



Faculty of Medicine

University of Dhaka

**FACTORS ASSOCIATED WITH LOW BACK PAIN
AMONG WHEELCHAIR USERS**

Susmita Saha Proma

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

DU Roll No: 918

Registration No: 3624

Session: 2015-2016

BHPI, CRP, Savar, Dhaka



Bangladesh Health Professions Institute (BHPI)

Department of Physiotherapy

CRP, Savar, Dhaka – 1343


Bangladesh

August, 2020

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

**FACTORS ASSOCIATED WITH LOW BACK PAIN
AMONG WHEELCHAIR USERS**

Submitted by **Susmita Saha Prama**, for the partial fulfilment of the requirement for the
degree of Bachelor of Science in Physiotherapy (B.Sc. PT).



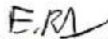
.....
Mst. Fatema Akter
Assistant Professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka
Supervisor



.....
Professor Md. Obaidul Haque
Vice-Principal
BHPI, CRP, Savar, Dhaka



.....
Mohammad Anwar Hossain
Associate Professor, Department of Physiotherapy, BHPI
Senior Consultant & Head of Physiotherapy Department
CRP, Savar, Dhaka



.....
Ehsanur Rahman
Associate Professor & MPT Coordinator
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka



.....
Md. Shofiqul Islam
Associate Professor & 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 mistake or inaccuracies are my own. I also declare that for any publication, presentation, or dissemination of the study, I would bound to take written consent from the Department of Physiotherapy of Bangladesh Health Professions Institute (BHPI).

Signature: *Susmita*

Date: 15.11.2021

Susmita Saha Prama

Bachelor of Science in physiotherapy

DU Roll No: 918

Registration No: 3624

Session: 2015-2016

BHPI, CRP, Savar

CONTENTS

Content	page No
Acknowledgment	i
Abbreviation	ii
List of tables	iii
List of figures	iv-v
Abstract	vi
Chapter - I: Introduction	1-7
1.1 Background	1-3
1.2 Justification	4
1.3 Research Question	5
1.4. Objective	6
1.5 Conceptual Framework	7
1.6 Operational Definition	8-9
Chapter – II: Literature review	10-15
Chapter – III: Methodology	16-22
3.1 Study Design	16
3.2 Study Area	16
3.3 Data collection period	16
3.4 Study of population and Sampling	16-17
3.5 Sampling technique	17
3.6 Sample Size	17
3.7 Inclusion Criteria	19

3.8 Exclusion Criteria	19
3.9 Data collection method	20
3.10 Data collection tools	20
3.11 Data analysis	20
3.12 Inform consent	21
3.13 Ethical consideration	21
3.14 Rigor	22
Chapter – IV: Results	23-54
Chapter – V: Discussion	55-69
Limitation	60
Chapter – VI: Conclusion and Recommendation	61-62
Reference	63-70
Appendix	71-87

Acknowledgment

First, I would like to pay my gratitude to God who has given me the ability to complete this project in time with grant success. I would like to pay my gratitude towards my parents who constantly used to encourage me to carry out this project.

I would like to pay my highest gratitude to my honorable research supervisor and respected teacher Mst Fatema Akter, Assistant Professor, Department of Physiotherapy, BHPI, CRP, Savar, Dhaka for giving me her valuable time, her keen supervisor and excellent guidance without which I could not able to complete this project.

I would like to reimburse my special appreciation to my respected teachers specially Profesor Md Obaidul Haque, Vice Principle BHPI. Mohammad Anwar Hossain, Associate Profesor, Department of Physiotherapy, BHPI and Senior consultatnt & Head of Physiotherapy Department, CRP for permitting me to collect data from the SCI and neurology unit of the Physiotherapy Department. Md. Shofiqul Islam, Head of Physiotherapy Department, BHPI. Ehsanur Rahman, Associate Professor & MPT Coordinator, Department of Physiotherapy, BHPI. Fabiha Alam, Lecturer, Department of Physiotherapy, BHPI.

My special thanks to my friends for their continuous suggestions and supports in taking challenges and that has inspired me throughout the project.

I would also like to thank the librarian of Bangladesh Health Professions Institute (BHPI) and her associates for their kind support to find out related books, journals, and also internet access.

Finally, I would like to thank all participants of the study for their enormous co-operation.

Abbreviation

BHPI	: Bangladesh Health Professions Institute
BSMMU	: Bangabandhu Sheikh Mujib Medical University
CRP	: Center for the Rehabilitation of the Paralyzed
DU	: Dhaka University
LBP	: Low Back Pain
MS	: Musculoskeletal
MSDs	: Musculoskeletal disorders
NSAIDS	: Nonsteroidal Anti-Inflammatory Drugs
PLID	: Prolapsed Lumbar Intervertebral Disc
SCI	: Spinal Cord Injury
SPSS	: Statistical Package of Social Sciences
WC	: Wheelchair
WHO	: World Health Organization
WMSDs	: Work-related musculoskeletal disorders

List of tables

Tables	Page No
Socio-demographic information	23
Sitting time in a wheelchair	29
The road surface of the participants	34
Nature of pain	38
Association between Socio-demographic information (age, gender, and living area) with low back pain of participants	50
Association between wheelchair related information with low back pain of participants	51
Association between low back pain related information with low back pain of participants	53

List of figures

Figure	Page No
Duration of using wheelchair of participants	25
Reason for using wheelchair of the participants	26
Type of wheelchair of participants	27
Lumber support in the wheelchair of the participants	28
Propel time of the participants	30
Supporter to propel wheelchair of participants	31
Sitting posture of participants	32
Propel posture of participants	33
Low back pain of participants	35
Duration of the pain of participants	36
The severity of pain of participants	37
Low back pain before using wheelchair of the participants	39
Family member low back pain of the participants	40
The smoking habit of participants	41
Lateral shift of participants	42
Reduced lumber lordosis of participants	43
Exercise regularly of participants	44
Lack of spinal mobility of the participants	45
Lumber spine surgery of the participants	46

Radiated pain to the leg of participants	47
Treatment receive of the participant	48
Treatment types of the participant	49

Abstract

Purpose: To identify the associated factors between low back pain and wheelchair users. **Objective:** This study's objective was to find out the factors associated with low back pain among wheelchair users. **Methodology:** This study was performed in a cross-sectional study design. This study's sample was collected through a convenience sampling technique and the total sample was 107. The data was collected from Spinal cord injury unit and neurology units at CRP, Savar. The data collection process was a questionnaire with a face-to-face interview. Data were analyzed by SPSS version 25 and Chi-square test was done to explore the association. **Result:** In this study, 72% of the participant had low back pain who use a wheelchair. In this research low back pain strongly associated with age ($p < .001$), daily sitting time on wheelchair ($p < .000$), daily propel time in a wheelchair ($p < .000$), sitting posture in a wheelchair ($p < .000$), propel posture in a wheelchair ($p < .000$), road surface ($p < .000$), smoking habit ($p < .000$), reduced lumbar lordosis ($p < .000$). **Conclusion:** It was found that the majority of them had low back pain among wheelchair users. In addition, since this sample size was small, to generate adequate evidence to support decision-making processes at the national level, there should be more studies among wheelchair users.

Key words: Low back pain, wheelchair users, associated factors

1.1BACKGROUND

In Bangladesh, the number of disabled people is increasing day by day due to the incremental rate of accidents (Mahmood et al., 2020). It is considered that in Bangladesh disabled population is approximately 16 million which is 10 percent of the total population whereas approximately 10-15% of the world's people live with a disability (Eusufzai et al., 2019). Research by the BSMMU in 2015, says that approximately 47,437 people were victims of road RTA and received major or minor forms of disabilities (Ahmed et al., 2021).

Artificial limbs or legs, manual wheelchairs, or even three-wheelers are being used as some primary assistive devices by physically disabled people for their daily mobility. A study on people using wheelchairs says that around 41.25% of patients are found loss of range of motion, 29.4% of patients have shoulder pain, 23.53% patients are suffering from wrist pain, back pain caused to 25.5% patients, during the time of propelling the wheelchair some patients feel discomfort and the portion is 29.4% (Sakib et al., 2015). As a risk factor of low back pain, a way of living is also considered. Behavior of smoking, less physical exercise, short sleep hours and lifting a heavy load, inappropriate posture, and heavy physical workload increase the risk of LBP (Tomita et al., 2010).

The wheelchair is a supportive device used for mobility. Due to their inability of standing and walking without the help of a caregiver, most of the lower limb disabled and elderly people use wheelchairs (Desai et al., 2018). In our society transferring to different places are unavailable for disabled people. Nowadays wheelchairs are a very beneficial assistive device for disabled persons. Long-term wheelchair use causes back pain, discomfort, pressure-related sores, skin breakdown, joint immobility, contractures, spasticity, and musculoskeletal problems (Borisoff et al., 2013).

Recent calculations from the WHO indicate that some 65 million people worldwide need a wheelchair. In 2010, a census conducted by the United States reported that around 3.6 million wheelchair users were over the age of 15 (Kairy et al., 2014). Persons who have

spinal cord injuries and lack of ability to walk, spend in their wheelchair a minimum of 9–11 h daily. An improper sitting posture for a prolonged time can cause, aggravate or sustain secondary health problems of the SCI patients. A pressure sore, deformities of the spinal cord, respiratory complications, low back pain, neck pain weight gain, chronic musculoskeletal pain, and fatigue are generally reported health problems that are related to sitting among SCI patients (Valent et al., 2019).

Other researchers have reported that the lumbar lordotic curve and pressure on the ischium and muscular activity are decreased by prolonged sitting. It has been reported that during sitting prolonged flexion was the cause of redistribution of the nucleus inside the annulus. Such factors may lead to herniation of disc, rupture or degeneration, and probably lower back pain (Lee & Yoo, 2011). Back pain and seating posture discomfort ability are highly prevalent problems among wheelchair users. When a manual wheelchair user moves he has to apply power on the handrails in a repeated course that may cause upper limb injuries in long term. Other research has shown a greater rate of pain in the wrist and shoulder among people using manual wheelchairs (Medola et al., 2014).

At the time of propelling wheelchair participants face obstacles such as restriction, and rough surfaces. Friction with these stumbling block create contusions and also vibrations on the wheelchair. These effects—the wheelchair user, possibly consequences injurious effects such as LBP, degeneration of the disc, fatigue in muscle, and other harmful effects (Giwnewer et al., 2020). Vehicle investigations on the relationship between shock and vibrations and a person's health motivated the research of trauma and vibrating vulnerability in wheelchair users especially since this population has a higher prevalence of neck pain, back pain, and spinal disorders (Hischke & Reiser, 2018).

Very few problems are as big as low back pain for the public health system worldwide. 84% of people have low back pain during their lifetime (Phattarasupharek et al., 2019). Low back pain encloses three different sources of pain: radicular axial lumbosacral, and referred pain. Axial lumbosacral backache indicates pain in the lumbar, or L1-5 vertebral area, and sacral spine, or S1 to sacrococcygeal synapse area. Radicular leg pain travels into an extremity along with a dermatomal distribution secondary to nerve or dorsal root ganglion irritation. Referred pain increases to a region different from its root but along a

non-dermatomal region. In the USA as well as worldwide pain in these 3 locations is comparatively normal (Urits et al., 2019).

In 1655 Stephen Farffler, a paraplegic aged 22, developed the first self-propelled wheelchair. There are numerous varieties of wheelchairs available today; nevertheless, the manual wheelchair is the most popular, especially in Anglo-Saxon countries. and effectively!.A recent study in France estimated the prevalence of manual and/or electric wheelchair use, with 206,000 and 155,000 users in dwellings and institutions, respectively, and these numbers rise exponentially with age. In terms of happiness, most users prefer the manual wheelchair because of the numerous applications and options it provides (Traoet et al., 2015).

1.2 Justification

Very few health problems are as common as low back pain all over the world. Approximately 20% population who are adults experience LBP at any given time and lifetime prevalence is around 80%. It is the number one factor for activity limitation. After headaches, it is the 2nd topical pain (Citko et al., 2018). Prolonged sitting prompts a poor posture which in turn causes fatigue in the back and neck muscles and puts a high strain on the spine. With prolonged sitting, if the head, neck, and shoulders are not aligned in an almost straight line, then there are chances of resulting pain in the back and shoulder muscles (Desai & Vinekar, 2019).

Back pain is a problem that is very common in people with paraplegia. The spinal cord is more inflexible at the levels of the joining. Increased movement is potentially to happen just over and just beneath the joining and this can cause pain in the back. There may also be found buttock pain, chest pain, and some sort of neck pain. It usually occurred due to placing the lower extremity downward while sitting in the wheelchair due to prolong period

Identifying risk factors for a disease is the greatest method used to gain an understanding of its etiology. Factors associated with the occurrence of low back pain can harshly be divided into personal factors, psychosocial factors, and physical factors. Among these physical factors, bending, lifting, twisting and whole-body vibrations are the most frequently reported ones associated with LBP. There is a great demand in identifying the associated factors with LBP to reduce the suffering of LBP patients. By conducting this research it is expected that some of these factors can be identified to minimize the cost of medical treatment, morbidity, inattentive from work, moreover psychological and physical distress, increase productivity as well as decrease socio-economic cost. Ascertain the associated factors with LBP give us evidence by which we take necessary preventive measures to manage this condition as well as to minimize the sufferings of this condition. The study may help to build awareness about posture and activities. The more we will know the associated factor, the more we can take preventative measures to prevent the diseases that are why it is major to know the factors associated with low back pain among wheelchair users.

1. 3: Research question

What are the factors associated with low back pain among wheelchair users?

1. 4: Objectives

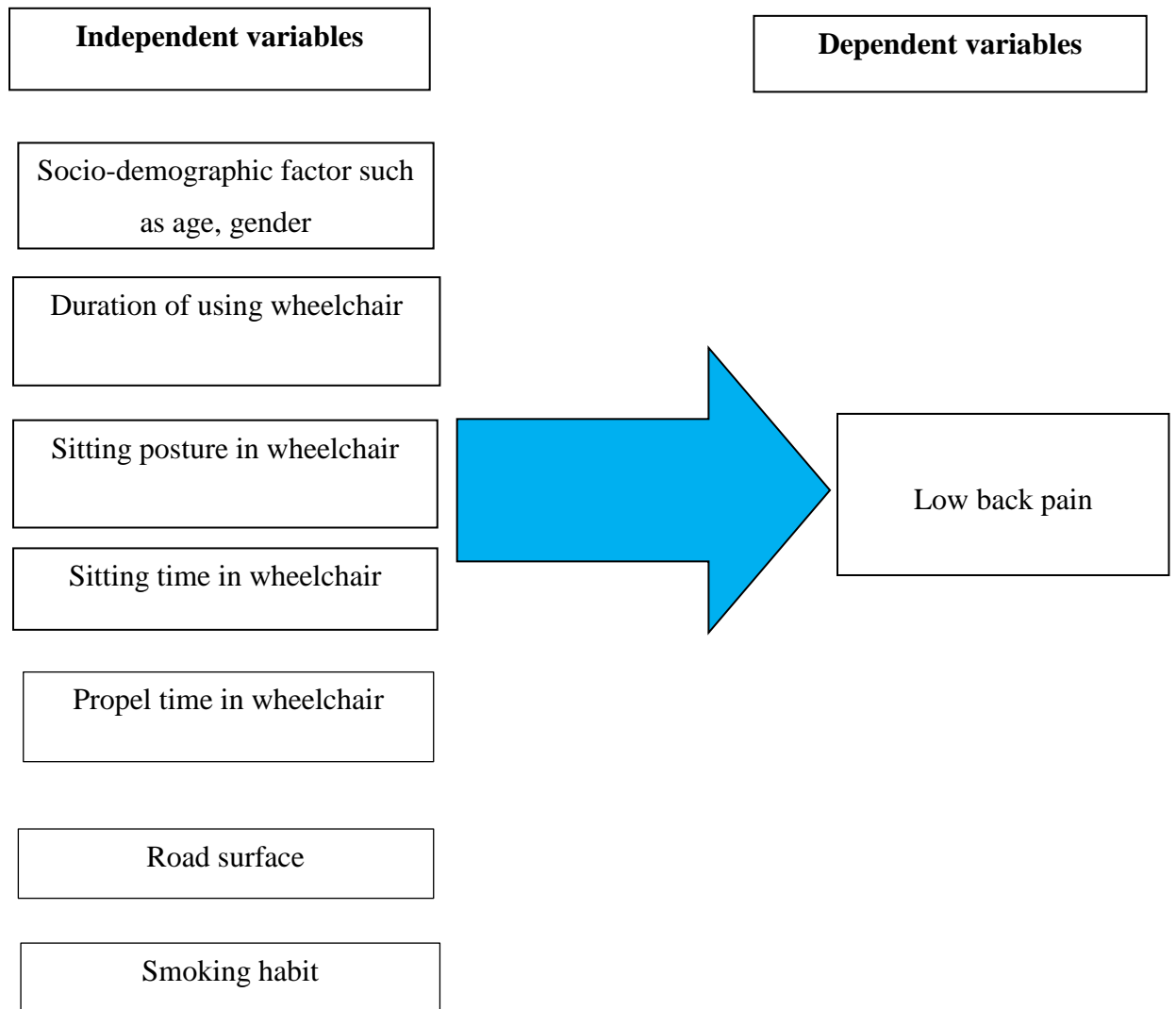
1.4.1: General objectives:

- To identify the factors associated with low back pain among wheelchair users

1.4.2: Specific objectives:

- To explore socio-demographic (age, gender, occupation, educational status) characteristics of patients with low back pain
- To investigate the association between daily sitting time on wheelchair and low back pain
- To find out the association between propel time in a wheelchair and low back pain
- To detect the association between sitting posture and low back pain
- To obtain the association between the road surface and low back pain
- To acknowledge propel posture and low back pain
- To find out the association between Lumber spine surgery and low back pain
- To explore the association between reduced lumber lordosis and low back pain
- To identify the association between smoking and low back pain

1.5 Conceptual framework



1.6 Operational definition

Low back

The low back, also called the lumbar region, is the area of the back that starts below the ribcage.

Pain

Pain is a troublesome sensory and emotional experience associated with actual and possible tissue damage or narrated in terms of such injury.

Low back pain

Low back pain is pain, muscle tension, or stiffness localized below the costal margin and above the inferior gluteal folds, with or without sciatica, and is defined as chronic when it persists for 12 weeks or more

Poor Sitting

Poor Sitting is the posture that results from certain muscles tightening up or shortening while others lengthen and become weak, which often occurs as a result of one's daily activities. It may lead to pain, injury, or other health problems

Smoking

Smoking is a practice in which a substance is burned and the resulting smoke is breathed in to be tasted and absorbed into the bloodstream. Smoking is to smoke a cigarette at least 3 times per day.

Exercise

Exercise is any bodily activity that enhances or maintains physical fitness and improve overall health and fitness

Physical Exercise

Physical exercise is the performance of some activity to develop or maintain fitness and overall health.

Positive Family history

Any history of low back pain among family members like parents, grandparents.

Wheelchairs are primary mobility devices for locomotive disabilities. More than half of individuals with amyotrophic lateral sclerosis, cerebral palsy, multiple sclerosis, multiple system atrophy, and spinal cord injury (SCI) patients are using wheelchairs for mobility. In 2002, the number of wheelchair users in the USA was approximately 2.7 million and they were using a wheelchair for their mobility activity. In Europe, around 3.3 million people are estimated to use wheelchairs (Chow et al., 2011). Studies investigate that about sixty percent disable people using wheelchairs have backache or neck pain. Other investigations also said that of their participants visited the doctor because of their pain and the percentage was 60 percent and also forty percent of participants had limitations in their activities of daily life. inadequate postural support, stress, depression, vibration, and other physical and psychosocial factors are some risk factors for neck and back pain and wheelchair users may have more exposure to these risk factors which is implied by an increase in the prevalence of back pain (Garcia et al., 2012).

