MEASUREMENT OF WHEELCHAIR SKILLS IN PATIENT WITH SPINAL CORD INJURY

Tahmina Akter

Bachelor of Science in Physiotherapy (B. Sc. PT)

Roll No:1620

Registration No:843

Session: 2009-2010

BHPI, CRP, Savar, Dhaka

Bangladesh Health Professions Institute (BHPI)

Department of Physiotherapy

CRP, Savar, Dhaka-1343

Bangladesh

August 2015

We the under signed certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitle

MEASUREMENT OF WHEELCHAIR SKILLS IN PATIENT WITH SPINAL CORD INJURY

Submitted by **Tahmina Akter**, for the partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy (B. Sc. PT).

…….
Mst Fatema Akter
Senior Lecturer of Physiotherapy
BHPI, CRP, Savar, Dhaka
(Supervisor)

……..
Md. Sohrab Hossain
Associate Professor, Physiotherapy, BHPI &
Head of the programs
CRP, Savar, Dhaka

……
Muhammad Millat Hossain
Senior Lecturer
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

……
Md. Shofiqul Islam
Assistant Professor
Department of Physiotherapy
BHPI,CRP,Savar,Dhaka

……
Md.Obaidul Haque
Associate Professor and Head
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

Declaration

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

Signature: **Date:**

Tahmina Akter
Bachelor of Science in Physiotherapy (B.Sc.PT)
Roll No:1620
Registration No:843
Session: 2009-2010
BHPI, CRP, Savar, Dhaka-1343

CONTENTS

Acknowledgement

All the praise must to Almighty Allah. At the same time my thanks with respect to my parents, who gave me constant support and covered all the expenditure of the study.

I am so much grateful to Md. Obaidul Haque, Associate Professor & Head, Department of Physiotherapy. My deepest great-fullness goes to my honorable Supervisor Mst Fatema Akter, Senior Lecturer of Physiotherapy, BHPI, for her proficient guidance to carry out this study and I could not able to complete this study without her support.

I am so much grateful to Md. Sohrab Hossain, Associate Professor, Physiotherapy, BHPI & Head of the programs, CRP.

I would specially give thanks to my honorable Teacher Mohammad Millat Hossain, Senior Lecturer, Department of Physiotherapy.

I would specially give thanks and I am very much grateful to my honorable Teacher Md. Shofiqul Islam, Assistant Professor, Department of Physiotherapy for giving me valuable time and suggestions.

I am very much grateful to all of the participants who give their important consent to participate in my research project.

I also pay my thanks to the staffs of BHPI library for helping me to find out journals for collecting literature of the study. I also like to thank all of my friends for their valuable support.

Acronyms

ASIA	**:**	American Spinal Injury Association
BHPI	**:**	Bangladesh Heath Professions Institute
BMRC	**:**	Bangladesh Medical Research Council
CRP	**:**	Center for the Rehabilitation of the Paralysed
IRB	**:**	Institutional Review Board
NTSCI	**:**	Non Traumatic Spinal Cord Injury
SCI	**:**	Spinal Cord Injury
SPSS	**:**	Statistical Package of Social Science
TSCI	**:**	Traumatic Spinal Cord Injury
WHO	**:**	World Health Organization
WS	**:**	Wheelchair Skills
WST	**:**	Wheelchair Skills Test
WSTP	**:**	Wheelchair Skills Training Program

List of Figures

.

List of Tables

.

Abstract

Purpose: To find out the measurement of wheelchair skills of person's with spinal cord injury in a tertiary rehabilitation center (CRP). *Objectives:* To evaluate the wheelchair manuver, to identify the transfer skills, to find out the total WST score, to see socio-demographic factors. *Methodology:* A cross sectional study design was used to conduct the study. About 30 participants were selected through convenient sampling technique from the SCI persons taking rehabilitation in CRP, Bangladesh. The data were collected by using WST questionnaire and were analyzed by descriptive statistics through using SPSS software version 22.0. *Results:* Study shows that the Wheelchair Skills of person's with spinal cord injury decrease remarkably after spinal cord injury in case of tetraplegic in comparison with paraplegic. The main consequences of SCI suggest this study is decrease wheelie capacity. So achieving an adequate wheelie capacity to improve wheelchair skills is considered the final goal of the rehabilitation process following a SCI and the need for outcome measures assessing health and wheelchair skills following rehabilitation is therefore becoming increasingly important. Since improved wheelchair skills is indicative of the success of treatment programs, it should be routinely measured among SCI patients. *Conclusion:* The results of this study provided more insight into the Wheelchair Skills of person's with spinal cord injury in CRP. More research is needed to evaluate the rehabilitation program for these patients.

Key words: Spinal Cord Injury, Wheelchair Skills, Rehabilitation, Wheelchair Skill test.

CHAPTER-I: INTRODUCTION

1.1 Background

Wheelchair skills are "activities". The ability to perform them represents "capacity" and their use in everyday life represents "performance (Kirby et al., 2014). The purpose of these activities is to overcome barriers in the environment and to thereby permit the wheelchair user to fulfill his/her desired role in society ("participation"). Other potential benefits of wheelchair-skills training for wheelchair users and caregivers include fewer acute and overuse injuries, an improved sense of wellbeing (through self-esteem, self-efficacy, confidence and personal control, the sense of becoming newly abled, empowerment and having accomplished something of worth), improved development (of children) and having fun (Kirby et al., 2014).

The CRP is a non-governmental organization in the management of patient with spinal cord injury (Haque et al.,2012).Here only CRP provides the treatment and complete rehabilitation training to the spinal cord injury patients. The management is based on a multi and inters-disciplinary approach, with emphasis on the development of community based rehabilitations programs (Haque et al.,2012).

In addition to learning wheelchair skills, there may be alternative ways to accomplish the learner's goals (e.g. by changing wheelchairs, by accepting the assistance of a caregiver or by eliminating accessibility barriers). Alternatively, if the goal is not a feasible one, the most appropriate strategy may be to assist the learner in adjusting his/her expectations to a more realistic level. Regardless of whether the wheelchair is a manual one, a powered one or a scooter, the characteristics of the wheelchair – its features, fit and setup – can have major effects on skill performance. In helping improve the safety, effectiveness and efficiency of wheelchair use, the service-delivery providers should try to optimize the wheelchair user (e.g. by improving strength or range of motion), the wheelchair (e.g. by moving the axles of a manual wheelchair forwards or adjusting the programming of a powered wheelchair) and/or training. The World Health Organization's process of wheelchair service delivery includes eight steps (e.g. prescription, fitting and set-up, training and follow-up). These components need not be sequential and are often iterative. For

instance, following training, it may be possible to revise the prescription and set-up (Kirby et al., 2014).

Manual wheelchair mobility is important for a large number of people, particularly those with spinal cord injury. The majority of people with a spinal cord injury (approximately 80%) are dependent on a wheelchair for their mobility for the rest of their lives. To function independently, manual wheelchair users must possess a variety of wheelchair skills to be able to deal with the physical barriers they will encounter in various environments in daily life. Manual wheelchair skill performance of people with spinal cord injury is positively associated with activities and participation (Kilkens et al., 2005). In this context, 'wheelchair skill performance' is defined as: 'The ability to move around and overcome obstacles encountered when carrying out daily activities or social roles in a self-propelled wheelchair' (Routhier et al., 2012). A 'wheelchair skills test' consists of various tasks to be performed by the candidate under standardized conditions. A validated and reliable wheelchair skills test is necessary as a guiding instrument in the rehabilitation process of people with spinal cord injury and those with lower limb impairments. Such a tool can assist in making the appropriate choice of skills to be trained in rehabilitation as well as in the evaluation of training interventions. Furthermore, a standardized and accepted wheelchair skills test could be used to develop standards of wheelchair skills performance for individuals with different levels of impairment (Fliess-Douer et al., 2010).

The majority of people with spinal cord injury (SCI) are dependent on wheelchairs for mobility (Post et al., 2007). This may impact overall functioning, primarily at the level of activities, and participation as is expressed in the International Classification of Functioning, Disability and Health model (WHO, 2011). Environmental and personal factors as well as lesion characteristics impact wheelchair skill performance during and after inpatient rehabilitation. The current study is the first that analyzes the complex of relationships within this conceptual model. To function independently, manual wheelchair users must possess a variety of wheelchair skills to deal with the physical barriers they will encounter in various environments (Pierce et al., 2008). Mastering wheelchair skills can make the difference between dependence and independence in daily life, and wheelchair skill training therefore is a major part of inpatient rehabilitation after SCI. During rehabilitation, recently injured persons with

SCI have to learn a completely new way of locomotion. When persons with acute SCI are discharged from inpatient rehabilitation, most are capable of performing various wheelchair skills, such as making transfers and negotiating curbs and ramps. It seems obvious that performance of wheelchair skills improves during inpatient rehabilitation as a direct consequence of practice and learning (Kilkens et al., 2005).

Community integration has been described as the ultimate goal in the rehabilitation of individuals following an injury or disability. In order to function independently, manual wheelchair users must acquire a variety of wheelchair skills to deal with the physical barriers encountered in various environments in daily life. Mastering wheelchair skills can make a difference between dependence and independence in the daily life of people with spinal cord injury (SCI) who are primarily wheelchair users (Fliess-Douer et al., 2013). Studies have shown that, during the early phase of inpatient rehabilitation of persons with SCI, wheelchair skills performance improved significantly (Kilkens et al., 2005). In a cross-sectional study, wheelchair skills performance of persons with SCI was found to be positively associated with participation (i.e. involvement in life situations) year after discharge from inpatient rehabilitation. At discharge from inpatient rehabilitation, persons with acute SCI can propel their wheelchair and perform various wheelchair skills, such as negotiating kerbs and transferring (MacPhee et al., 2005). However, other studies have shown that, after rehabilitation, wheelchair users may be immature in their performance of wheelchair skills (Fliess-Douer et al., 2013).

The achievement of independent mobility is vital in the rehabilitation of physically disabled individuals. When ambulation is impaired, a hand rim wheelchair provides a relatively fast and effective means of mobility for people with lower limb disabilities. A hand-rim wheelchair can provide the necessary access to social, vocational and recreational activities that are conditional to a productive and rewarding life. To function independently, people who use manual wheelchairs for mobility must possess a variety of skills. The ability to propel their wheelchairs over even surfaces brings the freedom to move about within a wheelchair-accessible environment. Independent mobility within a greater variety of environments requires obstacle negotiation skills. These skills can make the difference between dependence and independence in daily life (Somers, 2006). Assessment of wheelchair skills can provide useful information concerning a person’s current wheelchair skill

performance. In clinical situations, wheelchair skills tests can help to define rehabilitation goals concerning mobility, and can also be used to evaluate the progression made regarding wheelchair mobility during rehabilitation. In research settings skills and, for example, level of activity and/or participation measurement of wheelchair skills can be used to study the effect of an intervention aimed at wheelchair mobility or to study the relation between wheelchair. (Kilkens et al., 2005).

