<0.05)	
	Needs pare anal, gastrostomy, or fully assisted oral feeding		Needs partial assistance for eating and /or drinking, or for wearing adaptive devices		Eats independently; needs adaptive or assistance only for cutting food and/or pouring and/or opening containers		Eats and drinks independently; does not require assistance or adaptive devices						
	Initial	Discharge	Initial	Discharge	Initial	Discharge	Initial	Discharge		Initial	Discharge	Initial	Discharge
0-10 year	1 0.9%	0 0%	1 0.9%	1 0.9%	0 0.0%	1 0.9%	0 0.0%	0 0%	2 1.9%	10.715	69.013	0.968	0.000
10-20 year	4	0	5	1	3	2	1	10	13				
	3.7%	0%	4.7%	0.9%	2.8%	1.9%	0.9%	9.3%	12.1%				
21-30 year	12	12	16	16	6	6	6	6	40				
	11.2%	11.2%	15.0%	15%	5.6%	5.6%	5.6%	5.6%	37.4%				
31-40 year	10	0	10	1	3	2	1	21	24				
	9.3%	0%	9.3%	0.9%	2.8%	1.9%	0.9%	19.6%	22.4%				
41-50 year	5	5	5	5	1	1	0	0	11				
	4.7%	4.7%	4.7%	4.7%	0.9%	0.9%	0.0%	0%	10.3%				
51-60 year	5	5	3	3	1	1	0	0	9				
	4.7%	4.7%	2.8%	2.8%	0.9%	0.9%	0.0%	0%	8.4%				
61-70 year	3	1	3	1	1	0	0	5	7				

	2.8%	0.9%	2.8%	0.9%	0.9%	0%	0.0%	4.7%	6.5%				
71-80 year	1	1	0	0	0	0	0	0	1				
	0.9%	0.9%	0.0%	0%	0.0%	0%	0.0%	0%	0.9%				

Table 17: Association between Age and recovery in Self care activities (Feeding)

Among total participants (n=107), maximum participants age ranges was 31 -40 years to this study. Among them 19.6% person became independent in feeding during discharge whose age range was 31 – 40 years. The second most participants of this study aged in between 10 - 20 years. 9.3% people became independent during discharge of this aged people. On the other hand, between 41 – 80 years of people, little amount of people became fully independent during discharge.

After statistical test, this study found to be a highly significant relationship ($p<0.05$) between two groups like age and recovery in self care activity (feeding).

Association between Age and recovery of Self care activities (Grooming)

Age	**Self care grooming (discharge)**				**Total**	**$\chi 2$**	**P-value ($p<0.05$)**
	Requires total assistance	Requires partial assistance	Grooms independently with adaptive devices	Grooms independently without adaptive devices			
0-10 year	0	1	0	1	2		
	0.0%	0.9%	0.0%	0.9%	1.9%		
10-20 year	0	3	0	10	13		
	0.0%	2.8%	0.0%	9.3%	12.1%	54.602	0.000

21-30 year	0	2	4	34	40		
	0.0%	1.9%	3.7%	31.8%	37.4%		
31-40 year	1	1	3	19	24		
	0.9%	0.9%	2.8%	17.8%	22.4%		
41-50 year	0	1	5	5	11		
	0.0%	0.9%	4.7%	4.7%	10.3%		
51-60 year	1	1	2	5	9		
	0.9%	0.9%	1.9%	4.7%	8.4%		
61-70 year	1	1	0	5	7		
	0.9%	0.9%	0.0%	4.7%	6.5%		
71-80 year	1	0	0	0	1		
	0.9%	0.0%	0.0%	0.0%	0.9%		

Table 18: Association between Age and recovery of Self care activities (Grooming)

Among total participants (n=107), maximum participants age ranges was 21 -30 years to this study. Among them 31.8% person became independent in grooming activity during discharge whose age range was 21 – 30 years. The second most participants of this study aged in between 31 - 40 years. 17.8% people became independent during discharge of this aged people. On the other hand, between 41 – 80 years of people, little amount of people became fully independent during discharge.

This study shows that, statistically there is highly significant relationship ($p<0.05$) between age and recovery in self care activity (grooming).

Association between Rehabilitation duration and recovery in Self care activities (Feeding)

Rehabilitation duration	Self care – Feeding (discharge)				Total	$\chi 2$	P-value (p<0.05)
	Needs pare anal, gastrostomy, or fully assisted oral feeding	Needs partial assistance for eating and /or drinking, or for wearing adaptive devices	Eats independently; needs adaptive or assistance only for cutting food and/or pouring and/or opening containers	Eats and drinks independently; does not require assistance or adaptive devices			
0-2 month	0	0	1	15	16	17.961	0.117
	0.0%	0.0%	0.9%	14.0%	15.0%		
2-4 month	1	1	9	41	52		
	0.9%	0.9%	8.4%	38.3%	48.6%		
4-6 month	1	2	8	17	28		
	0.9%	1.9%	7.5%	15.9%	26.2%		
6-8 month	1	2	0	6	9		
	0.9%	1.9%	0.0%	5.6%	8.4%		
8-12 month	0	0	0	2	2		
	0.0%	0.0%	0.0%	1.9%	1.9%		

Table 19: Association between Rehabilitation duration and recovery in Self care activities (Feeding)

Most of the patient discharge after 2-4 month rehabilitation. 38.3% patient discharge became fully independent in feeding. The table shows that, there is no statistically significant difference ($p<0.05$) between two areas like rehabilitation duration and recovery in Self care activities (feeding).

Association between injury types and recovery in self care- dressing

Injury type	Self care- dressing - B - discharge					Total	$\chi 2$	P-value(p<0.05)
	Requires total assistance	Requires partial with clothes without buttons, zippers or laces (cwobzl)	Independent with cwobzl; requires adaptive devices and/ or specific settings (adss)	Independent with cwobzl; does not require adss; needs assistance or adss only for bzl	Dresses (any cloth) independently; does not require adaptive devices or specific setting			
Complete paraplegia	0	1	6	16	6	29	60.273	0.000
	0.0%	0.9%	5.6%	15.0%	5.6%	27.1%		
Incomplete paraplegia	0	0	2	8	16	26		
	0.0%	0.0%	1.9%	7.5%	15.0%	24.3%		
Complete tetraplegia	5	4	0	1	1	11		
	4.7%	3.7%	0.0%	0.9%	0.9%	10.3%		
Incomplete tetraplegia	4	6	6	11	11	38		
	3.7%	5.6%	5.6%	10.3%	10.3%	35.5%		
SCI without neurological deficit	0	0	0	0	2	2		
	0.0%	0.0%	0.0%	0.0%	1.9%	1.9%		
Spinal tumor	0	0	0	1	0	1		
	0.0%	0.0%	0.0%	0.9%	0.0%	0.9%		

Table 20: Association between injury types and recovery in self care- dressing

Above table found that statistically there is to be a highly significantly difference ($p<0.05$) between two areas. Incomplete paraplegia patient recover fast than tetraplegia.

Chapter 06
Discussion

The aim of this study was to assess the functional recovery of patients with SCI who completed their rehabilitation into CRP from January – December, 2016. Total 107 patients were taken in this in study period. The study population consisted of 94 males (87.9%) and 13 (12.1%) females. According to Razzak (2013) found that, among 56 participants 84% were male and 16.0% were female.[55] Anderson et al. (2007) found that among 231 participants male were 63% and female were 37% following SCI.[56] An epidemiological in Southeast Nigeria found that the male and female ratio was 4.3:1 and the 31-45 year age group was more frequently affected.[57]

In the present study, the age ranged from 8 to 75 years of the participants. In this study the mean age of the patients were 34.22 years with standard deviation (±14.420). In other study conduct in Brazil, the mean age was 30.3 ± 1.1 years.[58] Another study showed that, the mean age was 40.8 ± 14.1 years.[59] In USA, a study showed that the mean age was 29·7 years.[60] In Pakistan mean age 28.3 ± 12.4 years.[61] In India, another study showed that the mean age was 34.3 years.[62]

The majority of the patient's were aged between 21-30 years. Similarly Bombardier et al. (2004) in their study found among 849 participants 15% was (25-49 years) age group.[63]

Most of the patients were young age. Among 107 patients 97.2% had traumatic SCI. Other hand in Netherland traumatic cause was 75%.[59]

Out of total respondents, most of them were farmers (46.7 percent), student were 14 percent, daily labour were 9.3 percent, businessman were 8.4 percent, house wife were 7.5 percent, service holder were 6.5 percent, garments worker were 2.8 percent and others were 4.7 percent. Similarly, around 27% of the participants were farmers, while daily labourers, service holders, business, garment workers, housewives, rickshaw pullers and students were 22%, 18%, 11%, 4%, 9%, 4%, and 4% respectively.[4] This differs from the Nigerian study, where it was found that farmers were the fifth most common occupation group who suffered from SCI.[57]