A recent study estimates that 100-130 million people with disabilities need wheelchairs. According to experts' predictions, the number of people who need wheelchairs will increase by 22 percent over the next ten years (Sutradhar et al., 2017). For community participation and quality of life, transfer and independence with transfers are very essential wheelchair skills for daily living and also one of the most important determinants. Usually, a full-time wheelchair user performs 15 to 20 transfers per day. For completing tasks of daily living, it is essential to perform the transfer (Hogaboom & Boninger, 2016).

In France, a recent study said that the prevalence of the use of the manual and/or electric wheelchair, with respectively 206,000 and 155,000 users in residences and institutions, and these numbers increase exponentially with age. It is satisfying that the majority of users prefer the manual wheelchair, for the various applications and the possibilities that it provides (Traore et al., 2015). LBP is a common musculoskeletal complaint in all components of the world. After headaches and tiredness, pain in the back is the third most common fitness problem. Heavy bodily workout like awkward posture, lifting, and total body vibration is the most commonly mentioned hazard issue for LBP. The reason for

extending the hazard of LBP are smoking behavior, lack of bodily exercise, and short sleep hours. A junction between LBP and psychosocial elements has also been reported. Riding greater than four hours/day is associated with pain in the back and it is proved In Taiwanese studies (Nahar et al., 2012).

The World survey on Disability says that approximately 15% population of the world stays with some kind of disability whereas 2–4% population of the world have severe difficulties in functioning without the use of Assistive devices. The prediction of WHO reports that the number of people living with disabilities will double by 2050. People in Bangladesh, Nepal, and India are still treated disabilities as social stigma and taboo (Karki et al., 2021). Research added that most of the manual WC users spend most of their time in their wheelchairs and the time is approximately 10 h/ day. They spend around ten percent of their time in their wheelchairs by sincerely wheeling. Seating changes also may additionally reduce some of the fitness hazards related to long-time wheelchair use such as pain and discomfort; pressure-induced tissue damage; joint immobility and contractures; and spasticity. It has been suggested to wheelchair users that there is no most suitable static seating function and established repositioning is strongly recommended. There is seating pain which is a common problem to many WC users for their spending too much time in a static position as they spend most of the time in a day with fixed seating systems in their wheelchair. Research about involving electricity wheelchair users stated that 59% of respondents felt their pain was increased by using their wheelchairs and 30% mentioned ache or pain aggravated via sitting (Mattie et al., 2019).

Another research shows that the incidence of pain in the lower region of the Back is higher among females than males in all age groups. And the prevalence of Pain in the lower region of the back is more frequently occur in the age group of 40-69 (Hoy et al., 2012). In the 21st century, no other health problem is as mounting as nonspecific pain in the lower region of the back. A sedentary lifestyle is suggested as one of the predictors for nonspecific pain in the lower region of the back. People leading a sedentary lifestyle do less physical activity which causes the demotion of muscle energy and strength. The sedentary lifestyle was also found as a possible risk factor for herniation of the vertebral disc. Flaccid hyper lordosis

may be developed in people who lead a sedentary lifestyle and this complex results in the development of non-specific low back pain (Citko et al., 2018).

Sitting for a prolonged period is a possible problem for the musculoskeletal health of the workers. There is mixed evidence in the lower region of the back concerning the connection between a long period sitting at the workplace and pain in the lower region of the back (Baker et al., 2011). Sitting in a static posture for a long period may harm the nutrition of the intervertebral disc. Sitting on slump posture decreases the spinal stabilizing muscles activation and it is connected with rises in loading on the disc of intervertebral and connective tissue. Clinically, according to our knowledge, chronic low back pain is aggravated by slump sitting posture which is one of the passive postures (Lee & Yoo, 2011).

In France, sixty-two humans per 10,000 use a wheelchair (Marchiori & Bensmail, 2015). Psychological variables associated with low back include stress, mood distress, and emotions cognitive, functioning, pain behavior, and depressive disorder. Research showed that poor status of mental health condition significantly increased the danger of low back pain by 1.11 times compared to the normal mental status (Nurul et al., 2010).

In Bangladesh, disability issues have been researched largely from the socioeconomic perspective of medical science. The socio-economic status of disabled persons as well as the differences between disabilities in accord with socio-economic and gender perspectives. Some research studies tried to examine (Farzana, 2018). Seating in a wheelchair for a long period was identified as a vital reason for pain for a large number of the respondents. They also suggested some points of disappointment with the tools. Also, The necessity to it reveals for transformation key for the seat design and backrest surface, for the sake of improving safety, comfort, and satisfaction with long term wheelchair usage. The results of a non-suitable we are injurious and sufficient to justify improvements in the product design (Medola et al., 2014).

Worldwide reports on handicap say that over one billion people, who almost contain 14% of the total populace, live with a type of inability. Studies show that around 10% of these people have lower extremity disabilities and are subject to physically moved wheelchairs for ambulation and performing exercises of day-by-day living (ADLs). Around 20 million

of the impaired, in any case, don't approach wheeled portability devices (Ebrahimi et al., 2016). LBP is a common disorder in modern life. Globally, two-thirds of adults experience LBP to the extent that treatment is required. Research reported that the indicated prevalence of low back pain is as much as 10%, and the 1-month prevalence is over 20%. The frequency of low back pain is not endless to a particular job category, industrial workers, but healthcare workers, nurses, tend to meet a relatively high frequency of low back pain. These employees all the time use their muscles in the back and spines in lumbar motions such as flexion, rotation, and side bending. Epidemiological analysis showed that regular flexion and rotation in the lumbar spine is a big associated factor for pain in the lower back. Although the prevalence of LBP is not limited to a particular job category, industrial workers, nurses, and healthcare workers tend to experience a relatively high prevalence of LBP. These workers frequently use their back muscles and spines in lumbar motions of flexion, rotation, and side bending. Epidemiological analysis revealed that periodic lumbar flexion and rotation are major risk factors for LBP. The danger for pain in the lower back region in hand-operated lifting tasks was estimated by research with calculations. According to the assessment of research, there is a risk for low back pain in manufacturing industries that use peak motion and progressive lumbar motions as danger factors of pain in the lower part of the back (Nakamoto et al ., 2018).

People using a wheelchair for a long time are generally faced with various health problems that are the result of seating inactively in a fixed posture on the wheelchair for a long period. Research said about the general problems of patients using wheelchairs counting troubles in shifting from a WC to bed and also problems in standing from sit because of seating in a wheelchair a prolonged time. The adjustment feature back seat of a WC can help people using a wheelchair in the positioning of the trunk (Desai et al.,2018). The reported lifetime LBP prevalence rates in the United States, Canada, and Europe range from 49 percent to 70 percent,8, and the projected direct and indirect expenses of LBP in the United States alone range from \$84 billion to \$624 billion (Gore et al., 2012).

According to the World health organization all over the world, 250,000-500,000 people suffer from an injury in the spinal cord every year. Physical limitations to basic movement are one of three issues that prevent many persons with SCI from fully participating in

society, according to the WHO. They recommend that folks use appropriate assistive gadgets to help them complete daily tasks. Only 5-15 percent of people with SCI in poor and middle-income countries have access to the assistive devices they require. In the United States alone, there are over 400,000 SCI victims, with 15,000 new injuries occurring each year. Every year, around 15 million individuals worldwide are afflicted by stroke, with 80% of those affected experiencing mobility issues. The market for assistive gadgets is relatively popular, and very few of them are too expensive for people in developing and impoverished countries. Nuclear families, which were once only prevalent in Western countries, have now spread to many developing countries and their people of low-income countries increasingly need such assistive devices (Megalingam et al., 2016). As the report of wheelchair users, it was observed that they found positive changes in daily activities and improved participation. The problems were primarily concerned with outdoor mobility and its effects on social roles and emotional well-being changes. It was reported that SCI people were satisfied with their wheelchairs. People who had complete SCI were slightly less satisfied than people with incomplete injury. Quality of life is more closely linked to involvement and the human environment than, wheelchair users' satisfaction (Varshney et al., 2017).

Approximately 33% of people with chronic SCI who use a wheelchair reported weariness, pain, pressure ulcers regularly, and instability during reaching. Research reported that lack of support in the wheelchair, out of all personal, lesion, and wheelchair variables appeared to be associated with several sitting-related health and stability problems. The odds of pain, mostly in the back or neck, increased in all persons who lacked support by their wheelchair e.g. in the back or lateral to the trunk. The amount of time spent in a wheelchair daily may be linked to sitting issues. Moreover, Age at the beginning and time since onset of SCI may have an impact, as difficulties may worsen over time. Lastly, the support provided by the seating system has a strong relationship with the posture of a seated paralyzed body. It is unknown how often sitting-related issues and displeasure with seating are among people with SCI. In SCI, there is a lot of literature on sitting and sitting-related disorders are scarce and sample sizes are small (Valent et al., 2019). Chronic LBP is very common has risen substantially in recent decades and insurance data reveal a higher percentage of conservative or surgical therapy for this chronic situation (Dickerson et al., 2018).

People who are mobility independent after a spinal cord injury (SCI) have better long-term results, such as well-being and participation than those who are not. Several studies have shown the wheelchair skills capacity of diverse wheelchair user demographics. Fewer studies on experienced wheelchair users with SCI have been published (Kirby et al., 2016). A study showed that more than a billion people worldwide are disabled in some way in this world. Among them, 0.2 billion have functional disabilities. Both as a cause and as a result of poverty, disability and poverty are difficult to link. A significant number of people were present with disabilities in the world are living with low, inadequate, and uncertain incomes (Eusufzai et al., 2019). The role of whole-body vibration's impacts is not fully understood in occupational exposure because individuals also have periods of prolonged sitting, bending forward, and frequent twisting of the spine which could also contribute to back pain (Hischke et al., 2018).

An acute episode of LBP resolves spontaneously in one-third of patients within the first three months; nevertheless, approximately 65 percent of patients still have LBP one year following the beginning. As a result, chronic LBP (LBP that lasts for more than 12 weeks) is a frequent issue that has a huge personal, economic, and societal cost. Adaptations of motor control, among other factors such as genetic, physical, and psychosocial characteristics, are likely to play a significant role in chronic or recurrent LBP because they are linked to several important factors that contribute to LBP chronification, such as increased spinal tissue strains due to potential loss of trunk control and enhanced trunk muscle co-contraction. Both factors, loss of trunk control and increased muscular co-contraction, have been associated with continuous mechanical strain on spinal tissues, potentially accelerating intervertebral disc and other tissue deterioration (Meier et al., 2019). For effective management of spinal stiffness and movement, back muscle function is required. Muscle structure influences muscle function, function influences structure, and pain/injury influences both, as is frequent in low back pain. Acute pain and nociceptive stimulation, as well as injury-related afferent input, influence back muscle function in the short term. Alterations in back muscle function, on the other hand, have been hypothesized as a cause of LBP development (Hodges & Danneels, 2019). Because men's muscles are physically stronger than women's, gender influences the risk degree of the muscular complaint. Physical capability is likewise linked to age, peaking around the age of 25.

Muscle power decreases by 25% and sensory-motor competence decreases by 60% between the ages of 50 and 60 (Arifin & Rustina, 2020).

Chronic low back pain (CLBP) is a major health concern around the world, and its prevalence has risen dramatically in recent decades. According to a global systematic study, there is a linear relationship between age and CLBP prevalence; specifically, those aged 20 to 59 have a CLBP prevalence of 19.6%, whereas older people have a prevalence of 25.4% (Malfliet et al., 2019). One study has found a link between smoking and lower back discomfort in those who have physically demanding jobs. People who work in physically demanding jobs are more likely to smoke. As a result, physical exposures at work may muddle the link between smoking and low back pain. In addition, smokers have a worse mental health state than nonsmokers. As a result, smoking could be a proxy for an underlying psychological issue that causes low back discomfort. Adolescents have a higher link between current smoking and the occurrence of low back pain than adults (Shiri et al., 2010).

Approximately 650 million individuals, or about 15% of the world's population, live with a handicap. Females have higher rates of impairment than males in most countries. This number is likely to rise as the population ages. People with disabilities make up about 80% of the population in developing countries. As a result, it is the researcher's enormous responsibility to build a user-friendly and cost-effective system to secure the safe movement of impaired individuals (Alametal et al., 2019). The MWC provides the body with mobility and support. It assists with activities of daily living (ADL), self-care, and recreation. In the United States, around 1.7 million persons used wheelchairs in 2000, with 1.5 million of them being MWUs (Rafiullah & Mazhar, 2017). Wheelchair and seating assistive technology, according to other studies, provides postural support and mobility for the individual, allowing them independence and participation (Kenny & Gowran, 2014).

3. 1: Study design:

The study was conducted by using a Cross-sectional study design to meet the study objectives. A cross-sectional study is the simplest variety of descriptive or observational epidemiological studies that can be conducted on representative samples of a population. It is a study that aims to describe the relationship between diseases and other factors of interest as they exist in a specified population at a particular time, without regard for what may have preceded or precipitated the health status found at the time of the study. These studies gather information about the prevalence of health-related states and conditions, but they cannot distinguish between newly occurring and long-established conditions. As there is no follow-up, fewer resources are required to run the study. According to (Hemed & Tanzania, 2015) stated that cross-sectional study is relatively cheap among the observational studies and can be conducted in a short time.

3. 2: Study area:

The researcher was chosen Spinal cord injury unite and neurology unites at CRP, Savar as a venue so that the researcher could obtain an appropriate sample with LBP among wheelchair users. The researcher thought that it is the most suitable place because there has the availability of the desired sample.

3. 3: Data collection period:

Data were collected from July 2021 to September 2021. Data was collected carefully and maintained the confidentiality of the data. Each participant provided a particular time to collect data. In general, each questionnaire took approximately 15-20 minutes to complete.

3. 4: Study population:

The sample was chosen purposively to conduct the study, as the using of purposive sampling method based upon the judgment of the researcher, in that a sample was made of elements that embrace the most characteristic, representative or typical attributes of the population to be studied. The researcher has developed a structured questionnaire for identifying the inclusive characteristics of subjects and then used it to purify the members of the population, especially those subjects using wheelchairs considering the inclusion.

3. 5: Sampling technique:

The study was conducted by using the convenience sampling methods because it is the easiest, cheapest and quicker method of sample selection. It was easy to get those subjects according to the criteria concerned with the study purpose through the convenience sampling procedure.

3. 6: Sample size:

The equation of sample size calculation was given below-

$$n = \frac{z^2 pq}{d^2} \quad (\text{Hannan, 2016})$$

$$= \frac{(1.96)^2}{0.05^2} \times 0.45(1 - 0.45)$$

$$= 380$$

Here,

$$z(\text{confidence interval}) = 1.96$$

$$P = (\text{prevalence}) = 0.45 \quad (\text{Kovacs et al., 2018})$$

$$q = (1-p)$$

$$= (1-0.45)$$

=0.55

d=0.05

Where,

n = Sample size

z= linked to 95% confidence interval (use 1.96)

p = expected prevalence (as fraction of 1)

q = 1- p (expected non-prevalence)

d = margin of error at 5% (standard value of 0.05)

As a student, it was quite difficult to collect data from the large range of samples in this pandemic situation. For this reason, the investigator collected data from 107 participants only.

Chi-square (χ^2) Test

The Chi-Square (χ^2) test is the most commonly used discrete data hypothesis testing method. It is a nonparametric statistical significance test for bivariate tabular analysis with a contingency table. The Chi-Square test is used to analyze data in the form of counts. This test can be used on nominal or categorical data that cannot be analyzed using the ranking technique.

Calculation of Chi-Square

Different and Independent variable

Variables were quantitative

Normal Distribution of the variable

Formula: the test statistics follow-

$$\chi^2 = \sum (O-E)^2 / E$$

Here,

χ^2 = Chi-square value

Σ = The sum of

O = Observed count

E = Expected count

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

3. 7: Inclusion criteria:

- Wheelchair users who were attending in CRP for treatment purpose
- Ages above 18 years
- Who were willingly participated

3. 8: Exclusion Criteria:

- Mentally challenged people
- The subject was unconscious

3. 9: Data collection method:

Firstly, the investigator introduced herself and describe the project study as well as its purpose. Then the researcher clarified that the participant has the right to refuse to answer any question during completing the questionnaire. They can withdraw from the study at any time. Participants were ensured that any personal information would not be published anywhere. The researcher took permission from each participant by using a written consent form. Method of data collection in this study data was collected by questionnaire form set on a paper. After getting consent from the participants, a standard questionnaire was used to identify the complaints and collect demographic information. The questionnaire form was close-ended questions. Questions were asked according to the Bangla format. On the other hand, the Bengali version about disease conditions might be helpful. For conducting the interview, the researcher conducted a face-to-face interview and asked questions. Face-to-face interviews are the most effective way to get the full cooperation of the participant in a survey. Face-to-face interviews were used to find specific data which describes the population descriptively during discussion. According to the participants' understanding level, sometimes the questions were described in the native language so that the patients can understand the questions perfectly and answer accurately. All the data were collected on the researcher's own to avoid errors.

3. 10: Data collection tools:

Data was collected by using a structured questionnaire paper set, by conducting a face-to-face interview to collect information. The questionnaire sought information on identification demographic information, lifestyle-related information, and work & posture-related information. The researcher was also used pen and pencils, approved forms, and consent forms.

3. 11: Data analysis:

Descriptive statistics were used to analyze data. Descriptive statistics refers to methods of describing a set of results in terms of their most interesting characteristics (Hicks, 2009).

After completing the initial data collection, every questionnaire was checked again to find out any mistakes or unclear information. The data were analyzed through the Statistical package of social science (SPSS 25) version software program. Microsoft Office Excel 2019 was used to create most of the graphs and charts. In this study researcher use bar, Colum, Figure, Pie chart to show the result of the study. Because it is easier to make sense of a set of data. To find out association Chi-square test was applied.

3. 12: Inform consent:

For this study, a consent form was given and the purpose of the research and consent forms was explained to the subject verbally. Participants were fully voluntary and they have the right to withdraw at any time. Participants were also ensured that their confidentiality will be maintained. Information might be published in any presentations or writing but they will not be identified. The study results might not have any direct effects on them but the members of the Physiotherapy population may be benefited from the study in the future. They would not be embarrassed by the study.

3. 13: Ethical consideration:

The researcher maintained some ethical considerations: The researcher has followed the Bangladesh Medical Research Council (BMRC) guideline & WHO research guideline. A research proposal was submitted to the physiotherapy department of BHPI for approval and the proposal was approved by the faculty members and gave permission initially from the supervisor of the research project and the course coordinator before conducting the study. The study protocol was sent to BHPI for the Institutional review board for approval as per the existing rules. Permission from in charge of the Physiotherapy department of CRP was taken to conduct the study. Verbal consent was taken from the participant informing them about the purpose of the study, anonymity, their rights to refuse to answer any question, withdrawal from the study at any point in time, and other issues mentioned in the form before starting the interviews. For any kind of use of the study, there was no identification of any participants only the data was used. The data was kept in a secure place where only the researcher had access. The researcher was eligible to do the study

after knowing the academic and clinical rules of doing the study about what should be done and what should not. All rights of the participants were reserved and the researcher was accountable to the participant to answer any type of study-related question.

3. 14: Rigor: During the data collection and data analysis it was always tried not to influence the process by own perspectives, values, and biases. No leading questions were asked and judgments were avoided. When conducting the study, the researcher was taken help from the supervisor when needed.