1.2 Rationale

Spinal cord injury is a overwhelming condition and it is affecting many peoples in the whole world and in our country Bangladesh. Spinal cord injury causes great damage to the affected individuals by increasing their disability and dependence. Despite advances in acute care and rehabilitation, evidence-based knowledge of the situation in individuals with SCI in Bangladesh is limited. To support people with SCI to lead healthy and active lives there is a need for increased knowledge of this population living in Bangladesh. Information about the factors that contribute most to wheelchair skills after SCI may help policy makers in deciding which intervention to support in order to maximize wheelchair skills. The measurement of wheelchair skills may contribute to a very realistic and pragmatic evaluation of the outcomes of the policies, programs and interventions. Knowledge about wheelchair skills and its determinants may influence service providers to be more sensitive of individual variables and also the effect of social variables on this. Only the clinical perspective can acts as an effective indicator to where resources can be utilized most effectively. Center for the Rehabilitation of the Paralised (CRP) was established immediate after liberation war of Bangladesh by Dr.Valeary A.Tayler a physiotherapist with the aim to serve the people injured by war. CRP provides both institute based rehabilitation, vocational training, and community based rehabilitation for the people with spinal cord injury. There is no research in this field to evaluate the effectiveness and outcomes of the program, so this study will help CRP to valuation of the outcomes policies, programs and interventions.

1.3 Research Question

How the Persons with Spinal Cord Injury are skills in wheelchair?

1.4 Study objectives

1.4.1 General objective

This study is to investigate socio-demographics (i.e., age, gender, socioeconomic status, environmental factors) and different aspects of wheelchair skills in people with SCI.

1.4.2 Specific objectives

1 To assess the socio-demographic characteristics of the participants.

2 To evaluate the wheelchair manoeuvring.

3 To identify Obstacles negotiating skills of the participants.

4 To measure the total WST score of the participants.

5 To see the Making transfer skills of the participants.

a. Conceptual Framework

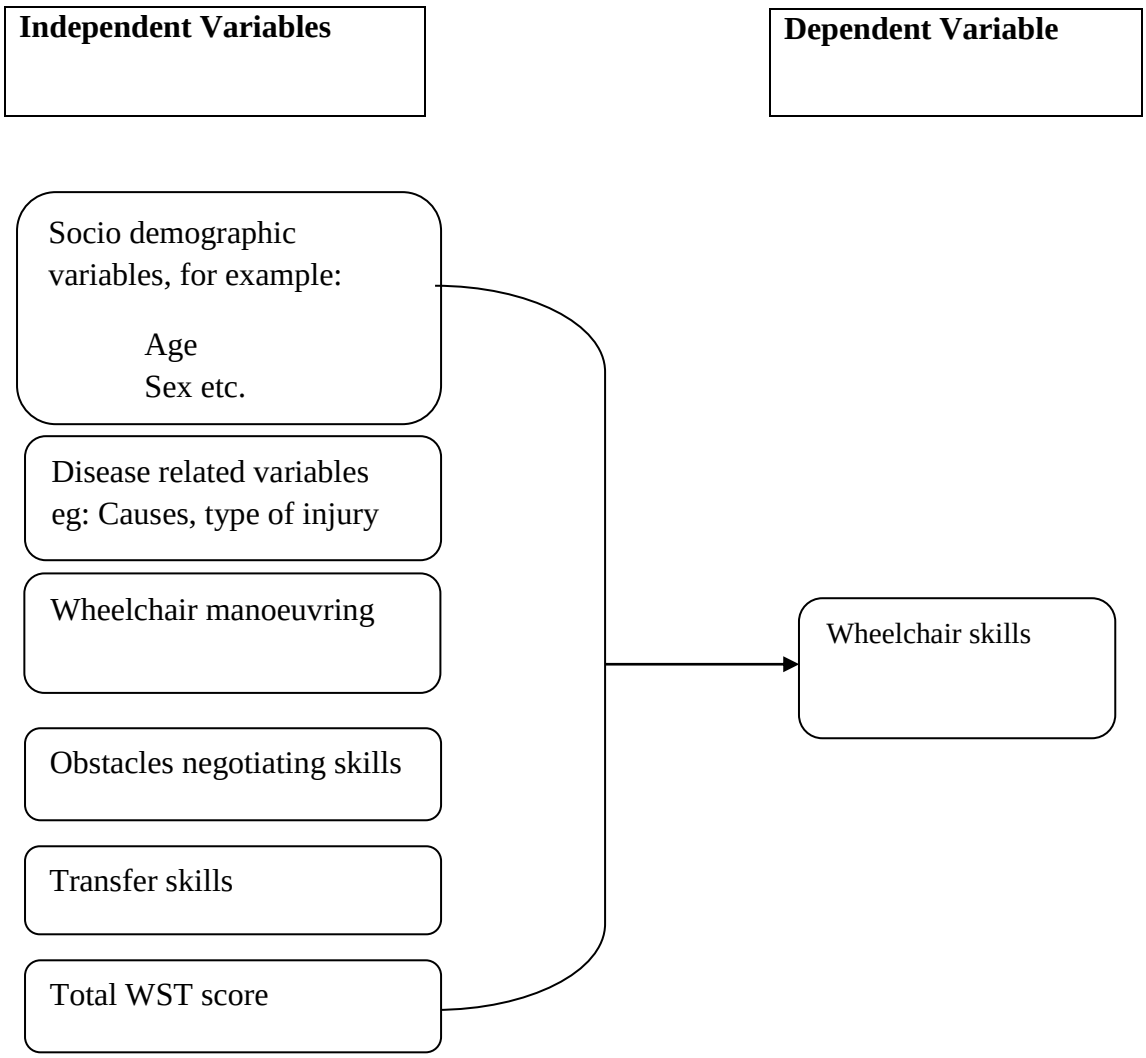

Figure: 1 Conceptual Framework

b. Operational Definition

Wheelchair skills

wheelchair skills are “activities”. The ability to perform them represents “capacity” and their use in everyday life represents “performance” (Kirby et al., 2014).

Adult

The person’s whose age between 18-24 years.

Young adult

The person’s whose age between 25-49 years.

Older

The person’s whose age between 50-60 years.

Educational level

Those who only can sign known as illiterate, those who only read and write they known as literate, and those who have at least one board certificate they known as well educated (Singh et al., 2005).

CHAPTER-II: LITERATURE REVIEW

A systematic search was undertaken for published articles published from 2000 to onward using PubMed, Google Scholar, research gate, and in the following database: Cochrane Methodological Register (CMR), Cochrane Central Register of Controlled Trails (CENTRAL), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, Popline, Scopus, IMSEAR (Index Medicus for South-East Asia Region). Researcher has also the access of research gate and many articles are collected by directly request to the author through research gate. The search strategy comprises SCI specific search terms (e.g. paraplegia, tetraplegia, traumatic SCI, non-traumatic SCI), wheelchair skill test and the names and abbreviations of outcome measures within the suite of WST instrument. To enhance the comprehensiveness of the search strategy, researcher conducted a bibliographic search of the reference lists of articles.

The worldwide incidence and prevalence of SCI increasing progressively. Cripps et al. (2011) found that the range of reported global prevalence is between 236 and 1009 per million. Asian countries, particularly China and India are not appropriately represented, with available Asian statistics likely underestimating the overall prevalence within this populous region. Asia, South and South-East: Prevalence data only exists for the Kashmir region in India and Vietnam, with a prevalence of between 236–464 per million traumatic SCI. In Australia: Prevalence data, available only for Australia, ranges between 370 in 1987 and 681 per million in 1998. In Western Europe: Two countries only have reported prevalence data: Finland 280 per million and Iceland 316 per million. In: North America: USA (721–1009 per million, with a median of approximately 853 per million). Canadian data is estimated at approximately 1173 per million (assuming a population of 30.7 million). The most representative incidence statistic for each country within WHO regions is presented along with aetiology data where possible. Asia Pacific: Japan, on the basis of a nation-wide survey, had an incident rate of 40.2 per million and had higher rates of tetraplegia than experienced in other countries. A higher than usual proportion of falls (42%) is probably related to an aged population at time of injury, given Japan has an extremely aged population with 29.7% of people being aged 60 years or over, based on 2009 statistics. Asia, East: Taiwan had an incident rate of 18.8 per million (70% of

possible SCI cases from centers throughout Taiwan). Land transport accounted for 49% of SCI in the general population. The incidence of SCI was higher in geriatric (age greater than 65) population (47.5 per million) with a higher proportion of tetraplegic patients in this group. Asia, South: Land transport-related SCI is reported to be much lower than European countries; falls predominate within southern Asia. The highest percentage of falls was in Pakistan 82%, particularly off trees and roof tops. Data from Bangladesh also had high number of falls (63%), out of which 43% of the falls involved falls from trees and 20% while carrying heavy loads. Mukhida provided statistics for people in Nepal under the age of 19, in which 61% of SCI was due to falls (mainly from rooftops as opposed to trees in the rest of the region). Incidence data are inadequate for this region. Asia, South-east: Vietnam: In Vietnam and Thailand transport caused about 47% of reported cases of SCI.

The last prior international comparisons of the literature was performed in 2006 by Wyndaele and this review found that the incidence and prevalence of SCI over 30 years per continent. In Northern America the incidence was 51/million inhabitants/year and prevalence was 755/million inhabitants, In Europe the incidence was 19.4/million inhabitants/year and prevalence was 252/million inhabitants, In Australia the incidence was 16.8/million inhabitants/year and prevalence was 681/million inhabitants. In Asia the incidence was 23.9/million inhabitants/year, literature data show that two-thirds of SCI patients are paraplegic, and one-third is tetraplegic whereas in older studies, the proportion of paraplegics used to be up to 90%. In the United States before 30 years, 40% of SCI patients had a complete lesion. Recent studies show an increase incomplete SCI to 50%. Except for Portugal and Taiwan, the mean age of patients sustaining their injury at is in their early thirties. This was also reported as such in older studies. In NSCISC fact sheet from 1973 to 1979, the average age at injury was 28.7 years and that it has risen to 37.6 years in 2000 and the sex distribution (men/women) of SCI in recent studies is 3.8/1, where it used to be 4.8/1. Men seem to be still more at risk for SCI; however, women do seem to catch up slowly (Wyndaele & Wyndaele, 2006).