In the present study, among total participants 36 percent have incomplete tetraplegia, 24.3 percent have incomplete paraplegia, 27.1 percent have complete paraplegia, 10.3 percent have complete tetraplegia and 2.8 percent participants have no types of injury. In Pakistan 46% patients had incomplete paraplegia, 43.3% had complete paraplegia, 4.8% had incomplete tetraplegia, and 5.9% had no neurological deficit.[64]

Out of 107 patients the impairment grading in ASIA scale A were 37.4 percent, ASIA scale B were 13.1 percent, ASIA scale C were 19.6 percent, ASIA scale D were 28.0 percent and 1.9 percent had no level. In China cervical injury was 46.3%, thoracic injury was 20.4% and lumber injury was 33.3%.[65] In this Study according to the grading scale ASIA A were 74.2%, ASIA B were 5.4%, ASIA C were 5.9% and ASIA D were 13.4%. In Pakistan, there was no case of ASIA A, 46% were in ASIA B, 41% were ASIA C and 8% were ASIA D.[64]

The study shows that, out of total respondents, most of them were farmers (46.7 percent), student were 14 percent, daily labour were 9.3 percent, businessman were 8.4 percent, house wife were 7.5 percent, service holder were 6.5 percent, garments worker were 2.8 percent and others were 4.7 percent. In China a 34 study showed that farmer was 57.2%, labor was 13.3%, student 2.6%, service holder 3.4% and others 12.4%.[65] In Nigera showed that students was 20%, farmers 12.9%, service holders 14%.[57]

This study found that, statistically there was no significantly difference between sex and recovery self care activities ($p< 0.05$). Similarly, In Australian study, there was no correlation between patients' gender and their recovery in function (P - 0.24).[66]

After statistical test, this study found to be a highly significant relationship ($p<0.05$) between two groups like age and recovery in self care activity. Moreover, age was not significantly associated with functional recovery as assessed by the difference between FIM scores at 6 weeks and 1 year after SCI in the unadjusted regression analysis (R2 ¼ 0.001; p ¼ 0.43), and after adjusting for potential confounders (R2 ¼ 0.05; p ¼ 0.47). In Canada, functional recovery among older people did not significantly differ from functional recovery in the younger group after SCI (18.78 4.28 versus 18.27 0.93, respectively; p ¼ 0.77).[67]

The study shows that, there is no statistically significant difference (p- 0.117) between two areas like rehabilitation duration and recovery in Self care activities (feeding).

However, no sub item significantly changed within this time period. In patients with quadriplegia, the following sub items showed significant improvement *(P* <.0167) between 1 and 3 months after injury: feeding, dressing upper body, bathing upper body, grooming, respiration, bladder care, bowel care, mobility indoors, mobility over moderate distances, mobility outdoors. The majority of the progress was seen in the sub item bowel management.

Chapter 07

Limitations and recommendations

5.1. Limitations

There are some limitations which were unconditionally taken by the researcher into account during the study period. The researcher always tried to consider the limitations during the period of study. These are given below:

- Data were collected only from CRP. Researcher could not collect information from patient.
- Researcher used quantitative method and it was time consuming to collect data from documents.
- The findings of this study cannot be generalised to all people with SCI because the sample size was small.
- Researcher faced many challenges to get permission from the authority to collect data from the patient's file.
- Researcher collected data only those patients who discharged in 2016 from CRP.
- Total 230 patients discharged from CRP in 2016 after taking rehabilitation. But in this study, the target population was 107 as the 40 patients were the sample of other study and others didn't fulfill the research criteria.
- The one of major limitation was time. To conduct the research project on this topic, time period was very limited. As the study period was short so the adequate number of sample could not arrange for the study.

- The functional outcome that found in this study was not compared with standard functional expectation guideline which was also a limitation of this study.
- There were limited resources and information available about the SCIM study as it is a new study within a Bangladeshi context.

5.2. Recommendations

5.2.1. Recommendations for Occupational therapists (OTs) in Bangladesh

OTs should implement a broader role and holistic treatment techniques for the persons with SCI. OTs need to update their knowledge in this area. OTs should involve the family members in treatment to reduce physical, mental, and social strain. OTs needs to concentrate more on this issue during the treatment period. Active involvement of the patient in the therapy session is also important to get maximum outcome. For these reason, it is necessary to involve the patient in different management program such as-energy conservation techniques, coping strategies, exercises etc. Occupational therapist need to follow client centered approach during treatment session to ensure maximum independence of the patient in everyday activities.

5.2.2. Recommendations for further research

The researcher's recommendation is that OTs needs to study this topic in depth. This may involve:

- If other authors want to further related study they are recommended for increasing sample size. If researcher conducts the study with large samples then it will be easy to generalise the result.
- In this study, researcher only took data from patients' file. So for further study researcher strongly recommended to collect data directly from patients.
- In this study, no comparison was done with standard functional expectation guideline. So for further study researcher strongly recommended to compare the functional outcome of each level of injury with the standard functional expectation guideline.
- If the researcher will take long term study, the result will be more significant.

Chapter 08
Conclusion

SCI is a condition which can occurs with traumatic or non-traumatic causes. It can hamper a person's full life at any age. Bangladesh is a highly populated country and male are mainly involved in outside occupation rather than female. Males are work at every area without maintaining any safety hazard. For that reason males are more prompt to having SCI. After SCI male persons become depended on their family and their income also become decrease day by day. They become depress which can hamper QOL after having SCI. SCI affects an individual and their family physically, psychologically, socially and economically. However it should be considered that it is necessary to provide more information during the rehabilitation period. The main aim is to helping person with a SCI to adapt to the new conditions and so that they will be able to express their expression in a new way. Skilled Occupational Therapists can help them in different ways to adapt their new situation in their daily lives.

In the context of Bangladesh, SCI occurs caused by fall from height, road accidents also others.[55] After SCI when it's affects the overall QOL of a person. They became independent in their everyday activities. They considered them as a good for nothing and became depressed about their life. They lost confidence to involve them in activities. Active participation is important to recover function. Recovery varies from sex, age and duration of treatment. Recovery also depends on cultural, social and environmental context. Strong association found between age and recovery in self care activities. Maximum recovery found among 21- 30 years people. Recovery rate is better of incomplete patients rather than complete. SCI management and rehabilitation is a long time process. It is important to create awareness, receive proper step to reduce the risk of SCI. Occupational therapists will listen and take actions which fulfill their professionals' role. Researcher hopes, if therapists concentrate on this issue properly it may improve quality of life for people with a SCI.[23]

References:

1. Hoque M, Hasan Z, Razzak A, Helal S. Cervical spinal cord injury due to fall while carrying heavy load on head: a problem in Bangladesh. Spinal Cord. 2011;50(4):275-277.
2. Islam M, Jahan H, Hossain M, Patwary M. Quality of Life among Persons with Paraplegic Spinal Cord Injury. Disability, CBR & Inclusive Development. 2016;27(3):102.
3. Van den Berg M, Castellote J, Mahillo-Fernandez I, de Pedro-Cuesta J. Incidence of Spinal Cord Injury Worldwide: A Systematic Review. Neuroepidemiology. 2010;34(3):184-192.
4. Arango-Lasprilla JC, Ketchum JM, Starkweather A, Nicholls E, Wilk AR. Factors predicting depression among persons with spinal cord injury 1 to 5 years post injury. NeuroRehabilitation. 2011 Jan 1;29(1):9-21.
5. Chen Y, Tang Y, Vogel L, DeVivo M. Causes of Spinal Cord Injury. Topics in Spinal Cord Injury Rehabilitation. 2013;19(1):1-8.
6. Nwankwo OUche E. Epidemiological and treatment profiles of spinal cord injury in southeast Nigeria. Spinal Cord. 2013;51(6):448-452.
7. Mothe ATator C. Review of transplantation of neural stem/progenitor cells for spinal cord injury. International Journal of Developmental Neuroscience. 2013;31(7):701-713.
8. Nwankwo OUche E. Epidemiological and treatment profiles of spinal cord injury in southeast Nigeria. Spinal Cord. 2013;51(6):448-452.
9. Spinal Cord Injury (SCI) Facts and Figures at a Glance. The Journal of Spinal Cord Medicine. 2016; 39(1):123-124.
10. Fehlings M, Singh A, Tetreault L, Kalsi-Ryan S, Nouri A. Global prevalence and incidence of traumatic spinal cord injury. Clinical Epidemiology. 2014:309.
11. Derakhshanrad N, Yekaninejad M, Vosoughi F, Sadeghi Fazel F, Saberi H. Epidemiological study of traumatic spinal cord injuries: experience from a specialized spine center in Iran. Spinal Cord. 2016;54(10):901-907.
12. Mueller G, Hopman M, Perret C. Comparison of respiratory muscle training methods in individuals with motor and sensory complete tetraplegia: A randomized controlled trial. Journal of Rehabilitation Medicine. 2013;45(3):248-253.