4. 1: Socio-demographic information

Variables	N (%)	Variables	N (%)
Age		Family	
18-33	24(22.4%)	Nuclear	71(66.4%)
34-49	17(15.9%)	Extended	36(33.6%)
50-65	19(17.8%)	Occupation	
>65	47(43.9%)	Job	24(22.4%)
Gender		Business	19(17.8%)
Male	77(69.2%)	Others	64(59.8%)
Female	33(30.8%)	Income	
Living area		<10000	2(1.9%)
Urban	14(13.1%)	11000-20000	78(72.9%)
Semi urban	45(42.1%)	21000-30000	26(24.3%)
Rural	48(44.9%)	>30000	1 (.9%)
Education level		Religion	
Illiterate	21(19.6%)	Muslim	99(92.5%)
Primary	38(35.5%)	Hindu	8(7.5%)
SSC	13(12.1%)		
HSC	23(21.5%)		
Others	12(11.2%)		

Table 1: Socio-demographic information

This study revealed the socio-demographic information such as age, gender, living area, educational level, occupation, family type, monthly income, the religion of the participants. This study's total participants were 107. Participants means and standard deviation of participants age where are Mean \pm SD=43.84 \pm 16.604; About 22.4% (n=24)

were people age 18-33 years age range; (15.9%) (n=17) were between 34-49 years age range; (17.8%) (n=19) were between age 50-65 years age range; and 43.9% (n=47) more than 65 years. Among 107 people are involved, in which there is 69.2% (n=77) are male and 30.8% (n=33) are female. Around 44.90% (n=48) of the people are lived in a rural area, 42.1% (n=45) are from semi-urban and 13.1% (n=14) people from urban areas.

Participants educational level 19.6% (n=21) where are illiterate, 35.5% (n=38) are primary education; 12.1% (n=13); are SSC, 21.5% (n=23) are HSC, 11.2% (n=12) are others level education. 66.4% (n=71) nuclear family; 33.6% (n=36) extended family. Among 107 participants majority of them 59.8% (n=64) of participants occupations were others like farmer, driver, some are students and housewife only 22.4% (n=24) were doing jobs and 17.8% (n=19) were doing business. In his research the mean and standard deviation of monthly income were (Mean \pm SD) = (27869.16 \pm 16.604); About this study 1.9% (n=2) monthly income less than 10000 taka; 72.9% (n=71) monthly income 11000-20000 taka; 2.3% (n=26) persons monthly income 21000- 30000 taka;.9% (n=1) monthly income more than 30000. This study is ninety-two-point five percent 92.5% (n=99) religion Islam; seven-point five percent 7.5% (n=8) participants Hindu.

4.2. Wheelchair related information

4.2.1: Duration of using wheelchair of participants:

In this study majority, 54.2% (n=58) of participants started using a wheelchair for 3 months, 17.8% (n=19) using 6 months and 28% (n=30) participants started using a wheelchair for more than 6 months.

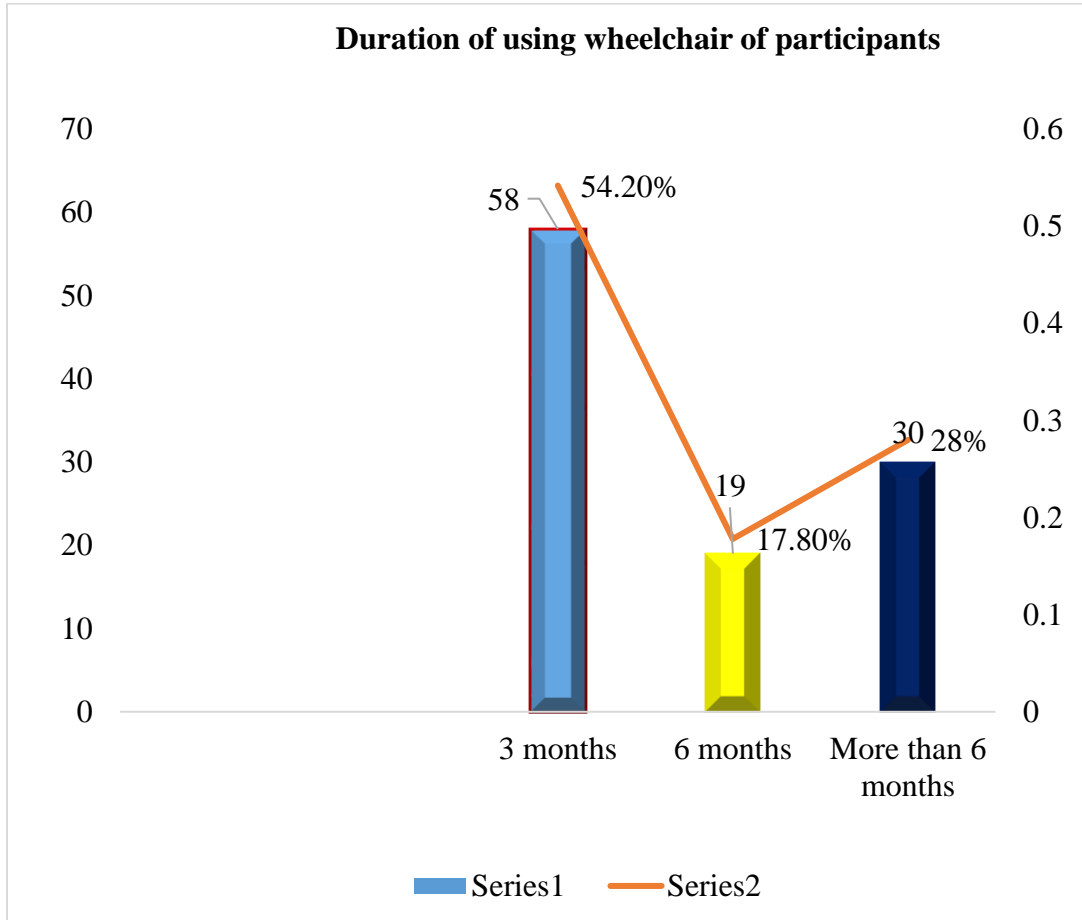


Fig no: 01- Duration of using wheelchair of participants

4.2.2: Reason for using wheelchair of participants:

About (49.5%) participants are Spinal cord injury patients, (39.3%) are Stroke patients, and (11.2%) of participants were others like GBS, head injury, Parkinson's disease, peripheral nerve injury.

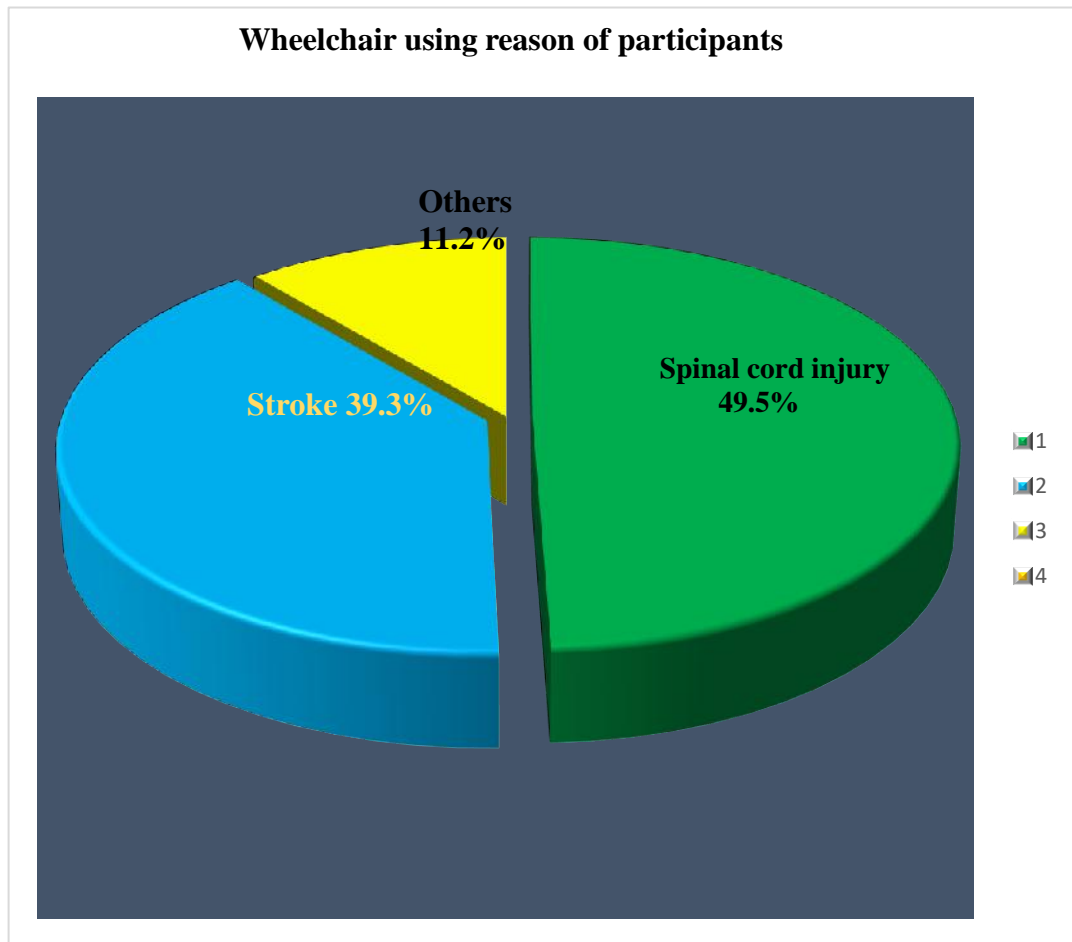


Fig no: 2 Wheelchair Using reason of participants

4.2.3: Type of wheelchair of participant:

In this study, 78.50% of participants used a local wheelchair and 21.50% used a measurable wheelchair.

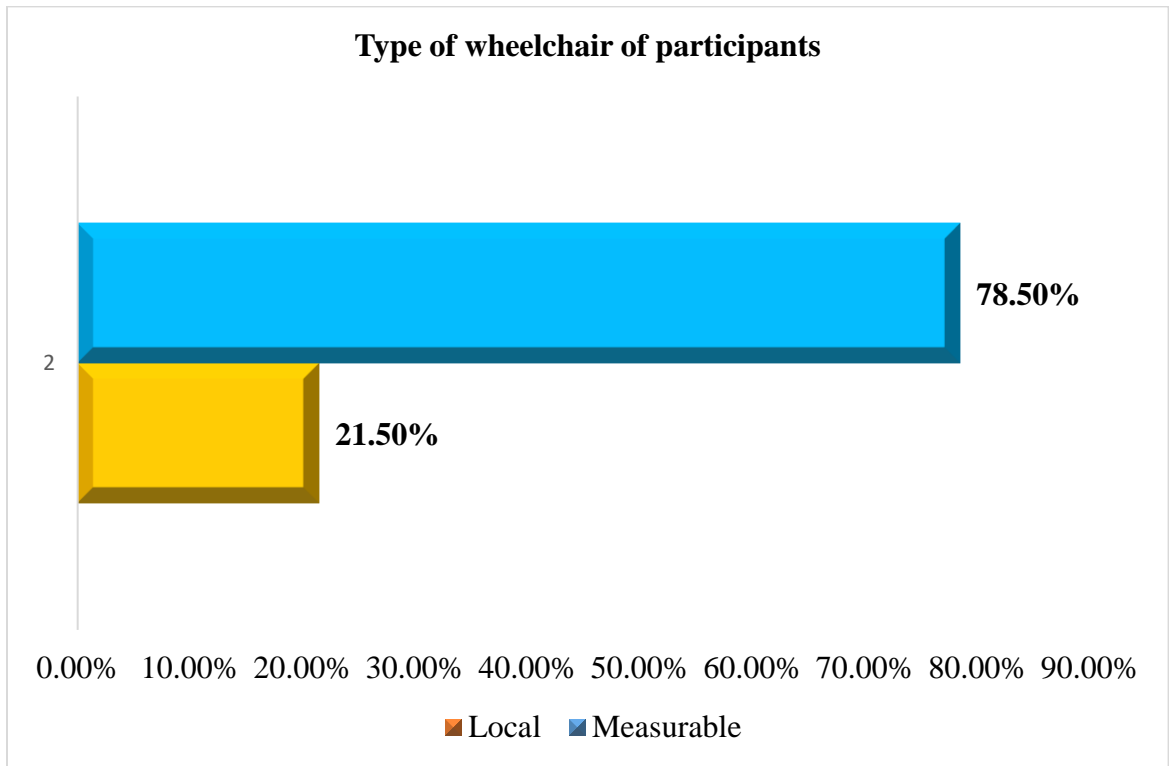


Fig no: 3- Type of wheelchairs of participants

4.2.4: Lumber support in the wheelchair of participants:

In this study total participants 107 among them the majority of participants (67.3%) did not use any lumber support in their wheelchair and (32.7%) participants use lumber support in their wheelchair.

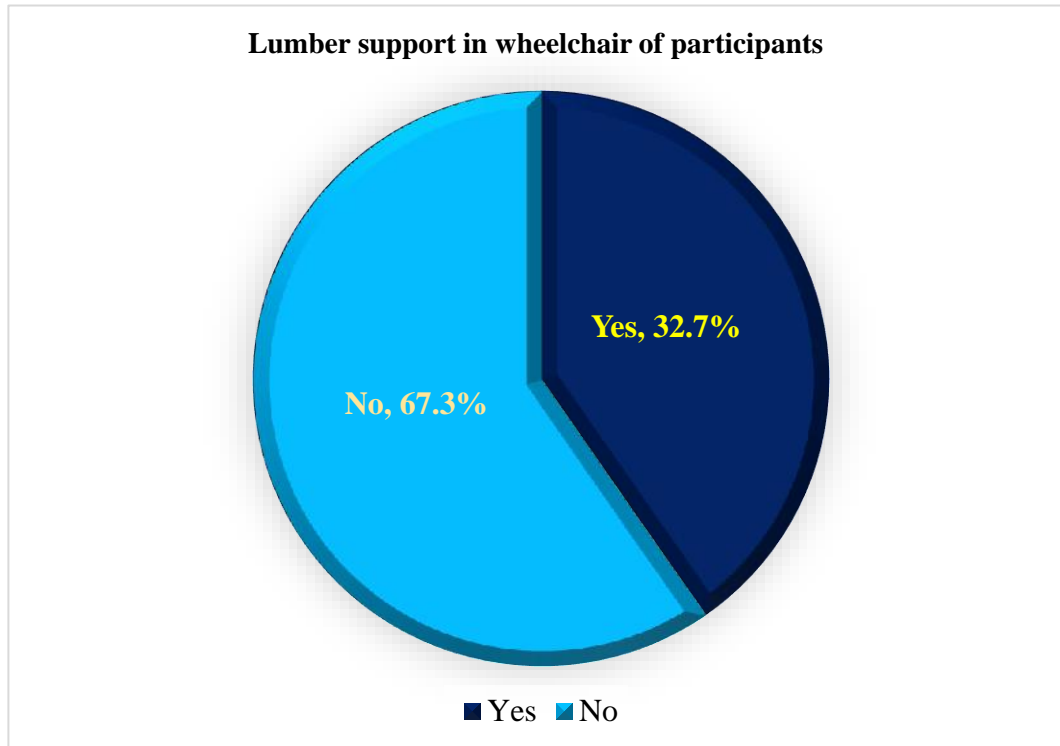


Fig no: 4 Lumber support in the wheelchair of participants

4.2.5: Sitting time in the wheelchair of participants:

About 20.60% (n=22) participants sat in a wheelchair for 2 hours, 28% (n=30) 3 hours, and 51.40% (n=55) sitting on a wheelchair for more than 3 hours on wheelchair

Sitting time in the wheelchair of participants	Frequency (n=107)	Percent (%)
2 hours	22	20.60%
3 hours	30	28%
More than 3 hours	55	51.40%

Tab no: 02- Sitting time in a wheelchair of participants

4 .2.6: Wheelchair propels time of participants:

In this research 66.40% of participants propel their wheelchair more than 3 hours, 20.60% propel 3 hours, and 13.10% of participants propel their wheelchair 2 hours.

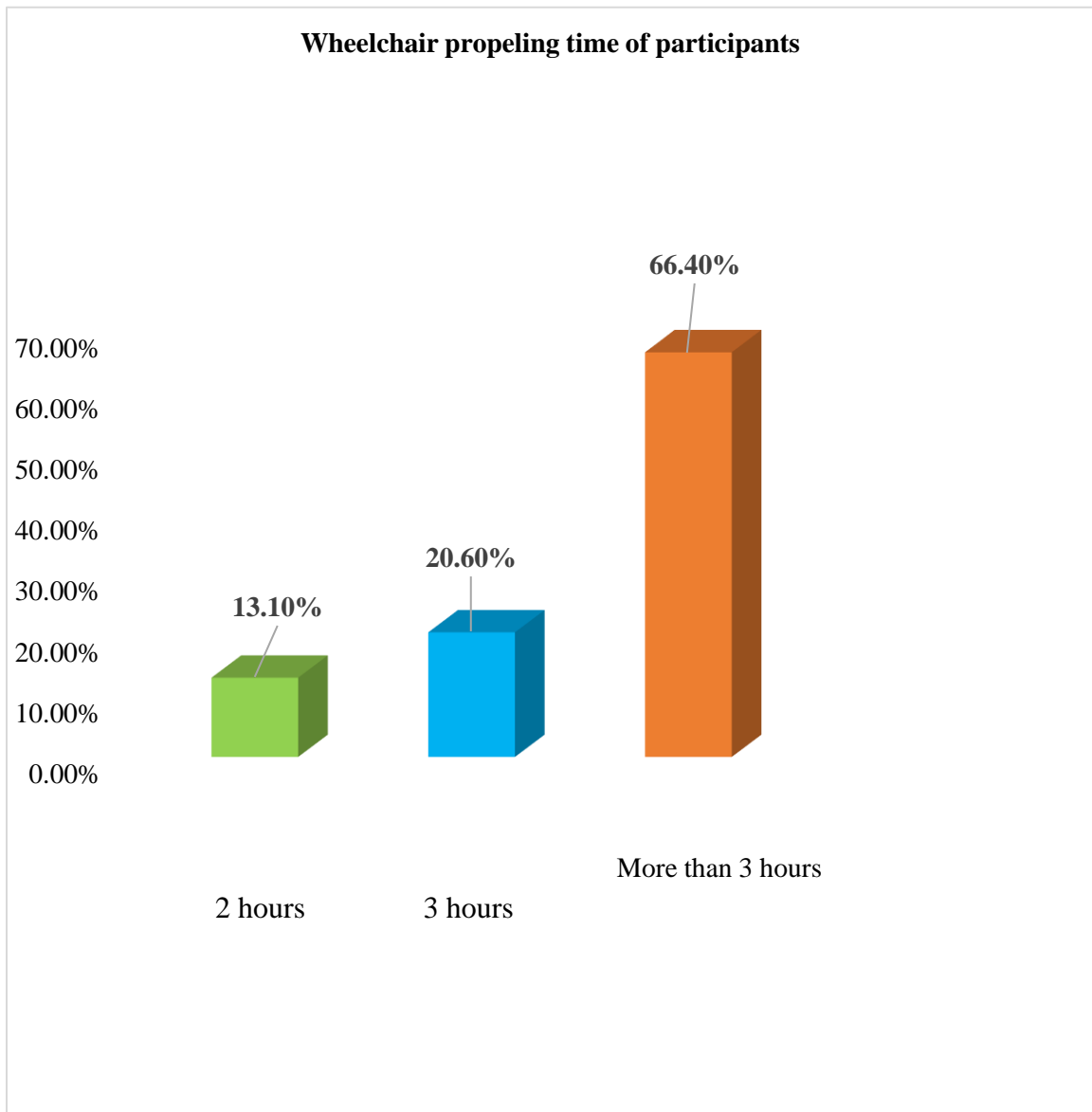


Fig no: 5- Wheelchair propel time of participants

4.2.6: Supporter to propel wheelchair of participants

In this study, 62.6% (n=67) participants had any supporter to propel a wheelchair and 37.4% (n=40) had no supporter to propel their wheelchair.