Spinal cord injury is two types such as complete and incomplete. A person loses all ability to feel and voluntarily move below the neurological level of the injury which occurs in a complete injury, on the other hand there is some functioning below the level of the injury which occurs in an incomplete injury (Guzelkucuk et al., 2014).

Most of SCI patient from all over Bangladesh take rehabilitation from CRP and finding from this center can reflect the scenario of Bangladesh. They found that in 247 patients included 218 males (88%) and 29 females (12%). Most of the patients were aged between 10 and 40 years, with 19% between 10 -20 years, 42% 20 - 30 years, 20% 30 - 40 years, 15% 40 - 50 years And 4% 50 - 60 years. Among the 179 `trauma' patients (72%), there were three main causes of injury. Seventy-six (43%) resulted from a fall from a height (such as a tree). Thirty-seven injuries (20%) were associated with falling while carrying a heavy load on the head. Thirty-three (18%) were a result of a road traffic accident. Eleven patients (6%) formed a very diverse group which included assault, stab injury, sports injury and bull attack. There was insufficient data available for 22 patients (13%). 107 were paraplegic (60%), and 72 tetraplegic (40%). Among the 68 patients (28%) in the `non-traumatic' spinal cord lesion group the main cause was Pott's disease (19 patients 28%), followed by 14 patients with a tumor (21%), seven cases of transverse myelitis (10%), six from a prolapsed intra-vertebral disc (9%), four with Guillain Barre syndrome (6%) and one associated with cervical spondylosis (1%). There were 17 (25%) cases which remained undiagnosed. In this` non-traumatic' group there were 57 (84%) paraplegic and 11 (16%) tetraplegic. The region of the fifth cervical vertebra and the junction of the twelfth thoracic and first lumbar vertebrae were the segments most exposed to trauma. The non-traumatic cases commonly involved either C_5-C_7 or T_7-L_4. Pott's disease most often affected the region of T_7 – T_{12}. The results of this small retrospective study have shown some differences in the etiology of spinal cord lesions seen in Bangladesh when compared with other countries in Asia. Authors proposed that the mechanism responsible for lesions of the cervical cord following a fall when carrying a heavy load on the head (Haque et al., 2012).

Islam et al. (2011) found that out of 107 patients, 70% were below the age of 40 years. The distribution pattern by 5-yearly age group, up to 40 years, did not show much variation, except at age 25–29 years, which showed maximum number of 23 patients (21.5%). The actual age range was between 9 and 60 years (median=30 years) and mean age was 31(±12) years. More than 80% (n=89) were males. The mean monthly family income of the patients was US $ 60 (±$53). About 44% patients had cervical lesion, 27% had thoracic and 29% had lumbar injury. Of the cervical, C_6, C_5 and C_7 had quite close frequency distribution ranging between 9 and 15%. Among

the thoracic, $T_{-12}$with 13% had the majority and among lumbar, L_1 had the majority incidence. Neurological conditions according to the American Spinal Injury Association (ASIA) scale showed about 78% of the patients falling in the complete A group. About 93% of the patients were traumatic. Of the traumatic causes, fall from height had the highest frequency, followed by fall while carrying heavy load on head, fall of heavy object on neck and back and road traffic accident. Causes of non-traumatic lesion consisted of tuberculosis of spine and transverse myelitis. Tetraplegia and paraplegia were almost equal with 46 and 54%, respectively. High proportion of SCL in Bangladesh was due to Traumatic causes, seems to occur mostly in young males of low social status, which were preventable.

Manual wheelchair mobility is important for a large number of people, particularly those with spinal cord injury. The majority of people with a spinal cord injury (approximately 80%) are dependent on a wheelchair for their mobility for the rest of their lives. To function independently, manual wheelchair users must possess a variety of wheelchair skills to be able to deal with the physical barriers they will encounter in various environments in daily life. Manual wheelchair skill performance of people with spinal cord injury is positively associated with activities and participation (Kilkens et al., 2005). In this context, 'wheelchair skill performance' is defined as: 'The ability to move around and overcome obstacles encountered when carrying out daily activities or social roles in a self-propelled wheelchair' (Routhier et al., 2012). A 'wheelchair skills test' consists of various tasks to be performed by the candidate under standardized conditions. A validated and reliable wheelchair skills test is necessary as a guiding instrument in the rehabilitation process of people with spinal cord injury and those with lower limb impairments. Such a tool can assist in making the appropriate choice of skills to be trained in rehabilitation as well as in the evaluation of training interventions (Fliess-Douer et al., 2010).

The wheelchair is arguably the most important therapeutic tool in rehabilitation. The prevalence of use is high (2.3M in the United States) and rising. Yet, despite the importance of wheelchairs, they are far from perfect in their functionality and safety. Many wheelchair users suffer from acute or chronic injuries due to wheelchair use. Inaccessibility and cognitive impairment (in some populations) further restrict the usefulness of wheelchairs for some users. The WST is a standardized evaluation method that permits a set of representative wheelchair skills to be objectively, simply

and inexpensively documented. The WST is intended to test a specific person in a specific wheelchair in a standardized manner. For clinical purposes, the WST may be used early in the course of a rehabilitation program as a diagnostic measure, especially to determine which (if any) skills need to be addressed during the rehabilitation process (e.g. by training or wheelchair changes). By repeating the test on completion of the rehabilitation phase (or later during follow-up), the WST can be used as an outcome measure. The WST may also be used for program evaluation, to answer research questions and to assist in wheelchair design. The measurement properties of the Wheelchair Skills Test (WST) have been documented. In these studies, the WST was found to be safe, practical, reliable, valid and useful. The WST has been used as a screening or outcome measure in a number of studies. Further study is needed to evaluate the measurement properties of the WST as it evolves, and in different settings. The relationships between the objective WST and the questionnaire version of the WST (WST-Q) have also been reported. The correlations between the total WST and WST-Q scores were found to be excellent, although the WST-Q scores were slightly higher. The WSTP uses the WST skill set and training methodology based on the literature. To date, we have completed two randomized controlled trials on wheelchair users, one on wheelchair users admitted for initial rehabilitation and one on wheelchair users in the community. In both, we found that the WSTP was safe, practical and resulted in significantly greater improvements (2-3 fold) in wheelchair skills performance than standard care. In a third randomized controlled trial, on occupational therapy students, we found that the WSTP resulted in significantly greater improvement (2-3 fold) in wheelchair skills than a standard undergraduate occupational therapy curriculum and that these skills were retained 9-12 months later. Finally, in a pilot study in a rehabilitation centre, we provided less than 50 minutes of training on wheelchair handling skills to caregivers of wheelchair users. We found that the WSTP was an effective way to improve caregiver skills and that these skills were retained. Studies of the safety and effectiveness of the WSTP in other settings are planned (Kirby et al., 2014).

CHAPTER-III: METHODOLOGY

3.1 Study design

A cross sectional study design was selected by the researcher to carry out the research. These types of research were primarily used to determine prevalence. Prevalence equals the number of cases in a population at a given point in time. All the measurements on each person were made at one point in time. The data are collected all at the same time or within a short time frame. A cross-sectional design provides a snapshot of the variables included in the study, at one particular point in time (Fraenkel & Wallen, 2008).

3.2 Study site

Data was collected from the SCI persons admitted in CRP, Savar, Dhaka, Bangladesh.

3.3 Study population and sample population

A population is the total observation on which a research is carried out. The target population was the persons with spinal cord injury from a rehabilitation center (CRP) and sample was collected by using convenient sampling.

3.4 Sampling technique

The researcher had select convenient sampling technique to draw out the sample from the population. For this sample, this method is the best way yet devised to obtain a sample representative of the population of interest.

3.5 Sample size

The sampling frame is finite,

As the data were collected from hospital settings, at the time of data collection from 16th august to 6th September total 30 patients was admitted those meet the inclusion criteria.

So actual sample size = 30.

3.5.1 Inclusion criteria of the study

Person's with spinal cord injury admitted in CRP.

Both male and female are included.

Taking rehabilitation from CRP.

Age: 14-60 years.

Wheelchair skill training for at least 2 days.

Persons who can operate wheelchair by himself.

3.5.2 Exclusion criteria of the study

Any concomitant impairment that might influence everyday function (such as cognitive or mental impairments).

Un-diagnosed injury.

Head injury.

Any other major disease except SCI.

3.5.3 Data collection tools

Modified version of 4.2 WST questionnaire.

Socio-demographic questionnaire.

Measurement tap.

Pen, pencil and ruler.

3.5.4 Data collection procedure

Data was collected through direct observation of participants using modified version of 4.2 WST questionnaire.

3.6 Data management and analysis

The collected data were processed and analyzed in the Statistical Package for the Social Sciences (SPSS) v22.0 for Windows. To reduce the likelihood of typing errors a duplicate data entry was carried out and then the information was compared. The analysis focuses on wheelchair skills in hospital setting as measured by WST there is no cut point for the WST subscales; higher score represent higher skills. Age and monthly income of family were transformed from continuous to categorical variables. Age groups were age 14-24, 25-49, 50-60 years. Monthly income of family was also

dichotomized as less than 5000, 5000-10000, 11000-20000 taka and more than 20000 taka. Two neurological groups included those with functionally complete paraplegia (American Spinal Injury Association ABC) and individuals with functionally incomplete paraplegia (American Spinal Injury Association D). Descriptive statistics used to examine the frequency and magnitude of reported barriers measured by WST scores. Pearson correlation test is performed to see the correlation between the variables and significance of the result.

3.7 Ethical consideration

A research proposal was submitted to the Institutional Review Board (IRB) of BHPI for approval and the proposal was approved by the board. Prior to data collection, permission was obtained from the Head of Department of Physiotherapy, BHPI, CRP to ensure the safety of the participants. The formal permission was taken from Head of Department of Physiotherapy, CRP to collect data from CRP. Data collection was started and completed within the allocated time frame.

Researcher will follow The Belmont Report: Ethical principles and guidelines for the protection of human subject, which was developed by the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research in April of 1979. The Belmont Report describes three basic ethical principles: (1) respect for persons, which emphasizes the importance of individual autonomy and decision-making, and the protection of individuals who have reduced autonomy from the risks involved in research; (2) beneficence, which focuses on maximizing the benefits associated with research and minimizing foreseeable harms to human research participants (alternatively referred to here as "research subjects," based on language contained in relevant regulations described below); and (3) justice, which here refers to the equitable distribution of research benefits and discomforts (it does not refer here to general social justice, but rather to the specific issue of distributive justice in research) (Pequegnat et al., 2011). World Health Organization (WHO) and Bangladesh Medical and Research Council (BMRC) guideline were also following to conduct the study.