13. New P, Simmonds F, Stevermuer T. A population-based study comparing traumatic spinal cord injury and non-traumatic spinal cord injury using a national rehabilitation database. Spinal Cord. 2010;49(3):397-403.
14. Anderson K, Aito S, Atkins M, Biering-Srensen F, Charlifue S, Curt A et al. Functional recovery measures for spinal cord injury: an evidence-based review for clinical practice and research. J Spinal Cord Med 2008; 31: 133–144.
15. Magasi S, Heinemann A, Whiteneck G. Participation Following Traumatic Spinal Cord Injury: An Evidence-Based Review for Research. The Journal of Spinal Cord Medicine. 2008; 31(2):145-156.
16. Abdur Razzak AT, Uddin Helal S, Parvin Nuri R. Life Expectancy of Persons with Spinal Cord Injury (SCI) Treated in a Rehabilitation Centre at Dhaka, Bangladesh. Disability, CBR & Inclusive Development. 2011 Sep 1;22(2).
17. Catz A Itzkovich M. Spinal Cord Independence Measure: Comprehensive ability rating scale for the spinal cord lesion patient. The Journal of Rehabilitation Research and Development. 2007; 44(1):65.
18. Brogioli M, Schneider S, Popp W, Albisser U, Brust A, Velstra I et al. Monitoring Upper Limb Recovery after Cervical Spinal Cord Injury: Insights beyond Assessment Scores. Frontiers in Neurology. 2016;7.
19. Dickson A, O'Brien G, Ward R, Allan D, O'Carroll R. The impact of assuming the primary caregiver role following traumatic spinal cord injury: An interpretative phenomenological analysis of the spouse's experience. Psychology & Health. 2010;25(9):1101-1120.
20. Craig A, Tran Y, Middleton J. Psychological morbidity and spinal cord injury: a systematic review. Spinal Cord. 2008;47(2):108-114.
21. Rhee JM, Shamji MF, Erwin WM, et al. Nonoperative management of cervical myelopathy: a systematic review. Spine (Phila Pa 1976). 2013;38(22 Suppl 1):S55–S67.
22. Whalley Hammell K. Experience of rehabilitation following spinal cord injury: a meta-synthesis of qualitative findings. Spinal Cord. 2007.
23. Wirth B, van Hedel H, Kometer B, Dietz V, Curt A. Changes in Activity After a Complete Spinal Cord Injury as Measured by the Spinal Cord Independence Measure II (SCIM II). Neurorehabilitation and Neural Repair. 2007;22(2):145-153.

24. Anderson K, Aito S, Atkins M, Biering-Srensen F, Charlifue S, Curt A et al. Functional recovery measures for spinal cord injury: an evidence-based review for clinical practice and research. J Spinal Cord Med 2008; 31: 133–144.
25. Magasi S, Heinemann A, Whiteneck G. Participation Following Traumatic Spinal Cord Injury: An Evidence-Based Review for Research. The Journal of Spinal Cord Medicine. 2008; 31(2):145-156.
26. Bickenbach J. International perspectives on spinal cord injury. 1st ed. Geneva: World health organization; 2013.
27. Kirshblum S.C, Burns S.P, Biering-Sorensen F, Donovan W, Graves D.E, Jha A, Johansen M, Jones L, Krassioukov A, Mulcahey MJ, Schmidt-Read M. International standards for neurological classification of spinal cord injury (revised 2011). The journal of spinal cord medicine. 2011 Nov 1; 34(6):535-46.
28. Verhaagen JMcDonald J. Spinal cord injury. 14th ed. Edinburgh: Elsevier; 2012.
29. Network A. Spinal Cord Injury [Internet]. Spinal-injury.net. 2017 [cited 22 February 2017].
30. Novy J. Spinal cord syndromes. InManifestations of Stroke 2012 Feb 14 (Vol. 30, pp. 195-198). Karger Publishers.
31. Fraser S, Roberts L, Murphy E. Cauda equina syndrome: a literature review of its definition and clinical presentation. Archives of physical medicine and rehabilitation. 2009 Nov 30;90(11):1964-8.
32. Define Tetraplegic | C1–C8 Spinal Cord Injury [Internet]. Tetraplegicliving.com. 20175[cited 5 March 2017]. Available from: http://www.tetraplegicliving.com/what-is-a-tetraplegic-disability-info
33. Kirshblum S.C, Burns S.P, Biering-Sorensen F, Donovan W, Graves D.E, Jha A, Johansen M, Jones L, Krassioukov A, Mulcahey MJ, Schmidt-Read M. International standards for neurological classification of spinal cord injury (revised 2011). The journal of spinal cord medicine. 2011 Nov 1; 34(6):535-46.
34. What are the consequences of a spinal cord injury? [Internet]. Wingsforlife.com. 2017 [cited 11 March 2017]. Available from: http://www.wingsforlife.com/en/latest/what-are-the-consequences-of-a-spinal-cord-injury-457
35. Spinal cord injury [Internet]. World Health Organization. 2013 [cited 9 March 2017]. Available from: http://www.who.int/mediacentre/factsheets/fs384/en/

36. Atchison B, Dirette DK, editors. Conditions in occupational therapy: effect on occupational performance. Lippincott Williams & Wilkins; 2007.
37. Brayman SJ, Clark GF, DeLany JV, Garza ER, Radomski MV, Ramsey R, Siebert C, Voelkerding K, LaVesser PD, King L, Lieberman D. Scope of practice (2004). The American journal of occupational therapy: official publication of the American Occupational Therapy Association. 2003 Dec;58(6):673-7.
38. Functional Goals per Level of Complete Spinal Cord Injury [Internet]. Sci-info-pages.com. 2016 [cited 3 March 2017]. Available from: http://www.sci-info-pages.com/function.html.
39. Deeming T. Spinal Cord Injuries and the Importance of Rehabilitation [Internet]. Slater and Gordon Lawyers. 2017 [cited 2 March 2017]. Available from: http://www.slatergordon.co.uk/media-centre/blog/2015/09/spinal-cord-injuries-and-the-importance-of-rehabilitation.
40. Occupational Therapy Practice Framework: Domain and Process (3rd Edition). American Journal of Occupational Therapy. 2014;68(Supplement_1):S1-S48.
41. RNOH communications department 0. Occupational therapy (Spinal Cord Injury Centre) | Royal National Orthopaedic Hospital NHS Trust [Internet]. Rnoh.nhs.uk. 2016 [cited 7 April 2017]. Available from: https://www.rnoh.nhs.uk/our-services/spinal-cord-injury-centre/occupational-therapy-spinal-cord-injury-centre
42. Definition of Age [Internet]. Merriam-webster.com. 2017 [cited 27 March 2017]. Available from: https://www.merriam-webster.com/dictionary/age
43. Definition of sex [Internet]. Merriam-webster.com. 2017 [cited 27 March 2017]. Available from: https://www.merriam-webster.com/dictionary/sex
44. Definition of occupation [Internet]. Merriam-webster.com. 2017 [cited 27 March 2017]. Available from: https://www.merriam-webster.com/dictionary/ occupation
45. Ferrans CE, Zerwic JJ, Wilbur JE, Larson JL. Conceptual model of health-related quality of life. Journal of Nursing Scholarship. 2005 Dec 1;37(4):336-42.
46. Fontinelle A. Income [Internet]. Investopedia. 2017 [cited 30 March 2017]. Available from: http://www.investopedia.com/terms/i/income.asp
47. What Is Physical Health? - Definition, Components & Examples - Video & Lesson Transcript | Study.com [Internet]. Study.com. 2017 [cited 27 March