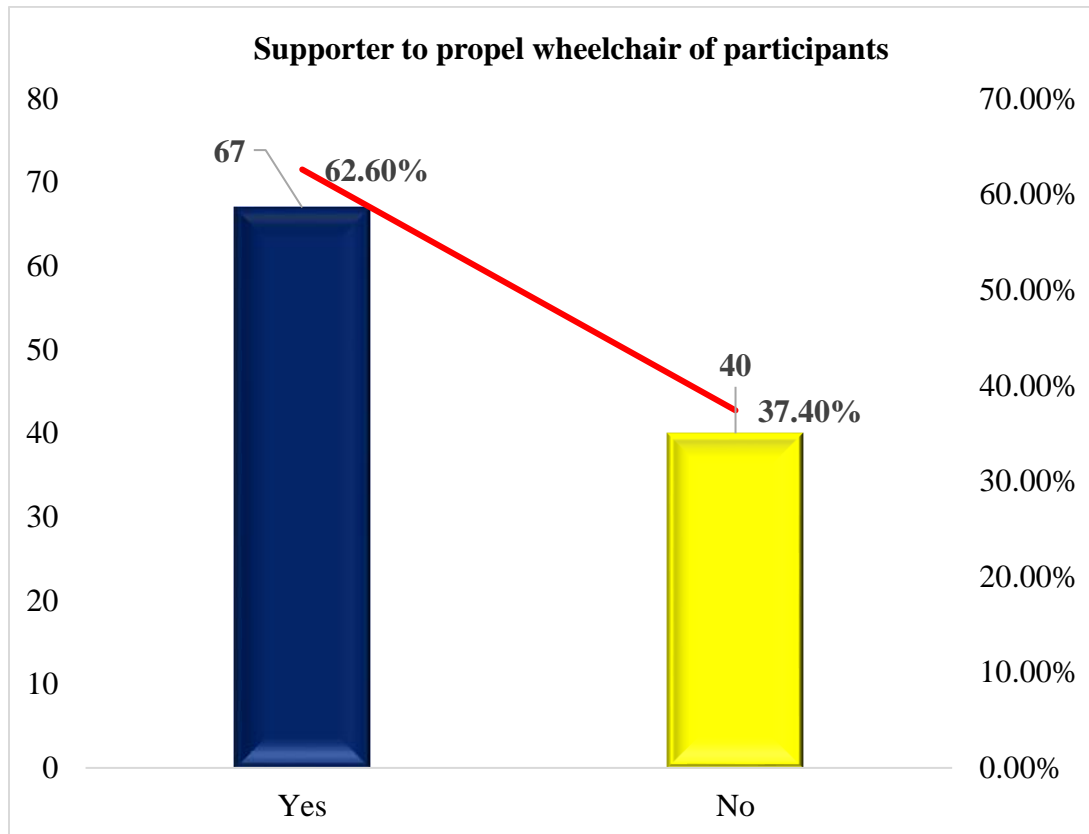


Fig no: 6- Supporter to propel wheelchair of participants

4.2.7: Sitting posture in the wheelchair of participants:

About 72% (n=77) of participants sitting bending posture in a wheelchair. And 28% (n=30) sitting in normal posture in a wheelchair.

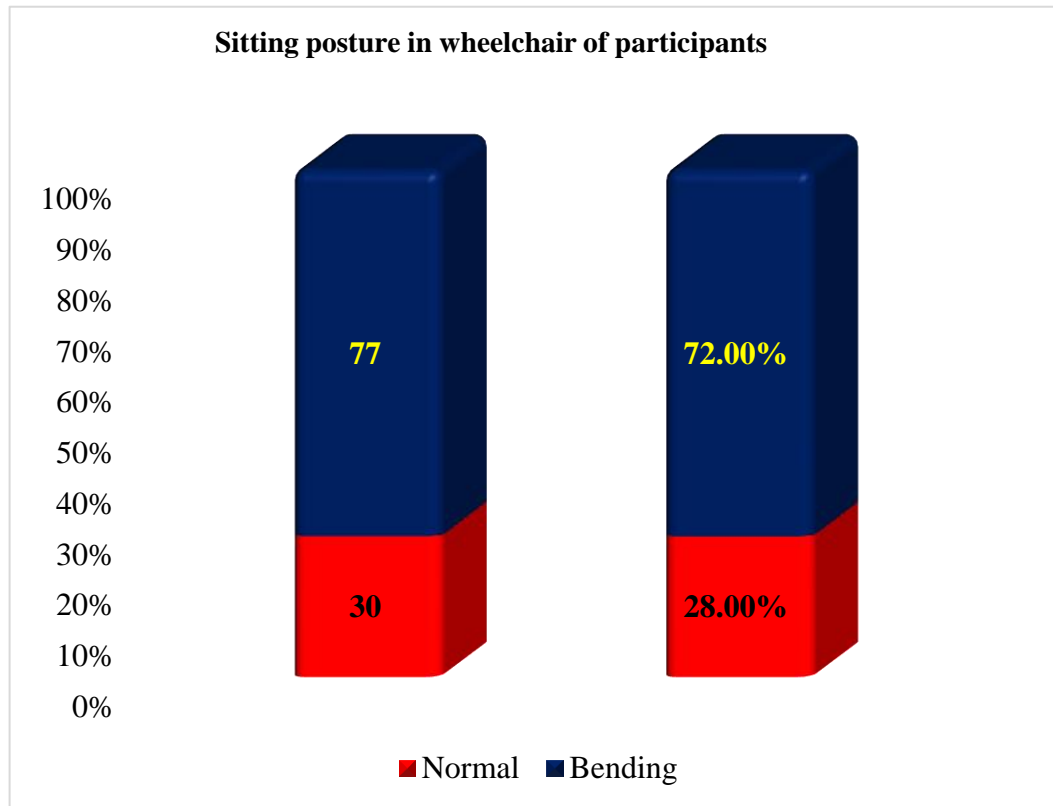


Fig no: 7- Sitting posture in the wheelchair of participants

4.2.7: Propelling posture of participants:

This study (68.2%) propelling wheelchair on bending posture and (31.8%) propelling wheelchair on normal posture.

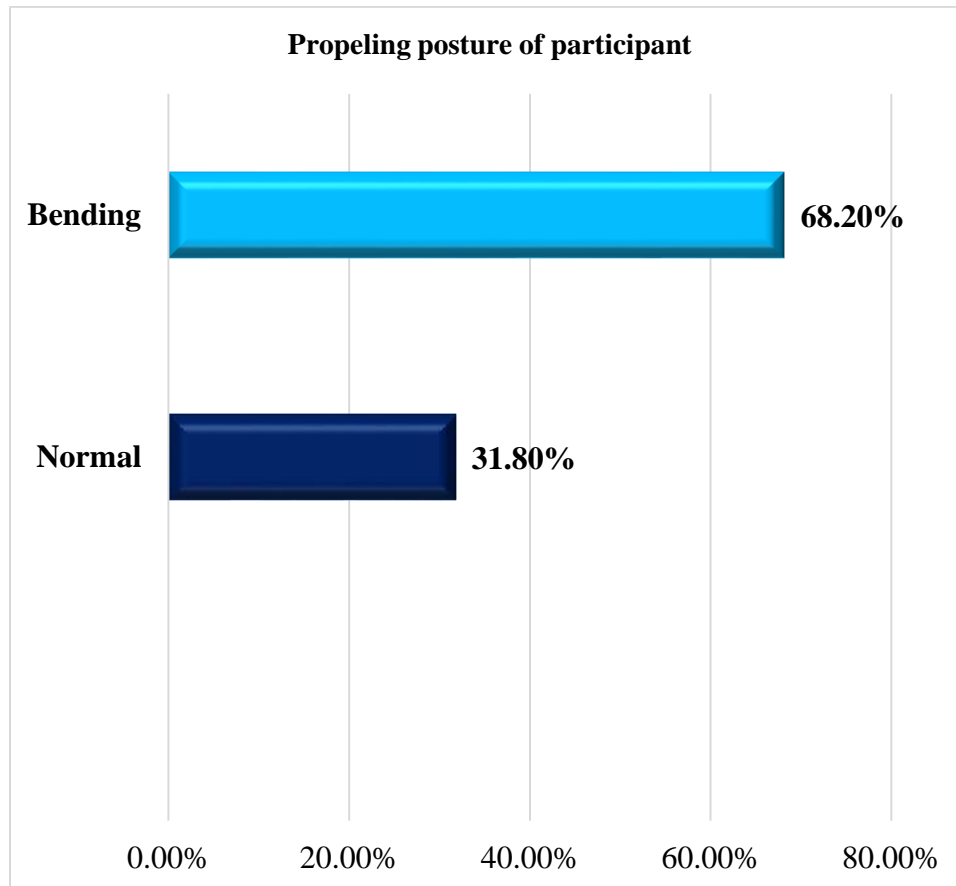


Fig no:8- Propelling posture of participants

4.2.8: Road surface of participants:

About 45.8% (n=49) participants use ups and downs road surface, 14% (n=15) use smooth surface, 16.8% (n=18) use raw road surface, 23.4% (n=25) participants use paved road surface.

The road surface of participants	Frequency (n=107)	Percent(%)
Ups and downs surface	49	45.8%
Smooth surface	15	14%
Raw road	18	16.8%
Paved road	25	23.4%

Tab no: 03- Road surface of participants

4.3. Low back pain related information

4.3.1 Low back pain of participants:

Among all participants, seventy-two percent (72%) participants had low back pain and twenty-eight percent (28%) participants do not have low back pain.

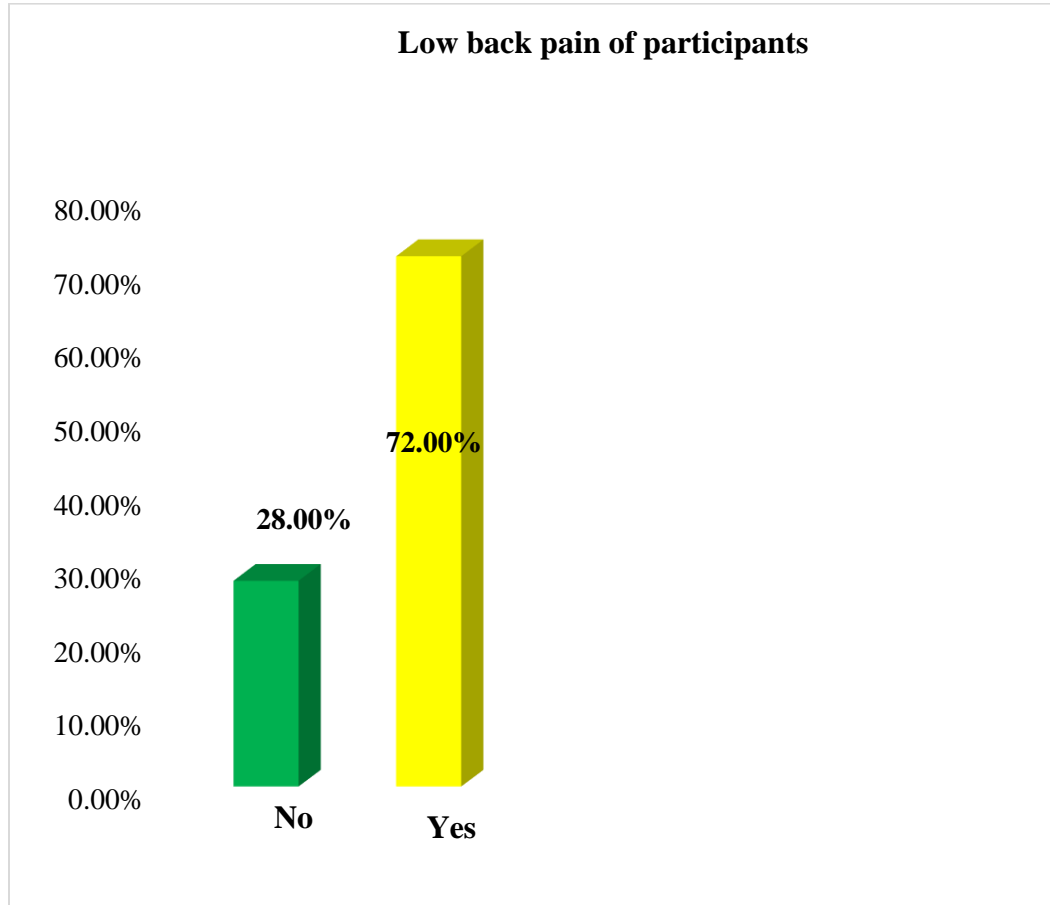


Fig no: 8- Low back pain of participants

4.3.2: Pain duration of participants:

Among all this data about (72%) of the participant were experiencing pain. Among them, (40.20%) of participants were pain duration less than 3 months and 31.80 % of participants had pain duration of more than 3 months.

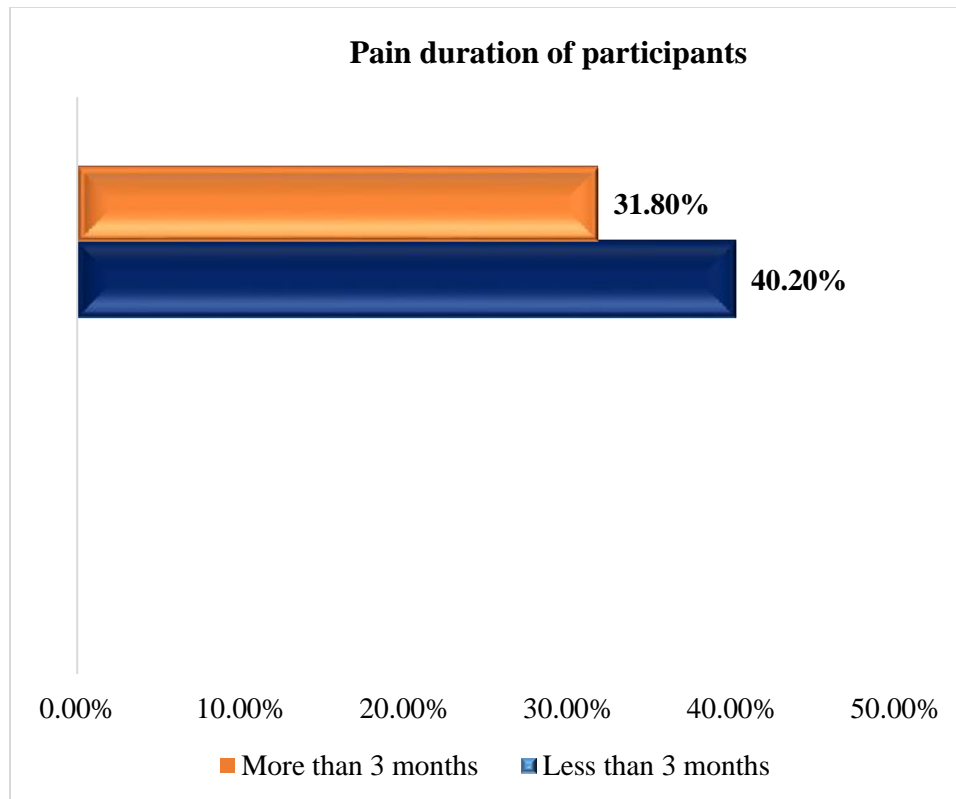


Fig no: 10- Pain duration of participants

4.3.3: Pain severity of participants:

This study found that 72% of wheelchair users suffered from low back pain. And the severity level was mild pain felt 20.60%, moderate pain experienced 31.80%, and 19.60% suffered from severe pain.

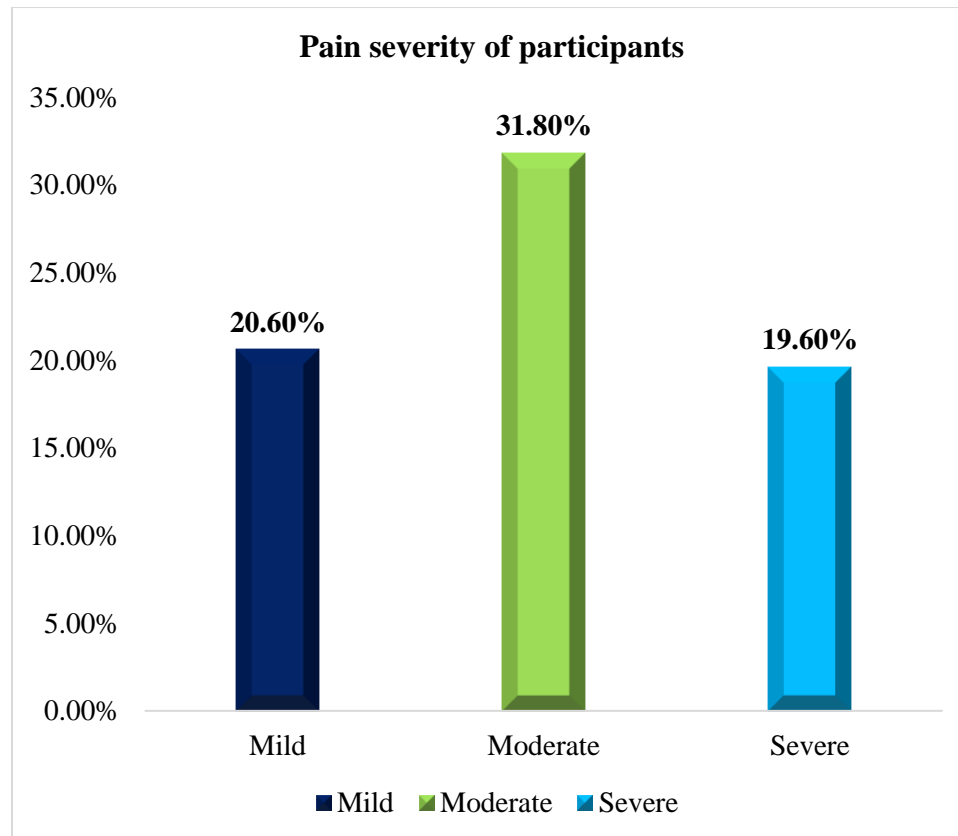


Fig no: 11- Pain severity of participants

4.3.4: Nature of pain of participants:

Among all this data about 72% (n=77) of the participant were experienced pain. The nature of pain in this study explored that 25.20% was sharp, 23% was dull nature pain 12.10% was shooting, 11.20% pain nature was burning.

Nature of pain	Frequency (n=107)	Percent (%)
Dull aching pain	25	23%
Sharp pain	27	25%
Shooting pain	13	12.1%
Burning pain	12	11.2%

Tab no: 4- Nature of Pain participants

4.3.5: Pain before using wheelchair of participants:

In this research total number of participants was 107. About 72% of wheelchair users suffered from low back pain. And found that (62.6%) does not have back pain before using a wheelchair and (37.4%) had back pain before using a wheelchair.