A written consent was given to all participants. Consent form was explained to the participants verbally. The researcher explained to the participants about his or her role in this study. The researcher received a written consent from every participants including signature. So the participant assured that they could understand about the

consent form and their participation was on voluntary basis. The participants were informed clearly that their information would be kept confidential. The researcher assured the participants the study would not be harmful for them. It was explained that there might not a direct benefit from the study for the participants but in the future cases like them might got benefit from it. Participation of this study is voluntary, refusal to participate will involve no penalty or loss of benefits to which the subject is otherwise entitled and the subject may discontinue participation at any time without penalty or loss of benefits to which the subject is otherwise entitled. Information from this study was anonymously coded to ensure confidentiality. They would not be embarrassed by the study. Participant can contact with supervisor of this project: for answers to pertinent questions about the research and research subjects' rights.

CHAPTER-IV: RESULTS

Sociodemographic information

4.1 Age and sex of the participants.

Out of 30 participants, the majority was male 83.3% (n=25) and female was 16.7% (n=5). Mean age of the participant were 27 year, age range of the participant were 42 year,(minimum14,maximum56) Standard deviation of the age were 10.41year.

Age and Sex of the participants

		Sex of the participant		
		Male	Female	Total
Age of the participant	14-24	11	3	14
	25-49	12	2	14
	50-60	2	0	2
Total		25	5	30

Table–1: Age and Sex of the participants

4.2 Marital status of the participants

Majority of the participant were married 53.3% (n=16), 46.7% (n=14) were unmarried.

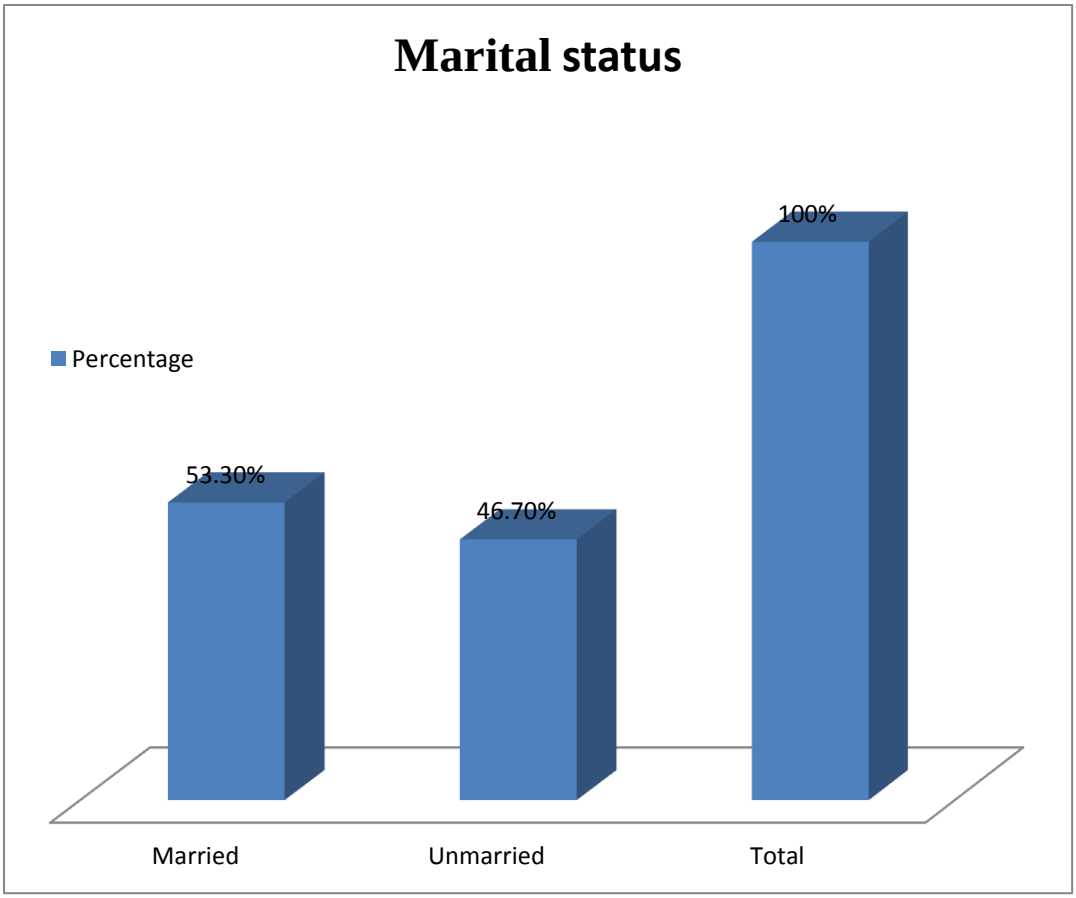

Figure – 2: Marital status of the participant

4.3 Educational status of the participants

Among the 30 participants educational status was, illiterate (n=9, 30%), primary (n=7, 23.3%), secondary (n=10, 33.3%), higher secondary or above (n=4, 13.3%).

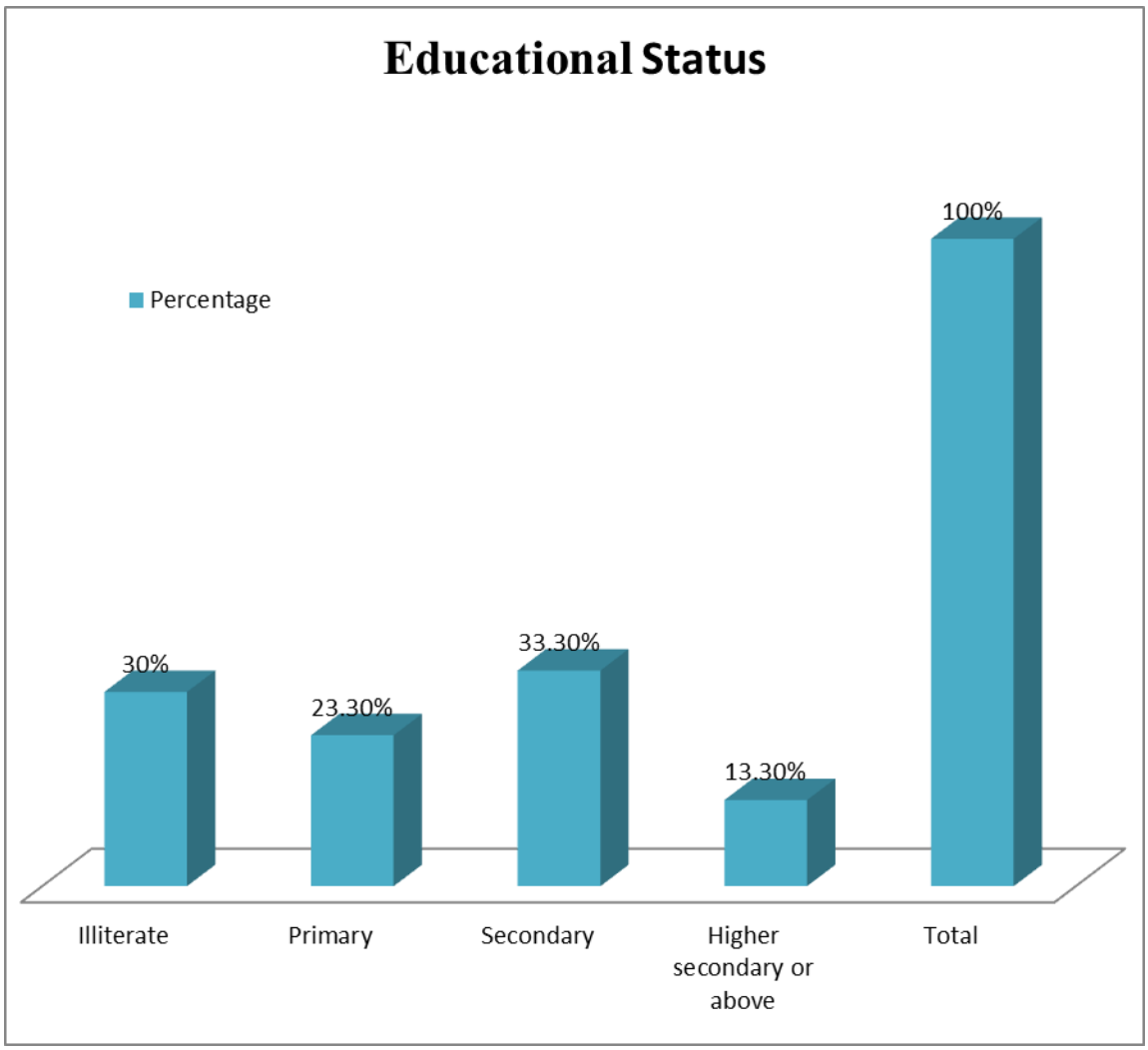

Figure – 3: Educational status of the participants

4.4 Occupation at the time of lesion

At the time of lesion occupation of the participant was, agriculture and other labors (n=15, 50%), small job (n=5, 16.7%), homemaker (n=4, 13.3%), student (n=5, 16.7%), others (n=1, 3.3%).