2017]. Available from: http://study.com/academy/lesson/what-is-physical-health-definition-components-examples.html
48. Ura K, Alkire S, Zangmo T, Wangdi K. A short guide to gross national happiness index. The centre for Bhutan studies; 2012.
49. Definition of Independence [Internet]. Merriam-webster.com. 2017 [cited 27 March 2017]. Available from: https://www.merriam-webster.com/dictionary/ Independence
50. Definition of Leisure [Internet]. Merriam-webster.com. 2017 [cited 27 March 2017]. Available from: https://www.merriam-webster.com/dictionary/ Leisure .
51. Anthonisen N. Retrospective Studies. Canadian Respiratory Journal. 2009;16(4):117-118.
52. Fraenkel JR, Wallen NE, Hyun HH. How to design and evaluate research in education. New York: McGraw-Hill; 1993 Jan.
53. Ackerman P, Morrison S, McDowell S, Vazquez L. Using the Spinal Cord Independence Measure III to measure functional recovery in a post-acute spinal cord injury program. Spinal Cord. 2009;48(5):380-387.
54. Wirth B, van Hedel H, Kometer B, Dietz V, Curt A. Changes in Activity After a Complete Spinal Cord Injury as Measured by the Spinal Cord Independence Measure II (SCIM II). Neurorehabilitation and Neural Repair. 2007;22(2):145-153.
55. Abdur Razzak AT, Uddin Helal S, Parvin Nuri R. Life Expectancy of Persons with Spinal Cord Injury (SCI) Treated in a Rehabilitation Centre at Dhaka, Bangladesh. Disability, CBR & Inclusive Development. 2011 Sep 1;22(2).
56. Anderson CJ, Vogel LC, Chlan KM, Betz R, McDonald CM. Depression in adults who sustained spinal cord injuries as children or adolescents. The journal of spinal cord medicine. 2007 Jan 1;30(sup1):S76-82.
57. Nwankwo OE, Uche EO. Epidemiological and treatment profiles of spinal cord injury in southeast Nigeria. Spinal cord. 2013 Jun 1;51(6):448-52.
58. Islam MS, Jahan H, Hossain MS, Patwary MF. Quality of Life among Persons with Paraplegic Spinal Cord Injury. Disability, CBR & Inclusive Development. 2016 Nov 14;27(3):102-17.
59. De Groot S, Dallmeijer AJ, Post MW, van Asbeck FW, Nene AV, Angenot EL, van der Woude LH. Demographics of the Dutch multicenter prospective cohort

study ‘Restoration of mobility in spinal cord injury rehabilitation’. Spinal cord. 2006 Nov 1;44(11):668-75.

60. Ning GZ, Mu ZP, Shangguan L, Tang Y, Li CQ, Zhang ZF, Zhou Y. Epidemiological features of traumatic spinal cord injury in Chongqing, China. The journal of spinal cord medicine. 2016 Jul 3;39(4):455-60.
61. De Groot S, Dallmeijer AJ, Post MW, van Asbeck FW, Nene AV, Angenot EL, van der Woude LH. Demographics of the Dutch multicenter prospective cohort study ‘Restoration of mobility in spinal cord injury rehabilitation’. Spinal cord. 2006 Nov 1;44(11):668-75.
62. Chhabra HS, Arora M. Demographic profile of traumatic spinal cord injuries admitted at Indian Spinal Injuries Centre with special emphasis on mode of injury: a retrospective study. Spinal Cord. 2012 Oct 1;50(10):745-54.
63. Lidal IB, Huynh TK, Biering-Sørensen F. Return to work following spinal cord injury: a review. Disability and rehabilitation. 2007 Jan 1;29(17):1341-75.
64. Rathore MF, Rashid P, Butt AW, Malik AA, Gill ZA, Haig AJ. Epidemiology of spinal cord injuries in the 2005 Pakistan earthquake. Spinal cord. 2007 Oct 1;45(10):658-63.
65. Wang HF, Yin ZS, Chen Y, Duan ZH, Hou S, He J. Epidemiological features of traumatic spinal cord injury in Anhui Province, China. Spinal Cord. 2013 Jan 1;51(1):20-2.
66. New P, Epi M. The Influence of Age and Gender on Rehabilitation Outcomes in Nontraumatic Spinal Cord Injury. The Journal of Spinal Cord Medicine. 2007;30(3):225-237.
67. Furlan JC, Fehlings MG. The impact of age on mortality, impairment, and disability among adults with acute traumatic spinal cord injury. Journal of neurotrauma. 2009 Oct 1;26(10):1707-17.

APPENDIX-1

Approval letter for conducting research

BANGLADESH HEALTH PROFESSIONS INSTITUTE

বাংলাদেশ হেল্‌থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)

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Date: 03/01/2017

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Session: 2012-2013, DU Reg. 5203
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Subject: Approval of the thesis proposal – "Functional recovery of Spinal Cord Injury (SCI) patients" by IRB of BHPI.

Dear Maitry Gope,

Congratulation!

The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application on December 1, 2016 to conduct the above mentioned thesis, with yourself, as the Principal investigator. The Following documents have been reviewed and approved:

SL#	Name of the Documents
1	Thesis Proposal
2	Questionnaire
3	Information sheet & consent form.

Since the study involves answering a questionnaire that takes 15 to 20 minutes, have no likelihood of any harm to the participants rather possibility of benefit by knowing functional recovery of Spinal Cord Injury patient in Bangladesh from the information of Questionnaire, IRB has approved the study to be conducted in the presented form at the meeting held at 08:30 AM on December 10, 2016 at BHPI.

IRB 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. IRB of BHPI is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,

Millat Hossain

Muhammad Millat Hossain
Senior Lecturer,
Dept. of M.Sc. in Rehabilitation Science
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh.

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ, ফোন ঃ ৭৭৪৫৪৬৪-৫, ৭৭৪১৪০৪ ফ্যাক্স ঃ ৭৭৪৫০৬৯
CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404, Fax : 7745069, E-mail : contact@crp-bangladesh.org, www.crp-bangladesh.org

Appendix-2

Permission letter for data collection

24 December, 2016
The Head of the Department
Department of Occupational Therapy
Center for the Rehabilitation of Paralyzed (CRP), Savar, Dhaka-1343

Subject: Application for ethical approval to collect data for the research project from the patients file.

Sir,
With due respect I would like to draw your kind attention that I am a student of BSc in Occupational therapy at Bangladesh Health Professions Institute (BHPI)- an academic institute of CRP under Faculty of Medicine of University of Dhaka (DU). This is a 4-year full-time course and 1-year internship. I have to conduct a thesis entitled, "Functional recovery of Spinal Cord Injury (SCI) patients" under honorable supervisors, SK. Moniruzzaman, Assistant professor and Head of the department, Department of Occupational Therapy, and Mir Hasan Shakil Mahmud, Lecturer, Department of Occupational Therapy. The purpose of the study is to assess the functional recovery level of spinal cord injury patients after taking rehabilitation service.
Spinal Cord Independence Measure (SCIM) scale will be used in order to make the functional assessments of patients with paraplegia or tetraplegia more sensitive to changes. As it is a retrospective study, the data will be collected from the files of SCI patients of 2016 who have been discharged from CRP after taking rehabilitation. Related information will also be collected from the patients' files. Data collector will keep the collected data confidential. Your permission is required to access the files for data collection.

Therefore I look forward to having your kind approval for the thesis proposal and to start data collection. I can also assure you that I will maintain all the requirements for study.

Sincerely yours,
Maitry Gope
Maitry Gope
Student of BSc in Occupational therapy
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

She may allowed to collect data.
24.12.16
Md. Julker Nayan
Assistant Professor & Head of OT
Occupational Therapy Department
CRP, Savar, Dhaka-1343

Recommendation from the thesis supervisor:

Approved by	Signature and Comments
SK. Moniruzzaman Assistant professor and Head of the department Department of Occupational Therapy Bangladesh Health Professions Institute (BHPI), CRP-Chapain, Savar	Sk. Mz 24.12.2016
Mir Hasan Shakil Mahmud Lecturer, Department of Occupational Therapy BHPI CRP-Chapain, Savar	24.12.16

Approved
26/12/16
DR. SAYEED UDDIN HASAN
MBBS, MPH, MS (Neurosurgery)
Consultant Neurosurgeon &
Head of Medical Services Wing, CRP

APPENDIX-3

Consent Form

সম্মতিপত্র

গবেষক, মৈত্রী গোপ বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউট (বি এইচ পি আই) এর ছাত্রী যা পক্ষাঘাতগ্রস্থদের পুনর্বাসন কেন্দ্র (সিআরপি) এর একটি শিক্ষা প্রতিস্থান। তিনি অকুপেশনাল থেরাপী বিভাগে ৪র্থ বর্ষে অধ্যয়নরত আছেন। এই গবেষণাটি তার অধ্যয়নের একটি অংশ। গবেষণাটির শিরোনাম, **"সুষুম্না বা মেরুদন্ডতে আঘাতপ্রাপ্ত (এস.সি.আই) রোগীদের ক্রিয়ার পুনঃলাভ অথবা পুনঃপ্রগতি"।**