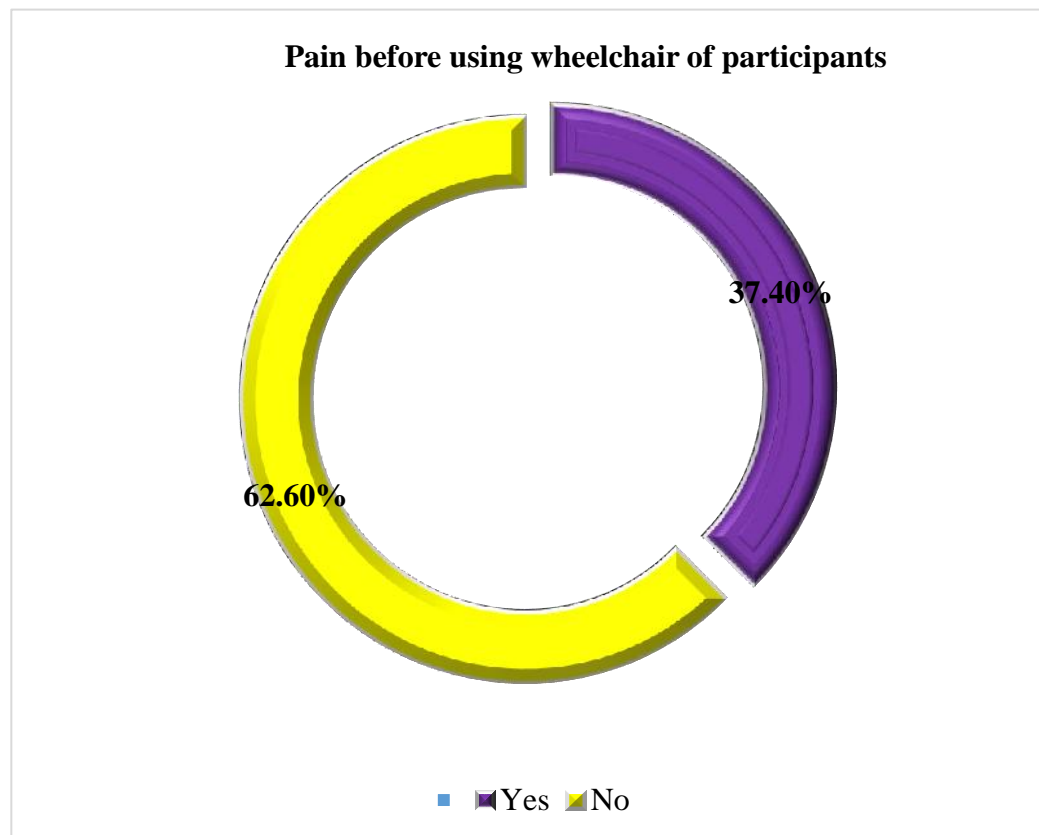


Fig no: 12- Pain before using wheelchair of participants

4.3.6: Family member low back pain of participants:

This study (88.8%) participants family members had low back pain and (11.2%) participants family members does not have low back pain

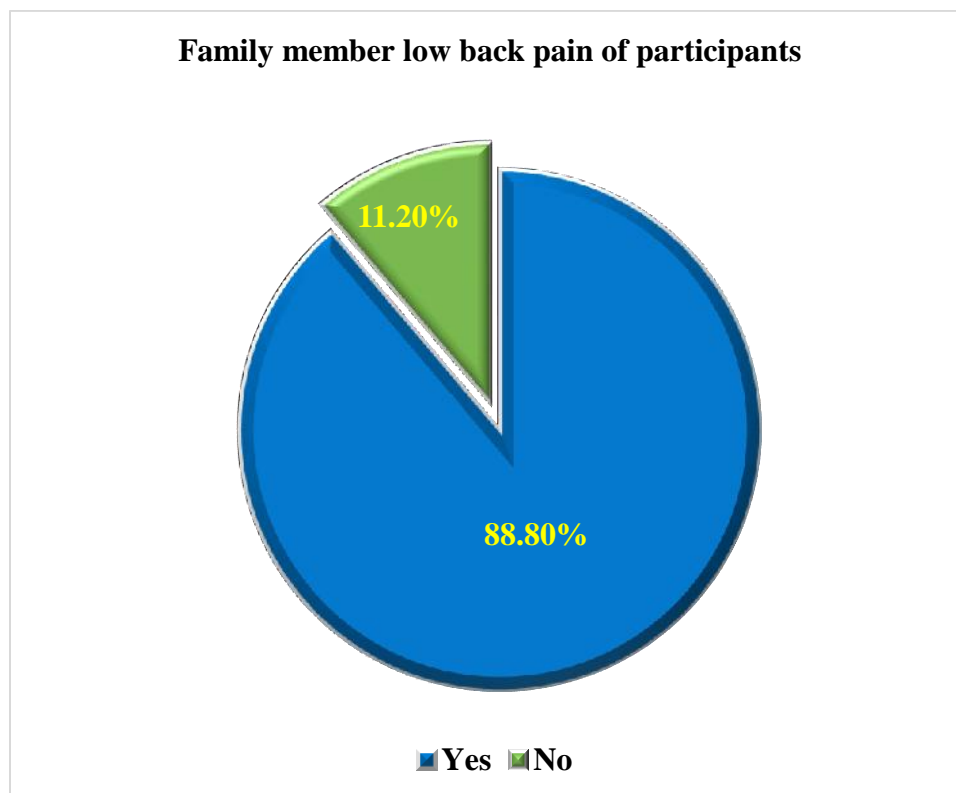


Fig no: 13 - Family member low back pain of participants

4.3.7: The smoking habit of participants:

In this research forty-eight points, six percent (48.6%) participants had a smoking habit, and fifty-one point four percent (51.4%) participants do not have a smoking habit.

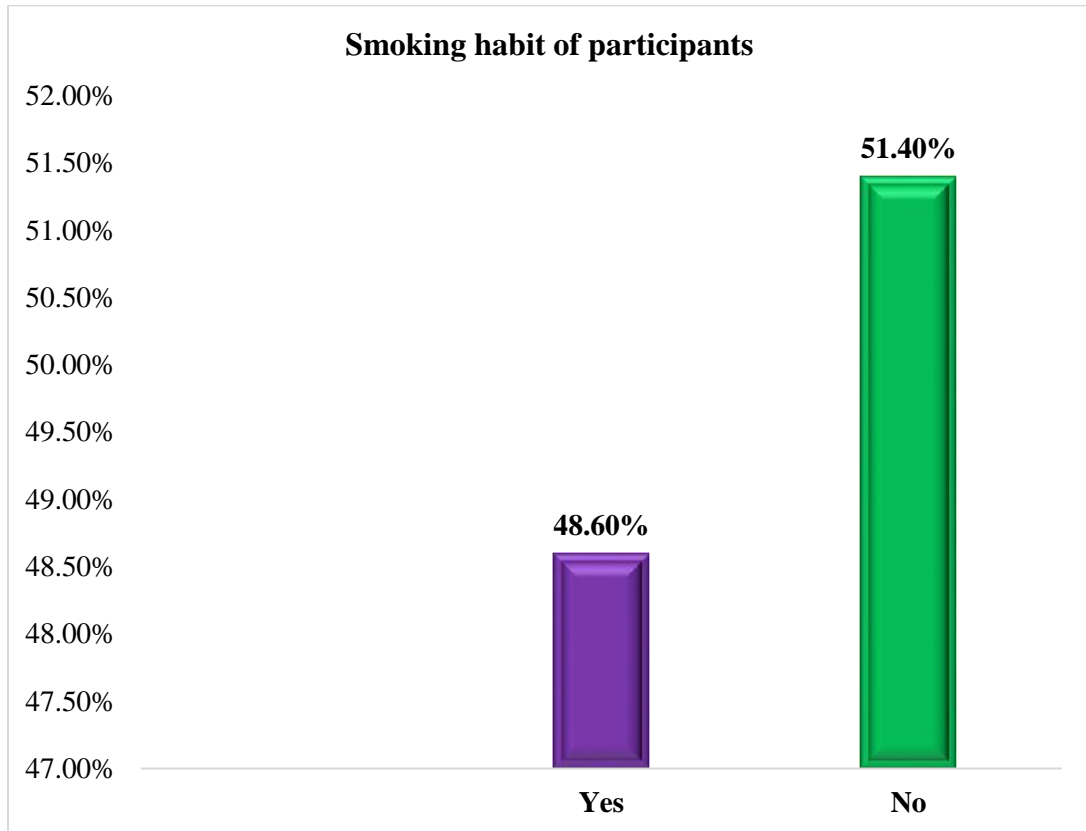


Fig no: 14 - The smoking habit of participants

4.3.8: Lateral shift of participants:

In this study, the total participants 107. About 72% of wheelchair users suffered from low back pain. And the researcher found that 65.40% of the participant had not lateral shift on their back and 34.60% had the lateral shift on their back

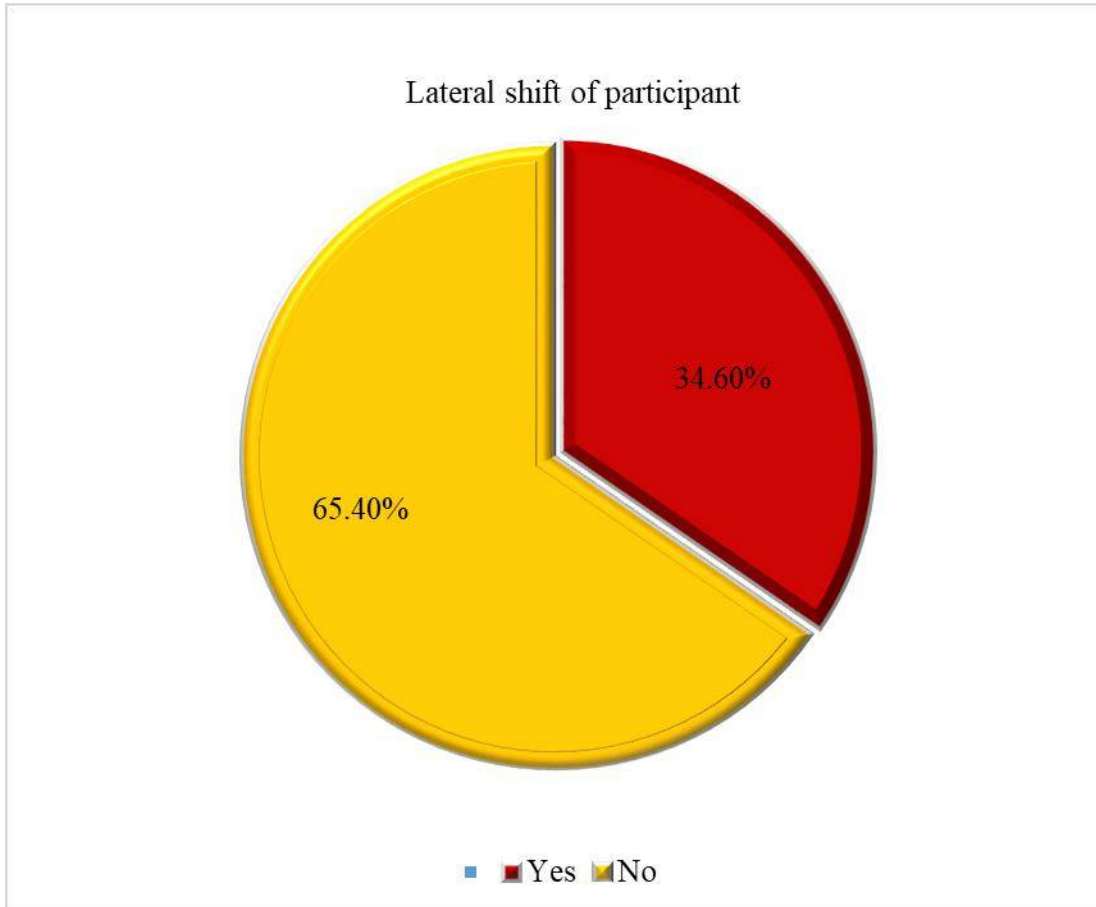


Fig no: 15- Lateral shift of participants

4.3.9:Reduced lumber lordosis of participants:

In this research total number of participants was 107. About 72% of wheelchair users suffered from low back pain. Among them,41.10%-wheelchair users had reduced lumbar lordosis and the rest of the 58.90% did not.

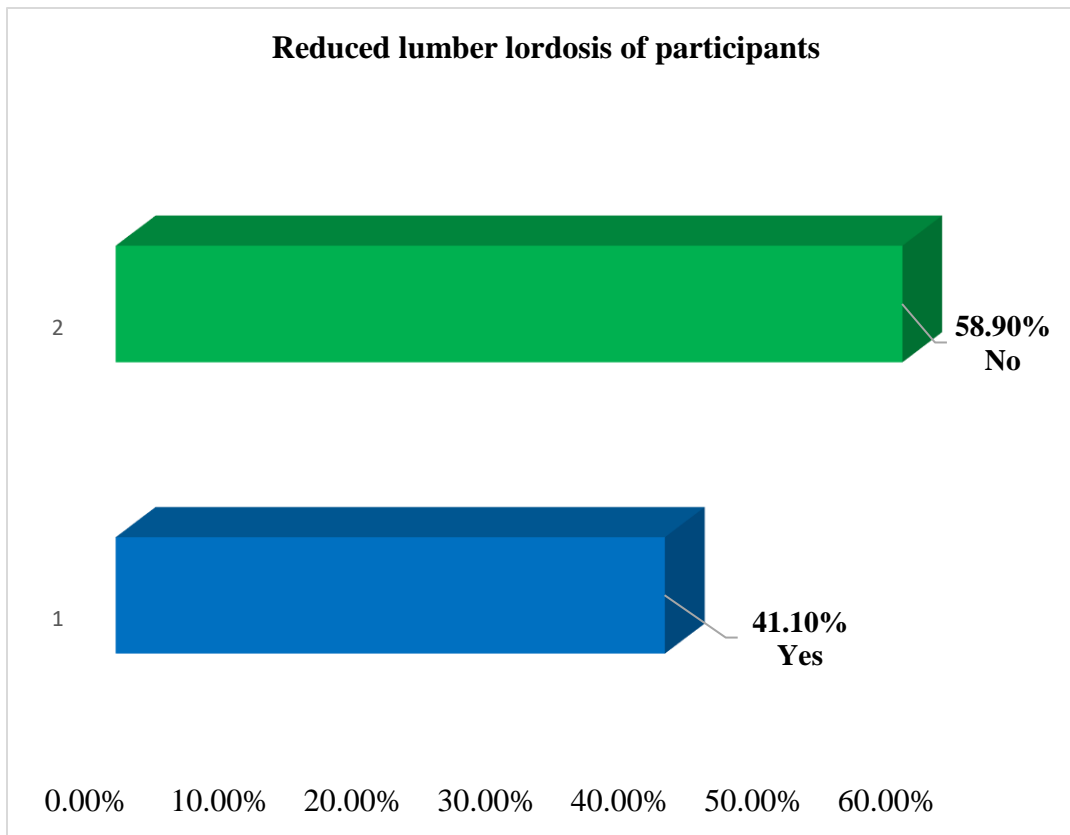


Fig no: 16 Reduced lumber lordosis of participants

4.3.10: Regular exercise of participants:

In this research among 107 participants, the investigator found that 31.40%-wheelchair users do regular exercise and the rest of the 68.20% of wheelchair users did not perform regular exercise.

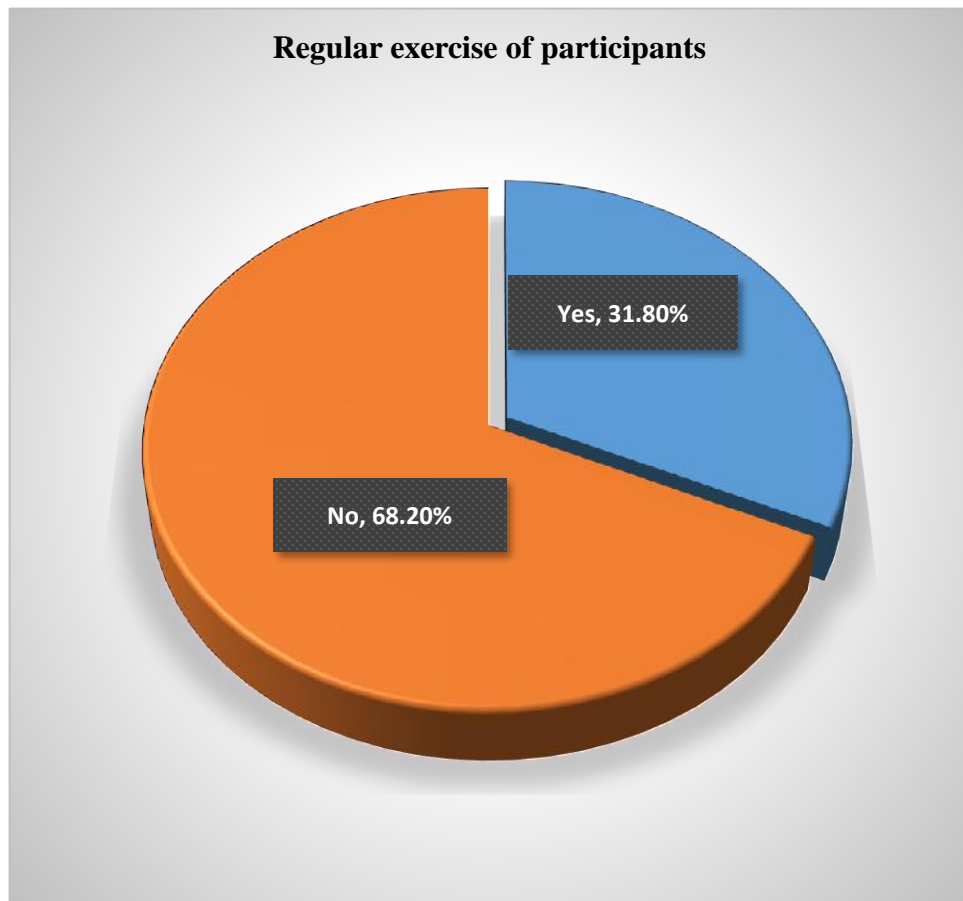


Fig no: 17- Regular exercise of participants

4.3.11: Lack of spinal mobility of participant:

In this study, the researcher found that 9.3%-wheelchair user participants experienced lake of spinal mobility and the rest of the 90.7% did not have a lack of spinal mobility.

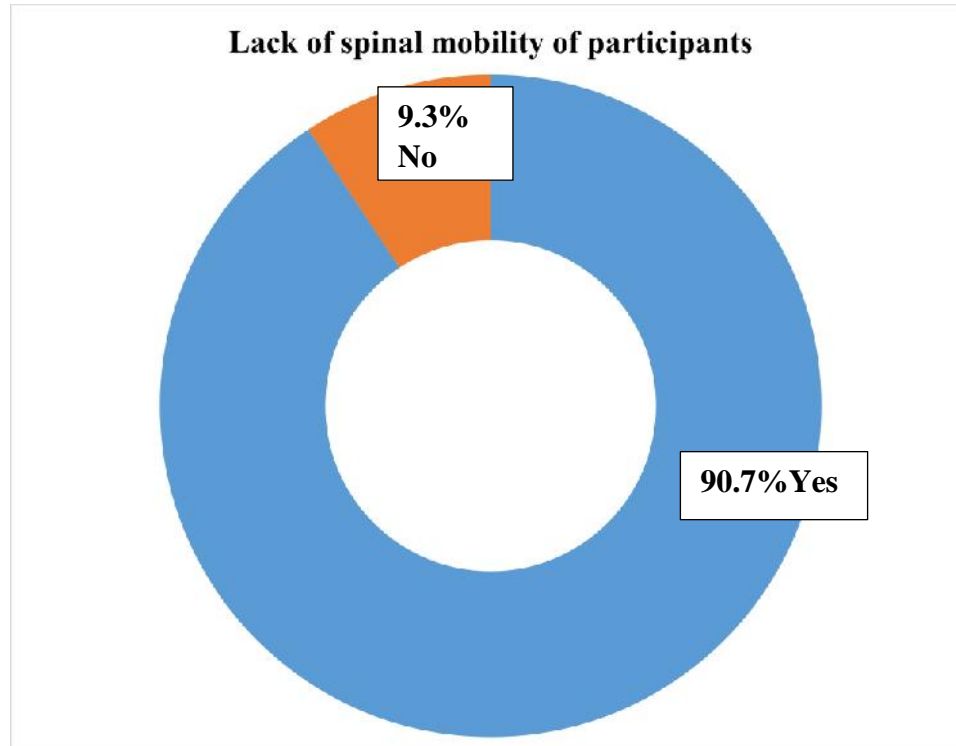


Fig no: 18- Lack of spinal mobility of participants

4.3.12: Lumbar spine surgery of participants:

In this study, the researcher found that 36.40%-wheelchair user participants had experienced lumber surgery and 63.60% of participants did not have experienced lumber surgery.