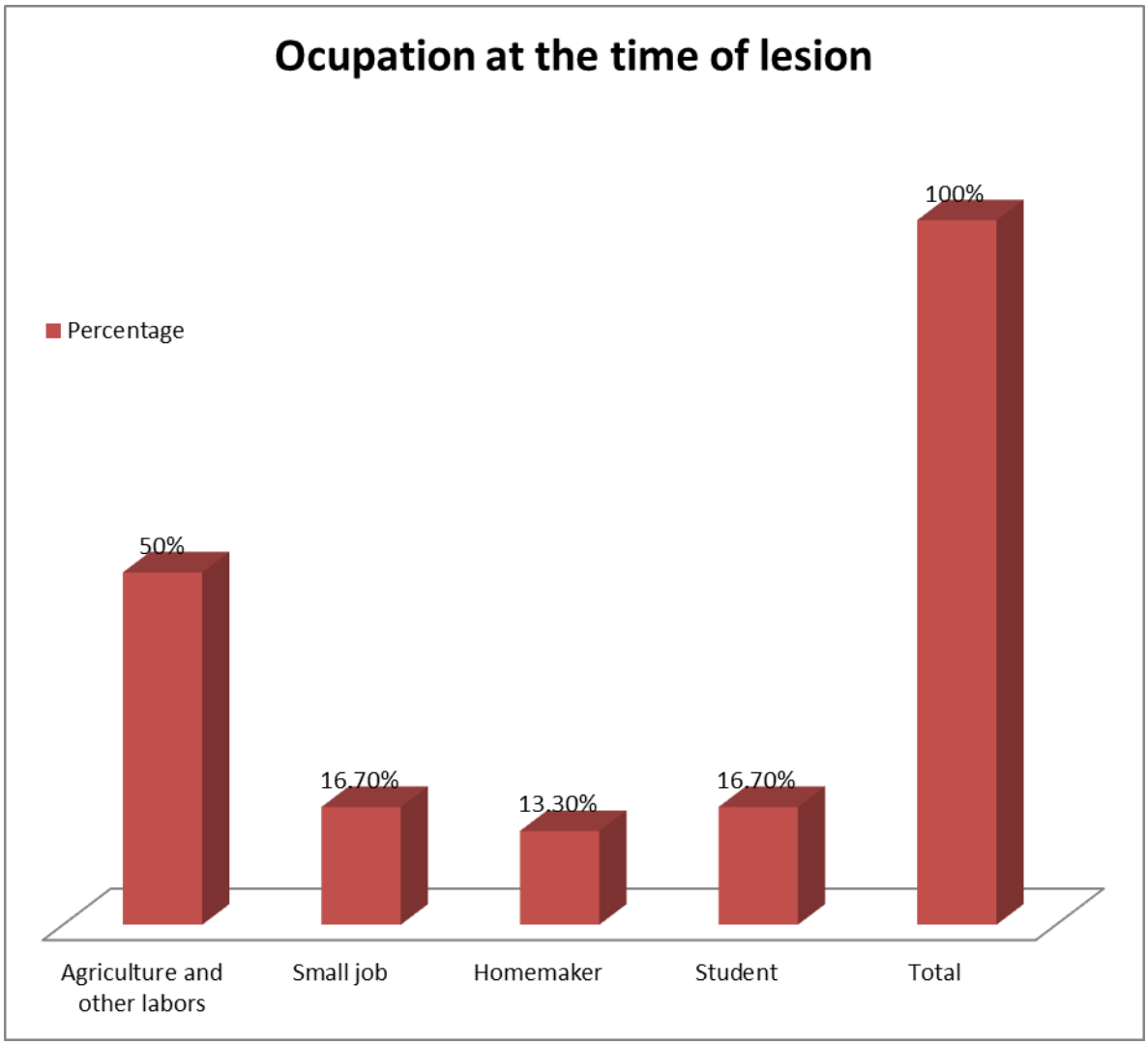

Figure – 4: Occupation at the time of lesion

4.5 Causes of lesion

Cause	Number	Percentage (%)
Traumatic	30	100
Non-traumatic	0	0
Total	30	100

Table-2: Causes of lesion

4.6 Causes of traumatic lesion

In case of traumatic cause among all of the participants, Fall from height was (n=14, 46.75%) Fall while carrying heavy load on head was (n=4, 13.3%), Fall of heavy object on back was (n=6, 20%), RTA was (n=6, 20%) .

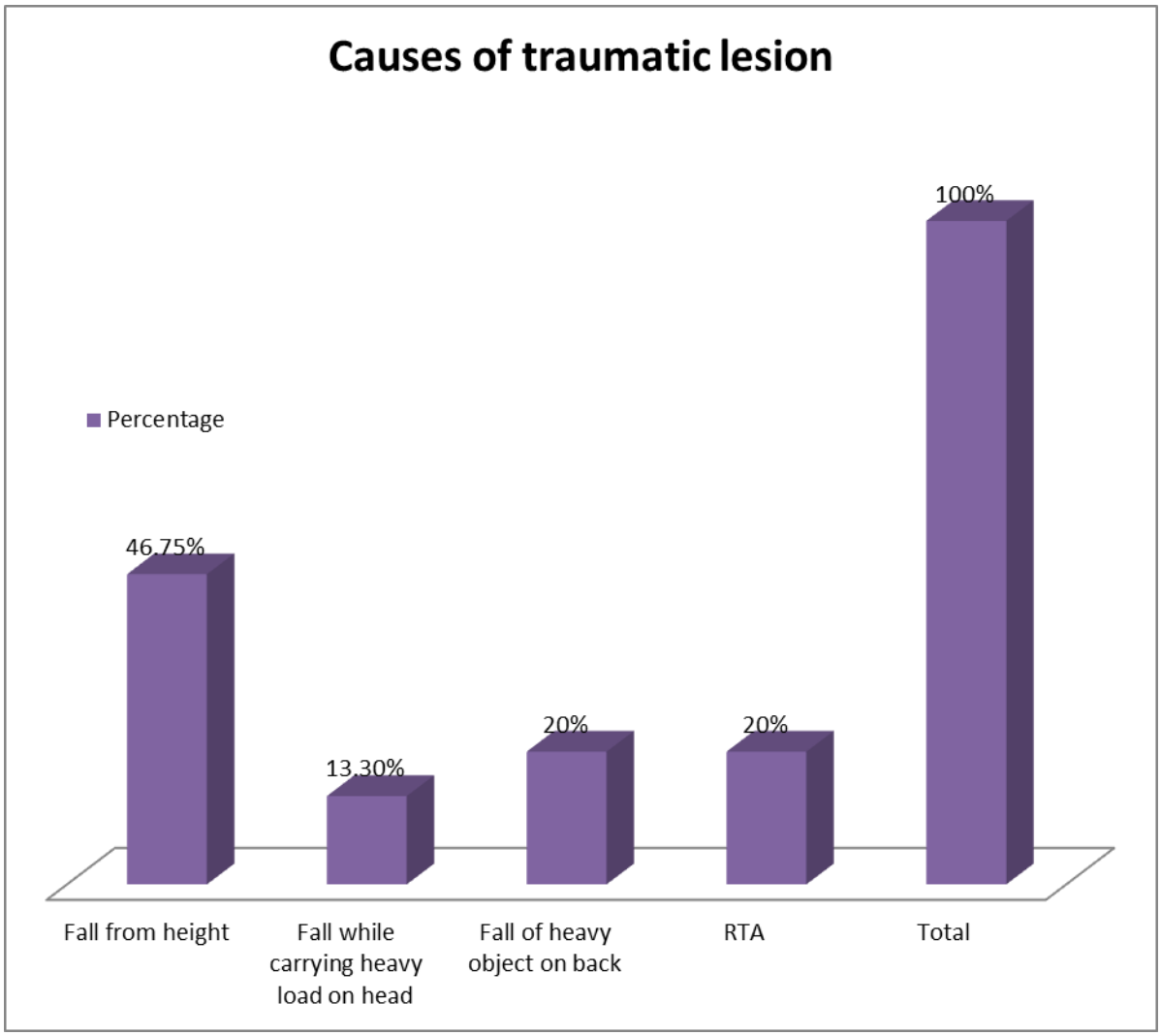

Figure -5: Causes of traumatic lesion

4.7 Type of paralysis

About two-third of the participant (n=22, 73.3%) was paraplegic, about one-third of the participant (n=8, 26.7%) was tetraplegic.

	Number	Percentage (%)
Tetraplegia	8	26.7
Paraplegia	22	73.3
Total	30	100

Table-3: Type of paralysis

4.8 Completeness of injury

Result shows that maximum participant (n=19, 63.3%) was complete injury and 36.3% (n=11) of the participant was incomplete injury.

	Number	Percentage (%)
Complete	19	63.3
Incomplete	11	36.3
Total	30	100

Table-4: Completeness of injury

4.9 Physical status of the participants

Physical status of the participant was, paralyzed lower limbs (n=25, 83.3%), paralyzed four limbs (n=3, 10%), weakness in lower limbs (n=1, 3.3%), weakness in all four limbs (n=1, 3.3%).

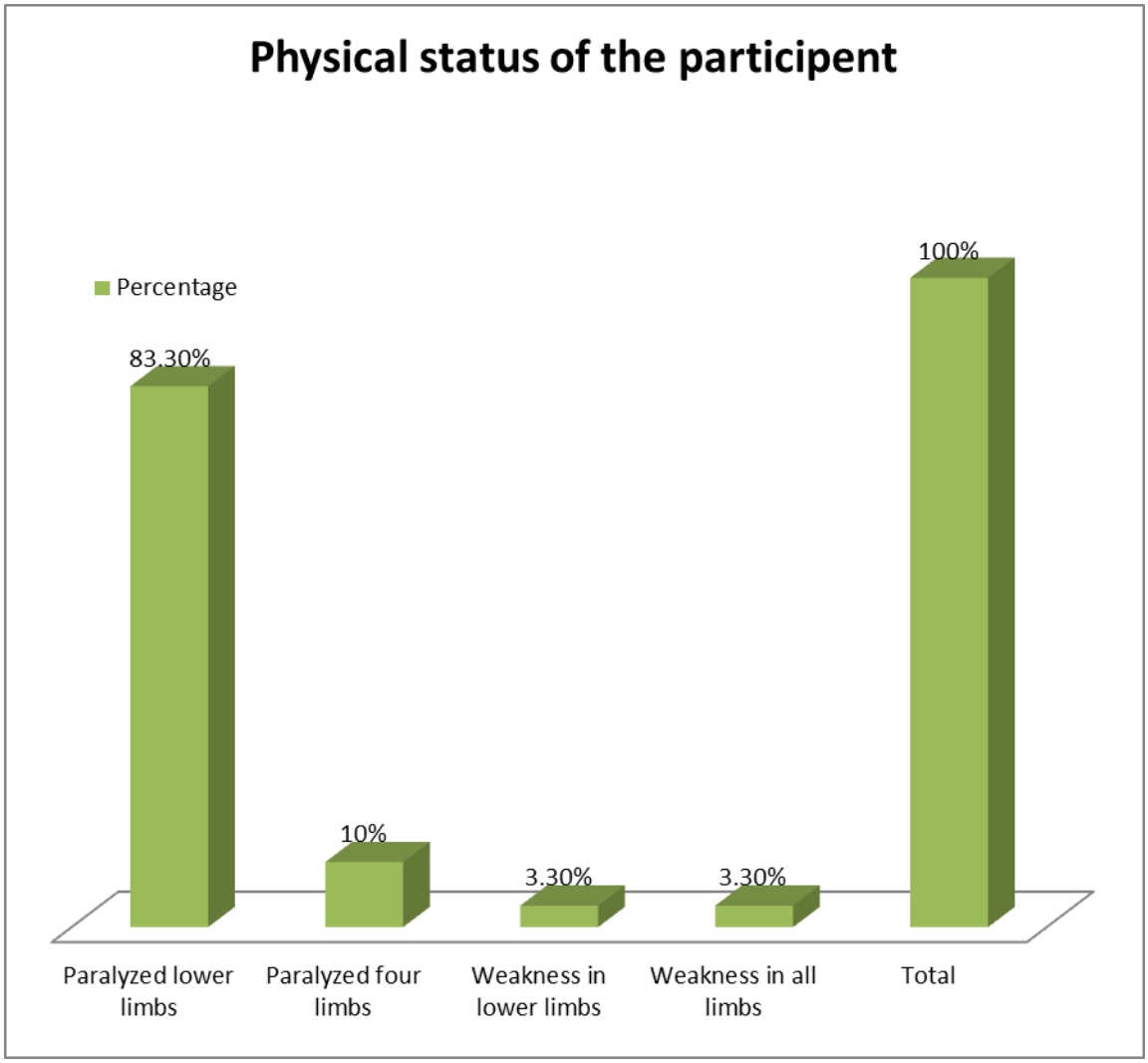

Figure -6: Physical status of the participants

WST score

Comparison with WST norms

In this study, for understanding the significance of the scores, comparison was made with the norms for the US population as there were no such data available for the Bangladeshi population.