আমি..... গবেষণাটির উদ্দেশ্য সম্পর্কে যথেষ্ট অবগত হয়েছি। আমি যে কোন সময় যে কোন মুহূর্তে গবেষণা থেকে অংশগ্রহণ বাতিল করতে পারব এবং এর জন্য কারও কাছে জবাবদিহি করতে বাধ্য থাকব না।

উক্ত গবেষণায় অংশগ্রহণকারীদের উপকার নাও আসতে পারে, তবে ভবিষ্যতে অংশগ্রহণকারীর মতো ব্যক্তিগন গবেষণা থেকে উপকৃত হতে পারেন। গবেষক অংশগ্রহণকারীদের অনুমতি সাপেক্ষে তথ্য সংগ্রহের জন্য মোবাইল ফোন ব্যাবহার করতে পারবেন।

আমি অবগত হয়েছি যে, গবেষণার জন্য আমার দেয়া সব তথ্য নিরাপদ ও গোপন রাখা হবে এবং যদি প্রকাশনার কাজে ব্যবহার করা হয় তাহলেও নামহীন ভাবে প্রকাশ করা হবে। আমার নাম, ঠিকানা এই গবেষণায় কোথাও প্রকাশ করা হবে না, এবং তা গবেষণার পর নষ্ট করে ফেলা হবে।

উপরুক্ত সমস্ত তথ্যাবলী জেনে আমি সম্পূর্ণ স্বেচ্ছায় এ গবেষণায় স্বতঃস্ফূর্তভাবে অংশগ্রহণ করছি।

স্বাক্ষর

অংশগ্রহণকারী স্বাক্ষরঃ	তারিখঃ
সাক্ষীর স্বাক্ষরঃ	তারিখঃ
গবেষকের স্বাক্ষরঃ	তারিখঃ

Consent form

The researcher Maitry Gope is a student of the Bangladesh Health Professions Institute (BHPI) which is the academic institute of the Centre for the Rehabilitation of the Paralyzed (CRP), Savar, Dhaka. She is studying in 4th year in Occupational Therapy Department of BHPI. This study is a part of her course curriculum. The title of the study is, "**FUNCTIONAL RECOVERY OF SPINAL CORD INJURY (SCI) PATIENTS**''.

In this study I am ……. a participant or sample and I have been clearly informed about the purpose of the study. I will have the right to withdraw in taking part from the study at any time at any stage and I am not bounded to answer to anyone for this. This study may not give any benefit or impact on participant work at present but in future people similar to them may get benefit from the study. Researcher can use mobile phone to get information for study purpose according to the permission of the participants.

I also informed that, researcher will keep all information safe and confidential and the identity of me will not be disclosed in publication of the study. Personal identity such as participant's name and address will not be published anywhere of the study and the confidential document will be destroyed after end of the study has been published.
I have been informed about the above-mentioned information and I am willingly agreed to be a participant of the study with giving my consent.

Signature

Signature of the Study Participant:	Date-
Signature of the witness:	Date-
Signature of the Researcher:	Date-

APPENDIX-4

Questionnaire

Data Collection Form

General information **Date**:

Patient name: **ID no**

Date of injury:..... Date of admission:..... Date of discharge:.....

Sl No	Question Characteristics	Coding Categories	Code
1.	Age	……..years	
2.	Sex	Male = 1 Female = 2	
3.	Marital status	Unnmarried =1 Married =2 Seperated =3 Divorced =4 Widowed/Widowerd = 5	
4.	Skeletal level of injury	Cervical = 1 Thoracic = 2 Lumber = 3 No =4	
5.	Neurological level	ASIA scale A = 1 ASIA scale B = 2 ASIA scale C = 3 ASIA scale D = 4 ASIA scale E = 5 SCI without neurological deficit=6	
6.	Type of injury	Complete paraplegia = 1 Incomplete paraplegia = 2 Complete tetraplegia = 3 Incomplete tetraplegia = 4 SCI without neurological deficit =5 Spinal tumor=6	
7.	Cause of injury	Traumatic = 1 Non- traumatic =2	
8.	Physical status	Oedema: Yes = 1 No = 2	
		Contracture: Yes = 1 No = 2	
		Muscle wasting: Yes = 1 No = 2	
		Pressure sore: Yes = 1 No = 2	

		Pain: Yes = 1 No = 2	
9.	Use of adaptive device	Wheelchair = 1 Crutch = 2 Walking stick = 3 Walkng frame = 4 Others = 5	
10.	Number of family members	……	
11.	Families present income generation	Son=1; Wife=2; Daughter=3; Brother=4; Father=5; Mother=6; Others=7; No one=8	
12.	Educational status	Illiterate= 1 Can sign only = 2 Primary (Class I-V) = 3 Secondary (Class VI- IX) = 4 SSC = 5 HSC = 6 Degree = 7 Masters = 8 Others = 9 (Specify).....	
13.	Occupation	House wife = 1 Farmer = 2 Service holder = 3 Buissiness= 4 Student = 5 Garments worker = 6 Daily Labour= 7 Others = 9)Specify(.....	
14.	Home environment	Area: Rural = 1 /Semi urban = 2/ Urban = 3 / Others = 4.	
		Access road type: Tarmac = 1 / Mud = 2 / Brick = 3 / Others = 4.	
15.	House type	Stairs for entering the room: Yes = 1 / No = 2.	
		Varanda: Yes = 1 / No = 2.	
16.	Toilet	Inside = 1 Outside = 2	
17.	Type of toilet	Asian = 1 Western = 2 Others = 3	
18.	Water source	Tap = 1 Tubewell = 2 Pond= 3 Others = 4	

Spinal Cord Independent Measure (SCIM)

Self- Care

1. Feeding (cutting, opening containers, pouring, bringing food to mouth, holding cup with fluid)

0. Needs pare anal, gastrostomy, or fully assisted oral feeding
1. Needs partial assistance for eating and /or drinking, or for wearing adaptive devices
2. Eats independently; needs adaptive or assistance only for cutting food and/or pouring and/or opening containers
3. Eats and drinks independently; does not require assistance or adaptive devices

2. Bathing (soaping, washing, drying body and head, manipulating water tap).A-upper body; B-lower body

A. 0. Requires total assistance
1. Require partial assistance
2. Washes independently with adaptive devices or in a specific setting (e.g., bars, chair)
3. Washes independently; does not require adaptive devices or specific setting (not customary for healthy people)

B. 0. Requires total assistance
1. Require partial assistance
2. Washes independently with adaptive devices or in a specific setting (adss)
3. Washes independently; does not require adaptive devices (adss) or specific setting

3. Dressing (clothes, shoes, and permanent orthoses: dressing, wearing, and undressing). A-upper body; B-lower body

A. 0.requires total assistance
1. Requires partial with clothes without buttons, zippers or laces (cwobzl)
2. Independent with cwobzl; requires adaptive devices and/ or specific settings (adss)
3. Independent with cwobzl; does not require adss; needs assistance or adss only for bzl
4. Dresses (any cloth) independently; does not require adaptive devices or specific setting

B. 0.Requires total assistance
1. Requires partial assistance with clothes without buttons, zipps or laces

(cwobzl)

2. Independent with cowbzl; requires adaptive devices and/or specific settings (adss)

3. Independent with cwobzl without adss; needs assistance or adss only for bzl

4. Dresses (any cloth) independently; does not require adaptive devices or specific setting

4. Grooming (washing hands and face, brushing teeth, combing hair, shaving, applying makeup)

0. Requires total assistance

1. Requires partial assistance

2. Grooms independently with adaptive devices

3. Grooms independently without adaptive devices

SUB-TOTAL (0-20)

Respiration and Sphincter Management

5. Respiration

0. Requires tracheal tube (TT) and permanent or intermittent assisted ventilation (IAV)

2. Breathes independently with TT; requires oxygen, much assistance in coughing or TT management

4. Breathes independently with TT; requites little assistance in coughing or TT management

6. Breathes independently without TT; requires oxygen, much assistance in coughing, a mask (e.g.,peep) or IAV (bipap)

8. Breathes independently without TT; requires little assistance or stimulation for coughing

10. Breathes independently without assistance or device

6. Sphincter Management- Bladder

0. Indwelling catheter

3. Residual urine volume (RUV)>100cc; no regular catheterization or assisted intermittent cathethrization

6. RUV<100cc or intermittent self- catheterization; needs assistance for applying drainage instrument

9. Intermittent self-catheterization; uses external drainage instrument; does not need assistance for applying

11. Intermittent self-catheterization; continent between catheterizations; does not use external insrtrument

13. RUV< 100cc; needs only external urine drainage; no assistance is required for drainage

15. RUV<100cc; continent; does not use external drainage instrument

7. Sphincter Management – Bowel

0. Irregular timing or very low frequency (less than once in 3 days) of bowel movements

5. Regular timing, but requires assistance (e.g, for applying suppository); rare accidents (less than twice a month)

8. Regular bowel movements, without assistance; rare accidents (less than twice a monts)

10. Regular bowel movements, without assistance; no accidents

8. Use of Toilet (perineal hygiene, adjustment of clothes before / after, use of napkins or diapers).

0. Requires total assistance

1. Requires partial assistance; does not clean self

2. requires partial assistance; cleans self independently

4. Uses toilet independently in all tasks but needs adaptive devices or special setting (e.g., bars)

5. Uses toilet independently; does not require adaptive devices or special setting

SUB-TOTAL (0-40)