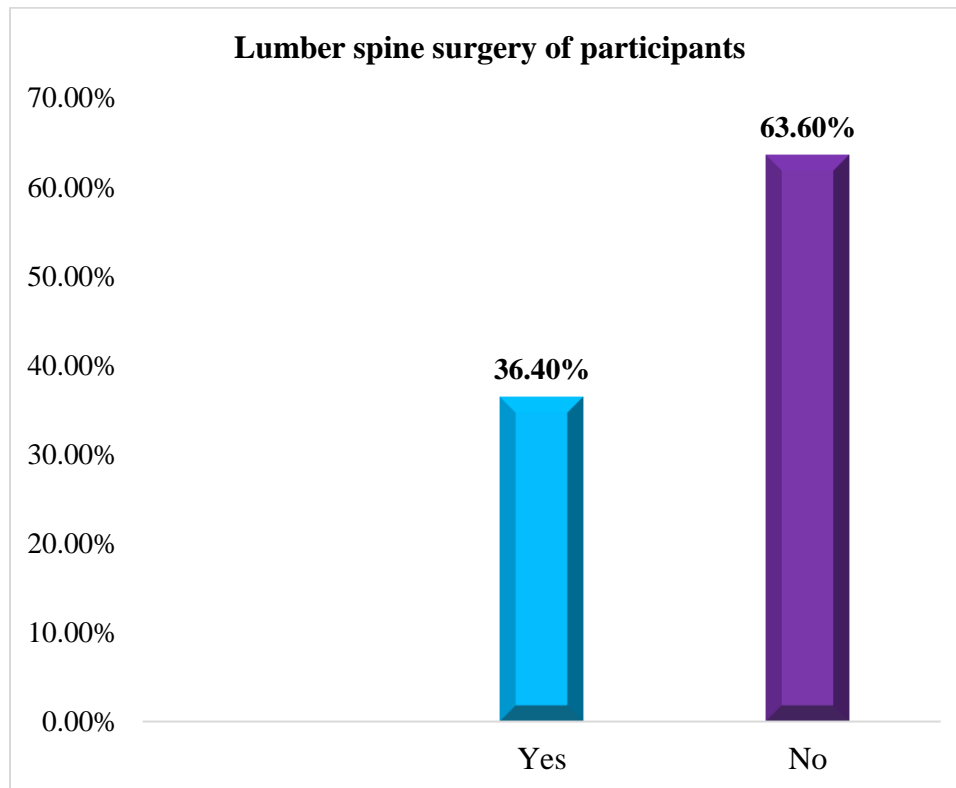


Fig no:19- Lumber spine surgery of participants

4.3.13: Radiate pain at the leg of participants:

This chart showed that 78.50% of participants did not have pain radiation to the leg but 21.50% of participants complain of pain radiating to the leg.

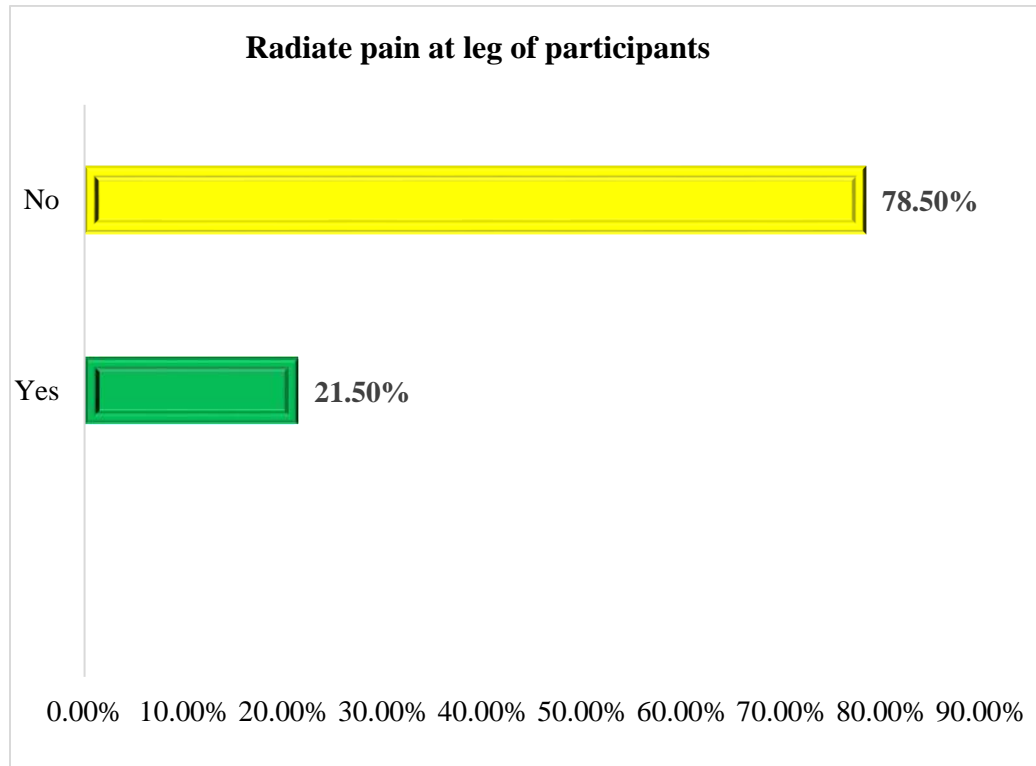


Fig no: 20 - Radiate pain at the leg of the participants

4.3.14: Treatment for low back pain of participants:

In this study, the researcher explores that 72.00% of low back pain participants had taken treatment for low back pain, and 28.00 %% did not take any treatment for low back pain.

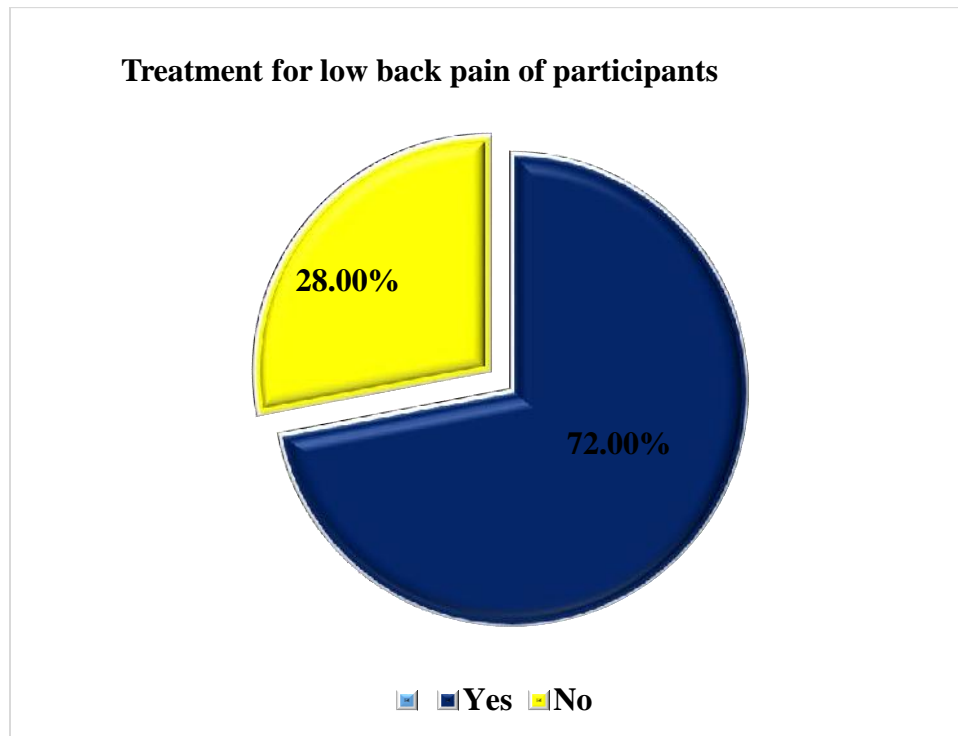


Fig no:21 - Treatment for low back pain of participants

4.3.15: Treatment types of participants:

In this research total number of participants was 107. And 72% had low back pain participants receive treatment and 28% did not get any treatment. Among them, about 71.00% of participants received physiotherapy treatment for low back pain and 0.90% had taken medication.

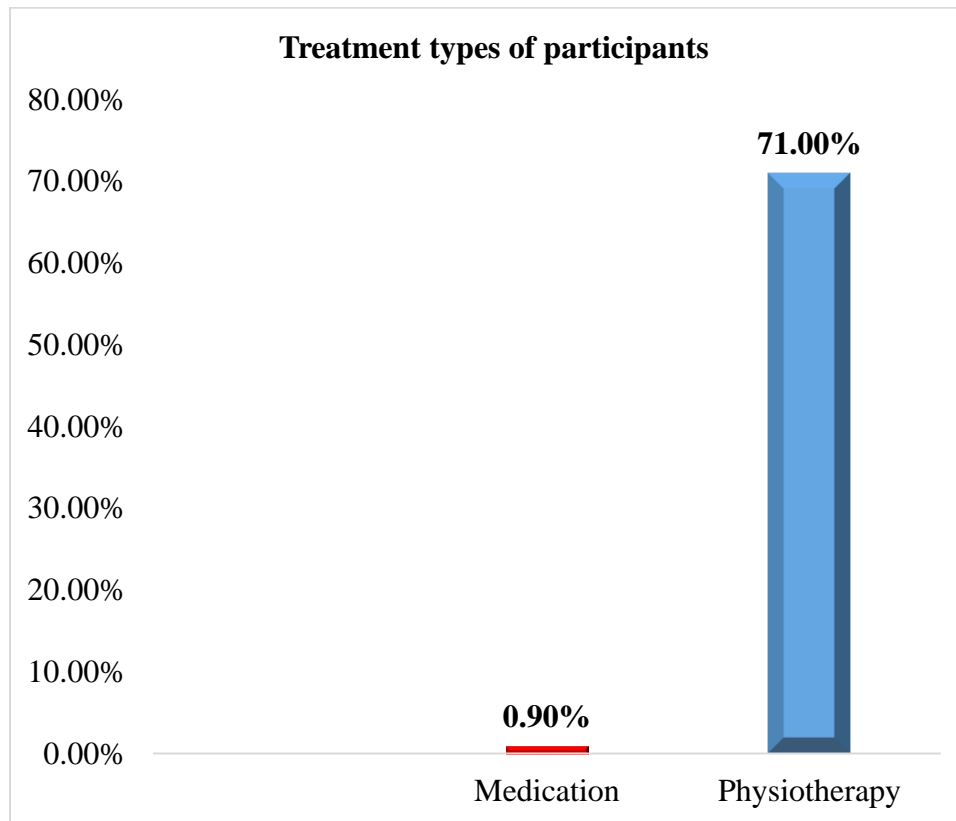


Fig no: 22 - Receive treatment of participants

4:4 Association

4.4.1: Association between socio-demographic information (age, gender, living area, occupation) with low back pain of the participants

Socio-demographic information	Low back pain	Chi- value	P-value	Significance
Age		16.327	.001	Significant
Gender		0.14	.551	Not significant
Living Area	Low Back	.535	.760	Not significant
Occupation	Pain	1.983	.343	Not significant

Table:6 Association between age, gender, living area, occupation with low back pain of the participant

In this study, there had some specific objectives to find out some association between age, gender, living area, and occupation with low back pain the researcher get some significant association between them. The Chai-value and P-value was age and low back pain (Chi-16.327, $P < .001$) gender low back pain (Chi-0.14, $P < .551$) living area and low back pain (Chi-.535, $P < .760$), and occupation and low back pain (Chi-1.983, $P < .343$)

4.4.2: Association between wheelchairs related information with low back pain of the participants

Wheelchair related information	Low Back Pain	Chi- value	P-value	Significance
Started using wheelchair		2.911	.233	Not significant
Reason for using a wheelchair		6.644	0.36	Not Significant
Type of wheelchair		0.83	.773	Not significant
Lumber support in wheelchair		.007	.932	Not significant
Daily sitting time on wheelchair	Low Back	20.265	.000	Significant
Propel time in wheelchair	Pain	29.528	.000	Significant
Sitting posture in wheelchair		25.741	.000	Significant
Propel posture in wheelchair		15.319	.000	Significant
Road surface		18.476	.000	Significant

Table: 7 Association between Wheelchair related information with low back pain of the participant

In this study, there had some specific objectives to find out some strong association between started using a wheelchair, the reason for using a wheelchair, type of wheelchair, lumber support in a wheelchair, daily sitting time on the wheelchair, propel time in a wheelchair, any supporter to propel a wheelchair, sitting posture in a wheelchair, propel posture in a wheelchair, road surface with low back pain the researcher get some significant association between them. The Chi-value and P-value were started using a wheelchair and low back pain (Chi- 2.911, P<.233) Reason for using a wheelchair and low back pain (Chi-6.644, P< 0.36). Type of wheelchair and low back pain (Chi-0.83, P< .773). Lumber support in a wheelchair and low back pain (Chi-.007, P<.932). Sitting time on wheelchair and low back pain (Chi- 20.265, P<.000) Propel time in a wheelchair and low back pain (Chi-29.528, P<.000) Sitting posture in a wheelchair and low back pain (Chi- 25.741, P<.000) Propel posture in a wheelchair and low back pain (Chi- 15.319, P<.000). Road surface and low back pain (Chi-18.476, P<.000).

4.4.3: Association between low back pain related information with low back pain of the participants

Low back pain related information	Low back pain	Chi- value	P-value	Significance
Low back pain before using a wheelchair		20.648	.000	Significant
Smoking Habit		17.016	.000	Significant
Lateral Shift	Low Back	11.133	.001	Significant
Reduced Lumber Lordosis	Pain	16.677	.000	Significant
Exercise Regularly		4.264	.039	Significant
Lack of spinal mobility		5.585	0.18	Not Significant
lumber spine surgery		.748	.387	Not significant
Pain radiate to the leg		8.148	.004	Significant

Table: 8 Association between Low back pain related information with low back pain of the participant

In this study, there had some specific objectives to find out some strong association between Low back pain before using wheelchair Smoking Habit Lateral Shift Lumbar Lordosis Exercise Regularly Lack of spinal mobility Any lumbar spine surgery Pain radiate to the leg Any treatment for low back pain with low back pain the researcher get some significant association between them. The Chi-square value and P-value were Low back pain before using a wheelchair and low back pain (Chi-20.648, $P < .000$). Smoking Habit and low back pain (Chi-17.016, $P < .000$). Lateral Shift and low back pain (Chi-11.133, $P < .001$). Reduced lumbar Lordosis and low back pain (Chi-16.677, $P < .000$). Exercise Regularly and low back pain (Chi-4.264, $P < .039$). Lack of spinal mobility and low back pain (Chi-5.585, $P < .018$). Any lumbar spine surgery and low back pain (Chi-.748, $P < .387$). Pain radiate to the leg and low back pain (Chi-8.148, $P < .004$)

This study aims to provide comprehensive research of the factors associated with low back pain among wheelchair users. This study's means and standard deviation of participant age where are Mean \pm SD=43.84 \pm 16.604; About 22.4% of people aged 18-33 years; (15.9%) age 34-49 years; (17.8%) age 50-65 years; and (43.9%) of people aged more than 65 years (Sonenblum et al., 2016) find similar to the study their means and standard deviation of age, Mean \pm SD =41 \pm 12 years.

In this study, around 107 people are involved, of which there is (69.2%) are male and (30.8%) are female. Other research in the USA showed that the participants were 44 among them (82%) male and (18%) female (Jahanian et al., 2020).

About this study of participant educational level (19.6%) where are illiterate, (35.5%) are primary education; (12.1%); are SSC, (21.5%) are HSC, (11.2%) are others level education. Other studies which are similar to this (Pousada et al., 2015) showed that education level no formal education (0%) Primary school (21 35%) High school (15 25%) Bachelor/degree (18.3%) Job training (21.7%).

In this research majority of them (59.8%) of participants' occupations were others like farmers, drivers, some are students and housewives only (22.4%) were doing jobs and (17.8%) were doing business. A survey among wheelchair users in Atlanta, Georgia (Sonenblum et al., 2016) showed that employed (46%), unemployed (39%), student (11%). In this study majority, the (54.2%) of participants started using a wheelchair for 3 months, 17.8% used 6 months, and 28% of participants started using a wheelchair more than 6 months. Research on SCI patients showed that using a wheelchair permanently for 13.5 years (Kovacs et al., 2018).

About (49.5%) participants are Spinal cord injury patients, (39.3%) are Stroke patients, and (11.2%) of participants were others like GBS, head injury, Parkinson's' disease, peripheral nerve injury. Other research about wheelchair users (Tariah et al., 2018) showed that reason for using Wheelchair Spinal cord injury (77.1%) Cerebral palsy (2.1%) Stroke (16.6%) Muscular dystrophy (2.1%) Spina bifida (2.1%).

This study total participants 107 among them (78.50%) participant use local wheelchair and (21.50%) uses a measurable wheelchair. Research in Atlanta shows that a total of participants 28 individuals and all participants used ultra-light manual wheelchairs (Sonenblum et al., 2016).

This study (66.40%) participants propel wheelchair more than 3 hours, (20.60%) propel 3 hours, and (13.10%) propel wheelchair for 2 hours. A survey in South Africa (Hammill et al., 2017) showed that wheelchair users who had poor wheelchair propulsion biomechanics, which in turn leads to upper limb overuse injuries.

This study (62.6%) participants have any supporter to propel wheelchair and (37.4%) has no supporter. Other research in Spain (Pousada et al., 2015) showed -similar to this study that Six participants (10%) used a manual wheelchair that was not self-propelled, whereas 23 participants (38.3%) used a self-propelled manual wheelchair.

This research (45.8%) use ups and downs road surface, (23.4%) use paved road surface, (16.8%) use raw road surface, (14%) use smooth surface. Another research shows that during propelling a wheelchair, users face obstacles such as rough and uneven surfaces. Friction with these obstacles causes contusions and also vibrations on the wheelchair. These potentially cause adverse effects such as low-back pain, disc degeneration, muscle fatigue, and other harmful effects (Giwnewer et al., 2020).

In this study (72%) of participants had low back pain and (28%) does not have low back pain. Another cross-sectional study shows that spinal pain among wheelchair users was 52.1% for neck pain, 41.5% for LBP and,73.3% for pain at any level (Kovacs et al., 2018).

In this study majority of them (40.20%) of participants pain duration less than 3 months and (31.80 %) participants pain duration more than 3 months. Other studies (Van et al., 2021) showed that People between the ages of 18 and 60 years, had chronic LBP for at least 12 months. Another study showed that individuals who had experienced low back pain in the past 3 months (Bonab et al., 2020).

This research found that the severity level was mild pain felt 20.60%, moderate pain experienced 31.80%, and 19.60% suffered from severe pain. A randomized controlled trial

Showed that total population of 186 (97 men, 89 women) the typical patient was approximately 50 years old, reported moderate to severe pain (Molsberger et al., 2009).

The nature of pain in this study explored that 11.20% pain nature was burning, 12.10% was shooting, 25.20% was sharp and 23.20 was dull nature pain. A study by (Michailidou et al., 2014) the UK showed that 64% of their sample described pain in the back area as ‘‘aching’’, and 61% reported ‘‘burning pain in the back’’

This study found that 41.10%-wheelchair users had reduced lumbar lordosis and the rest of the 58.90% did not. Another study showed that prolonged sitting decreases the lumbar lordotic curve (Lee & Yoo, 2011).

This study found that 31.40%-wheelchair users do regular exercise and the rest of the 68.20% did not perform regular exercise. A study on South Africa (Hammill et al., 2017) said that those who regularly exercise enjoy improved cardiorespiratory fitness and reduced cardiometabolic risk as well as reduced levels of depression and a consequently enhanced quality of life.