Scale	Range	Minimum	Maximum	Mean ±SD	Normal for WST
In case of tetraplegia					
Wheelchair Maneuver	7	7	14	11.25 ± 2.82	14
Obstacle Negotiating	27	1	28	6.63 ± 9.19	28
Transfers Skills	2	0	2	0.5 ± 0.93	4
Total WST score	40	10	50	21.86 ± 12.84	50
In case of paraplegia					
Wheelchair Maneuver	2	12	14	13.86 ± 0.47	14
Obstacle Negotiating	21	7	28	21.09 ± 0.94	28
Transfers Skills	2	0.0	2	1.55 ± 0.8	4
Total WST score	23	27	50	42.23 ± 8.19	50

Table-5: Comparison WST result with normal

Scale	Range	Minimum	Maximum	Mean ±SD	Normal for WST
Complete injury					
Wheelchair Maneuver	2	12	14	13.79 ± 0.35	14
Obstacle Negotiating	26	2	28	20.05 ± 8.39	28
Transfers Skills	2	0	2	1.42 ± 0.90	4
Total WST score	31	19	50	41.00 ± 9.86	50
Incomplete injury					
Wheelchair Maneuver	7	7	14	12.09 ± 2..74	14
Obstacle Negotiating	27	1	28	12.36 ± 10.73	28
Transfers Skills	2	0.0	2	1.00 ± 1.00	4
Total WST score	40	10	50	29.54 ± 15.25	50

Table-6: Comparison WST result with normal

Correlation between variables:

In case of paraplegia

Wheelchair maneuver

In these results, the Pearson correlation between wheelchair maneuver and obstacle negotiating is 0.474, which indicates that there is a moderate positive relationship between the variables. The Pearson correlation between wheelchair maneuver and transfers skills is 0.463, which indicates that there is a moderate positive correlation between them, and correlation between wheelchair maneuver and total WST score is 0.543 which indicates that there is a moderate positive relationship between this variables.

Obstacle negotiating

The Pearson correlation between obstacle negotiating and wheelchair maneuver is 0.474 which indicate that there is a moderate positive relationship between them. The Pearson correlation between obstacle negotiating and transfers skills is 0.677 which indicate that there is a moderate positive relationship between them. The Pearson correlation between obstacle negotiating and total WST score is 0.993 which indicate that there is a strong positive relationship between them.

Transfers skills

The Pearson correlation between transfers skills and wheelchair maneuver is 0.463 which indicate that there is a moderate positive relationship between them. The Pearson correlation between transfers skills and obstacle negotiating is 0.677 which indicate that there is a moderate positive relationship between them. The Pearson correlation between transfers skills and total WST score is 0.743 which indicate that there is a moderate positive relationship between them.

Total WST score

The Pearson correlation between total WST score and wheelchair maneuver is 0.543 which indicate that there is a moderate positive relationship between them. The Pearson correlation between total WST score and obstacle negotiating is 0.993 which indicate that there is a strong positive relationship between them. The Pearson correlation between total WST score and transfers skills are 0.743 which indicate that there is a moderate positive relationship between them.

In case of tetraplegia

Wheelchair maneuver

In these results, the Pearson correlation between wheelchair maneuver and obstacle negotiating is 0.578, which indicates that there is a moderate positive relationship between the variables. The Pearson correlation between wheelchair maneuver and transfers skills is -0.055, which indicates that there is a weak negative correlation between them, and correlation between wheelchair maneuver and total WST score is 0.717 which indicates that there is a moderate positive relationship between this variables.

Obstacle negotiating

The Pearson correlation between obstacle negotiating and wheelchair maneuver is 0.578 which indicate that there is a moderate positive relationship between them. The Pearson correlation between obstacle negotiating and transfers skills is 0.529 which indicate that there is a moderate positive relationship between them. The Pearson correlation between obstacle negotiating and total WST score is 0.969 which indicate that there is a strong positive relationship between them.

Transfers skills

The Pearson correlation between transfers skills and wheelchair maneuver is -0.055 which indicate that there is a weak negative relationship between them. The Pearson correlation between transfers skills and obstacle negotiating is 0.529 which indicate that there is a moderate positive relationship between them. The Pearson correlation between transfers skills and total WST score is 0.463 which indicate that there is a moderate positive relationship between them.

Total WST score

The Pearson correlation between total WST score and wheelchair maneuver is 0.717 which indicate that there is a moderate positive relationship between them. The Pearson correlation between total WST score and obstacle negotiating is 0.969 which indicate that there is a strong positive relationship between them. The Pearson correlation between total WST score and transfers skills are 0.463 which indicate that there is a moderate positive relationship between them.

Correlation of the variables (Pearson)

In case of tetraplegia

	Wheelchair maneuver	
Obstacle negotiating	Pearson Correlation	0.578
	Significant	0.133
Transfers skills	Pearson Correlation	-.055
	Significant	0.897
Total WST score	Pearson Correlation	0.717
	Significant	0.046
	Obstacle negotiating	
Wheelchair maneuver	Pearson Correlation	0.578
	Significant	0.133
Transfers skills	Pearson Correlation	0.529
	Significant	0.178
Total WST score	Pearson Correlation	0.969
	Significant	0.000
Correlation is significant at the 0.05 level		

	Transfers skills	
Wheelchair maneuver	Pearson Correlation	-.055
	Significant	0.897
Obstacle negotiating	Pearson Correlation	0.529
	Significant	0.178
Total WST score	Pearson Correlation	0.463
	Significant	0.248
	Total WST score	
Wheelchair maneuver	Pearson Correlation	0.717
	Significant	0.046
Obstacle negotiating	Pearson Correlation	0.963
	Significant	0.000
Transfers skills	Pearson Correlation	0.463
	Significant	0.248
Correlation is significant at the 0.05 level.		

Table-7: Correlation of the variables

In case of paraplegia

	Wheelchair maneuver	
Obstacle negotiating	Pearson Correlation	0.474
	Significant	0.026
Transfers skills	Pearson Correlation	0.463
	Significant	0.03
Total WST score	Pearson Correlation	0.543
	Significant	0.009
	Obstacle negotiating	
Wheelchair maneuver	Pearson Correlation	0.474
	Significant	0.026
Transfers skills	Pearson Correlation	0.677
	Significant	0.001
Total WST score	Pearson Correlation	0.993
	Significant	0.000
	Transfers skills	
Wheelchair maneuver	Pearson Correlation	0.463
	Significant	0.03
Obstacle negotiating	Pearson Correlation	0.677

	Significant	0.001
Total WST score	Pearson Correlation	0.743
	Significant	0.000
	Total WST score	
Wheelchair maneuver	Pearson Correlation	0.543
	Significant	0.009
Obstacle negotiating	Pearson Correlation	0.993
	Significant	0.000
Transfers skills	Pearson Correlation	0.743
	Significant	0.000
Correlation is significant at the 0.05 level		

Table8: Correlation of the variables

Significance of the study (P-Value):

In case of paraplegia

Wheelchair maneuver

In these results, the p-values for the correlation between wheelchair maneuver and obstacle negotiating is 0.03 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between wheelchair maneuver and transfers skills is 0.03 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between wheelchair maneuver and total WST score are 0.009 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant.

Obstacle negotiating

P-values for the correlation between obstacle negotiating and transfers skills is 0.001 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between obstacle negotiating and total WST score are 0.000 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant.

Transfers skills

P-values for the correlation between transfers skills and total WST score are 0.000 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant.

Total WST score

P-values for the correlation between total WST score and wheelchair maneuver is 0.009 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between total WST score and obstacle negotiating, transfers skills are 0.000 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant.

Significance of the study (P-Value):

In case of tetraplegia

Wheelchair maneuver

In these results, the p-values for the correlation between wheelchair maneuver and obstacle negotiating is 0.14 which is more than the significance level of 0.05 and, which indicates that the correlation coefficients are not significant. P-values for the correlation between wheelchair maneuver and transfers skills is 0.89 which is more than the significance level of 0.05, which indicates that the correlation coefficients are not significant. P-values for the correlation between wheelchair maneuver and total WST score are 0.04 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant.

Obstacle negotiating

P-values for the correlation between obstacle negotiating and transfers skills is 0.18 which is more than the significance level of 0.05, which indicates that the correlation coefficients are not significant. P-values for the correlation between obstacle

negotiating and total WST score are 0.00 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant.

Transfers skills

P-values for the correlation between transfers skills and total WST score are 0.25 which is more than the significance level of 0.05, which indicates that the correlation coefficients are not significant.

Total WST score

P-values for the correlation between total WST score and wheelchair maneuver is 0.04 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between total WST score and obstacle negotiating is 0.000 which is less than the significance level of 0.05 which indicates that the correlation coefficients are significant. P-values for the correlation between total WST score and transfers skills is 0.25 which is more than the significance level of 0.05 which indicates that the correlation coefficients are not significant.

		Wheelchair maneuver	Obstacle negotiating	Transfers skills	Total WST score
Age of the participant	Correlation	-0.118	-0.417	-0.519	-0.372
	Significant	0.536	0.022	0.003	0.043
	N	30	30	30	30

Correlation is significant at the 0.05 level.