Mobility (room and toilet)

9. Mobility in Bed and Action to Prevent Pressure Sores

0. Needs assistance in all activities: turning upper body in bed, turning lower body in bed, sitting up in Bed, doing push-ups in wheelchair, with or without adaptive devices, but not electric aids

2. Performs one of the activities without assistance

4. Performs two or three of the activities without assistance

6. Performs all the bed mobility and pressure release activities independently

10. Transfers: bed- wheelchair (locking wheelchair, lifting footrests, removing and adjusting arm rests, transferring, lifting feet).

0. Requires total assistance

1. needs partial assistance and /or supervision, and/or adaptive devices (e.g., grab-bars)

2. Independent (or does not require wheelchair)

11. Transfers: wheelchair-toilet-tub (if uses toilet wheelchair: transfers to and from; if uses regular Wheelchair: locking wheelchair, lifting footrests, removing and adjusting armrests, transferring, lifting feet)

0. Requires total assistance

1. Needs partial assistance and /or supervision, and/or adaptive devices (e.g., grab-bars)
2. Independent (or does not require wheelchair)

Mobility (indoors and outdoors, on even surface)

12. Mobility Indoors

0. Requires total assistance
1. Needs electric wheelchair or partial assistance to operate manual wheelchair
2. Moves independently in manual wheelchair
3. Requires supervision while while walking (with or without devices)
4. Walks with a walking frame or crutches (swing)
5. Walks with crutches or two canes (reciprocal walking)
6. Walks with one cane
7. Needs leg orthosis only
8. Walks without walking aids

13. Mobility for Moderate Distances (10 – 100 meters)

0. Requires total assistance
1. Needs electric wheelchair or partial assistance to operate manual wheelchair
2. Moves independently in manual wheelchair
3. Requires supervision while walking (with or without devices)
4. Walks with a walking frame or crutches (swing)
5. Walks with crutches or two canes (reciprocal walking)
6. Walks with one cane
7. Needs leg orthosis only
8. Walks without walking aids

14. Mobility Outdoors (more than 100 meters)

0. Requires total assistance
1. Needs electric wheelchair or partial assistance to operate manual wheelchair
2. Moves independently in manual wheelchair
3. Requires supervision while walking (with or without devices)
4. Walks with a walking frame or crutches (swing)
5. Walks with crutches or two canes (reciprocal waking)
6. Walks with one cane
7. Needs leg orthosis only
8. Walks without walking aids

15. Stair Management

0. Unable to ascend or descend stairs

1. Ascends and descends at least 3 steps with support or supervision of another person

2. Ascends and descends at least 3 steps with support of handrail and/ or crutch or cane

3. Ascends and descends at least 3 steps without any support or supervision

16. Transfers: wheelchair-car (approaching car locking wheelchair, removing arm - and footrests, transferring to and from car bringing wheelchair into and out of car)

0. Requires total assistance

1. Needs partial assistance and/or supervision and/or adaptive devices

2. Transfers independent; does not require adaptive devices (or does not require wheelchair)

17. Transfers: ground-wheelchair

0. Requires assistance

1. Transfer independent with or without adaptive devices (or does not require wheelchair

SUB- TOTAL (0-40)

TOTAL SCIM SCORE (0- 100)

Modified Spinal cord Injury Measure (MSCIM)

1. Productivity (Communicate with buyer, operate instrument, prepare products, sell, counting money, documentation)

0-Requires total assistance

1-Requires partial assistance does not operate instrument

2 Independent requires adaptive devices or specific settings.

3-Income generating independently, does not requires adaptive devices or specific settings

2. Leisure (Collect necessary tools, participate specific activities-start, continue and finish, communicate with peers, cheerful mind)

0-Requires total assistance

1-Requires partial assistance to continue task, does not collect necessary tools

2-independent, requires adaptive devices or specific settings.

3-Independnt does not require adaptive devices or specific settings.

Domestic ADL

3. Cleaning (Sweep, collect dirt, keep in basket)

0-Requires total assistance

1-Requires partial assistance, does not collect dirt

2-independent requires adaptive devices or specific settings.

3-Independent does not require adaptive devices or specific settings

4. laundry (collect water, soaping, washes, squeezes cloth, dry)

0-Requires total assistance

1-Requires partial assistance, does not collect water.

2-independent requires adaptive devices or specific settings.

3-Independent does not require adaptive devices or specific settings

5. Cooking (Collect vegetable/rice, cutting, washes, firing, keep dish on burner, manipulate vegetable/rice, dry rice)

0-Requires total assistance

1-Requires partial assistance, does not cut vegetable

2-independent requires adaptive devices or specific settings.

3-Independent does not require adaptive devices or specific settings.

Sub- total (0-9)

TOTAL MSCIM SCORE

স্পাইনাল কর্ড ইনডিপেন্ডেন্ট মিজার (এসসিআইএম)

দেহের যত্ন

১. খাদ্যাভ্যাস (কাটাকাটির কাজ,পাত্র খোলা, পাত্রে খাবার নেয়া, খাবার গ্রহন করা, পাত্রে তরল সংরক্ষন)

০.প্রয়োজনীয় এনাল কর্তন, গাসট্রনমি বা সম্পূর্ণ সহযোগিতায় মৌখিক খাবার গ্রহন

১.আংশিক সহযোগিতায় সাহায্যকারী ডিভাইস প্রয়োজন।

২. আংশিক সহযোগিতায় খাবার গ্রহন বা পান করা, অথবা সাহায্যকারী ডিভাইস ব্যাবহার করা।

৩.নিজে নিজে খাবার ও পানি গ্রহন করা। কোন ধরনের সহযোগী বা সাহায্যকারী ডিভাইসের প্রয়োজন নেই।

২. গোসল (সাবান ব্যাবহার করা, ধোঁয়া, দেহ ও মাথা শুকানো এবং পানির কল ব্যাবহার করা)

(।) দেহের উপরিভাগ (।।) দেহের নিম্নভাগ

(।) দেহের উপরিভাগ

০. সার্বিক সহযোগিতা প্রয়োজন।

১. আংশিক সহযোগিতা প্রয়োজন।

২. কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাস (যেমনঃ যে কোন দণ্ড বা চেয়ার) ব্যাবহার করে নিজে নিজে ধোঁয়া।

৩.নিজে নিজে ধোঁয়া। কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাসের প্রয়োজন নেই (সুস্থ ব্যাক্তির জন্য প্রযোজ্য নয়)।

(।।) দেহের নিম্নভাগ

০. সার্বিক সহযোগিতা প্রয়োজন।

১. আংশিক সহযোগিতা প্রয়োজন।

২.কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাস (যেমনঃ এডস) ব্যাবহার করে নিজে নিজে ধোঁয়া।

৩. নিজে নিজে ধোঁয়া। কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাসের (যেমনঃ এডস) প্রয়োজন নেই।

৩. পোশাক পরিধান (পোশাক, জুতা ও অত্যাবশ্যকীয় অর্থসেস পরিধান করা বা এতে সজ্জিত হওয়া এবং পোশাক খুলে ফেলা)

(।) দেহের উপরিভাগ (।।) দেহের নিম্নভাগ

(।) দেহের উপরিভাগ

০. সার্বিক সহযোগিতা প্রয়োজন।

১. বোতাম, চেইন ও ফিতার (cwobzl) ক্ষেত্রে আংশিক সহযোগিতা প্রয়োজন।
২.cwobzlএর ক্ষেত্রে স্বাধীন। সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাসের (যেমনঃ এডস) প্রয়োজন।
৩.cwobzlএর ক্ষেত্রে স্বাধীন। এডস প্রয়োজন নেই, কিন্তু এডস বা bzlএর ক্ষেত্রে সহযোগী প্রয়োজন।
৪.যে কোন পোশাক নিজে নিজে পরিধান করতে সক্ষম। কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাসের প্রয়োজন নেই।
(।।) দেহের নিম্নভাগ