This study found that 78.50% of participants did not have pain radiation to the leg but 21.50% of participants complain pain was radiated to the leg. Another research shows that almost 25–40% of individuals report LBP in the past 12 months, and 4–25% report chronic LBP. Lumbar radicular pain is pain that radiates from the lower back along the sciatic nerve to the back of the thigh and down the leg. Sciatica is lumbar radicular pain that is accompanied by clinical findings suggestive of a herniated lumbar disc or nerve root irritation. Lumbar radicular pain is more severe but less prevalent than nonspecific LBP (Shiri et al., 2019).

This research found that the majority of them about 71.00% of participants received physiotherapy treatment for low back pain and 0.90% had taken medication. Low back pain is the fifth most common reason for visiting a US doctor. (Shiri et al., 2019). Low back pain the guidelines recommended entirely non-pharmacological treatments, additionally including work-based interventions, advice/programs to return to work, and surgical intervention (Corp et al., 2021).

In this study, there had some specific objectives to find out some association between age, between age, sitting time on the wheelchair, propel time in a wheelchair, any supporter to

propel a wheelchair, sitting posture in a wheelchair, propelling posture in a wheelchair, road surface, low back pain before using a wheelchair, smoking habit, lateral Shift, lumber Lordosis, pain radiate to the leg with LBP. The researcher gets some strong significant associations between them. The Chi-value and P-value was age and low back pain (Chi-16.327, $P < .001$)

About (20.60%) participants sat in wheelchairs for 2 hours, (28%) 3 hours and, (51.40%) sitting more than 3 hours in wheelchairs. Other research added that many manual wheelchair users spend more than 10 h/ day in their wheelchairs, (Mattie et al., 2019). Sitting time on wheelchair and low back pain (Chi- 20.265, $P < .000$) For the low back. (Baker et al., 2011) showed mixed evidence regarding the association between sitting at work and low back pain. Prolonged static sitting posture may harm the nutrition of the intervertebral disc. Long-time wheelchair users are generally faced with many health problems associated with inactive seated posture in a wheelchair long time(Gore et al., 2012). Other research reported lack of support in the wheelchair' appeared to associate with many sitting-related health and stability problems. The odds of pain, mostly in the back or neck, increased in all persons who lacked support by their wheelchair e.g. in the back or lateral to the trunk. (Valent et al., 2019) showed that daily long time spent in the wheelchair may also be associated with sitting problems.

About (72%) participants sitting in bending posture and (28%) sitting in normal posture in a wheelchair. Sitting posture in a wheelchair and low back pain (Chi- 25.741, $P < .000$) In another study (Medola et al., 2014) showed that back pain and discomfort in seated posture are highly prevalent problems among wheelchair users. (Lee & Yoo, 2011) showed that slump sitting reduces the activation of the spinal stabilizing muscles and is associated with increases in loading on the intervertebral disc and connective tissue.

Propel time in a wheelchair and low back pain (Chi-29.528, $P < .000$) Propel posture in a wheelchair and low back pain (Chi- 15.319, $P < .000$) Road surface and low back pain (Chi-18.476, $P < .000$) The Chi-value and P-value was Low back pain before using a wheelchair and low back pain (Chi20.648-, $P < .000$)

(48.6%) participants had a smoking habit and (51.4%) did not have a smoking habit. Smoking Habit and low back pain (Chi-17.016, $P < .000$). Research in Finland showed an

association between smoking and low back pain. The association was strongest for chronic low back pain and disabling low back pain. Former smokers were at a lower prevalence of low back pain than current smokers. The association between smoking and the incidence of low back pain was stronger in adolescents than in adults (Shiri et al., 2010).

Lateral Shift and low back pain (Chi29.457-, P<.001). Reduced lumber lordosis and low back pain (Chi-16.677, P<.000). Exercise Regularly and low back pain (Chi-4.264, P<.042). Lack of spinal mobility and low back pain (Chi-5.585, P<0.26).Any lumber spine surgery and low back pain (Chi-.748, P<.383) Pain radiate to the leg and low back pain (Chi-8.148, P<.001).

Limitations of the study

The study should be considered in light of the following limitations:

The findings of the study were not generalized to the wider population. The samples were collected only from the CRP at Savar and the sample size was very small, so the result of the study could not be generalized to the whole population of LBP among wheelchair user patients in Bangladesh. This small number of samples is not enough to generalize the result. As a student, this study was conducted by my fund, so there might have been some limitations of financial aspect in this study. Because of the pandemic situation covid-19, the investigator was not able to gather a huge number of participants and this result cannot be generalized all over Bangladesh. If it could, it may make the result more valid and reliable. Few researchers had done this before on this topic area. So, there was little evidence to support the result of the study.

Conclusion

This study aims to provide a comprehensive survey of the factors associated with low back pain among wheelchair users. For the fulfillment of the study, the researcher was designed a quantitative study design cross-sectional and collected 107 data from the samples through a standard questionnaire. This study focused on associated factors with low back pain among wheelchair users. From the database, it was found that - participants have had low back pain among wheelchair users. Some strong association was found between age, sitting time on the wheelchair, propel time in a wheelchair, any supporter to propel a wheelchair, sitting posture in a wheelchair, propelling posture in a wheelchair, road surface, low back pain before using a wheelchair, smoking habit, lateral Shift, lumber Lordosis, pain radiate to the leg with low back pain. In addition, since this sample size was small, to generate adequate evidence to support decision-making processes at the national level, there should be more studies among wheelchair users.

Recommendation

The purpose of the study was to assess the factor associated with low back pain among wheelchair users. But due to time limitations, the investigator was not able to gather a huge number of participants and this result cannot be generalized all over Bangladesh. So, for further study, it is strongly recommended to increase the sample size to generalize the result in all wheelchair users in Bangladesh. Should do pilot study to establish the appropriateness of the questionnaire. The ratio of rural and urban participants was not equal, in case of further the equality of the rural and urban participants should be maintained for the accuracy of the result. This study can be considered as a groundwork for the physiotherapy service provision for the wheelchair user's low back pain they usually suffered. Proper physiotherapy can reduce symptoms and prevent post complications. There are few studies on wheelchair users. These cannot cover all aspects of the vast area. So, it is recommended that the next generation of physiotherapy members continue study regarding this area as well as different - areas such as common musculoskeletal problems, the effectiveness of

physiotherapy for postural pain, common physiotherapeutic intervention to reduce the complications.

REFERENCES

- Abu Tariah, H., Ghasham, N., Alolayan, M., Alahmadi, B. and Alqarni, A., (2018). Wheelchair accessibility of mosques in Riyadh. *Work*, 60(3):385-391.
- Ahmed, F., Paul, R., Ahmad, M.M., Ahammad, A., and Singha, S., (2021). Design and Development of a Smart Wheelchair for the Disabled People. *Institute of electrical and electronic engineers*, 45-49.
- Alam, M.E., Kader, M.A., Hany, U., Arjuman, R., Siddika, A. and Islam, M.Z., (2019). A multi-controlled semi-autonomous wheelchair for old and physically challenged people. *Institute of electrical and electronic engineers*, 1-6.
- Arifin, A.N., Rahayu, S.R. and Rustiana, E.R., (2020). Analysis of Postures Towards Musculoskeletal Disorders Experienced By Batik Artisans of Sukamaju Giriloyo Yogyakarta. *Public Health Perspective Journal*, 5(1).
- Baker, R., Coenen, P., Howie, E., Williamson, A. and Straker, L., (2018). The short-term musculoskeletal and cognitive effects of prolonged sitting during office computer work. *International journal of environmental research and public health*, 15(8):11
- Bonab, M.A.R., Colak, T.K., Toktas, Z.O. and Konya, D., (2020). Assessment of spatiotemporal gait parameters in patients with lumbar disc herniation and patients with chronic mechanical low back pain. *Turk Neurosurg*, 30(2):277-284.
- Borisoff, J.F., Mattie, J. and Rafer, V., (2013). Concept proposal for a detachable exoskeleton-wheelchair to improve mobility and health. *Institute of electrical and electronic engineers*, 1-6.
- Cherubini, M. and Melchiorri, G., (2012). Descriptive study about congruence in wheelchair prescription. *Eur J Phys Rehabil Med*, 48(2):217-22.
- Chow, J.W. and Levy, C.E., (2011). Wheelchair propulsion biomechanics and wheelers' quality of life: an exploratory review. *Disability and Rehabilitation: Assistive Technology*, 6(5):365-377.

Citko, A., Górski, S., Marcinowicz, L. and Górka, A., (2018). Sedentary lifestyle and nonspecific low back pain in medical personnel in North-East Poland. *Bio-Med research international*.

Corp, N., Mansell, G., Stynes, S., Wynne-Jones, G., Morsø, L., Hill, J.C. and van der Windt, D.A., (2021). Evidence-based treatment recommendations for neck and low back pain across Europe: A systematic review of guidelines. *European Journal of Pain*, 25(2):275-295.

Desai, M. and Vinekar, T., (2019). Prevalence of Musculoskeletal Problems in Plastic Industry Workers. *International Journal of Health Sciences and Research*, 9(8):196-204

Desai, S., Mantha, S. and Phalle, V., (2018). Design of a reconfigurable wheelchair with stand-sit-sleep capabilities for enhanced independence of long-term wheelchair users. *Technology and Disability*, 30(3):135-151

Dickerson, C.R., Alenabi, T., Martin, B.J. and Chaffin, D.B., (2018). Shoulder muscular activity in individuals with low back pain and spinal cord injury during seated manual load transfer tasks. *Ergonomics*, 61(8):1094-1101.

Ebrahimi, A., Kazemi, A. and Ebrahimi, A., (2016). Wheelchair Design and Its Influence on Physical Activity and Quality of Life Among Disabled Individuals. *Iranian Rehabilitation Journal*, 14(2):85-92.

Eusufzai, S.Z., Hossain, S.M., Jamayet, N.B. and Alam, M.K., (2019). Measuring Health-related Quality of life and its determinants among physically disabled adults in Bangladesh. *Bangladesh Journal of Medical Science*, 18(3):607-614.

Farzana, F., (2018). Accessibility of Public Buildings in Khulna, Bangladesh, for Wheelchair Users. *Disability, CBR & Inclusive Development*, 29(4):83-97.

Garcia-Mendez, Y., Pearlman, J.L., Cooper, R.A. and Boninger, M.L., (2012). Dynamic stiffness and transmissibility of commercially available wheelchair cushions using a laboratory test method. *Journal of Rehabilitation Research & Development*, 49(1).

- Giwnewer, U., Rubin, G., Friedman, A. and Rozen, N., (2020). User Assessment of a Novel Suspension for a Wheelchair—A Prospective, Randomized, Double-Blind Trial. *Geriatric Orthopaedic Surgery & Rehabilitation*, 11-21
- Gore, M., Tai, K.S., Sadosky, A., Leslie, D. and Stacey, B.R., (2012). Use and costs of prescription medications and alternative treatments in patients with osteoarthritis and chronic low back pain in community-based settings. *Pain Practice*, 12(7):550-560.
- Haefeli, M. and Elfering, A., (2005). Pain assessment. *European Spine Journal*.
- Hammill, H., Swanepoel, M., Ellapen, T. and Strydom, G., (2017). The health benefits and constraints of exercise therapy for wheelchair users: A clinical commentary. *African journal of disability*, 6(1):1-8.
- Hannan, J. M. A., (2016). *Medical and Pharmaceutical Statistics*. 2nd edition. Dhaka: AFI publication.
- Hemed, M. and Tanzania, G.F.M.E.R., (2015). Cross-sectional studies. *Training Course in Sexual and Reproductive Health Research Geneva*, 12.
- Hischke, M. and Reiser II, R.F., (2018). Effect of rear-wheel suspension on tilt-in-space wheelchair shock and vibration attenuation. *PM&R*, 10(10):1040-1050.
- Hodges, P.W. and Danneels, L., (2019). Changes in structure and function of the back muscles in low back pain: different time points, observations, and mechanisms. *journal of orthopedic & sports physical therapy*, 49(6):464-476.
- Hogaboom, N.S. and Boninger, M.L., (2016). Transfer component skill deficit rates among Veterans who use wheelchairs. *Journal of rehabilitation research and development*, 53(2):279.
- Hoy, D., Bain, C., Williams, G., March, L., Brooks, P., Blyth, F., and Buchbinder, R., (2012). A systematic review of the global prevalence of low back pain. *Arthritis & Rheumatism*, 64(6): 2028-2037.

Jahanian, O., Van Straaten, M.G., Goodwin, B.M., Lennon, R.J., Barlow, J.D., Murthy, N.S. and Morrow, M.M., (2020). Shoulder magnetic resonance imaging findings in manual wheelchair users with spinal cord injury. *The Journal of Spinal Cord Medicine*, 1-11.

Kairy, D., Rushton, P.W., Archambault, P., Pituch, E., Torkia, C., El Fathi, A., Stone, P., Routhier, F., Forget, R., Demers, L. and Pineau, J., (2014). Exploring powered wheelchair users and their caregivers' perspectives on potential intelligent power wheelchair use: a qualitative study. *International journal of environmental research and public health*, 11(2):2244-2261

Kang, B.R., Cho, D.H., Kim, H.S. and Ahn, S.N., (2019). Upper extremity musculoskeletal pain during rehabilitation in persons with spinal cord injuries using manual wheelchairs. *Physical Therapy Rehabilitation Science*, 8(2):79-85.

Karki, J., Rushton, S., Bhattarai, S., and De Witte, L., (2021). Access to assistive technology for persons with disabilities: a critical review from Nepal, India, and Bangladesh. *Disability and Rehabilitation: Assistive Technology*, 1-9.

Kenny, S. and Gowran, R.J., (2014). Outcome measures for wheelchair and seating provision: a critical appraisal. *British Journal of Occupational Therapy*, 77(2):67-77.

Kirby, R.L., Worobey, L.A., Cowan, R., Pedersen, J.P., Heinemann, A.W., Dyson-Hudson, T.A., Shea, M., Smith, C., Rushton, P.W. and Boninger, M.L., (2016). Wheelchair skills capacity and performance of manual wheelchair users with spinal cord injury. *Archives of physical medicine and rehabilitation*, 97(10):1761-1769.

Kovacs, F.M., Seco, J., Royuela, A., Barriga, A. and Zamora, J., (2018). Prevalence and factors associated with a higher risk of neck and back pain among permanent wheelchair users: a cross-sectional study. *The spinal cord*, 56(4):392-405.

Lee, J.H. and Yoo, W.G., (2011). The mechanical effect of anterior pelvic tilt taping on slump sitting by seated workers. *Industrial Health*, 49(4):403-409.

Ma, C., Li, W., Gravina, R. and Fortino, G., (2017). Posture detection based on the smart cushion for wheelchair users. *Sensors*, 17(4):719.

Mahmood, M., Rizwan, M.F., Sultana, M., Habib, M. and Imam, M.H., (2020). Design of a low-cost Hand Gesture Controlled Automated Wheelchair. Institute of electrical and electronic engineers, 1379-1382.

Malfliet, A., Ickmans, K., Huysmans, E., Coppieters, I., Willaert, W., Van Bogaert, W., Rheel, E., Bilterys, T., Van Wilgen, P. and Nijs, J., (2019). Best evidence rehabilitation for chronic pain part 3: Low back pain. *Journal of clinical medicine*, 8(7):1063.

Marchiori, C. and Bensmail, D., (2015). Manual wheelchair satisfaction among long-term users and caregivers: A French study. *Journal of rehabilitation research and development*, 52(2):181.

Mattie, J., Aitken-Mundhenk, L., Bicknell, L., Mortenson, W.B. and Borisoff, J., (2019). Exploring the lived experience of people using ultralight wheelchairs with on-the-fly adjustable seating function. *Disability and Rehabilitation: Assistive Technology*, 1-7.

Medola, F.O., Gama, S., Elui, V., Paschoarelli, L. and Fortulan, C., (2014), July. Users' perceptions on mobility, comfort, and usability of manual wheelchairs. *Researchgate*, 7845-7849.

Megalingam, R.K., Rangan, V., Krishnan, S. and Alinkeezhil, A.B.E., (2016). Ir sensor-based gesture control wheelchair for stroke and sci patients. *Sensors Journal*, 16(17):6755-6765.

Meier, M.L., Vrana, A. and Schweinhardt, P., (2019). Low back pain: the potential contribution of supraspinal motor control and proprioception. *The Neuroscientist*, 25(6):583-596.

Michailidou, C., Marston, L., De Souza, L.H. and Sutherland, I., (2014). A systematic review of the prevalence of musculoskeletal pain, back and low back pain in people with spinal cord injury. *Disability and Rehabilitation*, 36(9):705-715.

Molsberger, A.F., Mau, J., Pawelec, D.B. and Winkler, J., (2009). Does acupuncture improve the orthopedic management of chronic low back pain—a randomized, blinded, controlled trial with 3 months follow-up Pain? *Elsevier Science*, 99(3):579-587.

- Nahar, B.N., Ashan, G.U. and Khan, N.A., (2012). Prevalence of low back pain and associated risk factors among professional car drivers in Dhaka city, Bangladesh. *Southeast Asia Journal of Public Health*, 2(1):60-63.
- Nakamoto, H., Yamaji, T., Yamamoto, A., Ootaka, H., Bessho, Y., Kobayashi, F., and Ono, R., (2018). Wearable Lumbar-Motion Monitoring Device with Stretchable Strain Sensors. *Journal of Sensors*.
- Nurul, I., Haslinda, A., Saidi, M., Shamsul, B. and Zailina, H., (2010). Prevalence of Low back Pain and its Risk Factors among School teachers. *American Journal of Applied Sciences*, 7(5):634-639.
- Phattharasupharerk, S., Purepong, N., Eksakulkla, S. and Siriphorn, A., (2019). Effects of Qigong practice in office workers with chronic non-specific low back pain: A randomized control trial. *Journal of bodywork and movement therapies*, 23(2):375-381.
- Pousada García, T., Groba González, B., Nieto Rivero, L., Pereira Loureiro, J., Díez Villoria, E. and Pazos Sierra, A., (2015). Exploring the psychosocial impact of wheelchair and contextual factors on quality of life of people with neuromuscular disorders. *Assistive Technology*, 27(4):246-256.
- Rafiullah, S.S. and Mazhar, S., (2017). The prevalence of shoulder pain in spinal cord injury patients using a manual wheelchair in KPK (Khyber Pakhtunkhwa). *Journal of Islamic International Medical College*, 12(2):101-105.
- Sakib, S.N., Mouri, S.P., Ferdous, Z. and Kaiser, M.S., (2015), December. A study on a low-cost solar-powered wheelchair for disabled people of Bangladesh. *Institute of electrical and electronic engineers*, 27-31.
- Shiri, R., Falah-Hassani, K., Heliövaara, M., Solovieva, S., Amiri, S., Lallukka, T., Burdorf, A., Husgafvel-Pursiainen, K. and Viikari-Juntura, E., (2019). Risk factors for low back pain: a Population-Based longitudinal study. *Arthritis care & research*, 71(2):290-299.

Shiri, R., Karppinen, J., Leino-Arjas, P., Solovieva, S. and Viikari-Juntura, E., (2010). The association between smoking and low back pain: a meta-analysis. *The American journal of medicine*, 123(1):87-97.

Sonenblum, S.E., Sprigle, S.H. and Martin, J.S., (2016). Everyday sitting behavior of full-time wheelchair users. *Journal of Rehabilitation Research & Development*, 53(5).

Sutradhar, A., Sunny, M.S.H., Mandal, M. and Ahmed, R., (2017), December. Design and construction of an automatic electric wheelchair, *Institute of electrical and electronic engineers*, 1-5.

Tomita, S., Arphorn, S., Muto, T., Koetkhilai, K., Naing, S.S. and Chaikittiporn, C., (2010). Prevalence and risk factors of low back pain among Thai and Myanmar migrant seafood processing factory workers in SamutSakorn Province, Thailand. *Industrial Health*, 48(3):283-291

Traore, Y., Lestriez, P., Pradon, D., Debray, K. and Taiar, R., (2015). Optimization of the wheelchair with standers. *Ser. Biomech*, 29(1):25-37.