Table-9: Correlation between age and WST domains

Wheelchair maneuver

The result shows that the correlation co-efficient between age and wheelchair maneuver is -0.118 which means weak negative correlation and the p value is 0.536 which is more than 0.05. So there is no significant correlation between the variables.

Obstacle negotiating

The correlation co-efficient between age and obstacle negotiating is -0.417 which means weak negative correlation and the p value is 0.022 which is more than 0.05. So there is no significant correlation between the variables.

Transfers skills

The correlation co-efficient between age and transfers skills are -0.519 which means weak negative correlation and the p value is 0.003 which is less than 0.05. So there is significant correlation between the variables.

Total WST score

The correlation co-efficient between age and total WST score are -0.372 which means weak negative and the p value is 0.043 which is less than 0.05. So there is significant correlation between the variables.

CHAPTER – V: DISCUSSION

The objective of the study was to evaluate the wheelchair skills of persons with spinal cord injury. Currently there is a lack of information on SCI in Bangladesh. In this study 30 participants were taken who has spinal cord injury and taking rehabilitation from CRP. Out of 30 participants, the majority was male 83.3% (n=25) and female was 16.7% (n=5). Among them n=14, Male=11, Female=3 was in between age group 14-24 years. n=14, Male=12, Female=2 was in between age group 25-49 years. n=2, Male=2, was in between age group 50-60 years. Majority of the participant was married 53.3% (n=16), 46.7% (n=14) was unmarried. Educational status was, illiterate (n=9, 30%), primary (n=7, 23.3%), secondary (n=10, 33.3%), higher secondary or above (n=4, 13.3%). At the time of lesion occupation of the participant was, agriculture and other labors (n=15, 50%), small job (n=5, 16.7%), homemaker (n=4, 13.3%), student (n=5, 16.7%), others (n=1, 3.3%). Study shows that after injury a large number of peoples become jobless. Results also suggest that people avoid agriculture and other labors after injury. All of the cause of SCI was trauma (n=30, 100%). In case of traumatic cause about half of the participants (n=14, 46.75%) was fall from height, Fall of heavy object on neck was (n=4, 13.3%), Fall of heavy object on back was (n=6, 20%), RTA was (n=6, 20.5%). About two-third of the participant (n=22, 73.3%) was paraplegic, about one-third of the participant (n=8, 26.7%) was tetraplegic. Result shows that maximum participant (n=19, 63.3%) was complete injury and 36.3% (n=11) participant was incomplete injury. Physical status of the participant was, paralyzed lower limbs (n=25, 83.3%), paralyzed four limbs (n=3, 10%), weakness in lower limbs (n=1, 3.3%), weakness in all four limbs (n=1, 3.34%).

Islam et al. (2011) found that out of 107 patients, 70% were below the age of 40 years. The distribution pattern by 5-yearly age group, up to 40 years, did not show much variation, except at age 25–29 years, which showed maximum number of 23 patients (21.5%). The actual age range was between 9 and 60 years (median=30 years) and mean age was 31 (±12) years. More than 80% (n=89) were males. The mean monthly family income of the patients was US $ 60 (±$53). About 44% patients had cervical lesion, 27% had thoracic and 29% had lumbar injury. Of the cervical, C_6, C_5 and C_7 had quite close frequency distribution ranging between 9 and 15%. Among

the thoracic, $T_{-12}$with 13% had the majority and among lumbar, L_1 had the majority incidence. Neurological conditions according to the American Spinal Injury Association (ASIA) scale showed about 78% of the patients falling in the complete A group. About 93% of the patients were traumatic. Of the traumatic causes, fall from height had the highest frequency, followed by fall while carrying heavy load on head, fall of heavy object on neck and back and road traffic accident. Causes of non-traumatic lesion consisted of tuberculosis of spine and transverse myelitis. Tetraplegia and paraplegia were almost equal with 46 and 54%, respectively. High proportion of SCL in Bangladesh was due to Traumatic causes, seems to occur mostly in young males of low social status, which were preventable.

Rognoni et al. (2014) found that sixty-six patients presented a traumatic spinal cord injury and sixty-four non-traumatic injuries/illnesses. Median age was 54 years in men and 60 years in women. Patients in acute phase of disease were 36.Patients distribution between ASIA categories was well balanced (75 patients were ASIA A or B).

In case of paraplegia

In these results, the p-values for the correlation between wheelchair maneuver and obstacle negotiating is 0.03 which is more than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between wheelchair maneuver and transfers skills is 0.03 which is more than the significance level of 0.05 and, which indicates that the correlation coefficients are not significant. P-values for the correlation between wheelchair maneuver and total WST score are 0.009 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between obstacle negotiating and transfers skills is 0.01 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between obstacle negotiating and total WST score are 0.000 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between transfers skills and total WST score are 0.000 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between total WST score and wheelchair maneuver is 0.009 which is less than the significance level of 0.05, which indicates that the correlation coefficients are

significant. P-values for the correlation between total WST score and obstacle negotiating, transfers skills are 0.000 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant.

In case of tetraplegia

In these results, the p-values for the correlation between wheelchair maneuver and obstacle negotiating is 0.14 which is more than the significance level of 0.05 and, which indicates that the correlation coefficients are not significant. P-values for the correlation between wheelchair maneuver and transfers skills is 0.89 which is more than the significance level of 0.05, which indicates that the correlation coefficients are not significant. P-values for the correlation between wheelchair maneuver and total WST score are 0.04 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between obstacle negotiating and transfers skills is 0.18 which is more than the significance level of 0.05, which indicates that the correlation coefficients are not significant. P-values for the correlation between obstacle negotiating and total WST score are 0.00 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between transfers skills and total WST score are 0.25 which is more than the significance level of 0.05, which indicates that the correlation coefficients are not significant. P-values for the correlation between total WST score and wheelchair maneuver is 0.04 which is less than the significance level of 0.05, which indicates that the correlation coefficients are significant. P-values for the correlation between total WST score and obstacle negotiating is 0.000 which is less than the significance level of 0.05 which indicates that the correlation coefficients are significant. P-values for the correlation between total WST score and transfers skills is 0.25 which is more than the significance level of 0.05 which indicates that the correlation coefficients are not significant.

In a cross-sectional study, wheelchair skills performance of persons with SCI was found to be positively associated with participation (i.e. involvement in life situations) year after discharge from inpatient rehabilitation. At discharge from inpatient rehabilitation, persons with acute SCI can propel their wheelchair and perform various wheelchair skills, such as negotiating kerbs and transferring.However, other studies

have shown that, after rehabilitation, wheelchair users may be immature in their performance of wheelchair skills (Fliess-Douer et al., 2013).

The mean total performance score of the sample on the WST was 80.7±11.8%, with a significant difference between participants with tetraplegia (C4–C8) and those with low-level paraplegia (T7–L2) ($P<0.01$). The average daily distance covered was 2.5±2.1km at 1.7±0.9 km per1 hour, with no significant difference between participants with paraplegia and those with tetraplegia (wheeled distance: $P=0.70$; speed: $P=0.65$). Significant relationships were found between MWC skills and daily wheeled distance ($r=0.32$, $P=0.05$), but the correlation between these variables did not remain significant when controlling for age (partial $r=0.26$, $P=0.07$). These results suggest that the level of injury is related to MWC skills but not wheeled mobility. MWC skills are related to greater wheeled distance, but to a lesser extent when controlling for age. (lemay et al.,2012).

One important limitation of the study was the issue of selectivity bias, as the study setting was selected conveniently. Another limitation is the absence of a standard WST score system for the Bangladeshi population for comparison. keeping in mind that cultural factors may influence how individuals assess their self-health status. 100% accuracy will not be possible in any research so that some limitation may exist. Regarding this study, there were some limitations or barriers to consider the result of the study as The first limitation of this study was small sample size. It was taken only 30 samples. Another major limitation was time. The time period was very limited to conduct the research project on this topic. As the study period was short so the adequate number of sample could not arrange for the study.As the study was conducted at Centre for the Rehabilitation of the paralyzed (CRP) which may not represent the whole country.

CHAPTER–VI: CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Study shows that wheelchair skills of Person's with Spinal Cord Injury decrease remarkably in comparison of paraplegic with tetraplgic. The main consequences of SCI suggest this study is wheele capacity. So achieving adequate wheelchair skills is considered the final goal of the rehabilitation process following a SCI and the need for outcome measures assessing health and wheelchair skills following rehabilitation is therefore becoming increasingly important. Since improved wheelchair skills is indicative of the success of treatment programs, it should be routinely measured among SCI wheelchair users.

6.2 Recommendation

In this study, the researcher takes information from the participants' through a standard questionnaire to evaluate the wheelchair skills of Persons with Spinal Cord Injury. Though the research has some limitations but researcher identified some further step that might help for the better accomplishment of further research. To ensure the generalize ability of further research it is recommended to investigate a large sample. In this study researcher collect data only from CRP, Savar, Dhaka. So researcher is strongly recommended to collect data from all over Bangladesh for further study. Comparative study should be done including the 't' test. In case of further long duration research study with more samples will bring more significant results. This research has been performed with 30 samples from the SCI person's taking rehabilitation from Center for the Rehabilitation of the Paralyzed which will not represent the whole country. So, it is finally recommended by the researcher for further study to take setting in whole Bangladesh as much as possible to generalize the study.

REFERENCES

Cripps, R.A., Lee, B.B., Wing, P., Weerts, E., Mackay, J and Brown, D., (2011). A global map for traumatic spinal cord injury epidemiology: towards a living data repository for injury prevention. Spinal Cord, 49:493–501.

Fliess-Douer, O., Vanlandewijck, Y.C., Post, M.W.M., Van Der Woud, L.H.V., and Groot, S.D., (2013). Wheelchair skills performance between discharge and one year after in patient rehabilitation in hand-rim wheel chair users with spinal cord injury. Journal of Rehabilitation Medicine, 45:553-549.

Fliess-Douer, O., Vanlandewijck, Y.C., Manor, L G., Van Der Woude L.H., (2010). A systematic review of wheelchair skills tests for manual wheelchair users with a spinal cord injury: towards a standardized outcome measure. Clinical Rehabilitation, 24:867-886.

Fraenkel, J.R., and Walleen, N.E., (2008). How to design and evaluate research in education, 4th edition, USA: McGraw-Hill Company.

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

Guzelkucuk, U., Demir, Y., Kesikburun, S., Yasar, E., and Yilmaz, B., (2014). Spinal cord injury in older population in Turkey. Spinal Cord, 52:850-854.

Islam, M.S., Hafez, M.A., and Akter, M., (2011). Characterization of spinal cord lesion in patients attending a specialized rehabilitation center in Bangladesh. Spinal Cord, 49(7):783-6.