০. সার্বিক সহযোগিতা প্রয়োজন।
১. বোতাম, চেইন ও ফিতার (cwobzl) ক্ষেত্রে আংশিক সহযোগিতা প্রয়োজন।
২.cwobzlএর ক্ষেত্রে স্বাধীন। সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাসের (যেমনঃ এডস) প্রয়োজন।
৩.cwobzlএর ক্ষেত্রে স্বাধীন। এডস প্রয়োজন নেই, কিন্তু এডস বা bzlএর ক্ষেত্রে সহযোগী প্রয়োজন।
৪. যে কোন পোশাক নিজে নিজে পরিধান করতে সক্ষম। কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাসের প্রয়োজন নেই।
৪. সাজসজ্জা (হাত মুখ ধোঁয়া, দাঁত ব্রাশ করা, চুল আঁচড়ানো, শেভ করা, মেকআপ করা)
০. সার্বিক সহযোগিতা প্রয়োজন।
১.আংশিক সহযোগিতা প্রয়োজন।
২.নিজে নিজে সাজসজ্জার জন্য সাহায্যকারী ডিভাইস প্রয়োজন।
৩.নিজে নিজে সাজসজ্জার জন্য কোন ধরনের সাহায্যকারী ডিভাইস প্রয়োজন নেই।

মোট (০-২০)

শ্বাস-প্রশ্বাস ও স্ফিংটার ম্যানেজমেন্ট

৫. শ্বাস-প্রশ্বাস

০. ট্রেকাল টিউব (TT) প্রয়োজন এবং স্থায়ী বা অস্থায়ী সহযোগী ভ্যানটিলেশোন (IAV) প্রয়োজন।
২. ট্রেকাল টিউব (TT) এর সাহায্যে স্বাধীনভাবেশ্বাস-প্রশ্বাসসম্ভব। কফিঙ বা TT ম্যানেজমেন্ট এর জন্য অতিরিক্ত সাহায্য প্রয়োজন।
৪. ট্রেকাল টিউব (TT) এর সাহায্যে স্বাধীনভাবে শ্বাস-প্রশ্বাস সম্ভব। কফিঙ বা TT ম্যানেজমেন্ট এর জন্য সামান্য সাহায্য প্রয়োজন।

৬. ট্রেকাল টিউব (TT)ছাড়া স্বাধীনভাবে শ্বাস-প্রশ্বাস সম্ভব। অক্সিজেন প্রয়োজন, কফিঙ, মাস্ক (পীপ) বা IAV (বীপাপ) এর জন্য অতিরিক্ত সাহায্য প্রয়োজন।
৮. ট্রেকাল টিউব (TT)ছাড়া স্বাধীনভাবে শ্বাস-প্রশ্বাস সম্ভব। কফিঙ সিমুলটেশোন এর জন্য সামান্য সাহায্য প্রয়োজন।
১০. ট্রেকাল টিউব (TT)ছাড়া স্বাধীনভাবে শ্বাস-প্রশ্বাস সম্ভব।

৬. স্ফিংটার ম্যানেজমেন্ট- মূত্রাশয়

০. অভ্যন্তরীণ মূত্রনিষ্কাশক

৩. রিসিডূয়াল ইউরিন ভলিউম (RUV)>১০০ সিসি;নিয়মিত ক্যাথেরাইজেশন বা সাহায্যকারী অস্থায়ি ক্যাথেরাইজেশন হবে না।
৬.RUV<১০০ সিসি বা নিজস্ব অস্থায়ি ক্যাথেরাইজেশন; নিষ্কাশনের জন্য সহযোগিতা প্রয়োজন।
৯. নিজস্ব অস্থায়ি ক্যাথেরাইজেশন; বহির্গত নিষ্কাশনে ব্যাবহার করা হয়; কোন সাহায্যের প্রয়োজন নেই।
১১. নিজস্ব অস্থায়ি ক্যাথেরাইজেশন; ক্যাথেরাইজেশনের অন্তর্ভুক্ত; বহির্গত নিষ্কাশন ব্যাবহার করা হয় না।
১৩.RUV<১০০ সিসি; শুধু বহির্গত মূত্র নিষ্কাশন প্রয়োজন; নিষ্কাশনের জন্য কোন সহযোগিতা প্রয়োজন নেই।
১৫.RUV<১০০ সিসি; বহির্গত নিষ্কাশনের ব্যাবহার নেই।

৭. স্ফিংটার ম্যানেজমেন্ট- অন্ত্র

০.আন্ত্রিক বিচলন অনিয়মিত বা ধীর গতির (৩ দিনে ১ এরও কম)।
৫. নিয়মিত কিন্তু সাহায্য প্রয়োজন (যেমনঃ সাপোজিটরি প্রয়োগ) বিরল দুর্ঘটনা- মাসে ২ এরও কম।
৮. কোন সাহায্য ছাড়া নিয়মিতআন্ত্রিক বিচলন; বিরল দুর্ঘটনা- মাসে ২ এরও কম।
১০. কোন সাহায্য ছাড়া নিয়মিতআন্ত্রিক বিচলন; কোন বিরল ঘটনা ছাড়া।

৮. টয়েলেট ব্যাবহার (পেরিনিয়াল হাইজিন, ন্যাপকিন বা ডায়পার ব্যাবহার আগে ও পরে কাপড় সমন্বয়)

০. সার্বিক সহযোগিতা প্রয়োজন।
১. আংশিক সহযোগিতা প্রয়োজন। নিজে থেকে পরিষ্কার থাকা সম্ভব না।
২. আংশিক সহযোগিতা প্রয়োজন। নিজে থেকে পরিষ্কার থাকা সম্ভব।
৪. নিজে নিজে টয়েলেটের সব কাজ করা সম্ভব। কিন্তু সাহায্যকারী ডিভাইস বা স্পেশাল বিন্যাস (যেমনঃ দণ্ড) প্রয়োজন।
৫. নিজে নিজে টয়েলেটের সব কাজ করা সম্ভব। কিন্তু সাহায্যকারী ডিভাইস বা স্পেশাল বিন্যাস (যেমনঃ দণ্ড) প্রয়োজন নেই।

মোট (০-৪০)

চলাচল (রুম ও টয়েলেট)

৯. বিসানায় চলাচল ও চাপজনিত ক্ষত রোধে করণীয়

০. সব ধরনের কাজের জন্য সহযোগী প্রয়োজনঃসাহায্যকারী ডিভাইস ব্যাবহার করেবা না করে বিসানা থেকে দেহের উপরিভাগ সরানো, বিসানা থেকে দেহের নিম্নভাগ সরানো, বিসানায় উঠে বসা, হুইল চেয়ার চালানো, কিন্তু কোন ধরনের ইলেকট্রিক এইড ছাড়া।

২. কোন ধরনের সাহায্য ছাড়া যে কোন একটি কাজ করতে সক্ষম।

৪. কোন ধরনের সাহায্য ছাড়া যে কোন দুটি বা তিনটি কাজ করতে সক্ষম।

৬.কোন ধরনের সাহায্য ছাড়া নিজে নিজে বিসানায় চলাচল ও চাপজনিত ক্ষত রোধ করতে সক্ষম।

১০. স্থানান্তরঃ বিসানা- হুইল চেয়ার (হুইল চেয়ার লক, ফুটরেস্ট উঠানো, আরমরেস্ট সমন্বয়,স্থানান্তর, লিফটিং ফিট স্থনান্তর)

০. সার্বিক সহযোগিতা প্রয়োজন।

১. আংশিক সহযোগিতা প্রয়োজন বা রক্ষনাবেক্ষন বা সাহায্যকারী ডিভাইস (যেমনঃ গ্রেব বারস) প্রয়োজন।

২. নিজে নিজে চলাচল সম্ভব (হুইল চেয়ারপ্রয়োজন নেই)।

১১. চলাচলঃ হুইল চেয়ার- টয়েলেট (যদি টয়েলেটহুইল চেয়ার থাকেঃ সেখান থেকে স্থনান্তর; যদি হুইল চেয়ার থাকেঃহুইল চেয়ার লক, ফুটরেস্ট উঠানো, আরমরেস্ট সমন্বয়,স্থানান্তর, লিফটিং ফিট স্থনান্তর)

০. সার্বিক সহযোগিতা প্রয়োজন।

১. আংশিক সহযোগিতা প্রয়োজন বা রক্ষনাবেক্ষন প্রয়োজন কিংবা সাহায্যকারী ডিভাইস (যেমনঃ গ্রেব বারস) প্রয়োজন।