Urits, I., Burshtein, A., Sharma, M., Testa, L., Gold, P.A., Orhurhu, V., Viswanath, O., Jones, M.R., Sidransky, M.A., Spektor, B. and Kaye, A.D., (2019). Low back pain, a comprehensive review: pathophysiology, diagnosis, and treatment. *Current pain and headache reports*, 23(3):23

Valent, L., Nachtegaal, J., Faber, W., Smit, C., Kaandorp, E., Pratt-Sutherland, S., Houdijk, H., Adriaansen, J. and Post, M.W.M., (2019). Experienced sitting-related problems and association with the personal, lesion, and wheelchair characteristics in persons with long-standing paraplegia and tetraplegia. *The spinal cord*, 57(7):603-613.

Van Dillen, L.R., Lanier, V.M., Steger-May, K., Wallendorf, M., Norton, B.J., Civello, J.M., Czuppon, S.L., Francois, S.J., Roles, K. and Lang, C.E., (2021). Effect of motor skill training in functional activities vs strength and flexibility exercise on function in people with chronic low Back pain: a randomized clinical trial. *JAMA neurology*, 78(4):385-395.

Varshney, M., Walia, S. and Noohu, M.M., (2017). Association of Assistive Device User Satisfaction and Participation in Manual Wheelchair Users with Chronic Spinal Cord

Injury. Journal of Physical Medicine & Rehabilitation Sciences/Fiziksel Tıp ve Rehabilitasyon Bilimleri Dergisi, 20(3).

APPENDIX

VERBAL CONSENT FORM

(Please read out to the participant)

Assalamualaikum/Namasker, my name is Susmita Saha Proma. I am conducting a study for partial fulfillment of Bachelor of Science in physiotherapy degree, titled on **factors associated with low back pain among wheelchair users in CRP**. From Bangladesh Health Professions Institute (BHPI) under medicine faculty of University of Dhaka. I would like to know about some personal and other related information about your problem. You are humbly requested to answer some questions that are mentioned in this form. This will take approximately 20-30 minutes. I need to meet you just once to collect entire information.

The aim of my study is to measure see the risk factors of developing low back pain. If the study can be completed successfully, the patients who are suffering from low back pain or who are at risk both will be benefitted by avoiding the factors that are responsible for developing low back pain. I would like to inform you that this is a purely academic study and obtained information will not be used for any other purpose. All information provided by you will be kept confidential and also the source of information will remain anonymous.

Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any negative consequences or any hesitation..

Do you have any questions before I start?

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

YES NO

Signature of the participantDate.....

Signature of researcher.....Date.....

মৌখিক অনুমতিপত্র

অংশগ্রহণ কারিকে পড়ে শুনাতে হবে

আসসালামু আলাইকুম /নমস্কার,আমার নাম সুস্মিতা সাহা প্রমা,আমি এই গবেষণা বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউট (বি এইচ পি আই),ঢাকা বিশ্ববিদ্যালয়ের চিকিৎসা অনুষদের অধীনে করেছি যা আমার ফিজিওথেরাপি স্নাতক কোর্সেও আশিংক অধিভুক্ত। যার শিরোনাম হলহুইলচেয়ার ব্যবহারকারীদের কোমর ব্যথার জন্য দায়ী সম্পর্কিত বিষয়সমূহ। আমি এক্ষেত্রে কিছু ব্যক্তিগত,হুইলচেয়ার সম্পর্কিত এবং কোমর ব্যথা সম্পর্কে আনুষঙ্গিক কিছু তথ্য জানতে চাচ্ছি। ফরমে উল্লেখিত কিছু প্রশ্নের উত্তর দেয়ার জন্য আনুমানিক ২০-৩০ মিনিট সময় নিবো।আমি এই তথ্য সংগ্রহের জন্য শুধুমাত্র একবারই আপনার সাথে সাক্ষাৎ করব।

এই অধ্যয়নের লক্ষ্য হলো "হুইলচেয়ার ব্যবহারকারীদের কোমর ব্যথার জন্য দায়ী সম্পর্কিত বিষয়সমূহসম্পর্কে জানা। যদি এই গবেষণা সম্পূর্ণভাবে সফল হয় তবে হুইলচেয়ার ব্যবহার কারীদের কোমর ব্যথার জন্য দায়ী বিষয়সমূহ থেকে বিরত থেকে উপকৃত হবেন, উভয় যারা কোমর ব্যথায় ভুগছেন অথবা ভুগছেন না।আমি আপনাকে অবগত করছি যে,এটা কেবলমাত্র আমার অধ্যয়নের সাথে সম্পর্ক যুক্ত এবং অন্য কোন উদ্দেশ্যে ব্যবহৃত হবে না।যারা তথ্য প্রদান করবেন তাদের গোপনীয়তা বজায় থাকবে

আমি আপনাকে অবগত করছি যে,এটা কেবলমাত্র আমার অধ্যয়নের সাথে সম্পর্ক যুক্ত এবং অন্য কোন উদ্দেশ্যে ব্যবহৃত হবে না।যারা তথ্য প্রদান করবেন তাদের গোপনীয়তা বজায় থাকবে

এই অধ্যয়নে আপনার অংশগ্রহণ স্বেচ্ছা প্রণোদিত এবং আপনি যেকোন সময় এই অধ্যয়ন থেকে নিজেকে প্রত্যাহার করতে পারবেন।এছাড়াও কোন নির্দিষ্ট প্রশ্ন অপছন্দ হলে উত্তর না দিতে চাওয়ার অধিকার ও আপনার আছে।

এই সাক্ষাৎকার শুরু করার আগে আপনার কি কোন প্রশ্ন আছে?

আমি আপনার অনুমতি নিয়ে এই সাক্ষাৎকার শুরু করতে চাচ্ছি?

হ্যা

না

সাক্ষাৎকার প্রদানকারী স্বাক্ষর.....

তারিখ.....

স্বাক্ষাৎকার গ্রহনকারীর স্বাক্ষর.....

তারিখ.....

English Questionnaire

Date:

Code no:

--	--	--

Patients ID:

Participant name:

.....

Address :

.....

Mobile No. :.....

Section: 1. Sociodemographic information.

Q.N	Question	Ans.
1.	What is your age?	<input type="text"/>
2.	What is your gender? 1. Male 2. Female 3. Others	<input type="text"/>
3.	Where do you live?	<input type="text"/>
4.	What is your education level? 1. Illiterate 4. HSC 2. Primary 5. Other 3. SSC	<input type="text"/>

<p>5.</p>	<p>Types of your family?</p> <p>1. Nuclear</p> <p>2. Extended</p>	<input data-bbox="1292 302 1377 361" type="text"/>
<p>6.</p>	<p>What is your occupation?</p> <p>1. Job(specify)</p> <p>2. Business</p> <p>3. others</p>	<input data-bbox="1292 581 1377 640" type="text"/>
<p>7.</p>	<p>What's about your monthly income?</p> <p>.....</p>	<input data-bbox="1292 861 1377 919" type="text"/>
<p>8.</p>	<p>What is your religion?</p> <p>1. Muslim</p> <p>2. Hindu</p> <p>3. Buddhist</p> <p>4. Christian</p> <p>5. Others</p>	<input data-bbox="1292 1079 1377 1138" type="text"/>

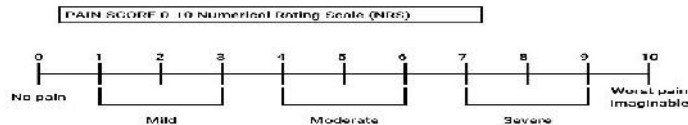
Section -2 Wheelchair related Question

QN	Question	Answer
1	When you started using wheelchair? 1. 3 months 2. 6 months 3. More than 6 months	<input data-bbox="1295 390 1430 447" type="text"/>
2	Reason for using a wheelchair? 1. Spinal cord injury 2. Stroke 3. Others (specify)	<input data-bbox="1295 611 1430 667" type="text"/>
3	What type of wheelchair do you use? 1. Measurable 2. Local	<input data-bbox="1295 831 1430 888" type="text"/>
4	Do you have lumber support in your wheelchair? 1. Yes 2. No	<input data-bbox="1295 1054 1430 1110" type="text"/>
5	How much time you sitting in your wheelchair daily? 1.2 hours 2.3 hours 3. More than 3 hours	<input data-bbox="1295 1220 1430 1276" type="text"/>
6	How much time you propel your wheelchair? 1. 2 hours 2. 3 hours 3. More than 3 hours	<input data-bbox="1295 1440 1430 1497" type="text"/>
7	Do you have any supporter to propel wheelchair? 1. Yes 2. No	<input data-bbox="1295 1661 1430 1717" type="text"/>
8	Sitting posture in wheelchair? 1. Normal	<input data-bbox="1295 1827 1430 1883" type="text"/>

	2. Bending	
9	Which posture do you maintain during propel wheelchair? 1. Normal 2. Bending	<input type="text"/>
10	What is the type of surface of road that you use regularly? 1. Ups and downs surface 2. Smooth surface 3. Raw surface 4. Paved surface	<input type="text"/>

Section: 3 Low back pain related question

QN	Question	Ans
11	Do you have low back pain? 1. Yes 2. No If yes please answer next questions	<input type="text"/>
12	Duration of pain 1. Less than 3 months 2. More than 3 months	<input type="text"/>
13	Severity of pain 1. Mild 2. Moderate 3. Severe Ref: Haefeli, M. and Elfering, A., (2005). Pain assessment. European Spine Journal. [online]. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3454549/	<input type="text"/>



14	Nature of Pain 1.Dull aching 2.Sharp 3.Shooting 4.Burning	<input type="checkbox"/>
15	Did you have low back pain before using wheelchair? 1. Yes 2. No	<input type="checkbox"/>
16	Does any of your family member have low back pain? 1. Yes 2. No	<input type="checkbox"/>
17	Do you have smoking habit? 1. Yes 2. No	<input type="checkbox"/>
18	Lateral shift? 1. Yes 2. No	<input type="checkbox"/>
19	Reduced lumber lordosis ? 1. Yes 2. No	<input type="checkbox"/>
20	Do you exercise regularly? 1. Yes 2. No	<input type="checkbox"/>
21	Lack of spinal mobility? 1. Yes 2. No	<input type="checkbox"/>
22	Have you any lumbar spine surgery? 1. Yes 2. No	<input type="checkbox"/>

23	<p>Is the pain radiate to the leg?</p> <ol style="list-style-type: none"> 1. YES 2. NO 	<input data-bbox="1333 247 1430 306" type="checkbox"/>
24	<p>Do you take any treatment for low back pain?</p> <ol style="list-style-type: none"> 1. Yes 2. No 	<input data-bbox="1333 411 1430 470" type="checkbox"/>
25	<p>If yes, then what kind of treatment do you receive?</p> <ol style="list-style-type: none"> 1. Medication 2. Surgery 3. Physiotherapy 4. Others 	

ছইলচেয়ার ব্যবহারকারীদের কোমর ব্যথার জন্য দায়ী সম্পর্কিত বিষয়সমূহ

তারিখঃ

কোডঃ

--	--	--

রোগীর আইডিঃ

অংশগ্রহণকারীর

নাম.....

ঠিকানাঃ.....

.....

মোবাইল

নাম্বার.....

অধ্যায়ঃ ১- সামাজিক জনতাত্ত্বিক তথ্য

প্রশ্ন নং	প্রশ্ন	উত্তর
১।	আপনার বয়স কত ?.....।	<input type="text"/>
২।	আপনার লিঙ্গ কি? ১। ছেলে ২। মেয়ে ৩। অন্যান্য	<input type="checkbox"/>
৩।	আপনি কোথায় থাকেন ? ১। শহর ২। মফস্বল ৩। গ্রাম	<input type="checkbox"/>

৪।	আপনার শিক্ষাগত যোগ্যতা কি? ১। নিরক্ষর ৪।এইচএসসি ২। প্রাথমিক ৫।অন্যান্য ৩। এসএসসি	<input type="checkbox"/>
৫।	আপনি কোন ধরনের পরিবারে বাস করেন? ১। একক ২। যৌথ	<input type="checkbox"/>
৬।	আপনার পেশা কি? ১। চাকরি ২। ব্যবসা ৩। অন্যান্য	<input type="checkbox"/>
৭।	আপনার মাসিক আয় কত?	
৮।	আপনার ধর্ম কি? ১।মুসলিম ২। হিন্দু ৩। বৌদ্ধ ৪। খ্রিস্টান	<input type="checkbox"/>

অধ্যায় -২ হুইলচেয়ার সম্পর্কিত প্রশ্ন

প্রশ্ন নং	প্রশ্ন	উত্তর
১।	আপনি কত দিন ধরে হুইলচেয়ার ব্যবহার করেন? ১। ৩ মাস ২। ৬ মাস ৩। ৬ মাসের অধিক	<input type="checkbox"/>
২।	হুইলচেয়ার ব্যবহারের কারণ? ১। স্পাইনাল কড ইনজুরি ২। স্ট্রোক ৩। অন্যান্য	<input type="checkbox"/>
৩।	কি ধরনের হুইলচেয়ার ব্যবহার করেন? ১। মেসারেবল ২। লোকাল	<input type="checkbox"/>
৪।	হুইলচেয়ারে কোন কিছুর সাহায্য নিয়ে বসেন? ১। হ্যা ২। না	<input type="checkbox"/>
৫।	প্রতিদিন কত সময় ধরে হুইলচেয়ারে বসে থাকেন? ১। ২ ঘণ্টা ২। ৩ ঘণ্টা ৩। ৩ ঘণ্টার অধিক	<input type="checkbox"/>

৬।	প্রতি দিন কত সময় হুইলচেয়ার চালান? ১। ২ঘন্টা ২। ৩ ঘন্টা ৩। ৩ ঘন্টার অধিক	<input type="checkbox"/>
৭।	হুইলচেয়ার চালানোর জন্য আপনার কোন সাহায্যকারী আছে? ১। হ্যা ২। না	<input type="checkbox"/>
৮।	হুইলচেয়ার চালানোর সময় আপনি কিভাবে বসেন? ১। স্বাভাবিক ২। ঝুকে	<input type="checkbox"/>
৯।	হুইলচেয়ারে বসার ভঙ্গি? ১। স্বাভাবিক ২। ঝুকে	<input type="checkbox"/>
১০।	আপনি কেমন রাস্তায় হুইলচেয়ার চালান? ১। উচু- নিচু ২। সমতল ৩। কাচা ৪। পাকা	<input type="checkbox"/>

অধ্যায় -৩ কোমর ব্যথা সম্পর্কিত প্রশ্ন

<p>১১।</p>	<p>আপনার কি কোমর ব্যথা আছে?</p> <p>১। হ্যা</p> <p>২। না</p> <p>যদি হ্যা হয়, তাহলে দয়া করে নিচের প্রশ্নগুলোর উত্তর দিন</p>	<input type="checkbox"/>
<p>১২।</p>	<p>কত দিন ধরে ব্যথায় ভুগছেন ?</p> <p>১। ৩ মাসের ও কম</p> <p>২। ৩ মাসের ও অধিক</p>	<input type="checkbox"/>
<p>১৩।</p>	<p>ব্যথার তীব্রতা কেমন?</p> <p>১। হালকা</p> <p>২। মাঝারি</p> <p>৩। তীব্রতর</p> <p>Ref: Haefeli, M. and Elfering, A., (2005).</p>	<input type="checkbox"/>
<p>১৪।</p>	<p>ব্যথার নমুনা কেমন?</p> <p>১। চাপা ব্যথা</p> <p>২। তীক্ষ্ণ</p> <p>৩। যন্ত্রনাপূর্ণ</p> <p>৪। জলন্ত</p>	<input type="checkbox"/>
<p>১৫।</p>	<p>ছইলচেয়ার ব্যবহারের পূর্বে কোমর ব্যথা ছিল?</p> <p>১। হ্যা</p> <p>২। না</p>	<input type="checkbox"/>

১৬।	আপনার পরিবারে কারো কি কোমর ব্যথা আছে? ১। হ্যা ২। না	<input type="checkbox"/>
১৭।	আপনার কি ধূমপানের অভ্যাস আছে? ১। হ্যা ২। না	<input type="checkbox"/>
১৮।	আপনি কি কোন পাশে ঝুকে থাকেন? ১। হ্যা ২। না	<input type="checkbox"/>
১৯।	আপনার কি লাম্বার লরডসিস আছে? ১। হ্যা ২। না	<input type="checkbox"/>
২০।	প্রতিদিন শরীরচর্চা করেন? ১। হ্যা ২। না	<input type="checkbox"/>
২১।	মেরুদণ্ডের গতিশীলতা কমে গেছে? ১। হ্যা ২। না	<input type="checkbox"/>

২২।	আপনার কি মেরুদণ্ডে অস্ত্রোপচার হয়েছে? ১। হ্যা ২। না	<input type="checkbox"/>
২৩।	ব্যথা কি কখনো পা পর্যন্ত আসে? ১। হ্যা ২। না	<input type="checkbox"/>
২৪।	আপনি কি কোমর ব্যথার জন্য কোন চিকিৎসা নিয়েছেন? ১। হ্যা ২। না	<input type="checkbox"/>
২৫।	যদি হ্যা হয়, তাহলে আপনি কি ধরনের চিকিৎসা নিয়েছেন? ১। ঔষধ ২। অস্ত্রোপচার ৩। ফিজিওথেরাপি ৪। অন্যান্য	<input type="checkbox"/>



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

Ref:

CRP/BHPI/IRB/06/2021/472

Date:

16/06/2021

To
Susmita Saha Prama
B.Sc. in Physiotherapy
Session: 2015-16, Student ID:112150291
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal "Factors associated with low back pain among wheelchair users" by ethics committee.

Dear Susmita Saha Prama,
Congratulations.

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

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

The purpose of the study is to find out the factors associated with low back pain among wheelchair users. The study involves use of a questionnaire to explore factors associated with low back pain that may take 15 to 20 minutes to answer and there is no likelihood of any harm to the participants. Data collectors will receive informed consents from all participants. Any data collected will be kept confidential. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 10:00 AM on 1st March, 2020 at BHPI 23rd IRB Meeting.

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

Best regards,

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

Permission Letter

Date: 03-09-2021
Head
Department of Physiotherapy
Centre for the Rehabilitation of the Paralysed (CRP)
Chapain, Savar, Dhaka-1343.
Through: Head, Department of Physiotherapy, BHPI.

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

Sir,

With due respect and humble submission to state that I am Susmita Saha Prama, a student of 4th year B.Sc in Physiotherapy at Bangladesh Health Profession Institute (BHPI). The Ethical committee has approved my research project "**Risk factors of low back pain among wheelchair users**" under the supervision of Mst Fatema Akter, Assistant Professor BHPI, Department of Physiotherapy. I want to collect data for my research project from the Department of Physiotherapy at CRP. So, I need permission for data collection from Spinal Cord Injury (SCI) & Neurology unit of Physiotherapy Department at CRP (CRP, Savar, Dhaka-1343). I would like to assure that anything of the study will not be harmful for the participants.

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

Your Faithfully,

Susmita Saha

Susmita Saha Prama
4th year
B.Sc. in Physiotherapy
Class Roll: 20, Session: 2015-16
Bangladesh Health Professions Institute (BHPI)
(An academic Institution of CRP)
CRP-Chapain, Savar, Dhaka-1343.

*forward
File.
04 09 2021*

*Recommended & forwarded for
consideration.*

Approved

04/09/21
MOHAMMAD ANWAR HOSSAIN
Senior Consultant &
Head of Physiotherapy Dept
Associate Professor, BHPI
CRP Savar, Dhaka-1343

Susmita
04.09.2021
Md. Shofiqul Islam
Associate Professor & Head
Department of Physiotherapy
Bangladesh Health Professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343