Kilkens, O.J., Post, M.W., Dallmeijer, A.J., vanAsbeck, F.W., and Van Der Woude, L.H., (2005). Relationship between manual wheelchair skill performance and participation of persons with spinal cord injuries1 year after discharge from inpatient rehabilitation. Journal of Rehabilitation Research and Development, 42:65-73.

Kirby, R.L., (2014). Wheelchair skill program version 4.2. Canada: Dalhousie University. Available: http:// www.wheelchairskillsprogram.ca/ eng/index.php [accessed on 12 June 2015].

Lemay, V., Routhier, F., Noreau, L., Phangand, S.H., Ginis, K.A.M., (2014). Relationships between wheelchair skills, wheelchair mobility and level of injury in individuals with spinal cord injury. Spinal Cord, 50:37-41.

MacPhee , A.H., Kirby, R., Coolen, A., Smith, C., Macleod, D.A., and Dupuis, D.J., (2005). Wheelchair skills training program: A randomized clinical trial of wheelchair users undergoing initial rehabilitation. Archives of Physical Medicine and Rehabilitation, 85:41-50.

Pequegnat, W., Stover, E., and Boyce, C.A., (2011). How to write a successful research grant application. 2nd edition., London: Springer.

Pierce, L.L., (2008). Barriers to access: frustrations of people who use a wheelchair for full-time mobility. Rehabilitation Nursing, 23(3):120-5.

Post, M.W., Asbeck ,V. F.W., Dijk V. A.J and, Schrijvers, A.J., (2007). Services for spinal cord injured: availability and satisfaction. Spinal Cord, 35:109-15.

Rognoni, C., Fizzotti, G., Pistarini, C., and Quaglini, S., (2014). Quality of life of patients with spinal cord injury in Italy: preliminary evaluation. IOS Press: doi:10.3233/978-1-61499-432-9-935.

Routhier, F., Vincent, C., Desrosiers, J., and Nadeau, S., (2012). Mobility of wheelchair users: a proposed performance assessment framework. Disability and Rehabilitation, 25:19–34.

Singh, R., Sharma, S.C., Mittal, R., and Sharma, A., (2005). Traumatic spinal cord injury in Haryana: An epidemiological study. Indian Journal of Community Medicine, XXVIII (4).

Somers, M.F, (2006). Spinal cord injury: functional rehabilitation. East Norwalk: Appleton & Lange. p 365.

WHO, (2011).World Health Organization. International classification of functioning, disability and health. Available: http://www.who.int/classifications/icf/en/ [accessed on 15 july 2015].

Wyndaele, M., and Wyndaele, J.J., (2006). Incidence, prevalence and epidemiology of spinal cord injury: what learns a worldwide literature survey. Spinal Cord, 44:523-529.

APPENDIX

মৌখিক অনুমতি পত্র

(অংশগ্রহনকারীকে পড়ে শোনাতে হবে)

আসসালামুয়ালাইকুম/নমস্কার, আমার নাম তাহমিনা আক্তার।আমি বাংলাদেশ হেল্‌থ প্রফেসনস ইন্সিটিউট এর অধীনে একটি গবেষনা করছি। আমার গবেষণার শিরোনাম হল "স্নায়ুরজ্জুর আঘাতজনিত রোগীর হুইল চেয়ার দক্ষতা পরিমাপ "।আমি এক্ষেত্রে কিছু ব্যক্তিগত এবং আনুষঙ্গিক তথ্য আপনার হুইল চেয়ার দক্ষতা সম্পর্কে জানতে চাচ্ছি যা আনুমানিক ২০-৩০ মিনিট সময় নিবে। আমি আপনাকে অবগত করছি যে, এটা আমার অধ্যয়নের অংশ এবং অন্য কোন উদ্দেশে ব্যবহার হবে না। গবেষক সরাসরি এই স্নায়ুরজ্জুর আঘাতজনিত অধ্যয়নের সাথে সম্পর্কিত নয়। তাই এই গবেষনায় আপনার বর্তমান এবং ভবিষ্যৎ চিকিৎসায় কোন প্রভাব ফেলবে না। আপনি যেসব তথ্য প্রদান করবেন তার গোপনীয়তা বজায় থাকবে এবং আপনার প্রতিবেদনের ঘটনাপ্রবাহে এটা নিশ্চিত করা হবে যে, এর উৎস অপ্রকাশিত থাকবে। এই অধ্যয়নে আপনার অংশগ্রহন ঐচ্ছিক এবং আপনি যে কোন সময় এই অধ্যয়ন থেকে কোন নেতিবাচক ফলাফল ছাড়া নিজেকে প্রতাহার করতে পারবেন। সাক্ষাৎকারের সময় কোন প্রশ্ন পছন্দ না হলে উত্তর না দেওয়ার অথবা না দিতে চাওয়ার অধিকারও আপনার আছে।এই অধ্যয়নে অংশগ্রহণকারী হিসেবে আপনার যদি কোন প্রশ্ন থাকে তাহলে আপনি আমাকে বা মোসাঃ ফাতেমা আক্তার, প্রভাষক, বিএইচপিআই, সিআরপি, সাভার, ঢাকা-১৩৪৩ এ যোগাযোগ করতে পারেন।

সাক্ষাৎকার শুরু করার আগে আপনার কি কোন প্রশ্ন আছে?

আমি আপনার অনুমতি নিয়ে এই সাক্ষাৎকার শুরু করতে যাচ্ছি।

হ্যাঁ ☐

না ☐

অংশগ্রহণকারীর সাক্ষর ----------

সাক্ষীর স্বাক্ষর.....

সাক্ষাৎগ্রহনকারীর সাক্ষর ---------- তারিখ.....

Title: MEASUREMENT OF WHEELCHAIR SKILLS IN PATIENT WITH SPINAL CORD INJURY.

Questionnaire

1. Socio-demographic information

1.1. Name:

1.2. Age: …… years.

1.3. Sex:

1. Male
2. Female
3. Common gender

1.4. Marital status:

1. Married
2. Unmarried
3. Widowed
4. Separate

1.5. Educational status:

1. Illiterate
2. Primary
3. Secondary
4. Higher secondary or above

1.6. Occupation at the time of interview:

1. Agricultural and other laborers
2. Small job
3. Homemaker
4. Student
5. Petty business
6. Others:

1.7. Family type:

1. Nuclear
2. Extended

1.8. Family members:

1.9. Family monthly income: …….. Taka.

1.10. Residence:

Date of interview:

Interviewer:

Patient ID:

Reg No:

Address:

House No-

Road No-

Village/Word-

Post office-

Thana-

District-

Mobile No-

1. Urban
2. Rural

Disease related information

1.11. Year of lesion:

1.12. Causes of lesion:

1. Traumatic
2. Non-traumatic

1.13.1. Causes of traumatic lesion:

1. Fall from height
2. Fall while carrying heavy load on head
3. Fall of heavy object on neck
4. Fall of heavy object on back
5. Road traffic accident (RTA)
6. Others

1.13.2. Causes of non-traumatic lesion:

1. TB spine
2. Transverse myelitis
3. Others

1.14. Type of paralysis:

1. Tetraplegia
2. Paraplegia

1.15. Completeness of injury:

1. Complete
2. In complete

1.16. Physical status:

1. Paralyzed lower limbs
2. Paralyzed four limbs
3. Weakness in lower limbs
4. Weakness in all four limbs

Wheelchair Skills Test (WST) Version 4.2 Form

Manual Wheelchairs Operated by Their Users

Name of wheelchair user: _____

Tester: _____ Date: _____

#	**Individual Skill**	**Capacity Score(0-2)**
1	Rolls forwards (10 m)	
2	Rolls backwards (2 m)	
3	Turns while moving forwards (90□)	
4	Turns while moving backwards (90□)	
5	Turns in place (180□)	
6	Maneuvers sideways (0.5 m)	
7	Gets through hinged door	
8	Reaches high object (1.5 m)	
9	Picks object up from floor	
10	Relieves weight from buttocks (3 sec)	
11	Transfers to and from bench	
12	Folds and unfolds wheelchair	
13	Rolls 100 m	
14	Avoids moving obstacles	
15	Ascends 5□ □incline	
16	Descends 5□ □incline	
17	Ascends 10□ □incline	
18	Descends 10□ □incline	
19	Rolls across side-slope (5□)	
20	Rolls on soft surface (2 m)	
21	Gets over gap (15 cm)	
22	Gets over threshold (2 cm)	
23	Ascends low curb (5 cm)	
24	Descends low curb (5 cm)	
25	Ascends curb (15 cm)	
26	Descends curb (15 cm)	
27	Performs stationary wheelie (30 sec)	
28	Turns in place in wheelie position (180□)	
29	Descends 10□ □incline in wheelie position	
30	Descends curb in wheelie position (15 cm)	
31	Gets from ground into wheelchair	
32	Descends stairs	
	Total score:*	%

Scoring Options for Individual Skills

Score	Score	What this means
Pass	2	Task independently and safely accomplished without any difficulty.
Pass with difficulty	1	The evaluation criteria are met, but the subject experienced some difficulty worthy of note.
Fail	0	Task incomplete or unsafe.
Not possible	NP	The wheelchair does not have the parts to allow this skill.
Testing error	TE	Testing of the skill was not sufficiently well observed to provide a score.

Formula for Calculating Total Scores

Total Capacity Score = sum of individual capacity scores/([32 – # of NP and TE scores] x 2)X 100%

16th August, 2015

Head

Department of Physiotherapy

Centre for the Rehabilitation of the Paralyzed(CRP)

CRP-Chapain, Savar, Dhaka-1343

Through: Head, Department of Physiotherapy, BHPI

Subject: Seeking permission for data collection to conduct my research project.

Sir,

With due respect and humble submission to state that I am Tahmina akter, student of 4th year B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). The Ethical Committee has approved my research title on "Measurement of wheel chair skill in patient with spinal cord injury'' under the supervision of Mst Fatema Akter, lecturer of Physiotherapy, BHPI. I have to collect data from spinal cord injury people in the CRP.For this I need permission from head of physiotherapy department,CRP.

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

Yours sincerely

Tahmina Akter

TahminaAkter

4th year B.Sc. in Physiotherapy
Session: 2009-2010
Bangladesh Health Professions Institute
(An academic Institution of CRP)
CRP- Chapain, Savar, Dhaka- 1343.

She may be allowed for data collection.
16.08.15

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

Giving permission for Data collection.
Ramana
Sr. PT 16.08.15

forword the Physiotherapy dept
16.08.15