২. নিজে নিজে চলাচল সম্ভব (হুইল চেয়ারপ্রয়োজন নেই)।

চলাচল (ঘরের ভিতরে, বাইরে ও যে কোন স্থানে)

১২. ঘরের ভিতরে চলাচল

০. সার্বিক সহযোগিতা প্রয়োজন।

১. ইলেকট্রিক হুইল চেয়ারপ্রয়োজন বা ম্যানুয়াল হুইল চেয়ার এর জন্য আংশিক সহযোগিতাপ্রয়োজন।

২. ম্যানুয়াল হুইল চেয়ার দিয়ে নিজে নিজে চলাচল সম্ভব।

৩.হাঁটারসময় রক্ষনাবেক্ষনপ্রয়োজন (যে কোন ডিভাইস দিয়ে বা ডিভাইস ছাড়া)।

৪. হাঁটার জন্য ক্রাচ প্রয়োজন (সুইং)।

৫. হাঁটার জন্য ক্রাচ বা দুটি কেন্স প্রয়োজন।

৬. হাঁটার জন্য একটি কেন্স প্রয়োজন।

৭. শুধু লেগ অরথসিস প্রয়োজন।

৮. ওয়াকিং এইড ছাড়া হাঁটা সম্ভব।

১৩. বিভিন্ন দূরত্বে চলাচল (১০-১০০ মি.)

০. সার্বিক সহযোগিতা প্রয়োজন।

১. ইলেকট্রিক হুইল চেয়ারপ্রয়োজন বা ম্যানুয়াল হুইল চেয়ার এর জন্য আংশিক সহযোগিতাপ্রয়োজন। | | | | | | |

২. ম্যানুয়াল হুইল চেয়ার দিয়ে নিজে নিজে চলাচল সম্ভব।

৩.হাঁটার সময় রক্ষনাবেক্ষন প্রয়োজন (যে কোন ডিভাইস দিয়ে বা ডিভাইস ছাড়া)।

৪. হাঁটার জন্য ক্রাচ প্রয়োজন (সুইং)।

৫. হাঁটার জন্য ক্রাচ বা দুটি কেন্স প্রয়োজন।

৬. হাঁটার জন্য একটি কেন্স প্রয়োজন।

৭. শুধু লেগ অরথসিস প্রয়োজন।

৮. ওয়াকিং এইড ছাড়া হাঁটা সম্ভব।

১৪. ঘরের বাইরে চলাচল (১০০ মি. এর অধিক)

০. সার্বিক সহযোগিতা প্রয়োজন।

১. ইলেকট্রিক হুইল চেয়ারপ্রয়োজন বা ম্যানুয়াল হুইল চেয়ার এর জন্য আংশিক সহযোগিতাপ্রয়োজন। | | | | | | |

২. ম্যানুয়াল হুইল চেয়ার দিয়ে নিজে নিজে চলাচল সম্ভব।

৩.হাঁটার সময় রক্ষনাবেক্ষন প্রয়োজন (যে কোন ডিভাইস দিয়ে বা ডিভাইস ছাড়া)।

৪. হাঁটার জন্য ক্রাচ প্রয়োজন (সুইং)।

৫. হাঁটার জন্য ক্রাচ বা দুটি কেন্স প্রয়োজন।

৬. হাঁটার জন্য একটি কেন্স প্রয়োজন।

৭. শুধু লেগ অরথসিস প্রয়োজন।

৮. ওয়াকিং এইড ছাড়া হাঁটা সম্ভব।

১৫. সিঁড়ি

০. সিঁড়িতে আরোহণ বা অবরোহণ করা যাবে না।

১. কারও সহযোগিতা বা রক্ষনাবেক্ষনে কমপক্ষে ৩ স্টেপ আরোহণ বা অবরোহণ করা যাবে। | | | | | | |

২. হ্যান্ডরেইল, ক্রাচ বা কেন দিয়ে কমপক্ষে ৩ স্টেপ আরোহণ বা অবরোহণ করা যাবে।

৩. কারও সহযোগিতা বা রক্ষনাবেক্ষন ছাড়া কমপক্ষে ৩ স্টেপ আরোহণ বা অবরোহণ করা যাবে।

১৬. স্থানান্তরঃ হুইল চেয়ার- গাড়ি (কার লকিং হুইল চেয়ারে প্রবেশ, আরমরেস্ট ও ফুটরেস্ট সরানো, গাড়িতে উঠা ও নামা, গাড়িতে হুইল চেয়ার স্থানান্তর)

০. সার্বিক সহযোগিতা প্রয়োজন।

১. আংশিক সহযোগিতা প্রয়োজন বা রক্ষনাবেক্ষন প্রয়োজন কিংবা | | | | | | |

সাহায্যকারী ডিভাইস প্রয়োজন।
২. নিজে নিজে চলাচল সম্ভব। সাহায্যকারী ডিভাইস বা হুইল চেয়ারপ্রয়োজন নেই।

১৭. স্থানান্তরঃ ভূমি- হুইল চেয়ার

০. সার্বিক সহযোগিতা প্রয়োজন।
১. নিজে নিজে চলাচল সম্ভব। সাহায্যকারী ডিভাইস বা হুইল চেয়ারপ্রয়োজন নেই।

মোট (০-৪০)
সর্বমোট স্কিম স্কোর (০-১০০)

মডিফাইড স্পাইনাল কর্ড ইনজুরি মিজার (এমএসসিআইএম)

১. প্রোডাক্টিভিটি (ক্রেতার সাথে যোগাযোগ, উপকরণ চালানো, পণ্য উৎপাদন, বিক্রয়, অর্থ সংক্রান্ত হিসাব, নথিপত্র)

০. সার্বিক সহযোগিতা প্রয়োজন।
১. আংশিক সহযোগিতা প্রয়োজন কিন্তু উপকরণ চালানো যাবে না।
২.কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাস ব্যাবহার করে নিজে নিজে করা সম্ভব।
৩.কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাস ব্যাবহার ছাড়া নিজে নিজে আয় সংক্রান্ত কাজ সম্ভব।

২. অবসর (প্রয়োজনীয় উপকরন সংগ্রহ, কোন কর্মকাণ্ডের শুরু থেকে শেষ পর্যন্ত থাকা, সহকর্মীদের সাথে যোগাযোগ, প্রফুল্ল মন)

০. সার্বিক সহযোগিতা প্রয়োজন।
১.কর্মকাণ্ড সম্পাদনে আংশিক সহযোগিতা প্রয়োজন কিন্তু উপকরণ সংগ্রহ করা যাবে না।
২. কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাস ব্যাবহার করে নিজে নিজে করা সম্ভব।
৩.কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাস ব্যাবহার ছাড়া নিজে নিজে করা সম্ভব।

গৃহস্থালি কাজ

৩. পরিষ্কার পরিচ্ছন্ন (ঝাড়ু দেয়া, ময়লা সংগ্রহ, ঝুড়িতে রাখা)
০. সার্বিক সহযোগিতা প্রয়োজন।
১.আংশিক সহযোগিতা প্রয়োজন, ময়লা সংগ্রহ করা যাবে না।
২. কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাস ব্যাবহার করে নিজে নিজে করা সম্ভব।
৩.কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাস ব্যাবহার ছাড়া নিজে নিজে করা সম্ভব।

৪. লন্ড্রি (পানি সংগ্রহ, সাবান দেয়া, ধোঁয়া, পানি নিংড়ানো, কাপড় শুকানো)

০. সার্বিক সহযোগিতা প্রয়োজন।
১.আংশিক সহযোগিতা প্রয়োজন, পানি সংগ্রহ করা যাবে না।
২. কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাস ব্যাবহার করে নিজে নিজে করা সম্ভব।
৩.কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাস ব্যাবহার ছাড়া নিজে নিজে করা সম্ভব।

৫. রান্না (সবজি/চাল সংগ্রহ, কাটা, ধোঁয়া, আগুন জ্বালানো, চুলায় পাত্র রাখা, রান্না দেখাশুনা করা, ভাতের পানি অপসারণ)

০. সার্বিক সহযোগিতা প্রয়োজন।
১.আংশিক সহযোগিতা প্রয়োজন, সবজি কাটা যাবে না।
২. কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাস ব্যাবহার করে নিজে নিজে করা সম্ভব।
৩.কোন ধরনের সহযোগী, সাহায্যকারী ডিভাইস বা নির্দিষ্ট বিন্যাস ব্যাবহার ছাড়া নিজে নিজে করা সম্ভব।

মোট (0-৯)

সর্বমোট এমএসসিআইএম স্কোর